AGENCY DRAFT

Remedial Investigation Report

University of Washington—Tacoma Campus
Tacoma, Washington
Ecology Agreed Order No. DE 11081

for

Washington State Department of Ecology on Behalf of the University of Washington

June 30, 2023

GeoEngineers

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

Section 13.0. Remedial Investigation – Westerly Plume

Section 16.0. Remedial Investigation – Southerly Plume

Section 17.0 Remedial Investigation – Area-Wide Soil

Section 19.0 Conclusions

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

Acronym/ Abbreviation	Description
°F	Fahrenheit
1,4-DCB	1,4-dichlorobenzene
1,2,4-TCB	1,2,4-trichlorobenzene
1,2,4-TMB	1,2,4-trimethylbenzene
1,3,5-TMB	1,3,5-trimethylbenzene
1997 Agreed Order	Agreed Order No. DE 97HW-S238
2016 Agreed Order	Agreed Order No. DE 11081
AGI	Amplified Geochemical Imaging LLC
Agreed Order	Agreed Order No. DE 97HW-S238
AOC	Area of Concern
AOC 1	Cragle Parcel
AOC 2	Williams Oil Filter
AOC 3	Prairie Line Trail
AOC 4	1706 Jefferson Street Association Parcel
AOC 5	Howe Parcel
AOC 6	Upton Parcel
AOC 7	1806 Jefferson Street Association Parcel
AOC 8	Derville Parcel
AOC 9	Kelly Parcel
AOC 10	Jet Parking Parcel
AOC 11	Area-Wide Groundwater
AOC 12	Area-Wide Soil
ASTM	American Society for Testing and Materials
BB	Birmingham Block Building
bgs	below ground surface
BHS	Birmingham Hay & Seed Building
BNSF	BNSF Railway
BTEX	benzene, toluene, ethylbenzene, and xylene
Campus	University of Washington Tacoma Campus
CAP	Cleanup Action Plan
CDF	controlled density fill
cis-DCE	cis-1,2-dichloroethylene
City	City of Tacoma

CLARC	Washington Department of Ecology Cleanup Levels and Risk Calculation
COC	contaminant of concern
COPC	contaminant of potential concern
CFR	Code of Federal Regulation
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSM	Conceptual Site Model
CVOC	chlorinated volatile organic compound
DCAP	Draft Cleanup Action Plan
DCA	1,1-dichloroethane
DCE	1,1-dichloroethylene
DNAPL	Dense Nonaqueous Phase Liquids
DNR	Department of Natural Resources
DO	dissolved oxygen
DP	direct push
EC	electrical conductivity
Ecology	Washington State Department of Ecology
EDB	1,2-dibromoethane
EDC	1,2-dichloroethane
EF	exceedance frequency
EM	electromagnetic
EPA	United States Environmental Protection Agency
ER	Exceedance Ratio
ESA	Environmental Site Assessment
Farallon	Farallon Consulting
FS	Feasibility Study
GPR	ground-penetrating radar
GWP	Garretson Woodruff & Pratt building
HDPE	high density polyethylene
HSA	hollow stem auger
HVAC	heating, ventilation, and air conditioning
I-5	Interstate 5
I-705	Interstate 705
IA	Interim Action
IAWP	Interim Action Work Plan
ICAP	Interim Cleanup Action Plan
ISCR	in-situ chemical reduction
ID	identification
IDW	investigation-derived waste

INW	Instruments Northwest
J&E	Johnson and Ettinger Model
LDPE	low density polyethylene
LNAPL	light non-aqueous phase liquid
MDS	McDonald Smith Building
MEK	methyl ethyl ketone
MIBK	methyl isobutyl ketone
MTBE	methyl tert-butyl ether
MTCA	Models Toxics Control Act
NGVD29	National Geodetic Vertical Datum of 1929
NTU	nephelometric turbidity unit
NWTPH-HCID	Northwest Total Petroleum Hydrocarbon Identification Method
OnSite	OnSite Environmental Inc.
ORP	oxygen reduction potential
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PCE	tetrachloroethylene
PCUL	proposed cleanup level
PID	photoionization detector
PLT	Prairie Line Trail
PLP	potentially liable party
ppm	parts per million
POC	point of compliance
psi	pounds per square inch
PQL	practical quantitation limit
PVC	polyvinyl chloride
Qf	artificial fill and/or reworked Quaternary deposit
Qva	Quaternary Vashon advance outwash
Qvi	Quaternary Vashon ice-contact deposits
Qvr	Quaternary Proglacial Vashon recessional outwash
RAA	Remedial Action Area
RCRA	Resource Conservation and Recovery Act
RCW	Revised Code of Washington
REC	Recognized Environmental Condition
RI	remedial investigation
RL	reporting limit
ROW	right-of-way

Sewer	City of Tacoma sanitary sewer within Tacoma Avenue South between South 17th Street and South 21st Street
sf	square feet
SL	screening level
SOP	Standard Operating Procedure
SVOC	semi-volatile organic compound
TCA	1,1,1-trichloroethane
TCE	trichloroethylene
TCLP	Toxicity Characteristic Leaching Procedure
TDS	total dissolved solids
TEE	Terrestrial Ecological Evaluation
Test America	Test America of Tacoma, Washington
TEQ	toxicity equivalent quotient
TLB	Tioga Library Building
TP	Test Pit
TPCHD	Tacoma-Pierce County Health Department
TPH	Total petroleum hydrocarbon
TPH-G	Total petroleum hydrocarbon quantified as gasoline
TPH-D	Total petroleum hydrocarbon quantified as diesel
TPH-O	Total petroleum hydrocarbon quantified as oil
TPS	Tacoma Paper & Stationery
trans-DCE	trans-1,2-dichloroethylene
TSDF	treatment, storage, and disposal facility
USACE	United States Army Corps of Engineers Engineering
USC	Urban Solutions Center
UST	underground storage tank
UW	University of Washington
VI	vapor intrusion
VOC	volatile organic compound
WAC	Washington Administrative Code
WCG	West Coast Grocery
WG	Walsh Gardner
WSDFW	Washington State Department of Fish and Wildlife
WOF	Williams Oil Filter
ZVI	zero-valent iron

Units

ft/day	feet per day
ft/ft	feet per foot

mg/kg	milligram per kilogram
mg/L	milligram per liter
µg/L	microgram per liter
µg/m^3	micrograms per cubic meter

EXECUTIVE SUMMARY

This Remedial Investigation (RI) Report has been prepared for the University of Washington Tacoma (UWT) Campus in Tacoma, Washington in accordance with Agreed Order No. DE 11081 (2016 Agreed Order) issued by the Washington State Department of Ecology (Ecology; 1062). This RI Report has been prepared by the University of Washington (UW) under the direction of Ecology to document the investigation findings for the UWT Campus and to define the nature and extent of contamination. The results of the RI will be used as the basis for the Feasibility Study (FS) that will identify and evaluate remedial alternatives and recommend a preferred cleanup action for addressing contamination in media of concern pursuant to the Model Toxics Control Act (MTCA) (Washington Administrative Code [WAC] 173-340-750).

The UWT Campus is currently listed in Ecology's database of confirmed and suspected contaminated sites under Facility/Site Number 1325 and Cleanup Site ID 141. The RI and FS Reports for the UWT Campus will be completed as separate documents and together with the Draft Cleanup Action Plan (DCAP) will fulfill the requirements of the 2016 Agreed Order.

UWT Campus Description and Regulatory History

The UWT Campus is comprised of multiple properties acquired as part of UW's Master Plan to develop the downtown Tacoma Campus. The UWT Campus currently consists of approximately 46 acres encompassing the area between South 17th Street and South 21st Street (north-south), and Pacific Avenue and Tacoma Avenue South (east-west). The UWs Master Plan for the UWT Campus includes redevelopment of existing historical structures when feasible, and the construction of new buildings and associated parking for the expansion of the university facilities.

Initially, Ecology and UW entered into Agreed Order No. 97HW-S238 in 1997 (1997 Agreed Order) to investigate contamination in soil and groundwater at several locations within the UWT Campus Master Plan Boundary. The findings of the initial investigation were documented in an RI Report prepared in 2002 in accordance with the 1997 Agreed Order (161). A draft FS Report was completed in 2003 and finalized in 2008 and a supplemental FS Report was completed in 2010 to evaluate remedial alternatives to address contamination identified in the 2002 RI Report (167, 208, 211). Ecology required additional investigation to address identified data gaps and further define the nature and extent of contamination for the UWT Campus following a review of the 2002 RI, 2003 FS, and 2008 FS Reports. The requirements for additional investigation of the UWT Campus to fill the identified data gaps and further define the nature and extent of contamination were negotiated between UW and Ecology in 2016 under a new Agreed Order (2016 Agreed Order; 1062).

The 2016 Agreed Order required the completion of additional soil, groundwater, soil vapor, stormwater, and geophysical investigations for 12 Ecology-identified Areas of Concern (AOCs), which were generally property-specific (i.e., local point source based on historical property/land uses) or area-wide (i.e., regional plume from multiple source areas) in nature.

Property-Specific Areas of Concern

Property-Specific AOCs identified by the 2016 Agreed Order are shown on Figure ES-1 below and included:

- **AOC 1**. Cragle Parcel (Cragle)
- **AOC 2**. Williams Oil Filter Parcel (Williams Oil Filter [WOF])

- **AOC 3**. Prairie Line Trail (PLT)
- **AOC 4**. 1706 Jefferson Street Association Parcel (1742 Jefferson)
- **AOC 5**. Howe Parcel (1754 Pacific Avenue or Garretson Woodruff & Pratt [GWP] Building Source Area)
- **AOC 6**. Upton Parcel (Upton or 1701 Tacoma Avenue South Source Area)
- **AOC 7**. 1806 Jefferson Street Association Parcel (1735 Jefferson Avenue or Tacoma Paper & Stationery [TPS] Building Source Area)
- **AOC 8**. Derville Parcel (Derville)
- **AOC 9**. Kelly Parcel (Kelly or 1755 Fawcett Avenue Source Area)
- **AOC 10**. Jet Parking Parcel (Jet Parking)

In addition to the AOCs listed above, Snoqualmie Library and Shaub-Ellison initially identified as part of the 1997 Agreed Order are included under this RI for completeness in defining the nature and extent of contaminants for the UWT Campus.

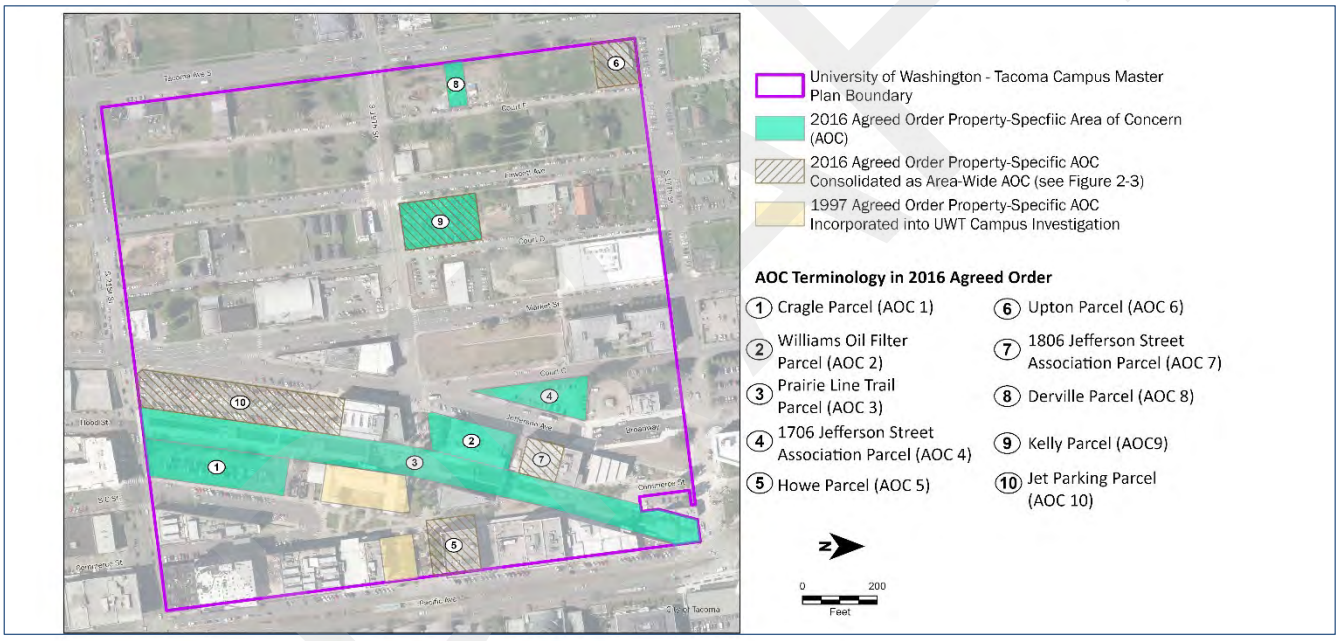


Figure ES-1. Property-Specific Areas of Concern (AOCs) identified by the 2016 Agreed Order (Agreed Order No. DE 11081) requiring further investigation.

Area-Wide Areas of Concern

Area-Wide AOCs identified by the 2016 Agreed Order include the following:

- **AOC 11**. Area-wide shallow and deep groundwater
- **AOC 12**. Area-wide shallow soil containing contaminant concentrations

AOC 11 was subdivided into four separate Area-Wide AOCs upon further evaluation of the 2016 Agreed Order RI results that include the Westerly Plume, Northerly Plume, Southerly Plume, and Easterly Plume as

described below. Area-wide shallow soil contamination identified as AOC 12 remains unchanged. Area-wide AOCs are shown on Figure ES-2 below.

- **Westerly Plume**. Chlorinated volatile organic compounds (CVOCs) associated with spills and/or releases from historical operations at AOC 4 (1742 Jefferson Avenue), AOC 6 (1701 Tacoma Avenue South), and AOC 9 (1755 Fawcett Avenue) located within the UWT Campus Master Plan boundary and CVOCs associated with spills and/or releases from historical operations from individual off-property and upgradient source areas including 1722 Tacoma Avenue South, 1904-1908 Tacoma Avenue South, 1922 Tacoma Avenue South, and 1934-1938 Tacoma Avenue South and a damaged portion of the City of Tacoma (City) Sanitary Sewer Pipe located within Tacoma Avenue South. CVOC contamination associated with these source areas (both within and upgradient of the UWT Campus) spans much of the western portion of the UWT Campus. For the purpose of this RI Report, CVOC contamination from these separate source areas is consolidated as the "Westerly Plume" due to their commingled nature. Note that total petroleum hydrocarbon (TPH) contamination associated with AOC 4 (1742 Jefferson Avenue) and AOC 9 (1755 Fawcett Avenue) is still being evaluated separately as property-specific sources.
- **Northerly Plume.** Contaminants (TPH, petroleum-related VOCs, and CVOCs) associated with spills and/or releases from historical operations at AOC 5 (1754 Pacific Avenue) and AOC 7 (1735 Jefferson Avenue) are consolidated as the "Northerly Plume" for the purpose of this RI Report due to their commingled nature.
- **Southerly Plume.** Jet Parking (AOC 10) was expanded to the west to include potential upgradient source areas located at 1934-1938 Market Street and 1956 Jefferson Avenue. For the purpose of this RI Report, Petroleum-related VOC contamination associated with spills and/or releases from historical operations at Jet Parking and upgradient source areas is now identified as the "Southerly Plume."
- **Easterly Plume.** CVOC contamination associated with spills and/or releases from historical operations at 1934-1938 Market Street and suspected releases within Commerce Street and South C Street from unknown sources has been consolidated as the "Easterly Plume" for the purpose of this RI Report due to their commingled nature.

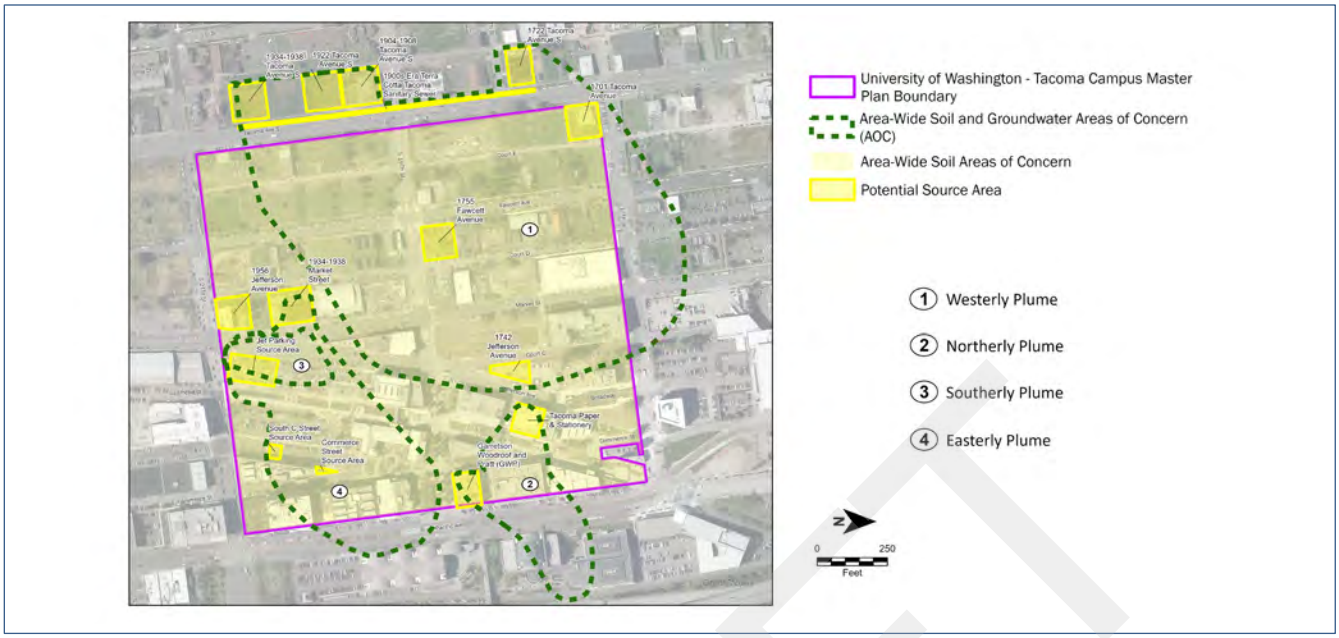


Figure ES-2. Area-Wide Areas of Concern (AOCs) identified by the 2016 Agreed Order (Agreed Order No. DE 11081) requiring further investigation.

Field Investigations and Remedial Actions

Multiple environmental studies and/or remedial actions have been conducted on or near the UWT Campus since 1991 including the following:

- Investigation activities and remedial actions conducted prior to the 1997 Agreed Order. Investigation activities and remedial actions at select locations in the eastern portion of the UWT Campus occurred between 1993 and 1996.
- Investigation activities and remedial actions conducted in accordance with the 1997 Agreed Order documented in the 2002 RI Report.
- Supplemental investigations conducted under the 1997 Agreed Order between 2002 and 2015.
- Environmental due diligence investigations conducted by UW during property acquisition and by others.
- Investigation activities and remedial actions during UW capital projects between 1996 and 2021 and by the City to support utility infrastructure projects.

A new RI Work Plan and subsequent RI Work Plan Addenda were developed and approved by Ecology as required by the 2016 Agreed Order. Further RI field investigations were completed to characterize subsurface conditions, fill data gaps identified by Ecology, and to further define the nature and extent of contamination associated with the various AOCs outlined above. Investigation locations for the 2016 Agreed Order RI were selected in consultation with Ecology based on the results of previous investigations to further characterize soil and groundwater and to fill data gaps identified in the 2016 RI Work Plan and subsequent addenda. Investigation results for the 2016 Agreed Order RI, as well as previous studies completed prior to and as part of the 1997 Agreed Order RI, environmental due diligence, and capital projects collectively constitute the RI for the UWT Campus. The results of the RI for the UWT Campus are summarized below.

Remedial Investigation Results

The results of the RI indicate that the distribution of TPH-related contaminants and CVOCs for the UWT Campus is highly influenced by their chemical properties, the location of the contaminant source(s), local geologic and hydrogeologic conditions, and the presence of building drains and sanitary sewer/stormwater utilities which may serve as preferential pathways for contaminant migration. The results of the RI are summarized below.

Geologic and Hydrogeologic Framework

Geologic conditions within the UWT Campus and the surrounding area generally consist of recent fill overlying layered glacial Quaternary advanced outwash (Qva) and Vashon ice-contact (Qvi) deposits with variable stratigraphy and permeability. The heterogeneous nature of the subsurface has a high degree of influence on contaminant fate and transport, and their resulting distribution across the UWT Campus. Locally, two aquifers are present across most of the UWT Campus and are generally separated by one or more silt layers which limit the vertical migration of the contaminants between the aquifers. The shallower (Qvi) aquifer is typically unconfined, responsive to recharge from precipitation on a short-term basis, and locally influenced by discharges/leaks from stormwater and/or sewer utilities within the UWT Campus. The Qvi aquifer is absent where incision of the confining Qvi and/or Qva silt layer has occurred allowing for vertical flow of groundwater into the deeper underlying Qva aquifer, where excavation during development has removed the confining silt layers, or where the Qvi unit is generally absent (i.e., beneath and east of Pacific Avenue). The deeper (Qva) aquifer is identified as a regional aquifer capable of yielding water in sufficient quantities for beneficial use and is less influenced by recharge from precipitation on a short-term basis as compared to the Qvi aquifer. Groundwater in the Qva aquifer at the UWT Campus ranges from unconfined to semi-confined with artesian conditions present at some locations.

Groundwater flow (and consequently contaminant migration) is more predominant within the observed stratified sand and gravel layers while the silt layers act to impede groundwater movement. Underground utility corridors can also provide potential preferential pathways for contaminant migration where present. Additionally, a pathway for contaminant migration may be present where the Qvi and Qva aquifers are in hydraulic connection as a result of glacial incision and/or area development whether it is related to the downward migration of contaminants into the Qva aquifer under draining conditions or the upward migration of contaminants into the Qvi aquifer under artesian conditions. Overall, the geology and hydrogeology are highly variable across UWT Campus and form key components of the conceptual site model (CSM) for each AOC, especially in regard to evaluating contaminant nature and extent.

Determination of Contaminants and Media of Concern

Contaminants of potential concern (COPCs) for soil, groundwater, and indoor air were evaluated for the UWT Campus on an individual (Property-Specific or Area-Wide) AOC basis utilizing the results of previous investigations, investigation results for the 1997 and 2016 Agreed Order RI and information from environmental due diligence and UW capital projects. In light of the CSM for each Property-Specific AOC and each Area-Wide AOC, proposed cleanup levels (PCULs) were developed based on complete exposure pathways, assuming unrestricted land use, for soil, groundwater, and indoor air pursuant to MTCA (WAC 173-340-720 through 750) to identify nature and extent of contaminants of concern (COCs) requiring cleanup action evaluation.

Soil PCULs were selected to be protective of human direct contact and groundwater. Groundwater PCULs were developed to be protective of drinking water, and, in select cases, to be protective of marine surface water. Indoor air PCULs were developed to be protective of human health for unrestricted land use and

commercial worker exposure based on current and anticipated future land uses. Soil vapor SLs were developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air PCULs/SLs in accordance with Ecology's Vapor Intrusion (VI) Guidance. PCULs were adjusted for natural background and the laboratory practical quantitation limit (PQL) as appropriate pursuant to WAC 173-340-705[6]. Contaminants were retained as a COC for soil, groundwater, and indoor air if the detected concentration exceeded the respective SL protective of indoor air. The nature and extent of COCs identified for the individual Property-Specific and Area-Wide AOCs are summarized in the following section.

Contaminant Nature and Extent

Ecology identified ten Property-Specific and two Area-Wide AOCs requiring further evaluation under the 2016 Agreed Order as a result of historical operations and land use, and previous investigation results. Several individual AOCs were consolidated into Area-Wide plumes due to the comingled nature of their contaminants upon further evaluation of the RI data for the UWT Campus. Additional source areas were also identified as contributing to the Area-Wide plumes.

The AOC number and name identifiers referred to in the 2016 Agreed Order are no longer used in this RI Report due to the complexity of the AOCs relative to Property-Specific AOCs, Area-Wide AOCs, and actual sources. The AOCs are herein referred to by the name identified below and include eight Property-Specific AOCs including: Cragle, WOF, PLT, 1742 Jefferson, Derville, Kelly, Shaub-Ellison, Snoqualmie, and four Area-Wide AOCs including: Westerly Plume, Northerly Plume, Easterly Plume, and Southerly Plume.

Property-Specific Areas of Concern

The nature and extent of contaminants for the Property-Specific AOCs are summarized below. Note that the Property-Specific AOC is identified as the parcel and/or property in which the historical operation occurred leading to the release of the contaminants to the environment. The "Site" is defined by the PCUL exceedance in the media of concern.

- **Cragle**. The Cragle Site is characterized by the presence of TPH quantified as gasoline (G), diesel (D), and oil (O), benzene, toluene, ethylbenzene and xylenes (BTEX), naphthalene, and carcinogenic polycyclic aromatic hydrocarbons (cPAHs) in soil, and TPH-D and benzene in groundwater at concentrations greater than their respective PCULs. Historical operations included fuel distribution, auto service, and used oil recycling which resulted in drips, leaks, and/or spills of contaminants from tanks including underground storage tanks (USTs), drums, vehicles, and/or other equipment (i.e., hydraulic hoists) directly into soil that subsequently migrated to groundwater. Most of the previously identified soil contamination was removed through remedial excavation and soil treatment completed between 1990 and 2020 although residual contamination remains in place at this location. The extent of residual soil contamination is currently limited to the central and eastern portions of Cragle and within portions of South C Street. Localized exceedances in groundwater were observed immediately downgradient of the remedial excavation area. The groundwater plume appears stable based on the results of the 2016 Agreed Order RI. Redevelopment of the property in 2022 for the Milgard Hall Capital Project included placement of engineering controls and surrounding hardscapes to minimize the potential for direct contact and VI. The results of indoor air and soil vapor sampling completed in December 2022 indicate VI is not occurring into Milgard Hall.
- **WOF**. The WOF Site is characterized by the presence of TPH-D in soil east of WOF within the PLT pedestrian corridor at a concentration greater than the PCUL. Historical operations included motor parts sales, a machine shop, bearing sales and services, and oil filter service between 1949 and 2000 when

the buildings were demolished. Releases from product piping associated with a former heating oil UST appear to be the source of contamination. Most of the TPH-D contamination identified in soil was removed in 2000 during redevelopment activities associated with the Science Building Capital Project. The extent of residual soil contamination is currently in a localized area east of the Science Building. The location is capped with up to 8 feet of clean imported soil and the paved surface of the PLT pedestrian corridor. VI to the Science Building is not anticipated because (1) the TPH-D is limited to soil and not groundwater, and (2) there is more than a 15-foot separation between the residual soil contamination and the adjacent building which is the minimum distance recommended by the Environmental Protection Agency (EPA) to allow for biodegradation of TPH-D in the soil vapor.

- **PLT**. The PLT Site is characterized by the presence of TPH-O, PAHs (naphthalene and total cPAHs), and metals (arsenic and lead) in the soil at concentrations greater than their respective PCULs. Historical operations included a rail line with multiple spurs to adjacent properties which operated from the late 1880s to the late 1990s. Primary sources of soil contamination for PLT are attributed to drips, leaks, and/or spills from rail cars from adjacent operations utilizing the railway, the placement of contaminated fill material from unknown sources, and grading material and treated timbers used for the railway. Surficial soil within the PLT pedestrian corridor potentially impacted by the historical rail operations was excavated and removed in 2013 in conjunction with the PLT Capital Project. The extent of residual soil contamination within the PLT pedestrian corridor is currently capped beneath a geotextile fabric under approximately 1 foot of imported fill and/or hardscapes (sidewalks, pedestrian pathway), which prevents direct contact. Residual soil contamination located in PLT adjacent to Milgard Hall is mitigated by engineering controls (i.e., chemical vapor barrier and passive vent system) and VI impacts are considered unlikely.

- **1742 Jefferson**. The 1742 Jefferson Site is characterized by the presence of TPH-G, TPH-D, benzene, ethylbenzene, and CVOCs (trichloroethylene [TCE]) in the soil at concentrations greater than their respective PCULs. Historical operations including a fuel and service station are attributed to the source of the contamination. CVOC contamination associated with historical operations was incorporated into the Westerly Plume as discussed below, while petroleum-related contamination is discussed in the context of the former service station. Potential release mechanisms include drips, leaks, and/or spills from tanks including USTs, drums, and/or other equipment (ex. hydraulic hoists, floor drains, sumps) directly to soil with the potential to leach to groundwater. Most of the petroleum-related soil contamination was removed in 2012 during a remedial action which required removal of two USTs, removal of a hydraulic hoist, and remedial excavation of surrounding contaminated soil. Residual petroleum-related contamination is localized within the central portion of the property and beneath a portion of the Jefferson Avenue right-of-way (ROW). Under the current land use scenario (i.e., UWT Campus parking lot) there is no current potential for VI because there are no occupied spaces within 30 lateral feet of the residual contamination.

- **Derville**. The Derville Site initially was characterized by the historical presence of TPH in soil and groundwater. Previous land uses included auto service and wood fuel yard operations. Early investigations identified TPH-O in groundwater at concentrations slightly exceeding the PCUL. However, subsequent investigation of soil and groundwater did not identify TPH-O exceedances of the PCUL. As a result, Derville is no longer considered to be a contaminated site.

- **Kelly**. The Kelly Site is characterized by the presence of TPH-G and TCE in the soil at concentrations greater than the PCULs. Historical land uses included motorcycle service/maintenance and dry cleaner operations that resulted in spills/leaks to the soil that migrated to groundwater. The extent of residual

TPH-G soil contamination is localized, and not adversely impacting groundwater based on the RI results. Furthermore, Kelly is developed with an asphalt-paved UWT Campus parking lot that prevents direct contact with the residual contamination. TCE contamination associated with prior uses at Kelly is included in the Westerly Plume (see below) for this RI. There is no current potential for VI because the residual contamination is localized and there are no occupied spaces within 30 lateral feet.

- **Shaub-Ellison**. The Shaub-Ellison Site is characterized by the presence of TPH-G in groundwater at concentrations greater than the PCULs. Historical operations included automobile tire sales/service and fuel supply. Potential release mechanisms include drips, leaks, and/or spills from USTs, drums, and/or other equipment (i.e., hydraulic hoists, floor drains, sumps) directly to the soil which migrated to groundwater. Remedial actions in the form of remedial excavation and in-situ treatment conducted between the 1990s and 2010 resulted in the removal or treatment of the contaminated soil . The RI results indicate the TPH-G concentrations in groundwater are limited in extent and are stable. Currently, groundwater contamination associated with Shaub-Ellison is located beneath impervious areas (sidewalks and paved portions of Pacific Avenue), which prevents direct exposure. Additionally, mobilization of COCs from precipitation is likely limited by stormwater collection and drainage systems that convey stormwater away from this area. VI is not considered a risk because residual contamination in soil and groundwater is situated at distances greater than the 30-foot horizontal and 15-foot vertical as recommended in Ecology's VI Guidance.

- **Snoqualmie Library**. The Snoqualmie Library Site is characterized by the presence of TPH-G and TPH-D in soil and TPH-D in groundwater at concentrations greater than their respective PCULs. Historical operations included fuel distribution and operation of a power distribution house. The primary source of petroleum contamination is historical releases from the former gasoline and diesel USTs that migrated from soil to groundwater. Most soil contamination was removed through remedial excavation and soil treatment activities completed between 1994 and 1995. The extent of residual soil contamination currently is limited to the eastern portion of the Snoqualmie Library Building. At this location, localized exceedances and periodic light non-aqueous phase liquid (LNAPL) have been observed in groundwater immediately downgradient of the remedial excavation area. The RI results indicate the TPH concentrations in groundwater are stable and/or are slowly decreasing over time through natural attenuation processes. VI is not considered a risk because residual contamination in soil and groundwater is situated at distances greater than the 30-foot horizontal and 15-foot vertical as recommended in Ecology's VI Guidance.

Area-Wide Areas of Concern

The nature and extent of contaminants for the Area-Wide AOCs are summarized below. Note that each Area-Wide AOC contains multiple source areas from one or more parcels, properties, and/or ROWs in which historical operations occurred leading to the release of contaminants to the environment. The "Site" is defined by the PCUL exceedance in the media of concern.

- **Westerly Plume.** The Westerly Plume Site is characterized by the presence of CVOCs including tetrachloroethylene (PCE), TCE, 1,1-dichloroethylene (DCE), cis-DCE, vinyl chloride, and 1,1-dichloroethane (DCA) in soil and groundwater across a broad area of the western and northern portions of the UWT Campus at concentrations greater than their respective PCULs. CVOC contamination identified for 1701 Tacoma Avenue South, 1755 Fawcett Avenue, and 1742 Jefferson Avenue (located within the UWT Campus) was consolidated for evaluation along with newly identified source areas located upgradient (west) of the UWT Campus including: 1722 Tacoma Avenue South, 1904-1908 Tacoma

Avenue South, 1922 Tacoma Avenue South, 1934-1938 Tacoma Avenue South, and a portion of the City's Sanitary Sewer Pipe located within Tacoma Avenue South. Releases from source areas west of Tacoma Avenue South, including from the City sewer connected to these source areas, previously resulted in concentrations constituting dense non-aqueous phase liquid (DNAPL) which migrated through the shallow (Qvi) aquifer water column and underlying silt layers and into the underlying Qva aquifer through sorptive and diffusive processes. Dissolved phases of CVOCs within the Qvi and/or Qva aquifers then migrated laterally and downgradient of the source areas within preferential flow paths (including but not limited to the Qvi channel deposits) and laterally by dispersion and diffusion. Contaminants released from these source areas extend from the area west of Tacoma Avenue east and downgradient across UWT Campus to Jefferson Avenue. The Westerly Plume Site appears to be generally stable due to dilution, sorption, and/or natural attenuation and is not observed to be migrating further downgradient of Jefferson Avenue based on the results of the RI. A VI evaluation was not completed within the Westerly Plume area. However, VI is not considered likely based on VI evaluations completed on other parts of campus (i.e., McDonald Smith Building [MDS], TPS Building, and Academic Block Buildings) that indicate that similar TCE concentrations in groundwater are not impacting indoor air based on predictive modeling or the results of indoor air sampling. UW-owned buildings in this area are used for commercial and academic purposes and operate on a neutral to positive building air pressure with high air exchange rates, limiting the potential for VI and inhalation by the building occupants.

- **Northerly Plume.** The Northerly Plume Site is characterized by the presence of TPH-G, TPH-D, petroleum-related VOCs, and CVOCs including PCE, TCE, cis-DCE, and vinyl chloride in soil and/or groundwater in the eastern portion of UWT Campus at concentrations greater than their respective PCULs. Primary source areas include: 1754 Pacific Avenue (GWP Building) and 1735 Jefferson Avenue (TPS Building) located within the UWT Campus. CVOCs in groundwater extend downgradient of the TPS and GWP buildings and across Pacific Avenue. Contaminants associated with the GWP Building source area and TPS Building source area are consolidated as the "Northerly Plume" in this RI due to their commingled nature. The greatest concentrations of CVOCs in soil and groundwater are generally located east and adjacent to the TPS Building and in close proximity to the former GWP Building cistern. TPH and petroleum-related COCs are limited to the soil in close proximity to the former GWP Building cistern and closed-in-place UST. Petroleum-related COCs were not detected in groundwater. Potential release mechanisms include spills/discharges from historical uses within the TPS Building which migrated into the underlying shallow (Qvi) and deep (Qva) aquifers. Potential release mechanisms within the GWP building include the historical release of chemicals to a former brick cistern in GWP and/or interception of the CVOC-contaminated groundwater by the GWP building drain which was previously discharged to the brick cistern. In 2013, UW implemented an Interim Action (IA) to address PCE contamination (and associated breakdown compounds) in groundwater downgradient of the GWP Building and migrating beneath the Federal Courthouse to the east of the UWT Campus. The IA consisted of injecting EHC® an in-situ chemical reduction reagent comprised of zero valent iron and organic substrates into the groundwater plume at multiple locations east and west of Pacific Avenue. The results of compliance groundwater monitoring showed that the IA reduced the overall size of the contaminant plume although it did not fully remediate the contaminant plume. Groundwater monitoring completed as part of the 2016 Agreed Order RI indicates that the leading edge of the Northerly Plume Site is stable and is not continuing to migrate toward the Thea Foss Waterway. CVOCs in sub-slab soil vapor have not resulted in indoor air concentrations greater than the indoor air PCUL for unrestricted use in UW buildings, or greater than the indoor air PCUL for commercial use in the Federal Courthouse based on analytical results for indoor air

samples and air modeling. VI of petroleum constituents is considered unlikely because these constituents are less volatile than CVOCs, which are not intruding at concentrations greater than the indoor air PCULs.

- **Easterly Plume.** The Easterly Plume Site is characterized by the presence of CVOCs including TCE, DCE, trans-DCE, cis-DCE, vinyl chloride, and chlorobenzene in soil and groundwater across a broad area of the southern portion of Campus from Market Street to Pacific Avenue. These CVOCs are at concentrations greater than their respective PCULs. Historical uses at the 1934-1938 Market Street Building resulted in releases of CVOCs and petroleum-related VOCs to property stormwater drains, which then migrated through the soil and into the shallow (Qvi) and deep (Qva) aquifers. Additional localized potential source areas were identified in the South C Street area and Commerce Street area. The RI results indicate the leading edge of the Easterly Plume Site is stable due to dilution, sorption, and/or natural attenuation. Additionally, the Easterly Plume is not migrating east of Pacific Avenue. The VI evaluation results for the Easterly Plume (i.e., MDS Building, GWP Building), other parts of the UWT Campus (TPS Building and Academic Block Buildings), and the Federal Courthouse indicate that similar CVOC concentrations in groundwater are not impacting indoor air. The December 2022 results of indoor air and sub-slab vapor sampling for the Milgard Hall Capital Project indicate VI is not occurring into Milgard Hall.
- **Southerly Plume.** The Southerly Plume Site is characterized by the presence of TPH and BTEX in soil and groundwater at concentrations exceeding their respective PCULs. While a specific point-source could not be identified for the Southerly Plume, likely historical land uses and operations which included (1) the potential use of solvents (i.e., benzene) during electrical repair services at 1956 Jefferson Avenue between 1947 and 1978, (2) historical operations at Jet Parking (1947 Jefferson Avenue) by the City Fuel Company between 1926 and 1949, as well as (3) other unknown spills and/or releases to soil within portions of Market Street and Jefferson Avenue. Additionally, gas and oil services at 1934-1938 Market Street during the late 1920s and early 1930s as well as releases from drips, spills, and/or imported soil used to grade portions of Market Street and Jefferson Avenue have resulted in the presence of these contaminants. Contamination associated with these source areas is consolidated into the "Southerly Plume" due to the commingled nature of contaminants. The contaminant plume originating from these source areas is localized to the area of the intersection of Market Street and Jefferson Avenue, and the Jet Parking lot. Soil and groundwater contamination for the Southerly Plume Site is predominantly situated beneath paved ROWs and parking lots preventing direct exposure. The contaminant plume in groundwater appears to be stable and/or is slowly shrinking through natural attenuation processes and is not migrating downgradient to the east based on the results of the 2016 RI. VI is not considered a risk due to significant separation distances between residual contamination and surrounding buildings. Residual contamination for the Southerly Plume Site is generally stable and is not migrating further downgradient of this area.

Feasibility Study Development

In accordance with the 2016 Agreed Order, sampling and analyses were completed to fill identified data gaps and further define the nature and extent of contamination at the UWT Campus. The results of the RI indicate there is sufficient data to prepare the FS and to identify and evaluate cleanup alternatives for contaminated media at the for the eight Property-Specific and four Area-Wide Sites. The FS Report will evaluate remedial technologies and alternatives for cleanup of Property-Specific and Area-Wide Site contaminants to meet remedial action objectives that will be developed during preparation of the FS.

1.0 INTRODUCTION

This report presents the results of the remedial investigation (RI) completed for the University of Washington (UW) Tacoma Campus (UWT Campus) located north of Interstate 5 (I-5) and west of Interstate 705 (I-705) within the downtown core of Tacoma, Washington (Figure 1-1). The UWT Campus is situated on approximately 46 acres of land located between South 17th Street and South 21st Street south to north and between Tacoma Avenue South and Pacific Avenue west to east. UW completed investigation activities with the Campus and surrounding area to define the nature and extent of contamination requiring cleanup action evaluation in accordance with Agreed Order DE 11081 (2016 Agreed Order) between the UW and the Washington State Department of Ecology (Ecology) and with Washington State Model Toxics Control Act (MTCA) cleanup regulations (Chapter 173-340 of the Washington Administrative Code [WAC]; 1062). The UWT Campus is currently listed in Ecology's database of confirmed and suspected contaminated sites under Facility/Site Number 1325 and Cleanup Site ID 141.

The purpose of this RI Report is to present the environmental data collected as part of the Ecology-approved RI Work Plan (280) and subsequent addenda (281, 289, 298, 299, 303, 300, 306, 307, and 310) and data previously collected from the UWT Campus. The investigation was designed to fill data gaps identified by Ecology in order to complete the characterization of the UWT Campus and to define the nature and extent of contamination in media of concern requiring cleanup evaluation. This RI Report is divided into 21 sections that include the following:

- Section 1.0 (Introduction) provides a brief description of the purpose and organization of the RI Report.
- Section 2.0 (Background Information) presents a description of the UWT Campus including location, general layout, historical and current land use, environmental setting, geologic and hydrogeologic setting, natural resources, and current regulatory status.
- Section 3.0 (Cleanup Standards) describes the development of Proposed Cleanup Levels (PCULs) used to evaluate contaminant concentrations for the individual Areas of Concern (AOCs) identified in the 2016 Agreed Order.
- Section 4.0 (Site Characterization) presents a description of the environmental studies completed within the UWT Campus and surrounding area and a description of the approach, methods, and procedures used to investigate subsurface conditions for the UWT Campus to support completion of the RI.
- Sections 5.0 through 17.0 present the RI results for the individual AOCs, including a discussion of the local land use history, conceptual site model (CSM) including sources of contamination, media of concern, contaminant fate and transport, ecological receptors and exposure pathways, and nature and extent of contamination.
- Section 18.0 (Contaminant Fate and Transport) presents the fate and transport of contaminants in media of concern for the UWT Campus on an area-wide basis based on the environmental and geophysical processes affecting the identified contaminants of concern (COCs).
- Section 19.0 (Conclusions) presents a summary of the RI results for each AOC to support development of the Feasibility Study (FS) for evaluating potential remedial technologies and remedial alternatives to address AOC COCs.
- Section 20.0 (Limitations) presents the limitations of this report.
- Section 21.0 (References) presents the references used in preparing this report.

The information presented in this report describes the results of the investigation activities used to characterize the nature and extent of contamination specific to each AOC contained within the UWT Campus. The data and interpretations contained in this report provide the basis for the FS that will identify and evaluate cleanup action alternatives for the selection of a preferred cleanup action alternative to address contamination pursuant to WAC 173-340-350.

2.0 BACKGROUND INFORMATION

2.1. General Information

General site information including location and property description, land use history, and current and future land use assumptions for the UWT Campus is discussed in Sections 2.1.1. through 2.1.3.

2.1.1. Location and Property Description

The UWT Campus is comprised of multiple property parcels acquired for use within UW's Master Plan (Figure 2-1) to develop the downtown Campus as part of a statewide initiative to increase the accessibility of higher education to Washington citizens. UW has acquired approximately 46 acres to date encompassing the area north of 21st Street, south of South 17th Street, west of Pacific Avenue, and east of Tacoma Avenue South for the Campus (Figure 1-1). The UWT Campus Master Plan includes redevelopment of existing historical structures when feasible, and the construction of new buildings, parking lots, garages, and accompanying beautification for the expansion of the university facilities in Tacoma, Washington.

The UWT Campus is generally located within three blocks of Tacoma's central business district and several key historic districts and development areas. The Federal Courthouse and the Washington State History Museum are located to the east across Pacific Avenue. The core area of the UWT Campus is composed of parcels of land acquired by UW from a variety of commercial and industrial property owners. Note that not all properties contained within the UWT Campus Master Plan boundary are owned by UW (see Figure 2-1). However, it is the overall goal of UW to acquire these properties as they become available for purchase.

The UWT Campus is accessible from I-705 via a road spur that terminates at the intersection of Pacific and South 21st Street. Major north-south arterials include Tacoma Avenue South and Pacific Avenue, which bracket the UWT Campus to the west and east, respectively. Major east-west arterials include South 17th Street and South 21st Street, which bracket the UWT Campus to the north and south, respectively. Jefferson Avenue passes diagonally through the UWT Campus and is the main thoroughfare for vehicular traffic across the UWT Campus. Prairie Line Trail (PLT) passes diagonally through the UWT Campus and is the main thoroughfare for pedestrian traffic.

The location of the UWT Campus relative to the surrounding area is shown on Figure 1-1. Figure 2-2 provides an overview of the UWT Campus property including parcels and City of Tacoma (City) rights-of-way (ROWs) contained within.

2.1.2. General Site History

The eastern portion of the UWT Campus is located within the Union Station/Warehouse Historic District of Tacoma Washington. The Union Station/Warehouse Historic District was initially developed (typically with warehouses) in the late 1880s and early 1900s following the completion of the first transcontinental railroad (now PLT). The warehouses were generally utilized to house imported products and to organize export products for shipping. The buildings along this corridor generally had two access points, the street side, and the rail side. The street side included stores like grocery, stoves companies, paper companies, dry goods, etc. Loading and unloading of import and export products occurred on the rail side of the buildings.

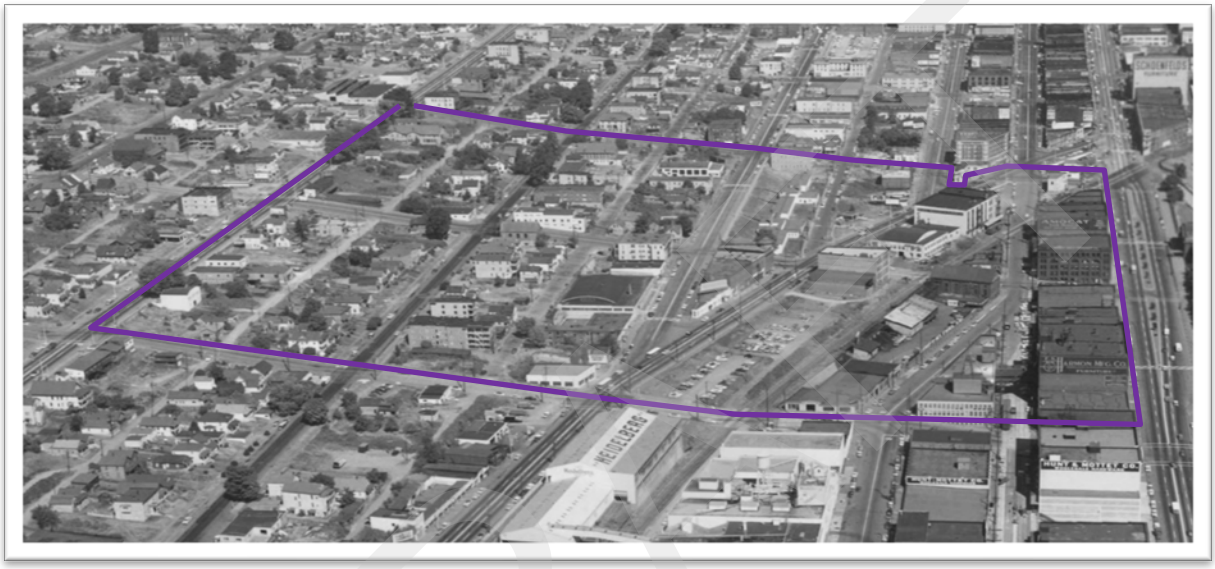


Photo 2-1. Circa 1958 photograph of UWT Campus (Looking North). Approximate UWT Campus Master Plan boundary shown in purple.

The western portion of the UWT Campus and the area west of Jefferson Avenue consisted of housing (apartments and single-family homes), hotels, corner stores, and union/society halls since the early 1900s. Currently, parcels comprising this area are generally vacant.

Historical aerial photographs of the UWT Campus and surrounding area from circa 1931 to 2018 documenting the general development history of the UWT Campus footprint and surrounding area are presented in Appendix A. In conjunction with this development and land use, parcel boundaries and numbers have also been revised over time to reflect changes in ownership and land use. Updates to the UWT Campus parcel boundaries and parcel numbers within the last 30 years are presented in Appendix B.

Specific property use history related to the AOC properties is discussed in subsequent sections of this report (see Sections 5.0 through 17.0).

2.1.3. Current and Future Land Use

The first UWT Campus Master Plan was completed in 1993, which set the initial vision for a new higher education campus located in the Union Station/Warehouse District of downtown Tacoma. Two subsequent major construction phases created the UWT Campus's current learning spaces, faculty and staff offices, and university library to support UW's mission to provide upper-level degree programs to a population of 2,000 students. In the Fall of 2006, UW began to enroll freshmen and sophomores. UW continues to

expand and develop new infrastructure and buildings on the UWT Campus to accommodate additions to support academic programs, student services, recreation, and student housing while the UWT Campus.

Anticipated future use of the UWT Campus will continue to be supporting higher education which will require the rehabilitation of historic buildings and the construction of new modern buildings, as needed, to meet the UWT Campus Master Plan goals and objectives.

2.2. Regulatory History and Current Framework

In 1997, UW and Ecology entered into Agreed Order No. DE 97HW-S238 (1997 Agreed Order) pursuant to the authority of the MTCA and Revised Code of Washington (RCW) 70.105D.050(1) to investigate known contamination in soil and groundwater within the UWT Campus Master Plan boundary. URS on behalf of UW prepared an RI Report in 2002 (161) documenting the investigation results and the nature and extent of contamination identified to fulfill the requirements of the 1997 Agreed Order. In 2008, an FS Report was prepared to document remedial technologies evaluated and remedial alternatives developed for addressing UWT Campus contamination identified by the 2002 RI Report.

However, Ecology determined that additional investigation activities were required to fill data gaps and further define the nature and extent of contamination for the UWT Campus based on the results of the initial RI and FS Reports. In 2016, a new Agreed Order (Agreed Order No. DE 11081 [2016 Agreed Order, Appendix C]) was negotiated between UW and Ecology for the UWT Campus that expanded the scope of the initial Agreed Order boundary to the western boundary of the UWT Campus (Tacoma Avenue South; Figure 2-1). The effective date of the 2016 Agreed Order is July 7, 2016.

Under the 2016 Agreed Order, UW is required to complete additional soil, groundwater, vapor, stormwater, and geophysical investigations to further evaluate the nature and extent of contamination for the Ecology-identified AOCs and prepare a new RI Report documenting the investigation results for the UWT Campus. In addition, UW is required to prepare a new FS Report and a Draft Cleanup Action Plan (DCAP) to fulfill the requirement of the 2016 Agreed Order. AOCs identified in the 2016 Agreed Order for the UWT Campus are described in Section 2.2.1.

2.2.1. Areas of Concern

Ecology identified 12 AOCs for the UWT Campus under the 2016 Agreed Order requiring further investigation to define the nature and extent of contaminants specific to each AOC. In general, AOCs were defined as Property-Specific (i.e., contaminants sourcing from specific parcels resulting from historical land uses and operations) and Area-Wide (i.e., regional soil and/or groundwater contamination encompassing large portions of the UWT Campus from a combination of multiple source areas). Property-specific AOCs (AOC 1 through 10) and Area-Wide AOCs (AOC 11 and 12) identified by the 2016 Agreed Order include the following:

- **AOC 1**. Cragle Parcel (Cragle) with residual total petroleum hydrocarbon [TPH] and benzene contamination.
- **AOC 2**. Williams Oil Filter Parcel (Williams Oil Filter [WOF]) with residual TPH contamination.
- **AOC 3**. Prairie Line Trail (PLT) with residual TPH, carcinogenic polycyclic aromatic hydrocarbon [cPAH], and lead contamination.

- **AOC 4**. 1706 Jefferson Street Association Parcel (1742 Jefferson or 1742 Jefferson Avenue Source Area) with residual TPH contamination.
- **AOC 5**. Howe Parcel (1754 Pacific Avenue or Garretson Woodruff & Pratt [GWP] Building Source Area) with residual tetrachloroethylene [PCE] contamination.
- **AOC 6.** Upton Parcel (Upton or 1701 Tacoma Avenue South Source Area) with PCE contamination.
- **AOC 7**. 1806 Jefferson Street Association Parcel (1735 Jefferson Avenue or Tacoma Paper & Stationery [TPS] Building Source Area) with PCE contamination.
- **AOC 8**. Derville Parcel (Derville) with TPH contamination from suspected underground storage tank (UST).
- **AOC 9**. Kelly Parcel (Kelly or 1755 Fawcett Avenue Source Area) with TPH releases from a former motorcycle shop and associated contaminants.
- **AOC 10**. Jet Parking Parcel (Jet Parking) with TPH and benzene contamination.
- **AOC 11**. Area-wide shallow and deep groundwater aquifers containing concentrations of PCE, trichloroethylene (TCE), and TPH of regulatory concern.
- **AOC 12**. Area-wide soil containing concentrations of cPAHs, TPH, and metals of regulatory concern.

Contaminants associated with area-wide chlorinated volatile organic compounds (CVOCs) and TPH resulting from historical land uses and operations were consolidated into select plume designations following the completion of the 2016 Agreed Order RI (further discussed in Section 4.0) as follows:

- **Westerly Plume.** CVOC contamination identified for AOC 4 (1742 Jefferson Avenue Source Area), AOC 6 (1701 Tacoma Avenue South Source Area), and AOC 9 (1755 Fawcett Avenue Source Area) within the UWT Campus were consolidated for evaluation along with newly identified source areas upgradient (west) of the UWT Campus including: 1722 Tacoma Avenue South, 1904-1908 Tacoma Avenue South, 1922 Tacoma Avenue South, and 1934-1938 Tacoma Avenue South, and a portion of the City's Sanitary Sewer Pipe within Tacoma Avenue South. CVOC contamination associated with these source areas (both within and upgradient of the UWT Campus) is now being identified as the "Westerly Plume" for this RI Report due to its commingled nature and areal extent. Note that TPH contamination associated with AOC 4 (1742 Jefferson Avenue Source Area) and AOC 9 (1755 Fawcett Avenue Source Area) is still being evaluated separately.
- **Northerly Plume.** CVOC and TPH contamination associated with potential spills and/or releases from historical operations from AOC 5 (GWP Building Source Area) and AOC 7 (TPS Building Source Area) has been consolidated as the "Northerly Plume" for this RI Report due to the commingled nature of these contaminants from the two sources areas.
- **Southerly Plume.** Jet Parking (AOC 10) has been expanded to include potential upgradient source areas located at 1956 Jefferson Avenue and 1934-1938 Market Street and is now identified as the "Southerly Plume."
- **Easterly Plume.** Previous environmental studies (further discussed in Section 4.0) identified CVOC contamination in groundwater as part of the southeast portion of the UWT Campus with no specific identified source. Investigation activities in this area now indicate that historical operations at 1934-1938 Market Street and unknown operations within Commerce Street and South C Street resulted in

the release of CVOCs to soil and/or groundwater. Contamination associated with these source areas is now identified as the "Easterly Plume."

In addition to the AOCs listed above, the following AOCs were identified as part of the 1997 Agreed Order and are being included as part of this RI for completeness of defining the nature and extent of contaminants for the UWT Campus:

- **Snoqualmie Library**. Localized TPH contamination associated with spills and/or releases from former USTs historically operating at this location.
- **Shaub-Ellison**. Localized TPH contamination associated with spills and/or releases from historical service station operations.

The AOC number and name identifiers referred to in the 2016 Agreed Order are no longer used in this RI Report due to the complexity of the AOCs relative to Property-Specific AOCs, Area-Wide AOCs, and actual sources. Table 2-1 presents a summary of Property-Specific and Area-Wide AOCs referenced herein by this UWT Campus RI Report. Figure 2-2 shows the locations of the Property-Specific AOCs relative to the UW Campus. Figure 2-3 shows the Area-Wide AOCs relative to the UWT Campus. Pursuant to MTCA, the term "Site" associated with each AOC (Property-Specific or Area-Wide) is defined by the extent of contamination contained within the media of concern with the potential to adversely affect human health and the environment. Specific details regarding historical land use, current conditions, investigations completed, and the nature and extent of contamination in media of concern associated with each AOC based on the results of 2016 Agreed Order RI and previous environmental investigations are further discussed are Sections 5.0 through 17.0.

2.3. Environmental Setting

The environmental setting, including the regional setting for climate, physiography, surface water, geology, and hydrogeology for Tacoma, Washington, is discussed below in Sections 2.3.1. and 2.3.2.

2.3.1. Regional Setting

2.3.1.1. Climate

The climate and weather conditions for Tacoma, Washington are characterized by dry summers and wet fall, winter, and spring seasons. The average annual precipitation is approximately 39.8 inches per year based on data available from March 1, 1982, until June 9, 2016 (Western Regional Climate Center [WRCC]; 1068). Seasonal precipitation averages range from approximately 2.8 inches during summer (July to September) to more than 19.8 inches during winter (December to March). The mean annual temperature for Tacoma is approximately 61.4 degrees Fahrenheit (°F) with a mean daily summer temperature of approximately 64.6 °F and a mean winter temperature of approximately 43.9 °F (1068).

2.3.1.2. Physiography

Tacoma is located on an upland drift plain in the southern portion of the Puget Sound Lowland. The topography and geology of the Puget Sound Lowland are glacially derived, with topographic features and unconsolidated sediment distribution resulting primarily from the most recent Pleistocene glaciation referred to as the Vashon Stade. The Puget lobe of the continental glaciation extended southward from British Columbia across the Puget Sound lowlands terminating south of Tacoma in Thurston County. Landforms generally trend north-south within the Puget lobe. The triangular peninsula located within the

City limits is approximately 400 feet in elevation National Geodetic Vertical Datum of 1929[1] (NGVD29) within the central portion of the upland and approximately at sea level near the north, east, and west margins. A broad upland region is located to the south of the UWT Campus ranging from Elevation 300 to 400 feet.

2.3.1.3. Surface Water

Tacoma is situated on a triangular peninsula bounded by the Tacoma Narrows to the west-northwest and by Commencement Bay to the east-northeast. Small, localized surface drainages are present within the northern portion of the Tacoma peninsula. The waterways of the Tacoma tide flats are located to the east with the Thea Foss Waterway being the closest waterway to the UWT Campus. The Tacoma tide flats consist of the surface water within man-made waterways at the mouth of the Puyallup River and Wapato and Hylebos Creeks. These waterways have undergone considerable modification including channelization and dredging to support industrial maritime operations.

2.3.1.4. Geology

The Puget Lowlands lie between the Olympic Peninsula to the west and the Cascade Mountains to the east. Multiple periods of continental glaciation occurred in the region during the Pleistocene Epoch (2.5 million to 10,000 years ago) as Cordilleran glaciers advanced into the Puget Lowlands. The Puget Sound area is filled with deep deposits of glacial debris reaching thicknesses of up to 2,000 feet in the Tacoma area (1001 and 1038).

The Vashon Stade of Fraser Glaciation was the most recent period of glaciation in Puget Sound. Glacial ice was approximately 5,000 feet thick near Seattle and approximately 1,500 feet thick in the Tacoma area and identified as the Puget Lobe of the Cordilleran Ice Sheet and formed the Vashon Drift formation. The terminus of the Puget Lobe of the Cordilleran Ice Sheet was located approximately 12 miles south of Olympia (1004). A proglacial lake was formed over the entire Puget Sound (Lake Russell) during the Vashon Stade glaciation resulting in the deposition of fine-grained sand and silts which would become the Lawton Clay formation. Quaternary Vashon advance outwash (Qva; Esperance sands/Colvos sands) was subsequently deposited throughout Puget Sound as the glacier moved south. During glaciation, Quaternary Vashon ice-contact deposits (Qvi) were deposited at the base and sidewalls of the glacier. These ice-contact deposits generally consist of sub- and pro-glacial alluvial channel deposits (sand and gravel), lacustrine (fine-grained sand and silts), and till (unsorted, unstratified, highly compacted mixture of clay, silt, sand, gravel, and boulders). Quaternary Proglacial Vashon Recessional Outwash (Qvr) consisting of sand and gravel was subsequently deposited near the toe of the glacier as the glacier retreated from the Tacoma region. Incision of the valley walls in the Puget Sound Lowlands and subsequent deposition of fluvial and alluvial deposits have since occurred following the last glacier retreat (approximately 10,000 to 13,000 years ago). Most recently, surficial deposits have been reworked by human activity and have included the import, placement, and grading of non-native (artificial) fill (Qf—artificial fill and/or reworked Quaternary deposit). As a whole, deposits from the Vashon Stade are locally characterized as Vashon Drift (1004).

[1] For the purpose of this RI, all elevations referenced herein refer to NGVD29 unless otherwise indicated.

Regionally the Vashon Drift is underlain by the Kitsap Formation. The Kitsap Formation is a non-glacial deposit. The formation is interpreted to have been deposited by rivers and lakes between Pleistocene glaciations with a thickness estimated to be at least 150 feet.

2.3.1.5. Hydrogeology

Regional hydrogeology for the Tacoma area includes two main water-bearing units contained within the Vashon Drift (upper regional water-bearing unit) and Kitsap Formation (lower regional water bearing-unit) deposits. The upper Vashon Drift aquifer is unconfined and semi-confined depending on the area with depths to groundwater that vary from approximately 5 to 60 feet below ground surface (bgs). The underlying Kitsap Formation aquifer is generally confined with depths to groundwater that vary from approximately 130 to 650 feet bgs.

2.3.2. Local Setting

2.3.2.1. Physiography

The UWT Campus is situated along the eastern hillside of the Tacoma peninsula. The crest of the hilltop is located west of the UWT Campus and is situated along South J Street. The hillside terminates east of the UWT Campus along the Thea Foss Waterway. The ground surface elevation ranges between approximately 50 and 220 feet east to west across the UWT Campus from Pacific Avenue to Tacoma Avenue South (Figure 2-4). The grade of the hillslope is generally consistent across the UWT Campus except where building structures and roads and/or parking lots cut into the hillside.

2.3.2.2. Stormwater Management

The UWT Campus is a mix of developed/paved parcels and undeveloped vegetated parcels bisected by arterial streets, roadways, and driveways. Utility infrastructure, such as ditches, culverts, catch basins, and piping, has been installed by the City during the historical development of the area (Section 2.1.2) to collect, contain and convey stormwater runoff from the UWT Campus to the east adjacent surface water body (Thea Foss Waterway). Stormwater runoff from precipitation falling onto the UWT Campus property either partially infiltrates into the ground where surfaces are unpaved or travels by sheet flow across impermeable surfaces into the City's stormwater system where it is conveyed and discharged through a series of outfalls located along the western shoreline of the Thea Foss Waterway (marine water body located approximately 950 feet east of the Pacific Avenue ROW centerline).

In general, the mainline pipes for the stormwater system run west to east down the slopes of South 17th Street, South 19th Street, and South 21st Street as shown on Figure 2-5. A limited number of north-south oriented stubs are present within Tacoma Avenue, Fawcett Avenue, and Market Street. A section of east-west pipe is also present within South 18th Street west of Tacoma Avenue South. The South 18th Street stormwater pipe is connected to the South 19th Street stormwater pipe via Tacoma Avenue South. Most of the stormwater mainlines located within the UWT Campus and surrounding area were installed between the early 1900s and 1950, except for the stormwater pipe within South 19th Street which was installed in 1973. Additionally, multiple sections of the stormwater pipe have been replaced between the 1990s and 2020, most notably the north-south oriented pipe within Market Street.

The existing stormwater pipes are generally constructed of unreinforced concrete with newer sections constructed of polyvinyl chloride (PVC), high-density polyethylene (HDPE), reinforced concrete, low-density polyethylene (LDPE), or ductile iron. Multiple sections have also been retrofitted and lined with cured-in-place thermosetting resin including the length of South 19th Street except for the section between Tacoma Avenue South and Fawcett Avenue. Pipe diameters generally vary from 6 to 24 inches.

The stormwater network within the UWT Campus boundary is comprised of two sub-basins (230 Drainage Basin and 235 Drainage Basin) with discharge to the Thea Foss Waterway (1019; Figure 2-5). The stormwater drainage basins were modified as part of the Jefferson and Hood Street Surface Water Interceptor Capital Project that was completed by the City in December 2022. The Jefferson and Hood Street Surface Water Interceptor Capital Project included the installation of new 48- to 60-inch-diameter stormwater piping within South 19th Street and Jefferson Avenue (which intercepts stormwater generated west of Court D and South 19th Street). The interceptor reroutes stormwater flow across portions of the UWT Campus. As a result, the divide between the 235 Drainage Basin (which discharges through Outfall 235) and the 230 Drainage Basin (which discharges through Outfall 230) was transitioned from approximately South 17th Street to South 19th Street. Stormwater discharge for water generated in Market Street north of South 19th Street (including the Y Student Center Building drain) remains unchanged. Currently, the majority of the stormwater collected from the UWT Campus discharges to the Thea Foss Waterway through Outfall 235 located under State Route 509. Stormwater collected within the 230 Drainage Basin discharges to the Thea Foss Waterway through Outfall 230 located near South 15th Street.

Since 2013, a portion of the stormwater collected within the 235 Drainage Basin is routed through the Regional Stormwater Treatment Facility located within PLT at South 21st Street (see Figure 2-5) prior to discharge to the Thea Foss Waterway. The Regional Stormwater Treatment Facility is a flow-through treatment facility that was installed in 2014. Stormwater originating from the South 19th Street area is diverted in Market Street via a flow splitter manhole (bottom of manhole elevation 102 feet), through Jet Parking, and into the stormwater basin in PLT. The treatment facility consists of a "Contech Water Quality System" manhole located in the southwest portion of Jet Parking (elevation 92.5 feet), several manholes, flow splitters, and a stormwater basin in PLT before reconnecting with the main stormwater pipe in South 21st Street. The Contech Water Quality System manhole is designed to detain water with multiple weirs and a trap for garbage, sediment, and oil, prior to passing through the treatment facility contained in PLT. The treatment facility within PLT consists of a series of 6-inch-diameter PVC tightline pipes that convey stormwater to six-lined cells to allow for retention and treatment within a 1.5-foot thick layer of proprietary Filterra® material. Treated stormwater is conveyed in a north-south oriented 6- to 18-inch-diameter stormwater pipe connected to the east-flowing stormwater pipe near the centerline of South 21st Street prior to discharge through Outfall 235.

For the purpose of this RI, the pre-December 2022 configuration of the stormwater basins are being discussed for correlation to the environmental data collected as part of the 2016 Agreed Order RI. An overview of major stormwater utility infrastructure (based on the pre-December 2022 configuration) as well as other utility infrastructure in the vicinity of the UWT Campus are shown on Figure 2-5. Utility infrastructure specific to individual AOCs related to potential contaminant migration pathways is discussed further in Sections 5.0 through 17.0.

2.3.2.3. Geology

Locally, the geologic stratigraphy of the UWT Campus and the surrounding area consists of artificial fill, including reworked native deposits near the ground surface, overlying stratified Vashon Drift. Vashon Drift deposits at the UWT Campus include outwash deposits, till-like ice contact deposits, and sub-glacial channel deposits. Vashon Drift ice-contact (Qvi) channel deposits across the UWT Campus are interpreted to influence groundwater and contaminant movement based on the 2016 Agreed Order RI and previous environmental studies (Section 4.0); the lateral extent of these Qvi channel deposits is shown in plan view on Figure 2-6. Soil stratigraphy identified for the UWT Campus, and surrounding area is shown in

generalized geologic cross sections on Figures 2-7 through 2-13 (as referenced on Figure 2-6) and is summarized below, from youngest to oldest:

- **Fill (Qf).** The Fill Unit is characterized by the import, placement, and grading of non-native (artificial) fill and surficial native deposits that have been reworked by human activity during area-wide development. The fill unit has been encountered in the majority of the borings completed on and upgradient of the UWT Campus and generally consists of locally derived, reworked Vashon ice-contact deposits or imported fill measuring up to approximately 10 feet in thickness.
- **Vashon Ice-Contact (Qvi) Deposits.** The Qvi unit is characterized by till, alluvial channel, and lacustrine deposits that were deposited along the ice margin and beneath the ice during glacial retreat. Sub-units of the Qvi identified in the vicinity of the UWT Campus include the following:
    - **Qvi Till-Like Deposits.** Till-like deposits in the vicinity of the UWT Campus consist of dense silty gravel with sand containing approximately 1 to 5 feet thick sand and gravel seams. The silty gravel with sand portion of the ice-contact deposits observed on the UWT Campus contains approximately 20 to 30 percent fines based on grain-size distribution analysis completed as part of previous investigations (Section 4.1). In general, these deposits have relatively low permeability. Sand and gravel seams, where present, are more permeable than the surrounding deposits and generally contain and readily transmit shallow groundwater. Overall, the till-like deposits beneath the UWT Campus are un-weathered except where exposed at the ground surface.
    - **Qvi Silt Deposits.** Two primary silt layers are present within the Qvi (see Figures 2-7 through 2-13) which locally act as semi-confining units to vertical groundwater flow and influence contaminant fate and transport (further discussed in later portions of this report). The upper silt layer is intermittently present west of Tacoma Avenue South and generally consists of silty gravel measuring approximately 1 to 2 feet in thickness. The upper silt layer is generally absent east of Tacoma Avenue South. The lower silt unit is located at the base of the Qvi unit (above the Qva unit) extending across most of the UWT Campus and generally consists of a gray to gray-brown silt layer, with gravel measuring from as little as 0.5 foot to as much as 20 feet in thickness with an average thickness of approximately 2 to 3 feet. The Qvi silt is absent in some areas due to erosion from the Qvi channel deposits or excavation as shown on Figures 2-7 through 2-16.
    - **Qvi Channel Deposits**. The Qvi channel deposits are interpreted to be derived from proglacial or subglacial fluvial deposition near the end of the Pleistocene. As shown on Figure 2-6, channel deposits are generally oriented in an east-west direction with a thickness of up to approximately 70 feet. These deposits consist of oxidized sand and gravel in distinct channel forms that appear to incise the lower Qvi silt and portions of the underlying Qva deposits at several locations, allowing for the intermixing of groundwater from the Qvi and Qva units, as discussed below in Section 2.3.2.4. The channel deposits are interpreted to be more permeable than surrounding Qvi till-like deposits and Qvi silt.
    - **Vashon Advance Outwash (Qva) Deposits.** The Qva unit underlies the Qvi deposits. Vashon advance outwash typically consists of stratified sand with silt and gravel layers deposited by meltwater streams flowing ahead of the advancing Vashon Glacier (1040). The advance outwash is likely greater than 50 feet thick locally and forms an extensive aquifer (1033). The contact between the Qva and the overlying Qvi deposits dips to the east at approximately the same slope as the natural topography. The Qvi/Qva contact is generally gradational in nature and consists of interbedded fine sand and silt with thicknesses ranging between approximately 1 and 14 feet. Sub-units of the Qva unit identified in the vicinity of the UWT Campus include the following:

- **Qva Sand and Gravel Deposits.** Sand and gravel deposits within the Qva typically consist of a thick layer of light gray fine- to coarse-grained gravel with interbeds of sand, silt, and occasional cobbles and boulders. The Qva sand and gravel deposits encountered in the explorations completed as part of the RI and during previous studies have typically been classified as fine gravel with silt and sand or silty gravel with sand, which is similar in texture to the ice-contact deposits. However, the gravel fraction and D_{10} size are typically greater in the Qva, and the unit matrix is less cemented, resulting in a higher effective porosity and greater permeability as compared to the Qvi.
- **Qva Silt.** The silt layers within the Qva are generally flat-lying and laterally continuous and consist of relatively clean to sandy silt with thicknesses ranging between approximately 5 and 15 feet. The silt layers (where present) act as confining units to vertical groundwater flow (further discussed in Section 2.3.2.4).
- **Lawton Clay.** The Qva unit is underlain by a proglacial lacustrine silt layer formed over Puget Sound in ancient Lake Russell as the glacier advanced. The Lawton Clay Formation consists of fine-grained sand, silt, and clay deposited within Lake Russell and is identified as a regional confining layer (1033). The top of the Lawton Clay is mapped at elevation 100 feet (1033) in the area south of the UWT Campus. This unit has not been encountered in borings completed during the RI and previous studies completed at the UWT Campus but is presumed to underlie the Qva based on regional geologic studies.

2.3.2.4. Hydrogeology

The hydrogeologic framework for the UWT Campus and the surrounding area consists of a shallow generally unconfined water-bearing zone contained within the Qf, Qvi till-like, and channel deposits (collectively comprising the Qvi aquifer), overlying a deeper semi-confined water-bearing zone contained within the Qva sand and gravel deposits (Qva aquifer). Groundwater within the Qvi and Qva aquifers generally flows to the east following natural topography. Where the Qvi and/or Qva silt is absent, the Qvi and Qva aquifers are in hydraulic connection (further discussed below). Perennial groundwater seeps have been observed during RI field activities at locations along Market Street where the natural grade of the hillside was cut during development (see cross section G-G', Figure 2-12). Groundwater contours for the Qvi and Qva aquifers are shown on Figures 2-14 through 2-20. These contours represent observed groundwater conditions for the March 2020, September 2020, and April 2021 groundwater monitoring events completed as part of the 2016 Agreed Order investigation (further discussed in Section 4.0).

The Qvi aquifer is predominantly unconfined throughout the UWT Campus. However, the Qvi aquifer is locally confined in the southern portion beneath Tacoma Avenue South, where groundwater occurring within the channel deposits is confined between Qvi till-like deposits and Qvi silt deposits (see Figure 2-10), and beneath the southern portion of Market Street, where till-like material contained within the channel deposits acts as a confining layer (see Figure 2-12). In contrast, the Qva aquifer is predominantly confined across the UWT Campus due to the presence of Qvi silt and/or Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qva aquifer is unconfined in the area north of South 19th Street and west of Fawcett Avenue (see Figures 2-9 and 2-10) and where the Qvi silt and/or Qva silt deposits are absent due to glacial incision of the silt layers separating the aquifers or excavation associated with property redevelopment.

The Qvi and Qva aquifers are in hydraulic connection at locations where the silt aquitards are absent. Where the Qvi and Qva aquifers are in hydraulic connection, the movement of groundwater between the two is controlled by the Qva aquifer potentiometric groundwater surface relative to the bottom of the Qvi unit. Where the Qva potentiometric groundwater surface is higher than the bottom of the Qvi unit, groundwater generally flows from the Qva aquifer into the overlying Qvi aquifer. Whereas when the Qva potentiometric

groundwater surface is lower than the bottom of the Qvi, the groundwater generally flows from the Qvi aquifer into the Qva aquifer, occasionally resulting in localized depletion of the Qvi aquifer. The Qvi unit is absent altogether and the Qva aquifer is unconfined beneath and to the east of Pacific Avenue. Perched groundwater in the Qvi aquifer may be present in some areas where groundwater occurs on top of the less permeable Qvi till-like deposits (specifically at Tacoma Avenue South).

Groundwater movement between the Qvi and Qva aquifers, where hydraulically connected, generally falls into one of five categories below as shown on Figures 2-14 to 2-16 and on cross sections A-A' through G-G' (Figures 2-7 through 2-13):

1. **Qvi Aquifer Locally Depleted.** Groundwater in the Qvi aquifer locally flows into the Qva aquifer where the confining silt layers are absent (either through glacial incision or development) and the Qva potentiometric groundwater surface occurs below the base of the Qvi unit. An example of this condition is observed between Market Street and Jefferson Avenue, north of South 19th Street (see cross section G-G' [Figure 2-13]) where glacial incision has removed the confining silt layer and the Qva potentiometric groundwater surface is below the base of the Qvi unit. At this location, groundwater from the Qvi aquifer is interpreted to drain into the underlying Qva aquifer resulting in depletion of the Qvi aquifer downgradient of this location except where perched groundwater is present.
2. **Qvi Groundwater Locally Flows into Qva Aquifer (Partial Depletion).** A portion of Qvi aquifer groundwater locally enters the Qva aquifer where confining silt layers are absent (either through glacial incision or development) and the Qva potentiometric groundwater surface is below the base of the Qvi unit. However, the local Qvi aquifer is not fully depleted and extends to the east/downgradient of this location. An example of this condition is observed between Jet Parking and Milgard Hall (see cross section F-F' [Figure 2-12]) where glacial incision has removed the confining silt layer and the Qva potentiometric groundwater surface occurs below the base of the Qvi unit. At this location, a portion of the Qvi aquifer drains into the Qva aquifer, though the Qvi aquifer is present downgradient of Milgard Hall.
3. **Qva Groundwater Locally Flows into the Qvi Aquifer.** Groundwater from the Qva aquifer enters the Qvi aquifer where the confining silt layer is absent (either through glacial incision or development) and the Qva potentiometric groundwater surface occurs above the base of the Qvi unit. An example of this condition is observed between South Fawcett Avenue and Court D, south of South 19th Street (see cross section A-A' [Figure 2-7]) where glacial incision has removed the confining silt layer and the measured groundwater level of the Qva aquifer occurs above the base of the Qvi unit.
4. **Qvi Unit is Locally Absent.** The Qvi aquifer is absent when the Qvi unit is absent. This condition is observed beneath and east of Pacific Avenue (see cross section A-A' [Figure 2-7]). Groundwater within the Qva aquifer becomes unconfined and groundwater from the Qvi aquifer enters the Qva at this location.
5. **Qvi Groundwater is Locally Absent Due to Seasonal Variation or Other Unknown Condition**. Locally, the Qvi aquifer is absent due to seasonal fluctuations in the groundwater table due to variations in recharge from precipitation (i.e., dry season vs wet season). An example of this condition is observed southeast of the Tacoma Avenue South and South 19th Street intersection where the monitoring wells completed within the Qvi aquifer are dry during the dry season (see Figures 2-14 to 2-16). Other unknown conditions result in the absence of the Qvi aquifer in the northeast portion of the UWT Campus, where the Qvi unit is present, but groundwater is absent within the Qvi. This condition may be related to one

or more of the conditions listed above, or the localized presence of less permeable Qvi materials limiting the ability of the Qvi to contain and transmit groundwater.

Specific areas where the Qvi and Qva aquifers are interpreted to be hydraulically connected as a result of glacial incision or development are shown on Figures 2-14 to 2-16 and on cross sections A-A' through G-G' (Figures 2-7 through 2-13) where noted. Qvi and Qva aquifer characteristics are further discussed below.

Qvi Aquifer

The Qvi aquifer is present across most of the UWT Campus occurring within the Qf and Qvi deposits where present. However, the Qvi aquifer is absent where incision of the Qvi and/or Qva silt has occurred allowing for the vertical flow of groundwater into the underlying Qva aquifer, where excavation during development has removed the confining layers, or where the Qvi unit is generally absent (i.e., beneath and east of Pacific Avenue; see Figures 2-7 through 2-16). The hydraulically connected Qvi and Qva aquifers may have the potential to influence contaminant fate and transport. Additional discussion of contaminant fate and transport related to areas where the Qvi and Qva aquifers are hydraulically connected is presented in Sections 5.0 through 17.0.

Groundwater flow in the Qvi aquifer is more predominant within the observed sand seams and interbedded gravel (i.e., Qvi channel deposits) and may be locally influenced by underground utility corridors that act as preferential pathways for groundwater flow. Locally, perched groundwater may be present within the Qf and Qvi deposits over less permeable soil (i.e., within fill overlying Qvi till-like deposits). Localized seasonal variations in shallow groundwater elevation, flow direction, and gradient are evident in the Qvi aquifer as shown on groundwater elevation contour maps for March 2020, September 2020, and April 2021 monitoring events (Figures 2-14 through 2-16), though the overall groundwater flow direction is consistently to the east based on the results of the RI and prior groundwater monitoring (Section 4.0).

Groundwater levels in the Qvi aquifer are highly influenced by recharge from precipitation, with typical responses occurring within hours of the start of precipitation events. Monitoring wells screened within the Qvi aquifer and located along Commerce and Pacific Avenue near the bottom of the hill on the eastern/downgradient side of campus generally have a lower degree of groundwater fluctuation in response to precipitation as compared to other monitored Qvi aquifer wells located upgradient. Some Qvi aquifer monitoring wells are dry seasonally, typically during the late summer and fall months when shallow groundwater is not regularly recharged by precipitation. The effects of precipitation on groundwater levels, groundwater gradients, localized variations in flow directions, and average linear groundwater velocities are discussed in detail for each individual investigation area in Sections 5.0 through 17.0.

Groundwater within the Qvi unit is unlikely to yield water in sufficient quantities for beneficial use (there are no known potable, industrial, or agricultural users), and is seasonally intermittent in some portions of the UWT Campus and therefore could be classified as a perched groundwater zone and not an aquifer. However, for the purposes of this RI, groundwater within the Qvi unit is referred to as the Qvi aquifer because groundwater is laterally continuous, exhibits characteristics of gradient and flow, and is a pathway for contaminant migration.

Qva Aquifer

The Qva aquifer is present throughout the UWT Campus and comprises all groundwater occurring within the Qva below the Qvi/Qva contact silt layer. The Qva aquifer is identified as a regional aquifer capable of yielding water in sufficient quantities for beneficial use. The overall groundwater flow direction for the Qva

aquifer is to the east-northeast. Localized seasonal variations in groundwater flow direction and gradient are evident in Qva groundwater elevation contour maps for March 2020, September 2020, and April 2021 (Figures 2-17 through 2-19), though the overall groundwater flow direction is to the east-northeast based on the results of the RI and prior groundwater monitoring events. Groundwater levels in the Qva aquifer are less influenced by recharge from precipitation on a short-term basis as compared to Qvi aquifer monitoring wells. Groundwater levels in the Qva aquifer typically follow a more gradual trend, rising during the winter and spring months, and falling during the summer and fall months. Groundwater in the Qva aquifer at the UWT Campus ranges from unconfined to semi-confined with artesian conditions present at some locations. Upward vertical hydraulic gradients have been documented at locations where the Qva aquifer is semi-confined and the silt layer is absent, allowing deep groundwater to move upward into the shallow Qvi aquifer. Groundwater gradients, localized variations in flow directions, and average linear groundwater velocities are discussed in detail for each individual investigation area in Sections 5.0 through 17.0.

2.4. Natural Resources

2.4.1. Terrestrial Habitat

Pursuant to WAC 173-340-7491(1), the UWT Campus does not meet the criteria for a Terrestrial Ecological Evaluation (TEE) exclusion. For sites that do not qualify for a TEE exclusion, either a simplified TEE or a site-specific TEE must be conducted to determine if a threat to terrestrial ecological receptors exists or if the site can be removed from further ecological consideration during the RI and cleanup process. MTCA provides four criteria for determining whether further evaluation is required. If one or more of these criteria are met, then further evaluation is not required. These criteria and a description of conditions at the UWT Campus in response to the criteria are summarized in the following table.

TERRESTRIAL ECOLOGICAL EVALUATION EXCLUSION CRITERIA

TEE Exclusion Criteria	Site Condition	Conclusion
Criterion 1. All affected soil is, or will be, located below the point of compliance (POC).	Petroleum-related and/or CVOC contaminants are detected within the standard POC from the ground surface to a depth of 15 feet bgs.	Criterion not met.
Criterion 2. All affected soil is or will be covered by buildings, paved roads, pavement, or other physical barriers that will prevent ecological exposure to the contaminated soil.	Property use plans do not include barriers over affected soil that would prevent potential ecological receptor exposure.	Criterion not met.
Criterion 3. Undeveloped land on or within 500 feet of the site is less than ¼ of an acre if any highly toxic constituents are detected in soil, or less than 1½ acres if highly toxic constituents are not detected in soil.	More than 1½ acres of undeveloped land are on or within 500 feet of the UWT Campus.	Criterion not met.
Criterion 4. Concentrations of constituents in the soil do not exceed natural background levels.	Contaminants are detected in soil at concentrations greater than natural background levels.	Criterion not met.

From the evaluation above, UWT Campus does not qualify for a TEE exclusion because the exclusion criteria were not met. As a result, a TEE (simplified or site-specific) is required. WAC 173-340-7491 presents criteria

for determining whether a site-specific TEE or simplified TEE is to be performed to evaluate the terrestrial habitat for the UWT Campus and surrounding areas, documenting the presence or absence of receptors or receptor habitats, rating the quality of habitat, and evaluating potential threats to terrestrial ecological receptors from exposure to contaminated soil having a potential to cause significant adverse effects. The following table presents the criteria for requiring a site-specific TEE and a description of conditions for the UWT Campus in response to the criteria.

SITE-SPECIFIC TERRESTRIAL ECOLOGICAL EVALUATION

Site-Specific TEE Criteria	Site Condition	Conclusion
WAC 173-340-7491(2)(a)(i). The site is located on, or directly adjacent to, an area where management or land use plans will maintain or restore native or semi-native vegetation (e.g., green-belts, protected wetlands, forestlands, locally designated environmentally sensitive areas, open space areas managed for wildlife, and some parks or outdoor recreation areas).	The UWT Campus is located in the downtown corridor of Tacoma. Undeveloped properties contained within the UWT Campus boundary and within 500 feet of the UWT Campus are separated by arterial streets, private roads, and/or have contained former buildings/residences (i.e., previously developed), which have been demolished and await redevelopment.	This condition is not met because the UWT Campus is not located within or adjacent to an area where management or land use plans will maintain or restore native or semi-native vegetation, is not contiguous, is subject to future development, and is separated by arterial streets.
WAC 173-340-7491(2)(a)(ii). The site is used by a threatened or endangered species; a wildlife species classified by the Washington State Department of Fish and Wildlife (WSDFW) as a "priority species" or "species of concern" under Title 77 RCW; or a plant species classified by the Washington State Department of Natural Resources (DNR) natural heritage program as "endangered," "threatened," or "sensitive" under Title 79 RCW. For plants, "used" means that a plant species grows at the site or has been found growing at the site. For animals, "used" means that individuals of a species have been observed to live, feed or breed at the site.	A review of WSDFW and DNR program websites indicated that the UWT Campus and surrounding area do not contain any priority species or species of concern, or plant species listed as endangered, or threatened.	This criterion is not met because the UWT Campus and surrounding area do not contain any priority species or species of concern, or plant species listed as endangered, threatened, or sensitive.
WAC 173-340-7491(2)(a)(iii). The site is located on a property that contains at least ten acres of native vegetation within 500 feet of the site, not including vegetation beyond the property boundaries.	Vacant land up to 2 acres in size is present within and adjacent to the UWT Campus. However, the vacant land is separated by arterial streets and is subject to future redevelopment under the UW Master Campus Plan and/or urban growth by the City.	This criterion is not met because the UWT Campus contains less than 10 acres of native vegetation within 500 feet of the site **AND** arterial streets provide a significant barrier between the limited areas of vegetated vacant land **AND** are subject to future redevelopment.

Site-Specific TEE Criteria	Site Condition	Conclusion
WAC 173-340-7491(2)(a)(iv). The department determines that the site may present a risk to significant wildlife populations.	The UWT Campus is surrounded by urban properties and does not contain any or is not located near any major greenbelt.	This criterion is not met because the UWT Campus and surrounding properties are zoned commercial, academic, and/or residential and the future land use of the UWT Campus and surrounding area are not anticipated to change.

None of the site-specific criteria defined in WAC 173-340-7941 were met from the evaluation above. Therefore, a simplified TEE was completed pursuant to WAC 173-340-7490. The process for conducting a simplified TEE includes an evaluation of the extent of exposure, exposure pathways, and type of contaminants present in site media. To complete the simplified TEE, the Exposure Analysis Procedure (Exposure Scenario 2) was used because the total area of soil contamination at the UWT Campus exceeded 350 square feet (sf). The results of the simplified TEE using Exposure Scenario 2 (outlined in Table 749-1, Appendix D) are summarized in the following table.

Simplified Terrestrial Ecological Evaluation Exposure Scenario 2 Evaluation Step	Site Analysis	Score (See Appendix D)
Line 1. Estimate the area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site to the nearest ½ acre (¼ acre if the area is less than 0.5 acre).	Aerial photography was used to estimate the area of the largest contiguous undeveloped parcel on the UWT Campus: the block bounded by Fawcett Ave and Court E and South 19th and South 21st Streets. The area of this block is estimated to be about 105,000 sf or 2.4 acres—rounding up to the nearest half acre.	9
Line 2. Is this an industrial or commercial property? If yes, enter a score of 3. If no, enter a score of 1.	The UWT Campus is predominantly zoned as downtown mixed-use district and downtown residential district as defined as follows. ▪ **Downtown Mixed-Use District.** This district is intended to contain a high concentration of academic, cultural, and governmental services, together with commercial services and uses. ▪ **Downtown Residential District**. This district contains a predominance of mid-rise, higher-density, urban residential development, together with places of employment and retail services. The score of 1 is used to be conservative.	1

Simplified Terrestrial Ecological Evaluation Exposure Scenario 2 Evaluation Step	Site Analysis	Score (See Appendix D)
Line 3. Enter a score in the box to the right for the habitat quality of the site, using the following rating system. High=1 Intermediate=2 Low=3	The quality of the habitat is rated as low based on an evaluation of the UWT Campus by a field biologist. The following are features considered in making this evaluation: ▪ Vegetation is predominantly noxious, non-native, and/or exotic. ▪ The land is severely disturbed by surrounding development (buildings, roads, and parking lots) and impacted by human activity.	3
Line 4. Is the undeveloped land likely to attract wildlife? If yes, enter a score of 1 in the box to the right. If no, enter a score of 2.	The undeveloped land is unlikely to attract wildlife based on an evaluation of the UWT Campus by a field biologist. The features considered include: the habitat is highly fragmented with isolated areas of suitable trees for nesting and roosting, and a majority of areas within the site are landscaped borders and mowed lawns and are generally highly constrained by surrounding development.	2
Line 5. Are there any of the following soil contaminants present: Chlorinated dioxins/furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene? If yes, enter a score of 1 in the box to the right. If no, enter a score of 4.	Only polychlorinated biphenyls (PCBs) and benzene were detected in soil within the upper 15 feet of the soil column. The contaminants detected are at concentrations less than simplified TEE soil screening values and/or were detected in the soil beneath asphalt or other paved surfaces, which reduces exposure pathways to plants, soil biota, and terrestrial wildlife.	4
Line 6. Add the numbers in the boxes on lines 2 - 5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified evaluation may be ended.	The score is larger than the score for Item 1. The results of the simplified TEE indicate that there is not a substantial threat of significant adverse effects to terrestrial ecological receptors from the site.	10

The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490. A copy of the simplified TEE is presented in Appendix D.

2.4.2. Groundwater Potability

The following table summarizes UWT Campus conditions relative to the MTCA criteria specified in WAC 173-340-720(2) for non-potable water:

GROUNDWATER POTABILITY EVALUATION

Groundwater Potability Criteria	Site Condition	Conclusion
WAC 173-340-720 (2)(a). The groundwater does not serve as a current source of drinking water.	No drinking water supply wells are present in the area of UWT Campus based on a review of Ecology's water well database (1065 and 1066). Drinking water is currently supplied by the City through its municipal water supply. The sources of the City's drinking water are the Green River watershed located east of Tacoma and wells located in the South Tacoma Wellfield (1043).	This criterion is met.
WAC 173-340-720 (2)(c). The department determines it is unlikely that hazardous substances will be transported from the contaminated groundwater to groundwater that is a current or potential future source of drinking water, as defined in (a) and (b) of this subsection [i.e., -720(2)], at concentrations which exceed groundwater quality criteria published in Chapter 173-200 WAC.	Contaminated groundwater at the UWT Campus occurs in shallow groundwater generally less than 60 feet in depth. Shallow groundwater flows generally east toward the Thea Foss Waterway and does not flow toward aquifers that may be a current or potential future source of drinking water.	This criterion is met.
WAC 173-340-720 (2)(d). Even if groundwater is classified as a potential future source of drinking water..., the department recognizes that there may be sites where there is an extremely low probability that the groundwater will be used for that purpose because of the site's proximity to surface water that is not suitable as a domestic water supply. An example of this situation would be shallow groundwater in close proximity to marine waters such as on Harbor Island in Seattle. At such sites, the department may allow groundwater to be classified as non-potable if each of the following conditions can be demonstrated. These determinations must be for reasons other than that the groundwater or surface water has been contaminated by a release of a hazardous substance at the site.		
WAC 173-340-720 (2)(d)(i). There are known or projected points of entry of the groundwater into the surface water.	Shallow and deep groundwater at the UWT Campus discharge into the Thea Foss Waterway, which is salt water.	This criterion is met.
WAC 173-340-720 (2)(d)(ii). The surface water is not classified as a suitable domestic water supply source under Chapter 173-201A WAC.	No natural surface water features exist at the UWT Campus; stormwater is collected and conveyed through underground stormwater utility to drain into the Thea Foss Waterway, which is salt water.	This criterion is met.

From the evaluation above, conditions at the UWT Campus meet the MTCA criteria under 173-340-720 for non-potable water. However, Ecology considers groundwater at the UWT Campus and the surrounding area a potential future beneficial use. Therefore, drinking water is retained as a potential exposure pathway.

3.0 CLEANUP STANDARDS

Development of cleanup standards for a site must include: (1) cleanup levels that are protective of human health and the environment; (2) the point of compliance at which the cleanup levels must be met; and (3) additional regulatory requirements, specified in applicable state and federal laws, which apply to the cleanup action because of the type of action and/or the location. The following sections describe the proposed cleanup levels developed and points of compliance for the UWT Campus.

3.1. Proposed Cleanup Levels

PCULs for soil, groundwater, and indoor air (unrestricted land use) and screening levels (SLs) for indoor air (commercial worker exposure) and vapor intrusion (VI) were developed for the RI to evaluate potential risks to human health and the environment. The PCULs were developed pursuant to MTCA (WAC 173-340-720 through 750). The SLs were developed in accordance with Ecology's Vapor Intrusion Guidance (VI Guidance) (1064). The soil, groundwater, indoor air, and VI PCULs and SLs are presented in Tables 3-1 through 3-6 and further discussed below in Sections 3.1.1 through 3.1.5. Note that specific land uses, potential exposure routes, and ecological receptors forming the basis of the CSM for individual AOCs (Property-Specific or Area-Wide) are discussed in Sections 5.0 through 17.0 and are used to determine the applicable PCULs to define contaminant nature and extent and/or potential for VI and inhalation for personnel occupying enclosed spaces.

3.1.1. Soil

Soil PCULs developed for the UWT Campus are presented in Tables 3-1 and 3-2. The soil PCULs were selected from the following criteria:

- **Human Direct Contact.** MTCA standard Method B soil cleanup levels protective of human health for unrestricted land use (WAC 173-340-740[3][b]) obtained from Ecology's CLARC (Cleanup Levels and Risk Calculation) Table (Excel) dated January 2023. The MTCA Method A soil cleanup level for unrestricted land use (WAC 173-340-740[2]) obtained from MTCA Table 740-1 is used for lead that does not have a standard Method B soil cleanup level.
- **Groundwater Protection.** Soil criteria protective of groundwater quality (based on the groundwater PCULs that are presented in Table 3-3 and discussed in Section 3.1.2). These soil criteria address the soil to groundwater pathway and were calculated using the MTCA fixed parameter three-phase partitioning model (WAC 173-340-747[4]). Default assumptions provided in WAC 173-340-747(4)(b) (Equation 747-1 and Equation 747-2) for vadose and saturated zone soils were used in the calculations, and model input parameter values (soil organic carbon-water partitioning coefficient [K_{OC}] and Henry's Law constants) were taken directly from Ecology's CLARC Table dated January 2023. The MTCA Method A soil cleanup levels for unrestricted land use (WAC 173-340-740[2]) obtained from MTCA Table 740-1 are used for gasoline- (TPH-G), diesel- (TPH-D), and oil- (TPH-O) range petroleum hydrocarbons that do not have standard Method B soil cleanup levels based on groundwater protection.

MTCA (WAC 173-340-705[6]) specifies that cleanup levels determined using Method B shall not be set at levels below natural background or the Practical Quantitation Limit (PQL), whichever is higher. Soil PCULs were initially selected based on the lowest of the applicable risk-based concentrations. The PCULs were then adjusted upward, as needed, based on background concentrations (metals) and PQLs. The background metal concentrations used are the Puget Sound region 90th percentile values reported by Ecology except for arsenic (1053). The natural background concentration for arsenic is based on MTCA

Table 740-1. The PQLs listed in Tables 3-1 and 3-2 were obtained from OnSite Environmental, Inc. of Redmond, Washington (OnSite), which is a Washington-accredited laboratory.

The lowest risk-based concentrations for vadose and saturated zone soil are presented in the first two columns to the right of the individual soil, titled Lowest Risk-Based Concentrations in Tables 3-1 and 3-2. The lowest risk-based concentrations have not been adjusted for background or PQLs. The soil PCULs for vadose and saturated zone soil in the last two columns, under the heading Proposed Soil Cleanup Level, have been adjusted for background and PQLs. The soil PCUL for the saturated zone was utilized for screening data throughout the UWT Campus.

Additionally, soil PCULs are based on groundwater protection for only those chemicals considered to be groundwater contaminants of potential concern (COPCs). Groundwater and soil COPCs were determined based on a statistical evaluation of the RI dataset (Tables 4-3 and 4-4 [Section 4.5], respectively). Chemicals were generally considered to be groundwater COPCs if detected at a concentration greater than the groundwater PCUL at a frequency greater than 10 percent and/or if detected at a concentration greater than two times the groundwater PCUL. In addition, a COPC was retained for consistency with MTCA Table 830-1 for Petroleum Releases. The identification of groundwater and soil COPCs and the associated rationale are presented in Tables 4-3 and 4-4 (Section 4.5), respectively. As discussed in Section 2.4.1, a simplified TEE was performed for the UWT Campus and is included in Appendix D. The exposure analysis indicated that land use at the UWT Campus and surrounding area makes wildlife exposure unlikely. Therefore, soil PCULs based on the protection of terrestrial ecological receptors are not required based on the TEE outcome.

The soil PCULs applicable to each source area may differ based on the receptors present and whether exposure and transport pathways are complete. Source area specific soil PCULs are discussed below in Sections 5.0 through 17.0. Tables 3-1 and 3-2 both include soil criteria based on direct contact exposure and protection of groundwater quality. However, the groundwater PCULs used to calculate soil concentrations protective of groundwater are different in Tables 3-1 and 3-2:

- **Table 3-1**. The groundwater PCULs used to calculate soil concentrations protective of groundwater are based on the protection of drinking water and surface water (see the last column in Table 3-3).
- **Table 3-2**. The groundwater PCULs used to calculate soil concentrations protective of groundwater are based on the protection of drinking water only (see the second to last column in Table 3-3).

The conditions at each source area will inform which set of groundwater PCULs is appropriate for the calculation of soil concentrations protective of groundwater.

3.1.2. Groundwater

Groundwater PCULs developed for the UWT Campus are presented in Table 3-3. The groundwater PCULs are based on protection of the following media/exposure scenarios:

- **Protection of Marine Surface Water.** Groundwater numerical criteria are protective of marine surface water and are based on MTCA standard Method B surface water cleanup levels prescribed in WAC 173-340-730(3)(b). The Method B surface water cleanup levels are protective of aquatic organisms and human health. MTCA Method B standard formula values based on the protection of human health via the consumption of aquatic life were obtained from Ecology's CLARC Table dated January 2023. As noted in WAC 173-340-730(3)(b)(iii), the standard formula values are necessary

when sufficiently protective criteria have not been established under applicable state and federal laws (e.g., Chapter 173-201A WAC, 40 CFR 131.45[2], and Section 304 of the Clean Water Act). Ecology considers a criterion sufficiently protective if the excess cancer risk is not greater than 1×10^{-5} or the hazard quotient is not greater than 1 (WAC 173-340-730(5)(b)). State or federal criteria that are not sufficiently protective were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. These adjusted values are presented in Table 3-2 in the columns "Carc. Adjusted" and "Non-Carc. Adjusted," respectively.

- **Protection of Drinking Water.** As described in Section 2.4.2, conditions at the UWT Campus meet the MTCA criteria under 173-340-720 for non-potable water. However, as required by Ecology, groundwater PCULs for the UWT Campus were developed based on numerical criteria protective of drinking water use from the MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b) because of the potential future beneficial use of groundwater as drinking water. MTCA Method B standard formula values based on the protection of human health via the consumption of drinking water were obtained from Ecology's CLARC Table dated January 2023. As noted in MTCA WAC 173-340-720(4)(b)(iii), the standard formula values are necessary when sufficiently protective criteria have not been established under applicable state and federal laws (e.g., state and federal drinking water Maximum Contaminant Levels). State or federal criteria that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1 (WAC 173-340-720(7)(b). These adjusted values are presented in Table 3-3 in the columns "Carc. Adjusted" and "Non-Carc. Adjusted," respectively. The MTCA Method A groundwater cleanup levels (WAC 173-340-720[3]) obtained from MTCA Table 720-1 are used for TPH-G, TPH-D, and TPH-O that do not have standard Method B groundwater cleanup levels based on protection of drinking water.

MTCA (WAC 173-340-705[6]) specifies that cleanup levels determined using Method B shall not be set at levels below natural background or the PQL, whichever is higher. Groundwater PCULs were initially selected based on the lowest of the applicable numerical criteria described above. The PCULs were then adjusted as necessary based on background concentrations (arsenic only) and PQLs. The background value for arsenic is the natural background groundwater arsenic concentration in the Puget Sound basin (1063). The PQLs listed in Table 3-3 were obtained from OnSite.

The lowest risk-based concentrations are presented in the first four columns to the right of the individual groundwater criteria, titled Lowest Risk-Based Concentrations. The lowest risk-based concentrations have not been adjusted for background or PQLs. The groundwater PCULs in the last four columns, titled Proposed Groundwater Cleanup Levels, have been adjusted for background and PQLs.

The groundwater PCULs applicable to each source area may differ based on the receptors present and whether exposure and transport pathways are complete. Source area specific groundwater PCULs are discussed below in Sections 5.0 through 17.0.

[2] United States Environmental Protection Agency (EPA) surface water criteria from 40 Code of Federal Regulations (CFR) 131.45 are included in Table 3-2. EPA has withdrawn these criteria and the decision to withdraw the criteria is undergoing federal litigation. The 40 CFR 131.45 criteria in Table 3-2 may be revised pending the outcome of the litigation.

3.1.3. Indoor Air

Indoor air PCULs and SLs developed for the UWT Campus are presented in Table 3-4. The indoor air PCULs and SLs were selected for the following exposure scenarios:

- **Method B Unrestricted Land Use.** Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173-340-750[3][b]), obtained from Ecology's CLARC Table dated January 2023. Unrestricted land use exposure assumptions for the indoor air SLs are 24 hours per day, 365 days per year, for 30 years.
- **Commercial Worker.** Indoor air SLs are based on the MTCA Method B indoor air SLs protective of human health for commercial worker exposure, obtained from Ecology's CLARC Table dated January 2023. Commercial worker exposure assumptions for the indoor air SLs are 9 hours per day, 250 days per year, for 25 years.

3.1.4. Soil, Soil Vapor, and Groundwater Vapor Intrusion Screening Levels

In addition to soil, groundwater, and indoor air PCULs developed for the UWT Campus, SLs for the protection of VI were developed to evaluate whether contaminants detected in soil, groundwater, and/or soil vapor have the potential to migrate into enclosed spaces at concentrations exceeding indoor air PCULs/SLs (Section 3.1.3) requiring further VI evaluation. Soil vapor SLs are presented in Table 3-4. Groundwater VI SLs for contaminants other than benzene and TPH are presented in Table 3-5 and are referenced to the standard VI MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

For petroleum sites, Appendix B of Ecology's VI Guidance presents a process for completing an initial assessment of the potential intrusion of petroleum vapors. As part of the process, Ecology recommends the use of soil and groundwater benzene, TPH-G, and TPH-D SLs in combination with vertical and horizontal separation distances (Table 3-6). The separation distances represent the thickness of clean soil between the source of petroleum vapors and the lowest point of a current or future building.

3.2. Points of Compliance

Under MTCA, the point of compliance is the point or location where cleanup levels must be attained. However, MTCA regulation recognizes that a standard point of compliance may not be attainable under all circumstances. Therefore, a conditional point of compliance may be established to meet the cleanup standard. The point of compliance (standard or conditional) for contaminants of concern (COCs) in media of concern will be established during the development of the FS and Draft Cleanup Action Plan (DCAP). The following sections (Section 3.2.1 through 3.2.3) present the standard point of compliance for evaluating soil, groundwater, and indoor air results relative to the PCULs.

3.2.1. Soil

Pursuant to WAC 173-340-740(6), the point of compliance is the point or points where the soil PCULs will be met. For soil cleanup levels based on the protection of groundwater, the point of compliance will be throughout the soil column (WAC 173-340-740[6][b]). For soil cleanup levels based on protection from vapors, the point of compliance will be throughout the soil column from the ground surface to the uppermost groundwater saturated zone (e.g., from the ground surface to the uppermost water table; WAC 173-340-740[6][c]). For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance

will be throughout the soil column from the ground surface to 15 feet pursuant to WAC 173-340-740(6)(d) and WAC 173-340-7490(4)(b), which represents a reasonable estimate of the depth of soil that could be excavated and distributed at the soil surface as a result of development activities.

3.2.2. Groundwater

For groundwater, the point of compliance is the point or points where the groundwater PCULs must be met to comply with the cleanup standards. The standard point of compliance will be throughout the site from the uppermost level of the saturated zone extending vertically to the lowest depth that could potentially be affected by WAC 173-340-720(8)(b). As noted above, a conditional point of compliance may be established if compliance with the PCUL cannot be met within a reasonable restoration time frame. Under this scenario, Ecology may approve a conditional point of compliance that shall be as close as practicable to the source area and within the property boundary if it is demonstrated that all practicable methods of treatment are to be used as part of the cleanup. For contaminants extending off-property, an off-property conditional point of compliance may be established if the property is not adjacent to surface water. If contamination approaches a water body via other properties, then PCULs based on the protection of surface water are used and the affected property owners between the source of contamination and the surface water body must agree in writing to the use of the conditional point of compliance.

3.2.3. Indoor Air

The point of compliance for soil vapor is ambient air throughout the UWT Campus WAC 173-340-750(6). A conditional point of compliance (i.e., occupied indoor spaces under a commercial use scenario) may be established that does not exceed the property boundary and does not pose a threat to human health or the environment.

4.0 FIELD INVESTIGATIONS AND REMEDIAL ACTIONS

Multiple investigations and remedial actions have been performed for the UWT Campus and surrounding area since 1991 culminating in the environmental dataset utilized for this RI Report. Collectively, environmental data collected as part of the individual investigations and remedial actions since 1991 are being used to evaluate subsurface conditions and to define the nature and extent of contaminants in the media of concern including soil, groundwater, and soil vapor. Environmental investigations and remedial actions completed prior to the 2016 Agreed Order RI (i.e., previous investigations) and other environmental studies (i.e., capital projects by UW and environmental due diligence studies completed by others) are summarized in Sections 4.1. and 4.2, respectively. Investigation activities completed by GeoEngineers on behalf of UW as required by the 2016 Agreed Order are summarized in Section 4.3. The overall quality of these environmental data for use as part of the UWT Campus RI is discussed in Section 4.4.

4.1. Previous Environmental Investigations and Other Environmental Studies

Multiple investigations were completed on and near the UWT Campus between 1991 and 2016, including investigations associated with the 1997 Agreed Order (DE 97HW-S238) between UW and Ecology, various capital project developments, environmental due diligence during property acquisition (i.e., Phase II Environmental Site Assessments [ESAs]) and investigation activities completed by individual property owners, Ecology and the City.) These investigations included the completion of 684 borings with 116 temporary and 89 permanent wells, and the collection and analysis of 685 soil samples, 820 groundwater samples, 29 stormwater samples, 13 sub-slab soil vapor samples, and 31 air monitoring samples.

An overview of the previous investigations and other environmental studies completed on or near the UWT Campus is presented in Table 4-1. Investigations presented in Table 4-1, with generalized investigation areas shown on Figures 4-1 through 4-5, include the following:

- **Environmental investigations completed prior to the 1997 Agreed Order (Pre 1997 Agreed Order Investigation).** Investigation activities conducted between 1993 and 1994 culminating in the completion of an RI/FS in 1995 for the eastern portion of the UWT Campus.
- **Environmental investigations as required by the 1997 Agreed Order (1997 Agreed Order Investigation).** Investigation activities conducted between 1997 and 2002 culminating in the completion of an RI in 2002 for the eastern portion of the UWT Campus.
- **Supplemental investigations under the 1997 Agreed Order.** Investigation activities completed between 2002 and 2015 under the 1997 Agreed Order to address data gaps identified by Ecology in their review of the 2002 RI and to further evaluate the nature and extent of contamination for the UWT Campus. Investigation activities included:
    - Westerly and Easterly CVOC plumes and Southerly benzene plume have previously been identified in these areas. A series of five investigations were completed between 2002 and 2013 to evaluate the source of contamination in these areas. The 2013 investigation was also completed inside select buildings and on selected properties to evaluate potential contamination that could impact future development.
    - Northerly Plume. Investigation activities to evaluate indoor air and groundwater conditions related to CVOC contamination sourcing from the GWP Building (formerly referred to as Howe).
- **Capital Projects.** Investigations were necessary prior to and during the construction of 20 separate capital projects by UW. Investigation activities were completed in part to further support the characterization of the UWT Campus (specifically following the 1997 and 2016 Agreed Orders) and to ensure that waste streams generated during building redevelopment and/or infrastructure upgrades met Washington State solid waste regulations. Capital projects for the UWT Campus have been completed between 1996 and 2021. In addition to investigation activities completed by UW, performed the City performed independent investigations as follows:
    - 2005. Soil sampling was completed by the City within Market Street to support planning and in conjunction with storm drain replacement activities.
    - 2018. Investigation to evaluate soil and groundwater conditions for an infrastructure project within Jefferson Avenue.
    - 2020. Investigation to evaluate soil and groundwater conditions for an infrastructure project within Fawcett, South 21st Street, and Market Street.
- **Environmental Due Diligence.** Multiple Phase II ESAs were completed during various property acquisitions by UW between 1992 and 2018. In addition to investigations completed by UW, independent investigations related to due diligence have been performed by the City and others as follows:
    - Ecology in 2003. Water sampling in storm drain manholes along South 21st Street was completed by Ecology between Market Street and Pacific Avenue as part of an area-wide stormwater investigation of Tacoma.
    - Farallon Consulting (Farallon) in 2019. Investigation to further evaluate source areas at 1920-1938 Tacoma Avenue South.

The chemical analytical data collected as part of these investigations are presented in Appendix E. These data are used as qualified (see Section 4.4) to support the UWT Campus characterization. Specific details regarding these investigations, as they pertain to Property-Specific and Area-Wide AOCs (Table 2-1) to support the development of the CSMs and define contaminant nature and extent, are described in Sections 5.0 through 17.0. Investigation logs for previous environmental investigations and other environmental studies are presented in Appendix F.

4.2. Previous Remedial Actions

Twenty-two separate remedial actions were completed for the UWT Campus under the 1997 Agreed Order, during capital projects and as part of environmental due diligence between 1993 and 2021. The remedial actions are summarized in Table 4-1 and shown on Figures 4-1 through 4-5. Previous remedial actions completed for the UWT Campus include the following:

- Interim action consisting of injections of EHC treatment reagent® completed to address CVOC groundwater contamination for the Northerly Plume in 2013.
- Remedial action consisting of an In-Situ Submerged Oxygen Curtain (iSOC) and bioventing in-situ treatment completed between 2006 and 2010 to address residual TPH soil and groundwater contamination at the Shaub-Ellison property located at 1902 Pacific Avenue.
- Remedial actions including removal of various petroleum-related USTs and related remedial excavations of petroleum-contaminated soil for the following areas:
    - Cragle Parcel
    - Williams Oil Filter (Science Building)
    - 1742 Jefferson (Formerly Standard Oil)
    - Jet Parking
    - Snoqualmie Library (Formerly Power Station)
    - Shaub-Ellison
    - 1934-1938 Market Street
    - Walsh Gardner Building
    - Sound Care Nursing Home and 1748 Jefferson Way
- Removal of contaminated soil during various capital projects or property purchases completed by UW and the City, including:
    - Prairie Line Trail
    - Joy Building
    - Tioga Library
    - William W. Philip Hall
    - Milgard Hall
    - Science Building
    - Y Student Center
    - South 19th Street and Fawcett Parking Lot

- Phase IIB Utilities
- Y-Student Center
- Strom Building

- Removal and closure of petroleum-related USTs from multiple locations within the UWT Campus Master Plan Boundary. UST removal and closure details are further discussed in this RI Report as it relates to the various AOCs evaluated. Results of the confirmation sampling indicate that residual petroleum-related contamination either was not identified at the final limits of the UST removal excavations or limited quantities of residual contamination remain in place (capped in place with building foundations or asphalt pavement).

The approximate locations of the remedial actions are shown on Figures 4-1 through 4-5. Confirmation samples collected to document conditions at the final excavation limits and/or evaluate post-construction/treatment groundwater conditions are presented in Appendix D. Specific details regarding these remedial actions as they pertain to Property-Specific and Area-Wide AOCs (Table 2-1), how they support the development of the CSMs and how they help define contaminant nature and extent are described in Sections 5.0 through 17.0.

4.3. 2016 Agreed Order Remedial Investigation

Based on the results of environmental investigations and/or remedial actions previously completed at the UWT Campus (Sections 4.1 and 4.2), UW entered into Agreed Order No. DE 11081 (2016 Agreed Order) with Ecology to further investigate subsurface conditions and address data gaps identified in the RI Work Plan. In accordance with the RI Work Plan, and associated RI Work Plan Addenda, soil conditions were further evaluated through the completion of 251 explorations using test pit (TP), hollow stem auger (HSA), and sonic drilling methods (Figure 4-6). In addition, groundwater conditions were further evaluated utilizing a network of new and existing monitoring wells positioned across the UWT Campus and surrounding area.

The 2016 Agreed Order RI was completed across multiple field mobilization and sampling events during 2016, 2018, 2019, 2020, and 2021. During each sampling event, analytical results were evaluated following their receipt, and the RI Work Plan was amended (Work Plan Addendum No. 1 through 9) in coordination with Ecology to ensure adequate environmental data were collected to fill all data gaps and to define the nature and extent of contamination for cleanup evaluation as part of the FS. Ecology participated in regular progress meetings between 2016 and 2021 to discuss the RI results and the identified new potential data gaps based on a review of the RI dataset and approved subsequent Work Plan Addenda to meet the requirements of the 2016 Agreed Order. The RI Work Plan and subsequent addenda are summarized in Table 4-2. The investigations were completed to the extent practicable based on access limitations. Investigation locations completed under the 2016 Agreed Order are shown on Figure 4-6.

The investigation activities completed to meet the objectives of the Ecology-approved RI Work Plan and subsequent addenda are summarized in the following sections (Sections 4.3.1 through 4.3.4).

4.3.1. Soil Investigation

The soil investigation was completed in general accordance with the Ecology-approved RI Work Plan and subsequent addenda to characterize the subsurface conditions and to define the nature and extent of contamination in soil. Exploration locations were selected to collect soil samples to address the specific

investigation objectives of filling identified data gaps and to provide comprehensive coverage of individual AOCs (Property-Specific and Area-Wide). Information from previous investigations (described above) and historical operations were used to support the selection of the soil sample locations. Soil sampling and analysis completed as part of the RI are described below in Sections 4.3.1.1 through 4.3.1.2.

4.3.1.1. Soil Sample Collection and Laboratory Analysis

The soil investigation consisted of collecting soil samples from a total of 251 explorations using HSA and sonic drilling methods between 2016 and 2021. Field screening during sample collection consisted of visual observations for contamination (i.e., staining, etc.), water sheen testing, and organic vapor monitoring. The procedures for soil sample collection, handling, field screening, and transport to the laboratory, as well as exploration logs detailing the materials encountered and field screening results, are presented in Appendix G.

Soil samples were submitted for chemical analysis based on the results of previous investigations, the presence of fill, and/or proximity to specific historical features (i.e., chlorinated source area and/or petroleum-related source area) as described in the RI Work Plan and to meet MTCA Table 830-1 for Petroleum Releases (WAC 173-340-700). Selected soil samples were submitted for a combination of the following analyses:

- Volatile organic compounds (VOCs) by Environmental Protection Agency (EPA) Method 8021 or 8260.
- Polycyclic Aromatic Hydrocarbons (PAHs) by EPA Method 8270 SIM.
- Hydrocarbon Identification by Northwest Total Petroleum Hydrocarbon Identification Method (TPH-HCID).
- TPH-G by Method NWTPH-Gx.
- TPH-D and TPH-O by Method NWTPH-Dx.
- Metals including arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver by EPA 6000/7000 Method Series.

Soil samples obtained during the RI were submitted to OnSite or Test America of Tacoma, Washington (Test America), Ecology-certified laboratories, for chemical analysis. The analytical results for soil samples collected as part of the RI are presented in Appendix H. Chemical analytical laboratory reports for soil samples collected during the 2016 Agreed Order RI are included in Appendix I. Chemical results related to the individual investigation areas are presented and further discussed in Sections 5.0 through 17.0.

Additionally, select soil samples collected during the RI were also submitted for a combination of the following physical analyses:

- Grain-size analysis in accordance with American Society for Testing and Materials (ASTM) D 421 and ASTM D 422.
- Bulk density in accordance with ASTM Method D2937.
- Moisture content in accordance with SM 2540 G-97.
- Porosity in accordance with United States Army Corps of Engineers Engineering (USACE) Method 1110-2-1906.

- Total organic carbon by EPA method 9060.
- pH by EPA method SW9045D.

Campus soils range from low-plasticity silt to sand and gravel deposits with varying amounts of silt. These soil types are consistent with the geologic units presented in Section 2.3.2 above. Physical analytical laboratory reports are presented in Appendix J.

4.3.1.2. Deviations from the RI Work Plan

The following deviations from the RI Work Plan were noted during the soil field investigation:

- Explorations A6-B11, A6-B12, A6-MW13M, A7-MW4S, A7-MW7S, A8-MW1S, A8-TP, A10-MW2D, A11-B10A, A11-B16, A11-MW4S, A11-MW16S, A11-MW19S, A11-MW34D, A11-MW34S, BA-MW1S, JS-MW5S, PS5-DP8, UG-MW10S, UG-MW11S, and UG-MW15S were not completed either due to access limitations, the presence of buried or overhead utilities, and/or were not relocated due to their proximately to other borings (historical and/or 2016 Agreed Order RI locations). Ecology was consulted when a particular location either could not be accessed, or the relocation of a proposed boring would have resulted in placing it near a previous boring.

- Physical analysis was not completed on borings completed in 2021. The soil samples were archived, and physical analysis can be completed in the future as required by the FS.

4.3.2. Groundwater Investigation

The groundwater investigation was completed in general accordance with the Ecology-approved RI Work Plan and subsequent addenda to characterize groundwater flow characteristics and gradients at the UWT Campus and to define the nature and extent of contamination in groundwater. To meet the objectives of the groundwater investigation, 142 permanent wells were installed with "grab" water samples collected at an additional 33 temporary well locations. Monitoring well locations installed as part of the 2016 Agreed Order RI, shown on Figure 4-6, were selected to address data gaps identified in the RI Work Plan and to provide comprehensive coverage of the UWT Campus. Information from previous investigations (described above) and historical operations were used to support the selection of the well (permanent and temporary) locations and the locations (both new and existing) for hydrogeologic testing and groundwater sampling. The procedures for monitoring well installation and development are presented in Appendix G. Survey documents to locate and document ground surface elevations are presented in Appendix K.

Aquifer testing completed to evaluate groundwater flow and gradients are described in Section 3.4.2.1. Groundwater sampling and analyses are described in Section 3.4.2.2.

4.3.2.1. Hydrogeologic Testing

Hydraulic conductivity testing and UWT Campus-wide groundwater elevation monitoring were completed to characterize hydrogeologic properties of the geologic units present at the UWT Campus and surrounding area and to evaluate groundwater flow characteristics and gradients for the Qvi and Qva aquifers. In accordance with the RI Work Plan (and subsequent addenda), hydraulic conductivity was estimated by conducting rising- and falling-head slug tests in 81 new and existing monitoring wells across the UWT Campus. To evaluate campus-wide flow and gradients, pressure transducers were deployed in up to 82 monitoring wells with water level readings collected between October 2016 and September 2021. Monitoring well locations where slug tests and pressure transducers were deployed are shown on

Figures 4-7 and 4-8, respectively. Procedures used to measure the hydraulic conductivity of groundwater are presented in Appendix G.

During each slug test, groundwater levels in the well being evaluated were measured and recorded both manually and using a pressure transducer with a data logger. The slug test groundwater level data were evaluated using spreadsheet software and then plotted to identify the type of hydraulic response and to derive estimates of hydraulic conductivity in the vicinity of the wells evaluated. The specific procedures used to perform the hydraulic conductivity testing and an evaluation of the test results are presented in Appendix L. The results from hydraulic conductivity testing completed as part of the RI are discussed further in Sections 5.0 through 17.0 as they relate to the individual Property-Specific and Area-Wide AOCs.

Water level measurements were recorded in select monitoring wells using pressure transducers with data loggers to evaluate seasonal changes in groundwater elevations and flow characteristics for the Qvi and Qva aquifers. A separate pressure transducer with a data logger was used to record barometric pressure changes during the study. The barometric data were used to correct the groundwater level data for barometric effects. The results of the groundwater gradient and flow study were used to estimate groundwater gradients across the UWT Campus. The specific procedures used to perform the groundwater gradient and flow study and an evaluation of their results are presented in Appendix L. Seasonal variations and flow characteristics for the Qvi and Qva aquifers based on the results of this study are presented in Section 2.3.2 and discussed further in Sections 5.0 through 16.0 as they relate to the individual Property-Specific and Area-Wide AOCs.

4.3.2.2. Groundwater Sample Collection and Chemical Analysis

Groundwater samples were collected from temporary wells during discrete sampling events corresponding to the time of various soil investigation activities. Additionally, up to five rounds of groundwater monitoring were completed from permanent wells to characterize groundwater conditions for the UWT Campus. This campus-wide groundwater monitoring was completed as a discrete event in December 2016 and then on a semi-annual basis between March 2018 and September 2020 in general accordance with the RI Work Plan and subsequent addenda. Groundwater samples were collected using a decontaminated non-dedicated bladder pump after field-measured water quality parameters (turbidity, temperature, conductivity, pH, dissolved oxygen [DO], and oxygen reduction potential [ORP]) stabilized. The procedures for groundwater sample collection, handling, and transport to the laboratory are presented in Appendix G. Water quality parameters measured at the time of sample collection are presented in Appendix H.

Groundwater samples were submitted for chemical analysis based on the results of previous investigations, the presence of fill, and/or proximity to specific historical features (i.e., chlorinated source area and/or petroleum-related source area) as described in the RI Work Plan and to meet MTCA Table 830-1 for Petroleum Releases (WAC 173-340-700). Selected groundwater samples were submitted for a combination of the following analyses:

- VOCs by EPA Method 8021 or 8260.
- Semi-volatile organic compounds (SVOCs) by EPA Method 8270/SIM.
- PAHs by EPA Method 8270 SIM.
- Hydrocarbon Identification by Method NWTPH-HCID (TPH-HCID).
- TPH-G by Method NWTPH-Gx.

- TPH-D and TPH-O by Method NWTPH-Dx.
- Total and/or dissolved lead by EPA Method 200.
- Dissolved gases including ethene, ethane, and methane by method RSK 175.

Additionally, select groundwater samples collected during the RI were also submitted for a combination of the following geochemical analyses:

- Total iron by EPA Method 6010.
- Nitrate and nitrite by EPA Method 353.2.
- Total organic carbon (TOC) by Method 415.1.
- Biochemical oxygen demand (BOD) by EPA Method SM5210B.

Groundwater samples obtained during the RI were submitted to OnSite or Test America for chemical analysis. The methods and procedures for the collection, handling, and transport of groundwater samples for laboratory analysis are presented in Appendix G. The analytical results for groundwater samples collected as part of the RI are presented in Appendix H. Chemical analytical laboratory reports for groundwater samples collected during this RI are included in Appendix I. Chemical results related to the individual investigation areas are presented and further discussed in Sections 5.0 through 17.0.

4.3.2.3. Deviations from the RI Work Plan

There were no significant deviations from the RI Work Plan for the groundwater investigation with the exception of groundwater sample collection from locations A6-MW13M, A7-MW4S, A7-MW7S, A8-MW1S, A10-MW2D, A11-B16, A11-MW4S, A11-MW16S, A11-MW19S, A11-MW34D, A11-MW34S, BA-MW1S, JS-MW5S, UG-MW10S, UG-MW11S and UG-MW15S which were not completed (see rationale presented in Section 4.3.1.2). Additionally, transducers were not installed in wells A11-MW17S, UG-MW5, PS3-MW1S, and PS3-MW1D.

4.3.3. Indoor/Outdoor Air and Soil Vapor Investigation

Air sampling (indoor and outdoor) was completed in general accordance with the Ecology-approved RI Work Plan and subsequent addenda to evaluate the potential for VI into occupied UWT Campus buildings at select locations based on previous investigation results. Air sampling investigation areas are shown on Figure 4-6 and further discussed in Sections 4.3.3.1 and 4.3.3.2 below.

4.3.3.1. Indoor Air and Soil Vapor Collection and Laboratory Analysis

A VI evaluation, including sub-slab and indoor and ambient (outdoor) air samples, was conducted in May 2017 within four buildings (Garretson Woodruff & Pratt, Birmingham Block [BB], Birmingham Hay & Seed [BHS], and West Coast Grocery [WCG] Buildings). Additionally, a VI evaluation was completed within the Federal Courthouse in March 2018 after access was granted. As part of these evaluations, 11 sub-slab soil vapor and 18 indoor and ambient air samples were collected to characterize and evaluate the soil vapor conditions and evaluate the potential for VI in these buildings. Sub-slab soil vapor samples were collected using Vapor Pin® sampling devices. Indoor and outdoor air samples were collected within the buildings and on the roof of the buildings near the heating, ventilation and air conditioning (HVAC) intakes using 6-liter Summa canisters equipped with an 8-hour flow controller. The sub-slab soil vapor, indoor, and ambient air samples were submitted to an analytical laboratory for chemical analysis of CVOCs including

TCE, PCE, DCE (1,1-dichloroethylene), cis-DCE (cis-1,2-dichloroethylene), trans-DCE (trans-1,2-dichloroethylene), and vinyl chloride by EPA Method TO-15 for the soil vapor samples and EPA Method TO-15 SIM for the indoor and ambient air samples.

A subsequent VI evaluation was conducted in June 2020 at one of the four buildings (BB; Figure 4-6) at the request of Ecology. As part of this evaluation, one indoor air sample was collected within the BB building and two ambient air samples (one near the HVAC intake on the roof of the BB building and one near the HVAC intake on the north-adjacent Joy building) were collected. The samples were submitted to an analytical laboratory for chemical analysis of TCE, PCE, DCE, cis-DCE, trans-DCE, and vinyl chloride by EPA Method TO-15 SIM.

The procedures for vapor sample collection, handling, and transport to the laboratory are presented in Appendix G. The analytical results for vapor samples collected as part of the RI are presented in Appendix H. Chemical analytical laboratory reports for soil samples collected during this RI are included in Appendix I. Air sampling results as they relate to the potential for VI into occupied spaces at the individual investigation areas are presented and further discussed in Sections 5.0 through 17.0.

4.3.3.2. Deviations from the RI Work Plan

There were no significant deviations from the RI Work Plan for the Air and Soil Vapor Investigation.

4.3.4. Passive Soil Vapor Survey

A passive soil vapor survey was conducted in the vicinity of the sanitary sewer mainline within Tacoma Avenue South, generally between South 18th Street and South 19th Street, and within the footprint of the building located at 1722 Tacoma Avenue South completed in general accordance with the Ecology-approved RI Work Plan and subsequent addenda. These soil vapor surveys used Amplified Geochemical Imaging (AGI) passive sorbent samplers. The purpose of the passive soil vapor sampling was to provide a high-resolution dataset to characterize soil vapor to assist in identifying locations for follow-up soil and groundwater sampling. The passive soil vapor samplers consisted of an absorbent material that collects VOCs in soil vapor over a 3 to 6-day period. The compounds of interest are then thermally desorbed by the laboratory to be quantified by mass spectrometry. Survey activities completed in the vicinity of the City's sanitary sewer within Tacoma Avenue South and for the 1722 Tacoma Avenue South area are summarized below.

4.3.4.1. Tacoma Avenue South Sanitary Sewer Passive Soil Vapor Survey

In May 2020, a total of 29 passive soil vapor samplers were installed along an approximate 1,000-foot section of sanitary sewer mainline located within Tacoma Avenue South, between about 250 feet north of South 18th Street and 150 feet south of South 19th Street (Figure 4-8). The soil vapor survey was conducted in three test areas: Test Area 1, Test Area 2, and Test Area 3. Three soil vapor samples were collected from Test Area 1, which was used as a control area assumed to be upgradient of the potential contaminant source. Six soil vapor samples were collected from Test Area 2, located about 50 feet south of Test Area 1, in the ROW adjacent to the building at 1722 Tacoma Avenue South. Twenty soil vapor samples were collected from Test Area 3, located in the Tacoma Avenue South ROW about 300 feet south of Test Area 1 and extending across South 19th Street adjacent to the building at 1902 Tacoma Avenue South. Passive vapor samples were also placed in five manholes located within Tacoma Avenue South between South 17th Street and South 21st Street. One sampler was damaged during sampling and was not analyzed. Upon collection, the samplers were submitted to AGI for VOC analysis.

4.3.4.2. 1722 Tacoma Avenue South

In October 2020, 35 passive soil vapor samplers were installed within the footprint of the building at 1722 Tacoma Avenue South. The soil vapor samplers were located to correspond with historic building features and areas where solvents may have been handled and/or disposed of, including around former plumbing features (e.g., sinks and floor drains) and at the locations of rooms/areas identified as having a chemical use (e.g., solvent room, acid room, etc.). Upon collection, the samples were submitted to AGI for VOC analysis. Soil vapor chemical analytical results for the sanitary sewer mainline and 1722 Tacoma Avenue South are presented in Appendix N and further discussed below (Section 13.0) as they relate to contaminant nature and extent.

4.3.5. Stormwater/Sanitary Sewer Investigation

4.3.5.1. Stormwater and Sanitary Sewer Sample Collection and Laboratory Analysis

The stormwater/sanitary sewer sampling activities were completed in general accordance with the Ecology-approved RI Work Plan and subsequent addenda to evaluate potential source areas and the migration of contaminants within the City's utility infrastructure to other portions of the UWT Campus. Sampling activities included the evaluation of baseline flow through these systems, and the collection of water and sediment samples at select locations, as discussed below.

The condition of select sections of the sanitary sewer and stormwater system was evaluated in general accordance with the Ecology-approved RI Work Plan and subsequent addenda and the investigation generally included:

- **Stormwater System West of Market Street.** Documented base water flow in the stormwater system in 15 manholes during each campus-wide groundwater sampling event. Water samples were collected from nine manholes where water was observed flowing in the system.
- **1934-1938 Market Street and Market Street.** Completed a video of the sanitary sewer and stormwater system within the 1934-1938 Market Street Building parking lot to evaluate the condition and location of laterals to adjacent buildings. Water samples were collected from two catch basins within Market Street and sediment and water samples were collected from three drains in the parking lot of 1934-1938 Market Street.
- **Potential Dry Well in ROW and East of 1922 Tacoma Avenue South.** Sediment and water samples were collected from the material within the potential dry well (TAC-Manhole). The water within the manhole was also removed via a vacuum truck to allow for video inspection in 2020.

A total of 54 water samples were collected from the stormwater system between 2016 and 2020. Three sediment samples were collected in the 1934-1938 Market Street parking lot drains in September 2019. Two water samples and one sediment sample were collected from the potential dry well in May 2019 and July 2020. Selected sediment and water utility samples were submitted for a combination of the following analyses:

- VOCs by EPA Method 8021 or 8260.
- TPH-G by Method NWTPH-Gx.
- TPH-D and TPH-O by Method NWTPH-Dx.

Water and sediment samples obtained during the RI were submitted to OnSite for chemical analysis. The methods and procedures for the collection, handling, and transport of samples for laboratory analysis are presented in Appendix G. The analytical results for water and sediment samples collected as part of the RI are presented in Appendix H. Chemical analytical laboratory reports for water and sediment samples collected during this RI are included in Appendix I. Chemical analyses related to the individual investigation areas are presented and further discussed in Sections 5.0 through 17.0.

In addition, video surveys were completed on stormwater and sanitary sewer systems after 2018 to identify the laterals to adjacent buildings and to prevent damage to the laterals during drilling.

4.3.5.2. Tacoma Avenue South Sanitary Sewer Assessment

City inspection records (2008 and 2011 assessment [Appendix M]) of the sanitary sewer mainline located within Tacoma Avenue South, between South 17th Street and South 21st Street were reviewed to evaluate potential migration pathways for contaminants to enter and/or exit this system given its proximity to potential adjacent source areas. The sanitary sewer mainline in this area is constructed with approximately 2-foot-long terra cotta pipe sections with grouted joints. Lateral pipes feeding the sewer main pipe from buildings constructed along Tacoma Avenue South were joined to the sewer mainline using both factory taps and post-construction break-ins with grouted connections.

Results of our review of the City's 2008 and 2011 assessments identified numerous holes, cracks, and areas of settled deposits. These cracks and holes were identified as preferential pathways for contaminant migration into and/or out of the sanitary sewer along Tacoma Avenue South and are further discussed in Section 13.0.

4.3.5.3. Deviations from the RI Work Plan

There were no significant deviations from the RI Work Plan as part of the Stormwater/Sanitary Sewer Investigation.

4.3.6. Geophysical Surveys

Geophysical surveys were completed at various portions of the UWT Campus to locate underground utilities (e.g., electric conduits, sanitary sewer pipes, stormwater pipes, etc.) and USTs, and to help identify magnetic anomalies recorded in previous investigations, and/or identify geologic anomalies encountered during drilling activities (e.g., voids). These surveys included ground penetrating radar (GPR), electromagnetic (EM), and microgravity surveying methods. Geophysical survey reports are included in Appendix O and are discussed in Sections 4.3.5.1 through 5.3.5.3, below.

4.3.6.1. Ground Penetrating Radar and Electromagnetic Survey—1922 Tacoma Avenue South Property

In accordance with the RI Work Plan, GPR, and EM surveys were completed in January 2021 by Global Geophysics, LLC at 1922 Tacoma Avenue South. The surveys were conducted to locate buried utilities and possible USTs that could be potential contaminant sources. The GPR method used an antenna to emit electromagnetic pulses at regular intervals to map subsurface features. Similarly, the EM method transmits electromagnetic pulses that induce eddy currents in buried metallic objects.

Multiple linear anomalies were identified during the GPR survey and were interpreted as buried utilities. Three anomalies were identified during the EM survey, including two buried metal objects and one linear pipe. The two buried metal objects were determined not to be USTs based on the depth, size, and shape indicated in the geophysical profile.

4.3.6.2. Microgravity Survey—1701 Tacoma Avenue South Property (Upton)

A microgravity survey was conducted at the Upton Parcel located at 1701 Tacoma Avenue South in October 2018 by Dr. Kevin Mickus, Ph.D. (Missouri State University, Springfield). The microgravity survey method used a gravimeter to measure differences in the densities of subsurface materials to determine the size and shape of potential subsurface voids. Such a void was encountered during drilling operations at boring location A6-MW5D (see Figure 4-6) between about 30 and 42.5 feet bgs. The void at this location is believed to be the result of an ice block buried during the most recent (Vashon Stade) period of glaciation. The microgravity survey confirmed the lateral extent of the void encountered during drilling. However, the vertical extent of the void could not be determined.

4.3.6.3. Ground Penetrating Radar and Electromagnetic Survey— 1755 Fawcett Avenue (Kelly)

GPR and EM surveys were completed at the northwest corner of the intersection of South 19th Street and Court D to evaluate the presence or absence of a potential UST left in place during building demolition. No UST was found at this location.

4.3.6.4. Deviations from the RI Work Plan

There were no significant deviations from the RI Work Plan for the Geophysical Investigation.

4.4. Environmental Data Used for the UWT Campus Remedial Investigation

The analytical results collected by GeoEngineers under the Ecology-approved RI Work Plan and associated addenda to fulfill the requirements of the 2016 Agreed Order underwent data validation as discussed in the following section (Section 4.4.1) were determined to be of acceptable quality for use. Laboratory data reports and associated validation reports are presented in Appendix I and P, respectively.

Soil, groundwater, sub-slab vapor, indoor air, and/or stormwater data from previous investigations of the UWT Campus were also reviewed for technical quality for use as part of the RI. Environmental data in which sample locations, sample depth, analytical methods, and chemical analytical results could be verified were considered acceptable for use by the RI to evaluate COPCs and contaminant nature and extent as documented by this report. A review of the chemical analytical data collected as part of previous environmental investigations and their technical quality for use by the RI are presented in Table 4-1.

4.4.1. Data Validation

Analytical data collected by GeoEngineers in accordance with the RI Work Plan and Addenda between 2016 and 2021 were reviewed in accordance with EPA guidelines for data review (1049, 1050) to determine whether the laboratory reporting limits (RLs) were less than the applicable soil, groundwater, water, or air SLs for the chemicals analyzed, and if accuracy and precision were sufficient to provide defensible data. Chemical analytical data reports for the 2016 Agreed Order RI are presented in Appendix I. Data validation reports for these data packages are presented in Appendix P.

4.5. Determination of Contaminants of Potential Concern

Chemical analytical results as qualified were determined to be acceptable for use for the RI. Note that acetone, methylene chloride, and carbon disulfide were detected in numerous soil and groundwater samples. However, these contaminants are generally considered laboratory contaminants due to the lack of historical use of these compounds at the subject properties, and the limited number of detections observed. Summary statistics for COPCs evaluated as part of the UWT Campus RI are presented in Tables

4-3 through 4-5. Table 4-3 presents COPCs for VI. Table 4-4 presents COPCs for groundwater. Table 4-5 presents COPCs for soil.

Environmental data for soil and groundwater samples were compared to the PCULs presented in Section 3.0 to identify: (1) which contaminants were not detected; (2) the magnitude of contaminant concentration relative to the PCUL; and (3) the frequency at which a contaminant exceeded a PCUL. Tables 4-3 through 4-5 present summary statistics for the number of samples analyzed, the frequency at which analytes were detected at a concentration greater than the PCUL or SL for VI, and the magnitude of the exceedance (i.e., exceedance factor). Analytes that were detected at concentrations greater than the PCUL were retained as COPCs if they met either of the following criteria:

1. The analyte had an exceedance frequency of at least 10 percent; and/or
2. The analyte had an exceedance ratio of 2 (i.e., greater than 2 times the PCUL) or more.

The frequency at which a contaminant exceeds the PCUL or SL for VI is termed the "exceedance frequency (EF)." The magnitude by which a contaminant exceeds the PCUL is termed the "exceedance ratio (ER)." The ER is derived by dividing the detected contaminant concentration by the concentration of the PCUL while the exceedance frequency is derived by dividing the number of samples detected at a concentration greater than the PCUL by the total number of samples analyzed.

Evaluation of COPCs in each medium was completed in a stepwise fashion where VI potential was followed by groundwater and then the soil was evaluated. For VI potential (Table 4-3), soil and groundwater data were screened to determine whether there was a sufficient concentration that a contaminant could volatilize and potentially migrate into an occupied enclosed space (i.e., potentially complete exposure pathway). If the VI pathway was determined to be incomplete (i.e., EF less than 10 percent or ER less than 2), VI analytes were not retained for further evaluation. If the EF was greater than 10 percent or the ER was greater than 2, then the COPC was retained for further evaluation for the individual AOCs (see Sections 5.0 through 17.0).

Groundwater data were then compared to PCULs for protection of marine surface water and drinking water, to identify groundwater COPCs (Table 4-4). For this evaluation, an analyte was retained as a COPC if either the EF was greater than 10 percent or EF was greater than 1 for the protection of surface water and/or drinking water PCUL. If an analyte was identified as a groundwater COPC, then the soil to groundwater exposure pathway was determined to be complete and the corresponding analyte in soil was compared to PCUL for both the protection of groundwater (surface water and drinking water) and direct contact (Table 4-5). If an analyte was not identified as a groundwater COPC, then the soil to groundwater exposure pathway was determined to be incomplete and the corresponding analyte was only compared to PCUL protective of direct contact (Table 4-5). COCs identified for each medium are summarized in the following sections.

4.5.1. Contaminants of Potential Concern for Vapor Intrusion

Table 4-3 presents the COPC evaluation for VI potential on a UWT Campus-wide basis utilizing soil and groundwater data from 1993 to 2021. Identified COPCs for VI potential include the following:

- **TPH.** TPH-G and TPH-D are identified as COPCs for potential VI.
- **BTEX**. Benzene, toluene, ethylbenzene and total xylenes (BTEX) are identified as COPCs for potential VI.

- **CVOCs.** PCE, TCE, cis-DCE, vinyl chloride, DCA, and chlorobenzene are identified as COPCs for potential VI.
- **Other VOCs.** 1,2,4-trimethylbenzene (1,2,4-TMB), 1,3,5-trimethylbenzene (1,3,5-TMB), 1,2-dibromoethane (EDB), 1,2-dichloroethane (EDC) and naphthalene are identified as COCs for potential VI.

Summary statistics for potential VI for individual Property-Specific and Area-Wide AOCs (see Section 2.2.1) are presented in Appendix Q and further discussed in Sections 5.0 through 17.0.

4.5.2. Groundwater Contaminants of Potential Concern

Table 4-4 presents the COPC evaluation for groundwater on a UWT Campus-wide basis utilizing groundwater data from 1993 to 2021. Identified groundwater COPCs include the following:

- **TPH.** TPH-G, TPH-D, and TPH-O are identified as COPCs for groundwater.
- **BTEX**. BTEX are identified as COPCs for groundwater.
- **CVOCs.** CVOCs and breakdown products of CVOCs including PCE, TCE, trans-DCE, cis-DCE, DCE, vinyl chloride, TCA, DCA, chloroethane, and chlorobenzene are identified as COPCs for groundwater.
- **Other VOCs.** 1,2,4-TMB and 1,3,5-TMB are identified as COPCs for groundwater.
- **PAHs.** Naphthalene is identified as COPC for groundwater.

In addition, other petroleum-related VOCs including EDC, EDB, and methyl tert-butyl ether (MTBE) were retained as a COPC for consistency with MTCA Table 830-1 for Petroleum Releases. Other analytes were not selected as COPCs because they were infrequently detected and/or did not exceed the groundwater PCUL for the protection of drinking water and surface water. Groundwater summary statistics for individual Property-Specific and Area-Wide AOCs (see Section 2.2.1) are presented in Appendix Q and further discussed in Sections 5.0 through 17.0.

4.5.3. Soil Contaminants of Concern

Table 4-5 presents the COPC evaluation for soil on a UWT Campus-wide basis. Identified soil COPCs include the following:

- **TPH.** TPH-G, TPH-D, and TPH-O are identified as COPCs for soil.
- **BTEX**. BTEX are identified as COPCs for soil.
- **CVOCs.** PCE, TCE, trans-DCE, cis-DCE, DCE, vinyl chloride, TCA, DCA, chloroethane, and chlorobenzene are identified as COPCs for soil.
- **Other VOCs.** 1,2,4-TMB and 1,3,5-TMB are identified as COPCs for soil.
- **PAHs.** Naphthalene and total cPAH calculated using the toxicity equivalent quotient (TEQ) methodology are identified as COPCs for soil.
- **Metals.** Arsenic, cadmium, and lead are identified as COPCs for soil.

In addition, other petroleum-related VOCs including EDC, EDB, and MTBE were retained as COPCs for consistency with MTCA Table 830-1 for Petroleum Releases. Other analytes were not selected as CPOCs

because they were infrequently detected and/or did not exceed the soil PCULs. Soil summary statistics for individual Property-Specific and Area-Wide AOCs (see Section 2.2.1) are presented in Appendix Q and further discussed in Sections 5.0 through 17.0.

5.0 REMEDIAL INVESTIGATION—CRAGLE

5.1. Introduction

Cragle is located at 1950 South C Street in Tacoma, Washington (Figure 5-1). Environmental data collected during soil and groundwater environmental investigations (further discussed in Section 5.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of TPH-G, TPH-D, TPH-O, BTEX, petroleum-related VOCs, naphthalene, and cPAHs in soil, and TPH-D and benzene in groundwater at concentrations greater than their respective PCULs. Summary statistics for soil and groundwater identifying COCs for Cragle are presented in Tables Q-1 and Q-2 (Appendix Q). Specifically, historical operations causing COC releases included fuel distribution operations by the Pacific Fuel Company and Griffin Fuel Company (which operated between 1889 and at least 1969), auto storage, service operations by multiple companies (which operated between 1928 and 1989) and used oil recycling by Arrcom Oil and Ramcor (which operated between 1981 and 1984).

However, most of the identified soil contamination was removed between the 1990s and 2020 through multiple phases of remedial actions including excavation and soil treatment . The extent of residual TPH-G, TPH-D, TPH-O, BTEX, naphthalene, cPAHs, and petroleum-related VOC soil contamination (Cragle Site; Figure 5-1) is currently limited to the central and eastern portions of Cragle and within portions of South C Street from approximately 2 to 22 feet bgs. In groundwater, localized exceedances of TPH-D and benzene were observed in the shallow Qvi aquifer immediately downgradient of the remedial excavation area (within South C Street). In 2022, the Milgard Hall Capital Project replaced the previous UWT Campus parking lot with the Milgard Hall building. Engineering controls including a sub-slab vapor mitigation system and surrounding hardscapes (sidewalks, parking lot, pavement in South C Street) were constructed in conjunction with the Milgard Hall building to prevent direct contact with the residual contamination and potential migration of contaminant vapors from entering the occupied indoor spaces. Additionally, the stormwater collection system for Milgard Hall and the surrounding area limits infiltration of precipitation that could contribute to contaminants leaching from soil to groundwater. Residual soil and groundwater contamination for the Cragle Site (as defined by TPH-G, TPH-D, TPH-O, BTEX, naphthalene, cPAHs, and/or petroleum-related VOC PCUL exceedances) based on post-remedial action data is generally stable and not migrating further downgradient of this area.

In addition, environmental data collected as part of the RI indicate a CVOC-contaminated groundwater plume that extends beneath the central and northern portions of Cragle associated with the Easterly Plume. Groundwater contamination associated with the Easterly Plume is further discussed in Section 15.0.

Cragle (AOC 1 in the 2016 Agreed Order) and the Cragle Site (residual TPH-G, TPH-D, TPH-O, BTEX, naphthalene, cPAHs, and petroleum-related VOCs contamination in soil and TPH-D and benzene contamination in groundwater) are shown relative to surrounding features on Figure 5-1. Terminology for Cragle referenced by this RI is described below:

- **Cragle.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019050027 (1.08-acre parcel). Historically, the parcel was split into two parcels (2019050023 and 2019050025) and did not include the ROW.
- **Cragle Site.** The area and media containing contamination exceeding PCULs associated with historical operations and/or land use.
- **Milgard Hall Capital Project.** The Milgard Hall Capital Project was completed in 2021/2022 for construction of the UW Milgard Hall building. The extent of the Milgard Hall Capital Project included the central and northern portions of Cragle for the new building as well as portions of the surrounding parcels for parking lot improvements, pedestrian access, and new utility infrastructure.
- **PLT.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 0320043155, which is further discussed in Section 7.0.
- **Snoqualmie Library.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019050026, which is further discussed in Section 12.0.
- **Easterly Plume.** The extent of CVOC (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) contamination associated with historic operations at 1934-1938 Market Street and within Commerce Street and South C Street, which is further discussed in Section 15.0.

Specific details regarding the historical property use leading to the release of contaminants, RI activities completed to date, the CSM, and the nature and extent of contamination associated with Cragle are summarized below.

5.2. Property Conditions

5.2.1. Location and Description

Cragle is located at 1950 South C Street in the southeast portion of the UWT Campus between South C Street and the PLT pedestrian corridor north of South 21st Street (Figure 5-1). Cragle has recently been redeveloped with the construction of the Milgard Hall building and an associated parking lot (Milgard Hall Capital Project). The ground surface is predominantly covered by pavement and the new Milgard Hall building except for limited landscaped areas. The finished floor elevation of the new Milgard Hall building is 79.5 feet. The surrounding area slopes down to the north with ground surface elevations ranging from approximately 83 to 70 feet within South C Street and from approximately 90 to 82 feet within the PLT pedestrian corridor. Milgard Hall is connected to the PLT pedestrian corridor by a series of ramps and stairs. The redevelopment of the PLT pedestrian corridor as part of the PLT Capital Project is further described in Section 7.0.

5.2.2. Historical Land Use

Historically, Cragle was used for varying commercial purposes including coal storage and distribution, wood storage, fuel yard operations, auto-related operations (painting, maintenance, and storage of cars, trucks, and golf carts), and used oil recycling. The used oil recycling operation was regulated as a hazardous waste treatment, storage, and disposal facility (TSDF) by the EPA. The operational periods for these various land uses overlap and are inconsistently reported. However, available records indicate the following:

Photo 5-1. Circa 1965 photograph of Griffin-Galbraith Fuel Company.

- **1896**. Fuel (coal) storage and distribution (Tacoma Bituminous Paving Company).
- **1889-1969**. Fuel distribution-related operations including coal and presto log storage (Pacific Fuel Company, Griffin Fuel Company, and Griffin and Galbraith)
- **1928-1989**. Auto-related uses including storage and service operations for trucks, cars, and golf carts (Twenty-First Street Garage, Double R Trucking, Ace Motor Truck Company, Roger's Auto Electric Service, Schinnell Body and Fender, Harley-Davidson Golf Carts, Holman Trucking, Ace Motor Truck Company).
- **1981-1984**. Used oil recycling (Hazardous waste TSDF) operations associated with EPA Identification Number WAD-98066-4718 (Arrcom Oil, Ramcor).
- **1993**. Petroleum-contaminated soil treatment.
- **1994-2021.** UWT Campus paved parking.
- **2021-2022.** Milgard Hall building construction for academic use with associated UWT Campus parking.

Multiple buildings and structures on Cragle were associated with the historical commercial/industrial land uses described above. Those buildings and structures included three warehouse style-buildings, a coal shed on the southern half of the property, two coal bunkers, and a concrete shed on the northern half of the property. The coal shed and bunkers were connected via a rail spur to the rail operations to the west. Multiple USTs, ASTs, and hydraulic hoists were present. This infrastructure was removed in the 1990s following the acquisition by UW to construct a Campus parking lot and later Milgard Hall. Historical land use, structures, and features for Cragle and the surrounding area are shown on Figure 5-2.

Historic land use adjacent to Cragle included railway operations (Prairie Line), photo developing, fuel distribution (wood and coal) operations, and power distribution (electrical transformer house) operations. Specific historical land use related to PLT and Snoqualmie Library are described further in other sections of this document.

5.2.3. Current and Future Land Use

UW purchased the Cragle property and adjacent properties in the early 1990s including the Snoqualmie Library properties. UW was gifted the PLT property in 2013 by BNSF Railway (BNSF). The structures on the adjacent properties have either been renovated or demolished and redeveloped as new campus buildings or pedestrian access since that time. The redevelopment of Cragle (Milgard Hall Capital Project) was completed in 2022 to support the continuing academic growth of the UWT Campus. The footprint of the Milgard Hall Capital Project along with associated subsurface utilities and adjacent properties are shown on Figure 5-3.

Anticipated future land use in this area will remain academic to support the UWT Campus with parking lots, surface streets, and pedestrian access.

5.2.4. Utility Infrastructure

Current utility infrastructure within and adjacent to Cragle with the potential to serve as preferential pathways for contaminant migration is shown on Figure 5-3 and includes the following:

- A north-south oriented 8-inch-diameter sanitary sewer line was located within the South C Street ROW with an inlet elevation of approximately 73 feet. This sanitary sewer line was disconnected and abandoned in place by the City in 1995. Sewer laterals to the former warehouse buildings on Cragle are likely present but their locations are unknown.
- A utility duct bank located under the sidewalk east of the new Milgard Hall building at a depth of approximately 4 to 6 feet bgs.
- An abandoned stormwater line exists at a depth of approximately 5 feet beneath and to the northeast of the Milgard Hall building that was used to provide drainage for the former parking lot on Cragle. This stormwater line was capped as part of the Milgard Hall Capital Project. Portions of this line may have been removed as a part of the Capital Project to facilitate construction activities.
- An 8-inch water line runs south to north at a depth of approximately 10 feet bgs within South C Street along the entire length of Cragle. Laterals to Milgard Hall (main water and fire suppression lines) are located near the northeast corner of the building.
- A detention vault and associated stormwater catch basins were installed on the northern portion of Cragle following UW's purchase and initial redevelopment as a UWT Campus parking lot in the early 1990s. The base of the detention vault was approximately 8 to 12 feet bgs and was subsequently filled with controlled density fill (CDF) during construction of Milgard Hall. Other stormwater infrastructure (i.e., catch basins and associated piping) either were rerouted or removed as part of the Milgard Hall Capital Project.
- A new stormwater drain system consisting of catch basins and trench drains connected by a tightline pipe is located around the perimeter of Milgard Hall at a depth of approximately 5 feet. This system intercepts stormwater from PLT and the Milgard Hall parking lot and conveys the stormwater to the northeast corner of Milgard Hall where it ties into the larger stormwater network and flows to the northeast off Cragle. Concrete trench dams are installed within the north-south and east-west arms of the stormwater line near the northeast corner of Milgard Hall to prevent any preferential flow of groundwater within the line backfill from leaving Cragle.

Additionally, multiple other utilities service the Milgard Hall building with connections near the northeast corner of the building including backup power and data lines at a depth of approximately 15 feet that connect to a concrete-encased utilidor within South C Street.

5.3. Field Investigations and Remedial Actions

Multiple environmental investigations have been completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations documenting soil and groundwater conditions, and remedial actions completed for Cragle and/or the surrounding area are discussed in Sections 5.3.1 through 5.3.5 below. Sampling locations used to evaluate soil and groundwater conditions are shown on Figures 5-4 through 5-6. Investigations completed for Cragle and the surrounding area to support the development of the RI are summarized in Tables 5-1 through 5-3. Construction details for permanent monitoring wells installed within Cragle and the surrounding area are presented in Table 5-4. Soil, groundwater and sub-slab soil vapor/indoor air monitoring results for the investigations completed are presented in Tables 5-5 through 5-7, respectively.

5.3.1. Pre-1997 Agreed Order Investigations and Remedial Action

An environmental investigation was completed at Cragle prior to the 1997 Agreed Order to evaluate soil and groundwater conditions along with a subsequent remedial action. UW initiated the environmental investigation as a part of the property acquisition in 1993. The investigation and remedial actions are described further below. Soil and groundwater sampling locations are shown relative to Cragle on Figure 5-4.

5.3.1.1. Soil and Groundwater Investigation and Results Summary

Investigation activities were completed at Cragle by AGI to evaluate soil and groundwater conditions on behalf of UW in 1993 and 1994. Investigation activities included the collection of soil samples from HSA borings, direct-push (DP) borings, and TP explorations and the collection of groundwater samples from permanent monitoring wells. These investigations included the following:

- Completion of 11 HSA borings (CR-MW1 through CR-MW9 and BL-MW1 and BL-MW2) to approximate depths ranging between 17 and 23 feet bgs. These borings were completed as permanent monitoring wells. Shallow soil samples collected from borings CR-MW1 through CR-MW7 ranging from approximately 5 to 10 feet bgs were submitted for a combination of analyses including TPH-HCID, TPH-G, TPH-D, TPH-O, select VOCs, PAHs, and metals. TPH-G, TPH-D, toluene, ethylbenzene, and/or total xylenes were detected in shallow soil collected at depths of approximately 10 feet bgs in borings CR-MW1 and CR-MW4. PAHs, select VOCs, and metals were detected at a depth of approximately 7.5 feet bgs in boring CR-MW6. Other contaminants were not detected in the analyzed samples. Groundwater samples collected in monitoring wells CR-MW1 through CR-MW7 were analyzed for TPH-G, TPH-D, and select VOCs. TPH-G, TPH-D, BTEX, EDC, and/or acetone were detected in groundwater. In addition, CVOCs including TCE, cis-DCE, vinyl chloride, and chlorobenzene associated with the Easterly Plume were detected in one or more of these wells. CVOC contamination is further discussed in Section 15.0.
- Completion of two DP soil borings (CR-B8 and CR-B9) to approximate depths of 18 feet bgs. Shallow soil samples collected from these borings ranging from approximately 12 to 18 feet bgs were submitted for a combination of analyses including TPH-G, TPH-D, select VOCs, PAHs, metals, and PCBs. TPH-G,

TPH-D, methylene chloride, PAHs, and metals were detected in the soil samples. Other contaminants were not detected in the analyzed samples.

- Completion of five TPs (CR-TP-10 through CR-TP-13 and BL-TP2) to approximate depths ranging between 8 and 10 feet bgs. Shallow soil samples collected from the base of each of these TPs were submitted for TPH-HCID analysis. TPH was not detected in the analyzed soil samples.

5.3.1.2. UST Removal and Remedial Action Summary

Remedial excavation and subsequent confirmation soil sampling activities were completed between 1993 and 1996 following the removal and closure of nine USTs from the property (Figure 5-4). Approximately 1,500 cubic yards of petroleum-contaminated soil was removed based on soil characterization (described above) from four separate areas (described below). Confirmation soil samples collected at the final remedial excavation limits confirmed the removal of petroleum-contaminated soil with the exception of soil represented by samples CR-S5 and CR-S21 collected at depths of approximately 9 feet bgs along the eastern property boundary.

USTs were generally grouped into four general areas. Details of the UST removal areas including the initial sampling and remedial excavation activities completed to address the observed petroleum contamination are summarized below. USTs, remedial excavation areas, and confirmation soil samples are shown on Figure 5-4.

- **Waste Oil UST Area**. Three USTs (two approximately 19,500-gallons and one approximately 15,500-gallons) and associated piping were removed on October 13, 1993. These USTs reportedly contained waste oil from oil-recycling (TSDF) operations in the early 1980s (161). The UST excavation was completed to a depth of approximately 12 feet bgs and encompassed each of the three USTs in the northeast portion of the property (Figure 5-4). Four soil samples (CR-W-North, -East, -South, and -West) were collected at the final UST excavation limit to evaluate soil conditions at the sidewalls of the excavation. Soil samples were analyzed for TPH-G, TPH-D, TPH-O, and BTEX. Sample CR-W-West was also analyzed for other select VOCs and metals. TPH-G, TPH-D, TPH-O and toluene, ethylbenzene total xylenes, and select VOCs were detected in one or more of the soil samples collected at depths ranging from approximately 7 to 9 feet bgs.
- **Gasoline/Diesel UST Area.** Three USTs (each approximately 2,500-gallons) and associated piping were removed on October 15, 1993. Two of the USTs reportedly contained diesel and one contained gasoline. The UST excavation was completed to an approximate depth of 7 feet bgs and encompassed each of the three USTs in the southeast portion of the property (Figure 5-4). Six soil samples (CR-10-15-North, -East, -West, -Tank 1, -Tank 2, and -Tank 3) were collected at the final UST excavation limit to evaluate soil conditions at the base and sidewalls of the excavation. Soil samples were analyzed for TPH-G, TPH-D, TPH-O, BTEX and other select VOCs. TPH-G, TPH-D, TPH-O, toluene, ethylbenzene, total xylenes, and naphthalene were detected in one or more of the soil samples collected at depths ranging from approximately 5 to 8 feet bgs.
- **Gasoline UST Area.** Two USTs (one approximately 1,000 gallons and one approximately 400 gallons) and associated piping were encountered during remedial excavation for the Gasoline/Diesel UST Area (further discussed below) and were subsequently removed on October 18, 1994. These USTs each reportedly contained gasoline. These USTs were discovered during remedial excavation to address contamination in the eastern portion of Cragle. In this area, the remedial excavation was completed to an approximate depth of 15 to 16 feet bgs. Confirmation soil sampling completed as part of the overall

remedial excavation in this area confirmed the removal of contaminated soil. Soil samples from the overall remedial excavation that represent soil conditions include CR-S11, CR-S21/CR-S22, CR-S23, and CR-S24. Soil samples were analyzed for TPH-G, TPH-D, TPH-O, and BTEX. TPH-G, BTEX, and naphthalene were detected in one of the soil samples (CR-S21/ CR-S22) collected at a depth of 9 feet bgs. Contaminants were not detected in the remaining analyzed samples.

- **Heating Oil UST Area.** One UST (approximately 500-gallons) and associated piping were removed on October 19, 1993. This UST reportedly contained heating oil and may have been associated with the former Bleckert (photo developer) building located north of Cragle. The UST excavation was completed to an approximate depth of 8 feet bgs and encompassed the UST at this location (Figure 5-4). Three soil samples (BL-10-19-B, -N, and -S) were collected at the final excavation limit to evaluate soil conditions at the base and sidewalls of the excavation. Soil samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, and BTEX. TPH-G, TPH-D, TPH-O, toluene, and total xylenes were detected in one or more of the analyzed soil samples.

Subsequent remedial excavation activities were performed in 1994 and 1996 (1994 Remedial Action) to depths ranging from approximately 10 to 16 feet bgs to remove additional soil with TPH-G, TPH-D, TPH-O and/or BTEX based on the results of the UST removal and sampling completed for the Waste Oil UST, Gasoline/Diesel UST and Heating Oil UST Areas. Two additional USTs were encountered and removed from the Gasoline/Diesel UST Area for closure as part of the 1994 Remedial Action. Thirty-four discrete confirmation soil samples (CR-S1 through CR-8, CR-11 through CR-S30, BL-UST-SS-11 and -12, and BL-S1 through BL-S5) were collected from the base and sidewalls of the remedial excavation to verify the removal of the petroleum contaminated soil and submitted for a combination of analyses including TPH-G, TPH-D, TPH-O, BTEX, select VOCs (including CVOCs) and PAHs. Soil represented by samples CR-S12 and CR-S14 through CR-S16 were subsequently over-excavated based on the confirmation sample results and the new excavation limit was resampled (samples CR-S12A and CR-S14A through CR-S16A) to confirm the removal of the petroleum contamination.

Soil from the remedial excavations was mechanically screened, mixed with reagents, and land-farmed on Cragle to promote enhanced ex-situ biological degradation of the petroleum constituents. The land-farmed soil was used as backfill for the remedial excavation upon confirmation that the soil met reuse criteria for the project (126). Treated soil was placed between the ground surface to depths ranging from approximately 6 to 13 feet bgs within the excavation area with imported soil to meet finished grades.

5.3.2. 1997 Agreed Order Investigations and Remedial Action

URS on behalf of UW completed an RI for the eastern portion of the UWT Campus between 1997 and 2002 in accordance with the 1997 Agreed Order. As part of the 1997 Agreed Order RI, investigation activities were completed within Cragle and the surrounding area to further evaluate soil and groundwater conditions in areas where petroleum-related contaminants were previously identified and in areas not previously investigated. Specifically, investigation activities were completed to evaluate subsurface conditions in the following areas:

- Within the footprints of the former warehouse and the 1994 soil treatment cell (not shown on figures).
- Within the area of the former concrete shed, which was historically used for drum storage.
- Downgradient from the former USTs and remedial action areas.

A remedial action was completed in 1997 (1997 Remedial Action) to remove petroleum-contaminated soil associated with two former hydraulic hoists in addition to the environmental investigations completed during this period as further described below (Section 5.3.2.3). Soil and groundwater sampling locations are shown on Figure 5-4.

5.3.2.1. Soil Investigation Summary

Soil investigations completed for Cragle as part of the 1997 Agreed Order RI included the following:

- **Former Warehouse and/or Soil Treatment Area.** Five direct-push borings (CR-B1 through CR-B5) and four TPs (CR-TP1 through CR-TP4) were completed to depths between approximately 6 and 16 feet bgs to evaluate soil conditions in this area. A total of 22 shallow soil samples collected from the completed borings and TP explorations ranging in depth from the ground surface to approximately 6 feet bgs were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX and other select VOCs. Low level concentrations of TPH-D and TPH-O were detected in one or more of these samples. Other contaminants were not detected in the analyzed soil samples.
- **Former Concrete Shed (Waste Storage Area).** Six borings (CR-C-B1 through CR-C-B3, CR-B6, CR-B7, and BL-B1) were completed to depths between approximately 2 and 16 feet bgs to evaluate soil conditions in the concrete shed. The concrete shed was historically used as waste storage for waste oil and waste oil-contaminated water and light ballasts (161). A total of six shallow soil samples collected from the completed borings ranging in depth from the ground surface (beneath the shed slab) and approximately 12 feet bgs were analyzed for a combination of BTEX and other select VOCs. Low level concentrations of benzene, ethylbenzene, xylenes, and petroleum-related VOCs were detected in one or more of these analyzed samples. Other contaminants were not detected in the analyzed soil samples.
- **Downgradient from USTs and 1994 Remedial Action Area.** Four borings (CR-GW1, CR-GW2, CR-MW9, and CR-MW10) were completed to depths between 16 and 30 feet bgs to evaluate soil and groundwater conditions in this area. Borings CR-GW1, CR-GW2, and CR-MW10 were completed as permanent monitoring wells to evaluate groundwater conditions as described below (Section 5.3.2.2). A total of six soil samples collected from the four borings at varying depths were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, select VOCs, and metals. TPH-G, 1,2,4-TMB, and naphthalene were detected in soil from boring CR-MW9[3] at an approximate depth of 21 feet bgs. Other contaminants were not detected in the remaining analyzed soil samples.

Other areas explored included locations BL-MW5 and BL-MW6 to further evaluate concentrations of benzene and CVOCs in groundwater downgradient of the former concrete shed. BL-MW5 was completed near the northwest corner of Cragle adjacent to BL-MW1 while boring BL-MW6 was completed to the northeast of Cragle approximately 150 feet downgradient from BL-MW1. Two soil samples collected from these borings at depths between approximately 30 and 45 feet bgs were analyzed for select VOCs including BTEX and TCE. VOCs were not detected in the analyzed soil samples.

[3] Boring CR-MW9 was initially completed in December 1994 and completed as a permanent monitoring well. However, soil samples were never analyzed at this location. To further evaluate soil conditions at this location, URS completed a supplemental boring at this location to collect soil samples for chemical analysis in March 1999 as part of the 1997 Agreed Order RI. Soil samples from this subsequent boring were also labeled as CR-MW9 for consistency with the original boring location.

5.3.2.2. Groundwater Investigation Summary

A total of 65 groundwater samples were collected from 11 permanent monitoring wells and 15 temporary wells (see Tables 5-2 and 5-4) as a part of the 1997 Agreed Order investigation. Grab groundwater samples from temporary wells were collected at the time of soil exploration activities. Permanent monitoring wells were sampled on a quarterly basis between October 1998 and September 1999 with two additional rounds of monitoring completed in April 2000 and September 2000. Groundwater samples were analyzed for TPH-G, TPH-D, TPH-O, BTEX, and other select VOCs, except for grab samples collected from BL-GW3_TW1, BL-GW3_TW2, BL-GW5, BL-MW5_TW1, BL-MW5_TW2, BL-MW5_TW3, BL-GW6_TW1, BL-GW6_TW2 and CR-B6, which were only analyzed for BTEX and other select VOCs.

Approximately 7 inches of light non-aqueous phase liquid (LNAPL) was observed in monitoring well CR-MW9 in 1998. The LNAPL level was checked and was removed from CR-MW9 to the extent practicable on several occasions between 1998 and 2001 using a bailer. LNAPL was not measurable in CR-MW9 between 2000 and 2001. TPH-G, TPH-D, TPH-O, BTEX, CVOCs (TCE, cis-DCE, trans-DCE, DCE, and vinyl chloride), and/or naphthalenes were detected in multiple samples with the highest concentrations detected in wells located downgradient from the 1994 Remedial Action area (Figure 5-4). TPH-D and/or benzene were also detected north of the 1994 Remedial Action area at locations BL-MW1 and BL_MW5, which are generally located downgradient from the former concrete shed. CVOCs including TCE, cis-DCE, trans-DCE, DCE and vinyl chloride detected in groundwater are associated with the Easterly Plume, which is further discussed in Section 15.0.

5.3.2.3. 1997 Remedial Action

Two hydraulic hoist foundations were discovered and subsequently removed from the central portion of Cragle (Figure 5-4). The hoists were located within the former warehouses used for auto-maintenance and related services. Excavation activities to remove the hoists were completed to an approximate depth of 8 feet bgs in each area. A total of 16 discrete confirmation soil samples were collected at the sidewalls and base of each hoist remedial excavation and analyzed for TPH-D. Soil represented by samples CR-HPN-B7, CR-HPN-E, and CR-HPN-W2.5 was over-excavated, and additional confirmation samples were collected (CR-NHP2-B, CR-NHP2-E, CR-NHP2-W). TPH-D was detected in each of the remaining analyzed soil samples.

5.3.3. Supplemental Investigations Under the 1997 Agreed Order

Supplemental investigation activities were completed in accordance with the 1997 Agreed Order to further evaluate soil and groundwater conditions for Cragle and the surrounding area. Investigation activities related to the Cragle are summarized in the following sections (Sections 5.3.3.1 and 5.3.3.2). Supplemental soil and groundwater sampling locations are shown on Figure 5-4. A summary of soil and groundwater investigations completed as part of the supplemental investigation under the 1997 Agreed Order is presented in Tables 5-1 and 5-2, respectively. Well construction details for new permanent monitoring wells are presented in Table 5-4. Chemical analytical results are summarized in Tables 5-5 and 5-6.

5.3.3.1. Soil Investigation Summary

One sonic soil boring (CR-MW15) was advanced to an approximate depth of 35 feet bgs and completed as a permanent monitoring well to further evaluate previously identified contamination in groundwater at Cragle and from potential upgradient sources. Boring CR-MW15 was located within South C Street approximately 50 feet east (downgradient) of the former Gasoline/Diesel UST Area and existing well CR-MW9 where LNAPL was present in the early 2000s. A total of 10 soil samples collected from boring CR-MW-15 at depths ranging between approximately 10 and 35 feet bgs were analyzed for a combination of

TPH-HCID, TPH-G, BTEX, select VOCs, PAHs, and metals. TPH-G and petroleum-related VOCs were detected in the soil sample collected from depths of approximately 10 and 19 feet bgs in boring CR-MW15.

5.3.3.2. Groundwater Investigation Summary

Supplemental groundwater monitoring for Cragle included the collection of samples from 10 wells (see Table 5-2). Water samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, VOCs, PAHs, and metals. TPH-G, TPH-D, BTEX, select VOCs, naphthalene, and arsenic with the highest detected concentrations at CR-MW9. In addition, CVOCs including TCE, trans-DCE, cis-DCE, vinyl chloride and/or chlorobenzene were detected in multiple wells. CVOC contamination is associated with the Easterly Plume, which is further discussed in Section 15.0.

5.3.4. 2016 Agreed Order Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions at Cragle in accordance with the RI Work Plan and subsequent addenda (Section 4.0) are summarized below (Sections 5.3.4.1 and 5.3.4.2). These activities included collection of soil samples from one supplemental soil boring and the collection of groundwater samples from 13 permanent groundwater monitoring wells (see Tables 5-1 and 5-2). Exploration locations for the 2016 Agreed Order RI are shown on Figure 5-5.

5.3.4.1. Soil Investigation Summary

Additional soil data gaps requiring further investigation at Cragle as part of the RI were not identified as indicated in the RI Work Plan based on the results of previous investigations (described above, Sections 5.3.1 through 5.3.3) and the results of capital projects completed at Cragle and the adjacent properties (described below, Section 5.3.5). However, soil samples collected from boring A11-MW30D completed north of Cragle (Figure 5-5) to evaluate the nature and extent of contamination associated with the Easterly Plume were also used to further evaluate soil conditions associated with Cragle. A total of 13 discrete soil samples including one field duplicate were collected from this boring at approximate depths ranging between 5 and 60 feet bgs and analyzed for CVOCs. One soil sample collected from approximately 5 feet bgs was also analyzed for TPH-HCID, BTEX, PAHs and metals in addition to the CVOC analysis. CVOCs including TCE, trans-DCE, cis-DCE, vinyl chloride, and chlorobenzene are associated with the Easterly Plume and are further discussed in Section 15.0. Contaminants were not detected in the 5-foot sample analyzed from this location with the exception of metals.

5.3.4.2. Groundwater Investigation Summary

A total of 71 groundwater samples (including duplicates) were collected between 2016 and 2020 for the 2016 Agreed Order RI from the network of new and existing monitoring wells (see Table 5-2) to further evaluate groundwater conditions and define the nature and extent of contamination resulting from historical operations at Cragle. Groundwater samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, select VOCs, PAHs, and PCBs at well locations screened within the Qvi aquifer, Qvi/Qva aquifer where the Qvi and Qva silt layers are absent, and Qva aquifer (geologic and hydrogeologic conditions in the vicinity of Cragle are further discussed in Section 5.4.2). Groundwater monitoring activities and results associated with Cragle are discussed below.

- A total of 55 groundwater samples were collected from 10 permanent monitoring wells screened within the Qvi aquifer located within and downgradient of Cragle during the RI[4]. Results of groundwater samples collected within the Qvi aquifer identified TPH-G, TPH-D, TPH-O, BTEX, naphthalene, and select VOCs with the highest detected concentrations in South C Street downgradient of the former Waste Oil UST and Gasoline/Diesel UST Areas.
- A total of five groundwater samples were collected from one permanent monitoring well (BL-MW6) screened within the Qvi/Qva aquifer (where hydraulically connected) located downgradient of Cragle during the RI. Contaminants associated with Cragle were not detected at this location.
- A total of 11 groundwater samples were collected from two permanent monitoring wells (A11-MW30D and BL-MW5) screened within the Qva aquifer located in the northwest portion of Cragle during the RI. Results of groundwater samples collected within the Qva aquifer indicate low level concentrations of TPH-G were detected in each of the Qva aquifer monitoring wells in this area. However, the analytical data were flagged by the laboratory as mainly attributed to a single peak chlorobenzene. The chlorobenzene detection is associated with the Easterly Plume. Other contaminants associated with Cragle were not detected.

5.3.5. Capital Projects

Investigation and remedial action activities were necessary to implement UW Capital Projects. Capital projects and investigation activities in the vicinity of the Cragle are summarized in Sections 5.3.5.1 through 5.3.5.3 below. Soil and groundwater sampling locations are shown on Figure 5-6.

5.3.5.1. Phase IIB Utility Capital Project

Environmental investigations were completed between 2001 and 2002 as part of the planning and design for landscaping and utility installation activities to be completed between the Cherry Parkes and Mattress Factory buildings (155). As part of this investigation, 14 borings (Phase II B-2 through Phase II B-15) were completed to depths up to 25 feet bgs to evaluate soil in this area. A total of 17 soil samples collected from the borings at varying depths were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, select VOCs and metals. TPH-D and metals were detected in soil from borings Phase II B-9, Phase II B-10, and/or Phase II B-12 at depths ranging between approximately 1 and 3 feet bgs. Other contaminants were not detected in the remaining analyzed soil samples.

Soil represented by these samples was subsequently excavated and removed from this area as part of the completed landscaping and utility work.

5.3.5.2. Prairie Line Trail Capital Project

Environmental investigation activities followed by remedial actions were completed between 2013 and 2014 within the footprint of PLT as part of the planning and development of the PLT Capital Project. One new monitoring well (PL-MW2) was installed on Cragle to evaluate groundwater conditions within the Qvi aquifer downgradient of PLT in conjunction with this capital project. Three soil samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, VOCs, PAHs, and metals from this boring. Select VOCs including

[4] Incision of the valley walls during the last glacier retreat (approximately 10,000 to 13,000 years ago) has locally resulted in the absence of the confining layer separating the Qvi and Qva aquifer (i.e., Qvi and/or Qva silt) in this vicinity (Figures 2-14 through 2-16). As a result, the Qvi and Qva aquifers are locally hydraulically connected. Groundwater occurrence is further discussed in Section 2.4.2.

acetone and metals were detected in soil samples collected from depths between approximately 10 and 15 feet bgs. Contaminants were not detected in groundwater.

Monitoring well PL-MW2 is shown on Figure 5-6. Chemical analytical results for soil and groundwater samples collected as part of this investigation associated with Cragle are presented in Tables 5-5 and 5-6, respectively. A detailed discussion of historical land use and investigation activities completed for PLT is presented in Section 7.0.

5.3.5.3. Milgard Hall Capital Project

Environmental investigation activities followed by remedial actions were completed between 2020 and 2021 as part of the planning and development of the Milgard Hall Capital Project. Investigation activities were performed in conjunction with the Milgard Hall Capital Project to evaluate soil conditions within and adjacent to the footprint of the construction area to ensure proper soil management and disposal. Investigation and confirmation sampling activities completed for the Milgard Hall Capital Project include the following:

- Completion of three HSA borings (MIL-B1 through MIL-B3) and 10 direct-push soil borings (MIL-B5 through MIL-B14) to depths up to 24.5 feet bgs. A total of 33 soil samples collected from these borings as either discrete or composite were analyzed to assess current soil conditions and characterize soil for off-site disposal ahead of construction. Additionally, HSA boring MIL-B4 and four TPs (MIL-TP1 through MIL-TP4) were completed for geotechnical purposes although samples from these explorations were not submitted for chemical analysis. Contaminants were detected in the following borings:
    - MIL-B5. Benzene, naphthalene, benzo(a)pyrene, and total cPAHs in the soil sample collected from approximately 7 to 8 feet bgs.
    - MIL-B9. Benzene in the soil sample collected from approximately 14.5 to 15 feet bgs.
    - MIL-B10. TPH-G, TPH-D, petroleum-related VOCs (ethylbenzene, chloroform, 1,2,4- TMB and 1,3,5-TMB and n-propylbenzene) and naphthalene in the soil sample collected from approximately 14 to 15 feet bgs.
    - MIL-B13. TPH-D in the soil sample collected from approximately 12.5 to 13.5 feet bgs.
- Collection of 59 confirmation soil samples from depths between 3 and 15 feet bgs. Confirmation soil samples were collected for two general purposes: (1) to document soil conditions left in place below the future building and improvements; and (2) as part of remedial excavations to document contamination removed or remaining. Contaminants were detected in the following areas based on the confirmation sample results:
    - TPH-G, BTEX, and/or naphthalene were detected downgradient of the former Gasoline and Gasoline/Diesel UST Areas in excavation sidewall and base confirmation samples collected between approximately 14 and 15 feet bgs at six locations (MIL-A4-CONF-ESWR, -SSWR, -Base, -WSW, -ESW and -SSW). Sample MIL-A4-CONF-SSWR was removed during additional excavation to the south. The remedial excavation in this area was limited in its extent due to the presence of utilities and the occurrence of groundwater at the base of the excavation.
    - TPH-D, 1,2,4-TMB, and naphthalene were detected at the limit of other remedial excavations.
- Collection of one sub-slab sample, two indoor air samples, and two outdoor air samples following the construction of the Milgard Hall building in December 2022 (Table 5-3). The purpose of the sampling was to evaluate the effectiveness of the vapor mitigation system. TPH, BTEX, naphthalene, and TCE

were detected in the soil vapor, indoor air, and outdoor air samples. Cis-DCE, DCE, trans-DCE, vinyl chloride, and chlorobenzene were not detected in the analyzed samples.

The extent of the Milgard Capital Project, remedial excavations, locations of investigation and confirmation soil samples, and the locations of soil vapor and air samples are shown on Figure 5-6. Chemical analytical results for soil samples collected as part of this investigation are presented in Table 5-5.

5.4. Conceptual Site Model

Development of the CSM for Cragle is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for Cragle is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 5.4.1 through 5.4.4 describe the specific elements of the Cragle CSM.

5.4.1. Physical Setting

Multiple phases of remedial excavation and demolition of former structures have been completed following the acquisition of the UWT Campus property by UW in the early 1990s to support the UWT Campus Master Plan for higher education and learning. The Milgard Hall Capital Project completed in 2022 resulted in a new Campus building and associated parking lot with pedestrian access to the PLT pedestrian corridor.

5.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic setting for Cragle (described in the following sections) informs the distribution of contaminants in media of potential concern. Local geology and hydrogeology in the vicinity of Cragle are described below in Sections 5.4.2.1 and 5.4.2.2.

5.4.2.1. Local Geology

Geologic units present beneath Cragle include Qf, Qvi, and Qva deposits. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings within Cragle and the surrounding area consists of locally derived reworked ice-contact deposits or imported fill material used within the former remedial excavations or as part of the Milgard Hall Capital Project. Fill extends to depths between approximately 8 and 16 feet bgs and is primarily composed of sand with varying amounts of gravel and silt. Oversized rocks and quarry spalls are also present at the limits of the remedial excavation area surrounding the former USTs. The fill depth generally correlates with topography (except within the remedial excavation areas) with shallower fill to the west-southwest and deeper fill to the east-northeast.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till and subglacial channel materials deposited beneath the glacial ice along the ice margin during the last glacial period. Qvi till-like deposits beneath Cragle range in thickness from approximately 6 to 10 feet and overlie up to approximately 15 to 20 feet of Qvi channel deposits.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** Qva deposits consisting of stratified sand with silt and gravel layers were observed at the maximum depths explored within the Cragle.

Geologic conditions in the vicinity of Cragle are shown relative to the UWT Campus on Figure 2-12.

5.4.2.2. Local Hydrogeology

Groundwater in the southeast portion of the UWT Campus occurs within both the Qvi (shallow) and Qva (deep) aquifers (Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Specific areas where the Qvi and Qva aquifers are interpreted to be hydraulically connected are shown on Figures 2-14 to 2-19 and include the following as they relate to groundwater flow beneath Cragle and the surrounding area:

- **North of Cragle.** The Qvi aquifer is absent in the area beneath and immediately surrounding the Snoqualmie Library where the Qvi unit was removed during excavation for construction of the building. Additional information regarding the construction of the Snoqualmie Library is presented in Section 12.0.
- **West of Cragle.** Incision of the valley walls during the last glacier retreat (approximately 10,000 to 13,000 years ago) has locally resulted in the absence of the confining layer separating the Qvi and Qva aquifer (i.e., Qvi and/or Qva silt) in this vicinity. As a result, the Qvi and Qva aquifers are locally hydraulically connected. West of Cragle, groundwater within the Qvi aquifer is interpreted to drain into and mix with groundwater from the underlying Qva aquifer (see Figure 2-12). At depth within the Qva unit (approximately 35 to 45 feet bgs), a silt layer is present which acts as a confining layer preventing the vertical flow of groundwater into deeper portions of the Qva aquifer.

Local groundwater occurrence and flow for the Qvi/Qva aquifer are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer is locally unconfined and occurs and flows primarily within the channel deposits and sand and gravel seams within the upper Qvi deposits at depths between approximately 7 and 17 feet bgs (Table 5-6). Perched groundwater may be present at some locations within the fill or upper Qvi deposits but is not considered representative of groundwater levels in the Qvi aquifer. The inferred groundwater flow direction in the Qvi aquifer across Cragle is generally northeasterly toward the Thea Foss Waterway, which is consistent with the generally easterly Campus-wide Qvi and Qva groundwater flow directions (Figures 2-14 and 2-19). Beneath and east of Cragle, the Qvi and Qva aquifers are locally hydraulically connected as a result of erosion and incision during glacial retreat as described above. As a result, Qvi groundwater is interpreted to flow into the Qva aquifer. However, the Qvi aquifer is not fully depleted.

The local estimated average linear groundwater velocity within the Qvi aquifer is approximately 2.94 feet per day (ft/day) with a hydraulic gradient of 0.10 feet per foot (ft/ft). Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

Qva Groundwater Occurrence and Flow

At depth (greater than approximately 35 to 45 feet bgs), the Qva aquifer is present under confined conditions below the Qva silt (Figure 2-12). The inferred groundwater flow direction for this deep Qva aquifer is generally east-northeasterly based on the UWT Campus-wide Qva flow direction (Figures 2-17 and 2-19).

The estimated Qva average linear groundwater velocity ranges from approximately 1.5 and 2 ft/day with a hydraulic gradient ranging from 0.05 to 0.11 ft/ft. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L

5.4.3. Sources of Contamination

The primary sources of the contamination at Cragle are fuel recycling, storage, and distribution (coal and liquid petroleum products) and auto-related services. As described above, fuel distribution operations by Pacific Fuel Company and Griffin Fuel Company occurred between 1912 and 1969. Portions of the property were used for auto storage, and service operations by multiple entities between 1928 and 1989. Used-oil recycling by Arrcom Oil and Ramcor occurred between 1981 and 1984. Potential release mechanisms include drips, leaks, and/or spills from tanks including USTs, drums, and/or other equipment (i.e., hydraulic hoists) directly to soil from which contaminants migrated to groundwater.

In addition to the local release of petroleum-related contaminants to shallow soil, CVOCs (TCE, trans-DCE, cis-DCE, DCE, vinyl chloride, and/or chlorobenzene) associated with upgradient and off-property releases (i.e., Easterly Plume) have been identified. CVOC contamination that has migrated onto Cragle due to releases from historical operations and land use for source areas contained within the Easterly Plume are further discussed in Section 15.0.

5.4.4. Potential Receptors and Exposure Pathways

Current and future land use were considered when evaluating potential receptors and exposure pathways for Cragle. The current and planned future land use is a UWT Campus building (Milgard Hall) with UWT Campus parking which consist primarily of impervious surfaces except for bordering landscape areas. Precipitation falling to the ground surface either infiltrates into the ground (unpaved areas) or is captured by roof drains and catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway. The surrounding area is commercial and academic. It is assumed that future land use will be similar to its current use.

Based on the current and anticipated future land use, the following exposure pathways and receptors have been identified:

- **Direct Contact**. The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities.

- **Drinking Water.** Groundwater within the Qvi/Qva aquifer beneath Cragle and the UWT Campus as a whole is not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.

- **Surface Water.** Surface water discharge from Cragle is not considered to be a current exposure pathway because the majority of the ground surface is capped with hardscaped, stormwater is directed to stormwater utilities, and the Thea Foss Waterway is more than 1,500 feet east of the UWT Campus.

- **Indoor Air**. VI into the Milgard Hall building is not considered to be a current exposure pathway because an underlying capillary break layer and vapor mitigation system (chemical vapor barrier and passive sub-slab ventilation) that were installed as part of the Milgard Hall construction to prevent VI into the building. To the east and north, the Mattress Factory and Snoqualmie Library buildings are located more than 30 feet from the TPH-impacted soil, therefore, in accordance with Ecology's VI guidance are not considered to be a current exposure pathway. The potential for VI and its impacts to indoor air is further discussed below in Section 5.6.4.

Potential receptors and exposure pathways for CVOC contamination in this area associated with the Easterly Plume are further discussed in Section 15.0.

5.5. Proposed Cleanup Levels

PCULs were developed for Cragle for the protection of human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (WAC 173-340), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water use, potential exposure pathways, and the potential receptors specific to Cragle. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for Cragle is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on the protection of human health for direct contact with soil and protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels**. PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b). Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels.** Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

5.6. Nature and Extent of Contamination

5.6.1. Contaminants and Media of Concern

Characterization data for Cragle are summarized in Tables 5-5 through 5-7 and were evaluated to determine contaminants and media of concern for the Cragle Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions (i.e., post-remedial excavation confirmation samples and samples from soil explorations collected beyond the final remedial excavation limit) is presented in Table Q-1 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2020) is presented in Table Q-2 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-3, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-1 through Q-3) include the following:

- **Soil.** TPH-G, TPH-D, TPH-O, and BTEX were identified as primary soil COCs for the Cragle Site based on the source of contamination to soil and the characterization results. However, most of this contamination was removed as a result of the 1994 Remedial Action, 1997 Removal Action and the Milgard Hall Capital Project as described in Section 5.3. Currently, residual TPH-G, TPH-D, TPH-O, and BTEX remain in place at concentrations exceeding the soil PCULs beneath and adjacent to Cragle. In addition, 1,2,4-TMB, 1,3,5-TMB, naphthalene, and cPAHs were identified as secondary soil COCs for the Cragle Site. These contaminants are considered secondary COCs because they either are collocated with one or more primary soil COC, infrequently exceed the PCULs (i.e., less than 10 percent), and/or exceed the PCUL for direct contact. However, the results of the 2016 Agreed Order RI indicate 1,2,4TMB, 1,3,5-TMB, naphthalene, and cPAHs are not adversely impacting groundwater indicating that the soil to groundwater exposure pathway is incomplete. The nature and extent of soil COCs (both primary and secondary) are further discussed in Section 5.6.2.
- **Groundwater.** TPH-D and benzene were identified as primary groundwater COCs for the Cragle Site based on results of the 2016 Agreed Order groundwater investigation in which TPH-D and benzene exceeded the groundwater PCUL during one or more monitoring events results between 2016 and 2020. As indicated above, previous investigation results are not considered representative of current conditions, therefore are not used to identify groundwater COCs. The nature and extent of groundwater COCs are further discussed in Section 5.6.3.
- **Soil Vapor**. Based on screening of soil and groundwater data, TPH-G, TPH-D, and benzene were identified as COCs with the potential to migrate into enclosed spaces at concentrations that could exceed the Method B indoor air PCULs and/or the SL for the protection of commercial workers. An evaluation for VI potential is further discussed in Section 5.6.4.

CVOCs including TCE, trans-DCE, cis-DCE, vinyl chloride, and chlorobenzene observed in soil at A11-MW30D located northwest/cross-gradient of Cragle and in groundwater at multiple locations upgradient and downgradient of the Cragle Site. However, the CVOCs are attributed to the Easterly Plume and are not attributed to historical activities for Cragle because CVOCs were not detected in soil prior to and following the 1994 Remedial Action completed to address contamination sourcing from the former USTs at the property. The occurrence of CVOCs in soil and groundwater is attributed to the Easterly Plume, as discussed further in Section 15.0, which sources from the 1934-1938 Market Street Source Area and has migrated beneath Cragle.

Primary COCs (TPH-G, TPH-D, TPH-O, and BTEX) for soil and groundwater are shown in plan view on Figures 5-7 through 5-14 and in cross section on Figure 5-15. The nature and extent of COCs in media of concern are further discussed below.

5.6.2. Soil

Remedial excavation activities completed between approximately 1993 and 2021 removed most of the identified contamination associated with historical land uses as well as primary sources (i.e., former USTs utilized as part of the historical fuel distribution and/or recycling operations). However, petroleum-related contamination remains in place in soil in localized areas within and downgradient of Cragle. The nature and extent of COCs in soil are summarized below. Primary COCs identified for the Cragle Site (TPH-G, TPH-D, TPH-O, and BTEX) representing current conditions are shown in plan view on Figures 5-7 through 5-10 and in cross section on Figure 5-15.

- **Within and Downgradient from Former Gasoline and Gasoline/Diesel UST Areas**. The primary area of contamination is directly adjacent to and downgradient from the former Gasoline and Gasoline/Diesel UST Areas (Figures 5-7 through 5-10). Primary COCs in soil including TPH-G (up to 3,000 milligrams per kilogram [mg/kg]), benzene (up to 1.5 mg/kg), toluene (up to 13.5 mg/kg), ethylbenzene (up to 17 mg/kg) and xylenes (up to 85 mg/kg) remain in place at the eastern sidewall of the 1994 Remedial Action area represented by confirmation sample CR-S21 collected from approximately 9 feet bgs and to the east in soil represented by the MIL-A4-CONF confirmation samples and investigation soil samples collected at depths ranging between approximately 11 and 21 feet bgs from boring MIL-B10, CR-MW9, and CRMW15. In addition, naphthalene (secondary COC) was detected at a concentration of 5.2 mg/kg at a depth of approximately 14 feet bgs at this location, which slightly exceeds the direct contact PCUL of 5 mg/kg. The downgradient extent of contamination is bounded based on the results of CR-MW10 and/or CR-MW15 soil samples located approximately 30 feet to the east of this area. The residual TPH-D concentrations exceed the SLs of 250 mg/kg for the protection of VI in confirmation sample location MIL-A4-CONF-ESW and boring B10 at a depth of 14 feet bgs and are located east and adjacent to Milgard Hall.
- **Within and Downgradient from Former Waste Oil UST Area**. Residual TPH-G (up to 1,090 mg/kg), TPH-D (up to 3,730 mg/kg), TPH-O (up to 2,920 mg/kg), ethylbenzene (3.2 mg/kg), and xylenes (11.6 mg/kg) remain in place at the base of the 1994 Remedial Action area in the vicinity of the former Waste Oil UST Area represented by soil samples CR-B8 and CR-S5. Sample CR-B8 was collected from approximately 17.5 feet bgs (below the base of the remedial excavation) and sample CR-S5 was collected at approximately 9 feet bgs at the eastern sidewall. The downgradient extent of contamination is bounded based on the results of the MIL-A5-CONF soil samples and soil samples from boring CRMW6 located approximately 20 feet east of sidewall sample CR-S5.
- **Adjacent to Former Concrete Shed (Drum Storage Area) and Coal Bunker**. Benzene was detected at a concentration of 0.0047 mg/kg in soil at a depth between approximately 7 and 8 feet bgs in this area as represented by soil samples from boring MIL-B5. In addition, 1,2,4-TMB, 1,3,5-TMB, and cPAHs (secondary COCs) were detected at a concentration of 5.4, 0.53, and 0.3 mg/kg, respectively, at this location, which exceeds the direct contact PCULs. The lateral extent of contamination is bounded based on sample results from borings CR-B6 and CR-B7 located immediately to the north and south of boring MIL-B5. In addition, TPH-D was detected in confirmation sample location MIL-A2-CONF-3 (410 mg/kg) located west and adjacent to Milgard Hall at the ground surface.

- **Adjacent to Former Hydraulic Hoists.** Residual TPH-D was detected in sample locations CR-HPS-B, CRHPS-E, CR-NHP2-W, CR-HPN-N, CR-HPN-S, and MIL-GL13/F-3 at depths ranging between approximately 2 and 8 feet bgs in the vicinity of two former hydraulic hoists in the central and south-central portion of Cragle. The residual TPH-D concentrations exceed the SLs of 250 mg/kg for the protection of VI at these locations.

The residual TPH-G, TPH-D, and benzene concentrations exceed the SLs for the protection of VI at multiple locations. The potential for VI from the residual TPH-G, TPH-D, and benzene is further discussed in Section 5.6.4.

5.6.3. Groundwater

The nature and extent of groundwater COCs for the Cragle Site (TPH-D and benzene) are based on the results of the 2016 Agreed Order RI, which is representative of current conditions. As noted above, TPH-D and benzene were identified as primary groundwater COCs based on PCUL exceedances during one or more monitoring events during the 2016 Agreed Order groundwater investigation. TPH-D and benzene groundwater data from the semi-annual sampling events completed between March 2019 and September 2020 are summarized below. Primary groundwater COCs identified for the Cragle Site (TPH-D and benzene) as well primary COCs identified for soil (TPH-G, TPH-O, toluene, ethylbenzene and total xylene) are shown in plan view on Figures 5-11 through 5-14 and in cross-section on Figure 5-15.

- **Downgradient from Former Gasoline and Gasoline/Diesel UST Areas.** TPH-D and benzene contamination was detected in Qvi groundwater in one or more monitoring events during the 2016 Agreed Order RI in well CR-MW9 located within South C Street downgradient of the former Gasoline and Gasoline/Diesel UST Areas. TPH-D was detected during two of the three monitoring events at this location but only exceeded the PCUL of 500 µg/L during the April 2019 monitoring event at a concentration of 710 µg/L. The TPH-D detection was flagged in the chemical analytical laboratory reports as an overlap with the TPH-G range. Benzene was detected at concentrations between 5.2 and 37 µg/L during each of the monitoring events that exceeded the PCUL of 5 µg/L. The benzene groundwater contamination in this area is generally bounded downgradient to the north and east by groundwater sample results from wells CR-MW8 and CR-MW15.
- **Downgradient from Former Waste Oil UST Area.** TPH-D contamination was detected in Qvi groundwater in one of the three monitoring events during the 2016 Agreed Order RI in well CR-MW5 located within South C Street downgradient of the former Waste Oil UST Area. TPH-D was detected at a concentration of 710 µg/L, which exceeded the PCUL of 500 µg/L during the March 2020 monitoring event. TPH-D was either not detected or was detected at a concentration less than the PCUL during each of the other monitoring events. Monitoring well CR-MW7 located east of CR-MW5 was decommissioned prior to the 2016 Agreed Order RI during construction activities in the area. However, TPH-D was either not detected or was detected at concentrations less than the PCUL in groundwater samples collected from this well between 1999 and 2000 suggesting that the current TPH-D groundwater contamination is bounded to the east by CR-MW7.

The residual benzene concentration exceeds the SL for the protection of VI in groundwater in the eastern portion of Cragle. The potential for VI from the residual benzene is further discussed in Section 5.6.4. Additionally, CVOC (TCE, cis-DCE, DCE, and vinyl chloride) groundwater contamination on the Cragle Site within the Qvi and Qva aquifers is attributed to the Easterly Plume and is discussed further in Section 15.0.

5.6.4. Soil Vapor and Indoor Air

Based on the soil and/or groundwater sampling results representing current conditions, TPH-G, TPH-D, benzene, and CVOCs (TCE, cis-DCE, DCE, and vinyl chloride) were identified as contaminants with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SL for the protection of commercial workers for the Cragle Site. The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination**. Petroleum-related contaminants in soil were evaluated for potential VI based on Ecology's 2022 VI Guidance. Ecology's guidance states buildings located within the inclusion area (30-foot horizontal and 15-foot vertical separation distance) of soil with TPH-D concentrations greater than 250 mg/kg and TPH-G concentrations greater than 100 mg/kg may be at risk of VI into indoor air (1064). An evaluation of the potential for VI is discussed below based on current conditions at Cragle and the surrounding area is discussed below:
    - Residual TPH-D contamination at locations CR-HPS-B and CR-HPS-E is located beneath an asphalt paved parking lot at a distance greater than the recommended 30-foot separation distance recommended by Ecology under the VI guidance from any enclosed space. Therefore, the residual TPH-D contamination is not a potential threat for VI in this area.
    - Residual TPH-D and/or TPH-G-contaminated soil at locations CR-S5, CR-HPN-N, CR-HPN-S, CR-NHP2-W, MIL-GL13/F-3, MIL-A2-CONF-3, MIL-A4-CONF-ESW, and MIL-B10 is located beneath Milgard Hall or within 30 lateral feet. However, engineering controls (i.e., chemical vapor barrier and passive vent system) have been incorporated into the Milgard Hall Building construction project to address the observed TPH-D and TPH-G contamination at this location. Sampling was completed in December 2022 to evaluate the effectiveness of the engineering controls (Table 5-7). BTEX, naphthalene, and the sum of TPH BTEXN (TPH, BETX and naphthalene) were detected in the sub-slab sample at concentrations less than the soil vapor SL for unrestricted use. The adjusted TPH BTEXN sum concentration in indoor air samples was greater than the indoor air PCUL for unrestricted use but less than the indoor air SL for a commercial worker. The adjusted naphthalene concentrations in indoor air samples were detected at concentrations than the indoor PCUL for unrestricted use and the indoor SL for commercial workers. The TPH BTEXN sum and the naphthalene adjusted indoor air concentrations were less than the typical background concentrations per Ecology VI Guidance. The TPH BTEXN sum and naphthalene detections in indoor samples are attributed to commercial products based on the sub-slab sample results and because the building was newly constructed with numerous commercial products that off-gas VOCs and TPH (i.e., pressed wood, flooring, etc.). The sampling in December 2022 confirmed VI is not occurring and the vapor mitigation system is effective. Therefore, the residual TPH-D and TPH-G contamination is not considered a potential concern for VI in this area.
    - The Mattress Factory Building and Snoqualmie Library are outside of the inclusion area (i.e., greater than 30 feet) for petroleum VI evaluation. Therefore, these buildings are not within the lateral inclusion area and TPH-D impacts to indoor air are not anticipated.
- **Petroleum-Related Groundwater Contamination.** Benzene was detected in groundwater at location CRMW9 located east of Milgard Hall and beneath the asphalt paved portion of South C Street. Engineering controls (i.e., chemical vapor barrier and passive vent system) have been incorporated into the Milgard Hall Building construction project to address the observed benzene contamination at this location. Benzene was detected in the indoor air samples at concentrations less than the MTCA Method B Indoor Air cleanup level in samples collected in December 2022 (Table 5-7). Other buildings are located more than 30 feet from the leading edge of the observed contamination. Therefore, benzene is not considered a potential threat for VI.

- **Other Contaminants**. CVOCs including TCE, cis-DCE and vinyl chloride exceeded the SL for groundwater VI. The potential for VI resulting from CVOCs associated with the Easterly Plume, which extends beneath Cragle, is further discussed in Section 15.0.

5.7. Contaminant Fate and Transport

The chemical properties of contaminants and the physical, chemical, and biological processes that they are exposed to affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed on a UWT Campus-wide basis in Section 18.0. Locally, soil and groundwater contamination associated with the Cragle Site is located beneath the Milgard Hall building and surrounding hardscape areas (UWT Campus parking lot, sidewalks, and paved portions of South C Street), which prevent direct exposure and infiltration precipitation (Figure 5-1 and 5-15). Additionally, mobilization of COCs from precipitation is likely limited by stormwater collection and drainage systems that convey the stormwater away from this area. As discussed above, the Milgard Hall building was constructed with engineering controls to prevent VI into the enclosed spaces. Utility infrastructure that could provide a preferential pathway for groundwater contaminant migration is either located at an elevation above the groundwater table or is outfitted with a trench dam to prevent the lateral flow of groundwater and migration of contaminants along the utility pipes and associated backfill.

Overall, groundwater monitoring completed for the 2016 Agreed Order RI indicates that soil COCs except for TPH-D and benzene are not impacting groundwater. Although present, TPH-D and benzene contamination in groundwater associated with the Cragle Site is limited to the area immediately downgradient of residual soil contamination remaining in place at the eastern boundary of the 1994 Remedial Action area within South C Street. Groundwater data indicated that the TPH-D and benzene are stable and/or are slowly decreasing through natural attenuation processes following the removal of the primary source areas during the 1994 Remedial Action and subsequent remedial actions completed at the property. Natural attenuation refers to naturally occurring processes in soil and groundwater that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of chemicals in those media. These processes may include biodegradation, adsorption, dispersion, dilution, volatilization, and chemical or biological stabilization or destruction of the chemicals (1029).

5.8. Summary

Historical land use at Cragle between 1889 and 1984 included coal and petroleum storage, distribution and recycling, and auto-related services. These historical uses resulted in releases of TPH and BTEX (primary COCs), naphthalene, and cPAHs (secondary COCs) to soil and/or groundwater. However, most of the soil contamination was removed through multiple phases of remedial action including excavation and soil treatment during the 1994 Remedial Action, 1997 Remedial Action, and the Milgard Hall Capital Project. The Milgard Hall building and associated surrounding hardscapes (sidewalks, parking lot, pavement in South C Street) constructed in 2022 prevent direct contact with contaminants while the engineering controls (sub-slab vapor mitigation system) prevent the migration of contaminant vapors into occupied indoor spaces. Additionally, the stormwater collection system for Milgard Hall and the surrounding area further prevents the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater. Residual soil contamination and contaminated groundwater for the Cragle Site are stable based on the monitoring data presented in this RI Report.

Soil, groundwater, and sub-slab soil vapor/indoor air data are presented in Tables 5-5 through 5-7, respectively. The nature and extent of primary COCs in soil and groundwater constituting the Cragle Site

are shown in plan view on Figure 5-1, by chemical/media on Figures 5-7 through 5-14, and in cross section on Figure 5-15. PCUL (protective of direct contact) exceedances of secondary COCs (naphthalene and cPAHs), which were only observed at two locations (within the former concrete shed/drum storage area and downgradient from former Gasoline and Gasoline/Diesel UST Areas), are collocated with primary COC PCUL exceedances. Groundwater monitoring data collected as part of the 2016 Agreed Order RI indicate that secondary COCs for the Cragle Site are not adversely impacting groundwater. Therefore, these exceedances are not shown.

6.0 REMEDIAL INVESTIGATION—WILLIAMS OIL FILTER

6.1. Introduction

Williams Oil Filter (WOF; currently the location of the Science Building) was generally located between 1741 and 1745 Jefferson Avenue and northeast of the intersection of South 19th Street and Jefferson Avenue in Tacoma, Washington (Figure 6-1). Environmental data collected during soil and groundwater studies (Section 6.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of TPH-D in soil east of WOF within the PLT pedestrian corridor at a concentration greater than the PCUL (WOF Site; Figure 6-1). This contamination migrated off the WOF property. It is a result of releases associated with product piping connected to a former heating oil UST that was used by WOF, and/or other spills and releases during historical land use. Summary statistics for soil and groundwater identifying COCs for WOF are presented in Tables Q-4 and Q-5 (Appendix Q). Specifically, historical operations included motor parts sales, a machine shop, bearing sales and services, and oil filter service between 1949 and 2000 when the buildings were demolished.

However, most of the TPH-D contamination identified in soil was removed in 2000 during redevelopment activities for the Science Building. The extent of residual TPH-D soil contamination (WOF Site; Figure 6-1) is currently limited to a localized area east of the Science Building, which is capped with up to 8 feet of clean imported soil and the paved surface of the PLT pedestrian corridor. The PLT pedestrian corridor and associated surrounding hardscapes (sidewalks, pedestrian pathway) constructed in 2013 prevent direct contact with the residual contamination, and the surrounding buildings are located at a sufficient distance to prevent the migration of contaminant vapors from entering the occupied indoor spaces. Currently, the stormwater collection system for the Science Building and the surrounding area prevents the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater. Residual soil contamination for the WOF Site (as defined by TPH-D PCUL exceedances) based on the post-remedial action results is generally stable and not impacting groundwater in this area based on the monitoring data presented for the WOF RI.

WOF (AOC 2 in the 2016 Agreed Order) and the WOF Site (residual TPH-D contamination in soil) are shown on Figure 6-1 relative to the surrounding historic features. Terminology for WOF referenced by this RI is described below:

- **WOF.** The source property or point of release for contamination associated with historic operations on the southern portion of Pierce County Parcel No. 2018060021 (1.84-acre parcel). Historically, the parcels were occupied by two separate buildings with addresses 1741 Jefferson Avenue (northern

building; historic Pierce County Parcel No. 20180600030) and 1745 Jefferson Avenue (southern building; historic Pierce County Parcel Nos. 20180600040).

- **WOF Site.** The area and media containing residual contamination exceeding PCULs.
- **Science Building.** The building currently occupying the northern and central portions of WOF, which is owned and operated by UW.
- **South 19th Street Stairs/Ramp.** Access path currently occupying the southern portion of WOF.
- **PLT.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 0320043155, which is further discussed in Section 7.0.

Westerly Plume. The extent of CVOC (PCE, TCE, DCE, cis-DCE, vinyl chloride, and DCA) contamination associated with historic operations and/or land use at 1701 Tacoma Avenue South, 1722 Tacoma Avenue South, 1904-1908 Tacoma Avenue South, 1922 Tacoma Avenue South, 1934-1938 Tacoma Avenue South, Tacoma Avenue South Sanitary Sewer, 1755 Fawcett Avenue, and 1742 Jefferson Avenue, which is further discussed in Section 13.0.Specific details regarding the historical property use leading to the release of contaminants, RI activities completed to date, the CSM, and the nature and extent of contamination associated with WOF are summarized below.

6.2. Property Conditions

6.2.1. Location and Description

WOF is located from 1741 to 1745 Jefferson Avenue in the central portion of the UWT Campus north of the intersection of South 19th Street and Jefferson Avenue (Figure 6-1). WOF was redeveloped in the early 2000s with the construction of the Science Building and associated pedestrian pathway (South 19th Street Stairs and ramp; Science Building Capital Project) to the south to support the academic growth of the UWT Campus. The ground surface is predominantly covered by the pavement and the Science Building except for limited landscaped areas. The finished floor elevation of the Science Building is approximately 79 feet. The area surrounding the Science Building slopes steeply to the east from an elevation of approximately 94 feet on Jefferson Avenue (west of the Science Building) to an elevation of approximately 72 feet on PLT (east of the Science Building). The PLT pedestrian corridor to the east of WOF was developed in 2013 to convert a historical railway corridor into a pedestrian pathway. The redevelopment of the PLT pedestrian corridor as part of the PLT Capital Project is further described in Section 7.0.

6.2.2. Historical Land Use

Residential structures were present on WOF between 1896 and at least 1912. The residential structures were demolished by 1950. The former 1745 Jefferson Avenue building was constructed in 1949 and occupied between 1949 and 1970 by a wholesale auto parts company with an operating machine shop. The whole sale auto parts company operated under the name "Motor Parts & Equipment Company" and "Motor Parts Company." A second building with addresses 1741 and 1743 Jefferson Avenue was constructed in 1957. An oil filter services company operated between at least 1957 and 1974 at the 1741 Jefferson Avenue under the names "Oil Filter Service Company", "Oil Filter Sales and Services Company", "Service Filter Company", and "Williams Oil Filter Service." Additionally, a company called "Central Recycling" operated at the 1741 address in at least 1978. The 1741 Jefferson Avenue address is not listed after 1978. A company called "Bearing Sales and Services" operated at the 1743 Jefferson Avenue address between 1957 and at least 1969. The 1743 Jefferson Avenue address is not listed after 1969.

Photo 6-1. Circa 1970 photograph of the Williams Oil Filter Service Company building (1741 Jefferson Avenue).

Photo 6-2. Circa 1949 photograph of the Motor Parts & Equipment Company (1745 Jefferson Avenue).

In 1970, "Williams Oil Filter Service Company" appears to have expanded from the northern building (1741 Jefferson Avenue) into the southern building (1745 Jefferson Avenue) based on historical photographs. City directories indicate "Williams Oil Filter Service" and "Motor Parts Company" operated in the southern building until at least 1978. "Williams Oil Filter Service Company" operated until 2000 when the buildings were demolished. A parking lot was present between the buildings and the former South 19th Street ROW.

In 1999, a battery storage area and equipment storage area were located to the east within the paved area along the outside of the former buildings and within the former railway corridor (161). Two floor drains were in use within the buildings — one in the north-central basement area and one in the northeast basement area. The north-central drain was reported to be where the former "hot tank" was located that likely contained solvent to degrease mechanical parts. The northeast drain was reported to be where former vehicle maintenance activities occurred (135). The physical locations of the two floor drains and discharge pipes were not located during an April 24, 1998, property walk prior to demolition due to the accumulation of debris along the exterior of the former building.

A 1,600-gallon heating oil UST was located south of the former building. The UST was removed in June 1994. In March 2000, the parcel was redeveloped for the construction of the current Science Building

and pedestrian path to the south, which resulted in the demolition and removal of the previous buildings and associated structures. The former South 19th Street ROW was also closed and redeveloped as the "South 19th Street Stairs and Ramp" providing pedestrian access between Jefferson Avenue and the PLT pedestrian corridor. Historical land use, structures, and features for WOF and the surrounding area are shown on Figure 6-2.

6.2.3. Current and Future Land Use

UW purchased the WOF property and properties adjacent to WOF in the late 1990s with the exception of PLT, which was gifted to UW in 2013 by BNSF. Since that time, structures on the adjacent properties have either been renovated or demolished and redeveloped as new campus buildings or pedestrian access. The redevelopment of WOF (Science Building Capital Project) was completed in 2013 to support continuing academic growth of the UWT Campus. The footprint of the Science Building along with associated subsurface utilities and adjacent properties are shown on Figure 6-3.

Anticipated future land use in this area will support the UWT Campus with academic buildings, surface streets, and pedestrian access.

6.2.4. Utility Infrastructure

Current utility infrastructure within and adjacent to WOF with the potential to serve as preferential pathways for contaminant migration is shown on Figure 6-3 and includes the following:

- Utilities within the building include water, electrical, sanitary sewer, roof drains, footing drains, and mechanical systems. The Science Building sanitary sewer is presumed to connect to the sanitary sewer in the PLT pedestrian corridor. The location of the lateral is not known.
- A stormwater system consisting of catch basins and unreinforced concrete pipes is located in the pedestrian path south of the Science Building and connects to a main west-east oriented stormwater line that was installed in 1973. Stormwater in this line is conveyed through a 10-inch-diameter pipe that was lined/cured in place with thermal setting resin by the City.
- A sanitary sewer line consisting of one north-south oriented 8-inch-diameter pipe is located east of the Science Building and within the PLT pedestrian corridor with the flow direction from the south to the north. The sanitary sewer is located 6 to 8 feet bgs (elevation 64.8 to 70.4 feet) east of the Science Building.

6.3. Field Investigations and Remedial Actions

Multiple environmental investigations have evaluated subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations documenting soil and groundwater conditions, and remedial actions for WOF and/or the surrounding area are discussed in Sections 6.3.1 through 6.3.5. below. Sampling locations used to evaluate soil and groundwater conditions are shown on Figures 6-4 and 6-5. Investigations completed for WOF and the surrounding area to support the development of the RI are summarized in Tables 6-1 and 6-2 and further discussed below (Sections 6.3.1 through 6.3.5). Construction details for permanent monitoring wells installed within WOF and the surrounding area are presented in Table 6-3. Soil and groundwater results for the subsurface investigations completed are presented in Tables 6-4 and 6-5, respectively.

6.3.1. Pre-1997 Agreed Order Investigation and Remedial Action

One 1,800-gallon heating oil (likely diesel) UST was removed from the parking area south of the WOF building in 1994 as reported in the 2002 RI (161, Figure 6-4). During the removal of the UST, approximately 50 tons of petroleum-contaminated soil was removed from the fill pipe area adjacent to the UST under oversight by UW personnel. The exact location and dimensions of the remedial excavation area could not be verified based on a review of UWs records. As reported by the 2002 RI, five discrete confirmation soil samples were collected from the base and sidewalls of the UST excavation for chemical analysis of TPH. Chemical analytical results for these samples were reported to be less than the 1996 MTCA Method A soil cleanup levels in each of the confirmation samples. However, these data were not reported in the 2002 RI Report and could not be independently verified. Upon completion of the UST removal and closure activities, the excavation area was reportedly backfilled with imported material and the surface was paved with asphalt.

6.3.2. 1997 Agreed Order Investigation

Between 1997 and 2002, URS on behalf of UW completed an RI for the eastern portion of the UWT Campus in accordance with the 1997 Agreed Order. As part of the 1997 Agreed Order RI, soil conditions within WOF were further evaluated. Specifically, investigation activities were completed to evaluate subsurface conditions downgradient from the former heating oil UST and remedial excavation area. As indicated above (Section 6.3.1), a heating oil UST was removed from this area in 1994, however, confirmation of soil conditions at the remedial excavation limit could not be verified based on the available information. Environmental investigation activities to further evaluate soil conditions in this area are further discussed below (Section 6.3.2.1). Soil sampling locations are shown on Figure 6-4.

6.3.2.1. Soil Investigation Summary

Soil investigations completed for WOF as part of the 1997 Agreed Order RI included the completion of one boring (WOF-W-B1) to an approximate depth of 8 feet bgs northeast of the former heating oil UST to evaluate soil conditions in this area. From this boring, one soil sample collected from a depth of 0.5 feet bgs was submitted for chemical analysis of cadmium and lead. Lead was detected at a concentration of 47.4 mg/kg; cadmium was not detected in the analyzed sample. Groundwater was not encountered during drilling at WOF-W-B1.

6.3.3. Supplemental Investigations Under the 1997 Agreed Order

Supplemental investigation activities were completed in accordance with the 1997 Agreed Order to further evaluate soil and groundwater conditions for WOF and the surrounding area. Investigation activities related to the WOF are summarized in Sections 6.3.3.1 and 6.3.3.2 below. Supplemental soil and groundwater sampling locations are shown on Figure 6-4.

6.3.3.1. Soil Investigation Summary

One sonic soil boring (JS-MW4D) was advanced to an approximate depth of 53 feet bgs and completed as a permanent monitoring well west of WOF to further evaluate soil and groundwater as part of the UWT Campus-wide investigation in 2013. Boring JS-MW4D was located within Jefferson Avenue approximately 50 feet west (upgradient) of the historical operations area. A total of 20 soil samples collected from boring JS-MW4D at depths ranging between approximately 7 and 53 feet bgs were analyzed for select VOCs. CVOCs (TCE) were detected in samples collected from approximately 43 to 52 feet bgs.

Other contaminants were not detected in the analyzed samples. CVOC contamination is associated with the Westerly Plume, which is further discussed in Section 13.0.

6.3.3.2. Groundwater Investigation Summary

Supplemental groundwater monitoring for WOF included the collection of samples from the newly installed well (JS-MW4D). Water samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, VOCs, PAHs and metals. CVOCs (TCE) and lead were detected in the groundwater sample. Other contaminants were not detected. CVOC contamination is associated with the Westerly Plume, which is further discussed in Section 13.0.

6.3.4. 2016 Agreed Order Investigation

Additional investigation related to WOF was proposed as part of the 2016 RI Work Plan. This work included the collection of groundwater samples for TPH-D in new monitoring wells A11-MW23S, A11-MW23D, and A7-MW5S to evaluate for TPH within the Qvi and Qva aquifers in the vicinity of the historical operational area. Monitoring wells A11-MW23S and A11-MW23D proposed for this area were installed to the southeast and away from WOF due to access constraints. Also, TPH-D analysis was removed from well A7-MW5S in RI Work Plan Addendum No. 5 because additional review of geology and hydrogeology in the area indicated that groundwater in the Qvi is discontinuous and/or perched (see Section 6.4.2). As a result, the additional investigation activities proposed as part of the 2016 RI Work Plan were not performed for WOF.

Groundwater investigation activities were completed at wells COT-MW4 and JS-MW4D located west (upgradient) of the WOF historical operations area (Figure 6-4) as part of the UWT Campus-wide investigation activities. Groundwater monitoring activities at these locations were completed in December 2016 and on a semi-annual basis between March 2019 and September 2020. These data were evaluated to identify potential contaminants coming onto WOF. Groundwater investigation activities for JS-MW4D and COT-MW4 are summarized below.

6.3.4.1. Groundwater Investigation Summary

Groundwater monitoring activities were completed at COT-MW4 and JS-MW4D as part of the UWT Campus-wide investigation as indicated above. COT-MW4 was dry during each sampling event. Groundwater samples collected from JS-MW4D were analyzed for select VOCs (Table 6-2). Petroleum-related VOCs were not detected in the analyzed samples. CVOCs (TCE) were detected in each analyzed groundwater sample. CVOC contamination is associated with the Westerly Plume, which is further discussed in Section 13.0.

6.3.5. Capital Projects

Investigation and remedial action activities were necessary to implement UW Capital Projects. Similar investigations were conducted by the City to support planning and design for various ROW utility projects. Capital projects and investigation activities in the vicinity of the WOF are summarized in Sections 6.3.5.1 through 6.3.5.3 below. Soil and groundwater sampling locations are shown on Figure 6-5.

6.3.5.1. Science Building Capital Project

A geotechnical investigation was completed in 1998 and an environmental investigation and associated remedial excavation was completed in 2000 as part of planning and development of the Science Building on WOF. Geotechnical and environmental investigations and associated remedial actions are summarized below.

Geotechnical Investigation Summary

An investigation was performed by GeoEngineers in anticipation of the Science Building construction between 1998 and 1999 at WOF (145). Investigation activities included the completion of soil borings 99-1 and 99-2 using HSA drilling methods to perform a geotechnical evaluation of the subsurface soil. Each boring was completed to approximately 29 feet bgs.

Groundwater from the Qva aquifer was encountered at approximately 27 feet bgs (elevation 53 feet) in boring 99-1 located in the southeast corner of the proposed building. Groundwater was not encountered in boring 99-2. Soil samples were not collected as part of the geotechnical investigation.

May 2000 Environmental Investigation and Remedial Excavation Summary

In May 2000, buried piping associated with the former heating oil UST (see section 6.3.1) and soil with field indications (staining, sheen, odor, etc.) of petroleum contamination was encountered underneath the former WOF building slab during demolition (143). Three samples (B12-2-2, B-9.5-1, and WW-5-1) representative of this material from locations WOF-B12-2, WOF-B-9.5-1, and WOF-WW-5 were collected at depths ranging between approximately 5 and 12 feet bgs and analyzed for TPH-G, TPH-D, and TPH-O. The method of sample collection is unknown. However, the samples are presumed to have been collected during the general building demolition and construction excavation as part of the Science Building Capital Project. TPH-D was detected in soil sample B12-2-2 at a concentration of 3,600 mg/kg. Naphthalene was detected at a concentration of 37 mg/kg. Other contaminants were not detected.

Ten DP soil borings (WOF-SP-01 through WOF-SP-10) were completed to depths ranging between approximately 12 and 18 feet bgs to evaluate the extent of petroleum-contaminated soil. Wet soil conditions were encountered at approximately 9 to 12 feet bgs in boring WOF-SP-08. Wet soil at this location is interpreted to be perched groundwater based on the absence of wet soil conditions in the other borings. Soil samples from locations WOF-SP-1, WOF-SP-7 and WOF-SP-8 were submitted for chemical analysis of TPH-D and TPH-O. TPH-D was detected at concentrations ranging between 1,300 and 6,700 mg/kg at depths between 3 and 12 feet bgs in each of the three borings. TPH-O was detected at a concentration of 1,500 mg/kg in the soil sample collected at a depth of approximately 6 feet bgs in boring WOF-SP-7. Sample locations are shown on Figure 6-5.

GeoEngineers subsequently oversaw remedial excavation activities to remove the petroleum-contaminated soil released from the product piping associated with the former heating oil UST represented by soil samples B-12-2, EW-10, SP-1-10-12, SP-7-3-6, and SP-8-9-12 (Table 6-4; 101). Remedial excavation removed approximately 2,580 cubic yards of contaminated soil. The soil was treated at TPS Technologies in Tacoma, Washington. The remedial excavation measured approximately 60 feet long by 60 feet wide and ranged in depth between approximately 12 and 27 feet bgs. To verify the removal of the petroleum contamination, 21 discrete confirmation soil samples were collected from the base and sidewalls of the remedial excavation and analyzed for TPH-D and TPH-O. These samples verified TPH-D contaminated soil was removed from the base and sidewalls of the excavation with the following exception.

Excavation of the eastern sidewall was limited by a sanitary sewer pipe at an approximate elevation of 67.6 to 66.4 feet (148). Although confirmation sidewall samples SEW-20-8, NESW-18-15 and ESW-19-13 collected from the eastern sidewall confirmed the removal of the petroleum-contaminated soil, the samples were collected at elevations above the sanitary sewer pipe (approximately elevations 71 feet, 58 feet, and 67 feet, respectively). Field indicators of petroleum contamination (staining, sheen, odor, etc.) were observed below the elevation of the sanitary sewer pipe. Based on this observation, residual petroleum

contamination above MTCA CULs (represented by sample WOF-EW-10) is presumed to remain in place at this location.

6.3.5.2. Prairie Line Trail Capital Project

In 2013, additional investigation and remedial excavation activities were performed by GeoEngineers east of the former WOF building during the construction of the PLT Capital project as shown in Photo 6-3 (252). The investigation was completed east of the sanitary sewer pipe observed in the 2000 WOF remedial excavation. Nine DP borings (PLT-BA6-1 through BA6-8[5] and PLT-B14) were advanced to depths ranging from approximately 10 to 15 feet bgs (approximate elevation 59 to 54 feet) east of the Science Building (former WOF building and 2000 excavation area) to further evaluate the nature and extent of residual petroleum-contaminated soil remaining in place at this location. In addition, a temporary well was placed in boring PLT-B14 for the collection of a perched groundwater sample (252). Groundwater was not encountered in the other soil borings completed at this location.

Photo 6-3. Circa 2013 photograph of Prairie Line Trail during investigation activities (looking north). Science Building to the left of the photograph occupies the majority of the former WOF Building footprint.

Soil samples were field screened using visual, water sheen, and headspace vapor screening methods (Appendix G). Field screening results were used as a general guideline to delineate areas of possible contamination and samples to be submitted for analyses. Field screening results indicated the potential petroleum contamination at depths ranging from approximately 6 to 10 feet bgs in borings BA6-3, BA6-5, BA6-7, and BA6-8 (Figure 6-5). Subsequently, soil samples from these borings with field screening evidence of petroleum contamination were submitted for chemical analysis of TPH-D and TPH-O. TPH-O was detected in soil at a concentration of 16,000 mg/kg from approximately 6 to 7 feet bgs in boring PLT-BA6-5. TPH-D and TPH-O were not detected in the remaining analyzed samples. Soil samples were not submitted for chemical analysis from PLT-BA6-1, PLT-BA6-2, and PLT-BA6-4 because field screening did not indicate evidence of possible contamination. Chemical analytical results for the DP borings are summarized in Table 6-4. Based on a review of the data, TPH-O from boring PLT-BA6-5 was interpreted to be associated with the historical operations on PLT, which are further discussed in Section 7.0, and not associated with WOF historical operations.

Perched groundwater encountered in boring PLT-B14 at approximately 10 to 11 feet bgs (elevation 63 feet) was also submitted for chemical analysis of TPH-G, TPH-D, TPH-O, select VOCs, and PAHs. Low-level PAHs were detected in the perched water sample collected from boring PLT-B14. Other contaminants including TPH-G, TPH-D, TPH-O, and petroleum-related VOCs were not detected. Chemical analytical results related to WOF for the perched water sample are summarized in Table 6-5.

[5] "PLT" added to the front of the borings in this report to distinguish them from other investigation areas for the UWT Campus.

In addition to the investigation activities completed within PLT, construction of the PLT pedestrian corridor (further discussed in Section 7.0) resulted in the installation of a soldier pile (Photo 6-4) wall between the Science Building (approximate extent of WOF Building footprint) and the sanitary sewer (the eastern portion of 2000 remedial excavation). Following installation of the soldier pile wall, a small prism of soil was excavated to support regrading activities within PLT. A geotextile fabric and at least 1 foot of imported fill soil were then placed. Visual indicators of petroleum contamination were not observed during construction of the PLT. The new ground surface west of the soldier pile wall is approximately elevation 75 feet. Soil generated from the soldier piles was disposed of at a Subtitle D landfill.

Photo 6-4. 2015 photograph of Science Building and final configuration of PLT looking northwest.

6.3.5.3. City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project

One soil boring (COT-MW5) was completed in December 2017 near the intersection of Jefferson Avenue and South 19th Street in the vicinity of a planned stormwater replacement project (Jefferson and Hood Street Surface Water Interceptor Capital Project). This boring was advanced to approximately 46 feet bgs and completed as a permanent monitoring well located west (upgradient) of WOF. Soil samples were analyzed for TPH-HCID and select VOCs. Benzene was detected in shallow soil less than 10 feet bgs. Other contaminants were not detected in the analyzed samples. Groundwater was not encountered in COT-MW5.

6.4. Conceptual Site Model

Development of the CSM for WOF is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant sources and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for WOF is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 6.4.1 through 6.4.4 describe the specific elements of the WOF CSM.

6.4.1. Physical Setting

WOF is located in the east-central portion of the UWT Campus. Demolition of former structures and a remedial excavation were completed following property acquisition by UW in the early 2000s to support the UWT Campus Master Plan. The Science Building Capital Project was completed in the early 2000s and the east adjacent PLT pedestrian corridor was completed in 2013.

6.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic settings for WOF (described in the following sections) inform the distribution of contaminants in media of potential concern. Local geology and hydrogeology in the vicinity of WOF are described below in Sections 6.4.2.1 and 6.4.2.2.

6.4.2.1. Local Geology

Geologic units present beneath WOF include the Qf, Qvi, and Qva deposits. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings within WOF, and the surrounding area, consists of locally derived, reworked ice-contact deposits or imported fill material used within the former remedial excavations or as part of the Science Building Capital Project. Fill material extends up to 23 feet bgs and is primarily composed of silty sand with varying amounts of gravel and silt.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till, subglacial channel materials, and lacustrine materials deposited beneath the glacial ice along the ice margin during the last glacial period. The Qvi deposits range in thickness of 8 to 35 feet and consist of Qvi till-like deposits, Qvi channel deposits, and Qvi silt.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** Qva deposits in the area of WOF consist of sand/gravel to the full depth explored. Qva silt was not observed in the borings completed in the area of WOF.

Geologic conditions in the vicinity of WOF are shown relative to the UWT Campus on Figure 2-13.

6.4.2.2. Local Hydrogeology

Groundwater in the east-central portion of the UWT Campus occurs within both the Qvi (shallow) and Qva (deep) aquifers (Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Specific areas where the Qvi and Qva aquifers are interpreted to be hydraulically connected and flow into each other are shown on Figure 2-14 to 2-19 and include the following as they relate to groundwater flow beneath WOF and the surrounding area:

- **West of WOF.** Incision of the valley walls during the last glacier retreat (approximately 10,000 to 13,000 years ago) has locally resulted in the absence of the confining layer separating the Qvi and Qva aquifer (i.e., Qvi and/or Qva silt) in this vicinity. As a result, the Qvi and Qva aquifers are locally hydraulically connected. Groundwater within the Qvi aquifer west of WOF is interpreted to drain into and mix with groundwater from the underlying Qva aquifer (see Figure 2-13) due to the absence of the Qvi aquifer beneath WOF.
- **Beneath and West of WOF**. The Qvi aquifer is absent in the area beneath and immediately surrounding the Science Building as a result of the valley wall incision west of this location (described above). Locally, groundwater within the Qvi unit occurs as perched and discontinuous lenses.

Local groundwater occurrence and flow for the Qvi and Qva aquifers are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer is locally absent beneath and east of WOF as a result of the erosion and incision during the glacial retreat as described above. Groundwater within the Qvi upgradient of WOF is interpreted to drain into the underlying Qva aquifer thus depleting the Qvi aquifer before reaching this area. Perched groundwater may be present at some locations within the fill or upper Qvi deposits but is not considered representative of groundwater levels in the Qvi aquifer.

Qva Groundwater Occurrence and Flow

The Qva aquifer is present beneath WOF with an inferred groundwater flow direction that is generally east-northeasterly based on the UWT Campus-wide Qva flow direction (Figures 2-17 and 2-19). A confining layer (Qvi silt) present at a depth of approximately 40 feet bgs separates the Qva aquifer from the overlying Qvi deposits (Table 6-5).

The local estimated average linear velocity and hydraulic gradient for the Qva aquifer beneath WOF were not estimated due to the limited number of wells screened within the Qva aquifer in this vicinity.

6.4.3. Sources of Contamination

The primary source of contamination at WOF is related to releases from product piping associated with a former heating oil UST used to support historical land use and operations between 1949 and 2000, including a machine shop, auto parts center, and oil filter service shop. The former heating oil UST was removed in 1994 and the associated product piping was removed in 2000. Other potential release mechanisms include drips, leaks, and/or spills from drums and/or other equipment directly to soil during historical operations within the former WOF building (135).

CVOCs (TCE) associated with upgradient and off-property releases (i.e., Westerly Plume) and benzene in shallow soil within Jefferson Avenue have been identified. CVOC contamination within the Westerly Plume has migrated onto WOF due to releases from upgradient historical operations and land use as discussed in Section 13.0. Benzene in shallow soil within Jefferson Avenue is discussed in Section 17.0 0 (Area-Wide Soil).

6.4.4. Potential Receptors and Exposure Pathways

Current and future land use were considered when evaluating potential receptors and exposure pathways for WOF. The current and planned future land use is a UWT Campus building (Science Building) and pedestrian corridor (PLT) which consist primarily of impervious surfaces except for bordering landscape areas. Precipitation falling to the ground surface either infiltrates into the ground (unpaved areas) or is captured by roof drains and catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway. The surrounding area is commercial and academic. It is assumed that future land use will be similar to its current use.

Based on the current and anticipated future land use, the following exposure pathways and receptors have been identified:

- **Direct Contact**. The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities.

- **Drinking Water.** Groundwater within the Qvi unit in the vicinity of WOF occurs as discontinuous perched lenses and is not considered to be a sufficient water supply. Groundwater within the Qva aquifer beneath WOF and the UWT Campus as a whole is not considered to be a current source of domestic water, which is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.

- **Surface Water.** Surface water at WOF is not considered to be a current exposure pathway because the majority of ground surface is capped with hardscapes, stormwater is directed to stormwater utilities, and the Thea Foss Waterway is more than 1,500 feet east of the UWT Campus.
- **Indoor Air**. VI into the Science Building is not considered to be a current exposure pathway because of the type of residual contamination remaining in place (TPH-D) and the location of the residual contamination relative to the enclosed spaces of the Science Building (i.e., vertical inclusion distance greater than 15 feet). The Keystone Building (to the east), TPS Building (north), and Tioga Building (south) are located more than 30 feet from the TPH-D impacted soil. Therefore, in accordance with Ecology's VI guidance are not considered to be current exposure pathways. The potential for VI and impacts to indoor air are further discussed below in Section 5.6.4.

Potential receptors and exposure pathways for CVOC (TCE) contamination in this area associated with the Westerly Plume is further discussed in Section 13.0. Potential receptors and exposure pathways for benzene contamination within this area are further discussed in Section 17.0 (Area-Wide Soil).

6.5. Proposed Cleanup Levels

PCULs were developed for WOF for the protection of human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (WAC 173-340), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water uses, potential exposure pathways, and the potential receptors specific to WOF. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for WOF is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels**. PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b). Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels.** Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

6.6. Nature and Extent of Contamination

6.6.1. Contaminants and Media of Concern

Characterization data for WOF are summarized in Tables 6-4 and 6-5. The data were evaluated to determine contaminants and media of concern for the WOF Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions (i.e., post-remedial excavation confirmation samples and samples from soil explorations collected beyond the final remedial excavation limit) is presented in Table Q-4 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2020 as well as groundwater samples collected as part of the 2013 PLT Capital Project within the PLT pedestrian corridor) is presented in Table Q-5 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-6, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-4 through Q-6) include the following:

- **Soil.** TPH-D was identified as a primary soil COC for the WOF Site based on the source of contamination to soil and the characterization results. Most of this contamination was removed when remedial actions were completed during the Science Building Capital Project (see Section 6.3). Based on field indicators of petroleum contamination (staining, sheen, odor, etc.) at the final remedial excavation limit, residual TPH-D contamination (represented by sample WOF-EW-10) is presumed to remain in place east of the Science Building. Although naphthalene previously was detected at a concentration greater than the soil PCUL within the petroleum-contaminated area (sample B-12-2, Table 6-4), MTCA Table 830-1 states naphthalene analysis is not required because it is included in the TPH-D Method A cleanup level. Therefore, naphthalene is not considered to be a soil COC. The nature and extent of TPH-D in soil are further discussed in Section 6.6.2.
- **Groundwater.** COCs were not detected in groundwater at concentrations greater than the PCUL. Therefore, groundwater is not considered a media of concern. A discussion of sampling results is presented in Section 6.6.3.
- **Soil Vapor.** Based on screening of soil and groundwater data, TPH-D was identified as a COC with the potential to migrate into enclosed spaces at a concentration that could exceed the Method B indoor air PCUL and/or the SL for the protection of commercial workers. An evaluation for VI potential is further discussed in Section 6.6.4.

In addition, benzene and CVOCs (TCE) observed in soil and/or groundwater at JS-MW4D located west/upgradient of WOF are not considered COCs based on the location/depth of contamination and historical land use that did not likely include the use of these compounds as part of these operations. The occurrence of CVOCs (TCE) in soil and groundwater is attributed to the Westerly Plume as discussed in Section 13.0. Total cPAH TEQ was also detected in boring PLT-B14 at a concentration greater than the PCUL, however, cPAH contamination at this location is associated with PLT as discussed in Section 7.0.

Primary COC for soil (TPH-D) and corresponding COCs in groundwater are shown in plan view on Figures 6-6 and 6-7 and in cross section on Figure 6-8. The nature and extent of COCs in media of concern are further discussed below.

6.6.2. Soil

Removal of the product piping associated with the former heating oil UST (primary release mechanism) followed by remedial excavation activities in 2000 resulted in the removal of the majority of the previously identified petroleum contamination from WOF as described above in Section 6.3. However, inaccessible soil with residual contamination based on field indicators (staining, sheen, odor, etc.) observed at the final remedial excavation limits remains in place east of the Science Building. Although confirmation soil samples collected from the final remedial excavation limit verify the removal of the petroleum contamination, TPH-D was reportedly left in place in the vicinity of the sanitary sewer line to avoid damage to the utility based on field indicators at the final excavation limit. Based on this observation, residual petroleum contamination (conservatively represented by sample WOF-EW-10) is presumed to remain in place at this location. The extent of the residual contamination at this location is approximately 10 feet thick and extends from below the elevation of the sanitary sewer (approximately elevation 67 feet) to the depth of the 2000 remedial excavation (elevation 58 feet).

The nature and extent of TPH-D (WOF Site) in soil are shown in plan view on Figure 6-6 and in cross-section on Figure 6-8. The residual TPH-D concentration exceeds the SLs for the protection of VI east of the Science Building and beneath the PLT pedestrian corridor. The potential for VI from the residual TPH-D is further discussed in Section 6.6.4.

6.6.3. Groundwater

Discontinuous perched lenses of groundwater are observed within the Qvi unit based on the results of the RI and observations during the 2000 remedial excavation completed to address petroleum releases from the product piping associated with the former heating oil UST historically in use at WOF. In boring PLT-B14 located east of the remedial excavation footprint (and east of the localized pocket of residual contamination), a grab sample of the perched groundwater was analyzed. Contaminant concentrations were not detected in this sample. Additionally, the Qva aquifer is not anticipated to be impacted due to the vertical separation between the TPH-D-contaminated soil and the Qva aquifer and confining layer separating the Qvi and Qva units in this area. TPH-D results in groundwater for comparison to the soil results are shown on Figure 6-7.

6.6.4. Soil Vapor and Indoor Air

Based on the soil and/or groundwater sampling results representing current conditions, TPH-D and TCE were identified as contaminants with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SL for the protection of commercial workers. The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination.** Petroleum-related contaminants in soil were evaluated for potential VI based on Ecology's 2022 VI Guidance. Ecology's guidance states buildings located within the inclusion area (30 feet horizontal and 15 feet vertical separation distance) of soil with TPH-D concentrations greater than 250 mg/kg may be at risk of VI into indoor air (1064). An evaluation of the potential for VI based on current conditions at WOF and the surrounding area is discussed below:
    - Although confirmation soil samples collected from the final remedial excavation limit verify the removal of the petroleum contamination, TPH-D was reportedly left in place in the vicinity of the sanitary sewer line to avoid damage to the utility based on field indicators at the final excavation limit. Based on this observation, residual petroleum contamination (conservatively

represented by sample WOF-EW-10) is presumed to remain in place at this location. To assess the potential for impacts to indoor air per Ecology guidance, an evaluation of the vertical and lateral separations to the Science Building was conducted. The results of this evaluation indicate that the separation between the Science Building and the TPH-D-impacted soil is approximately 20 feet horizontal and 13 feet vertical, with an angled distance of approximately 28 feet through compacted engineered fill. In accordance with Ecology's VI Guidance, a 15-foot horizontal separation is likely sufficient to allow for biodegradation of TPH-D in the soil vapor because TPH-D is limited to contaminated soil and not groundwater. Therefore, TPH-D impacts to indoor air in the Science Building are not anticipated.

  - The Tioga Building, TPS Building, and Keystone Building are outside of the inclusion area for petroleum VI evaluation. Therefore, these buildings are not within the lateral inclusion area (i.e., greater than 30 feet) and TPH-D impacts to indoor air are not anticipated.

- **Petroleum-Related Groundwater Contamination.** TPH-D was not detected in groundwater in boring PLT-B14 located east of the remedial excavation footprint (east of the localized pocket of residual contamination), therefore TPH-D impacts to indoor air are not anticipated.
- **Other Contaminants**. CVOCs (TCE) exceeded the SL for groundwater VI at JS-MW4D located west and upgradient of WOF beneath Jefferson Avenue. The potential for VI resulting from CVOCs associated with the Westerly Plume is further discussed in Section 13.0.

6.7. Contaminant Fate and Transport

The chemical properties of contaminants and the physical, chemical, and biological processes that they are exposed to affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed on a UWT Campus-wide basis in Section 18.0. Locally, soil contamination associated with WOF (i.e., WOF Site) is located east of the Science Building and beneath portions of the PLT pedestrian corridor (hardscape and landscape areas constructed over imported fill and geotextile fabric), which prevents direct exposure (Figures 6-1 and 6-8) and reduces the potential for infiltration of stormwater. Furthermore, stormwater is captured by drainage systems that convey the stormwater away from WOF to prevent the vertical migration of contamination through the soil column via leaching. The residual soil contamination is stable and is not in contact with groundwater (except where perched groundwater exists within the Qvi unit). Utility infrastructure that could provide a preferential pathway for contaminant migration is located at an elevation above the groundwater table, which prevents the migration of contaminants via these systems.

Future impacts to groundwater (Qvi and Qva) are not anticipated due to the absence of the Qvi aquifer in this area and the presence of the confining layer (i.e., Qvi silt) separating the residual TPH-D contamination (WOF Site) and the Qva aquifer. Additionally, the WOF Site and surrounding area are generally capped with an impermeable surface (paving or gravel) reducing the potential for infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater.

6.8. Summary

WOF historically operated auto parts and oil recycling facilities between 1949 and 2000. A heating oil UST with product piping extending beneath the former WOF buildings was used during these historical operations. Although significant releases from the former heating oil UST were not observed during removal in 1994, releases from the product piping identified in 2000 during building demolition resulted in widespread TPH-D contamination in soil. Soil contamination extended from the central portion of WOF to portions of PLT to the east. Most of the contaminated soil was removed during the 1994 UST removal and

closure, and later in 2000 during the product pipe removal and subsequent remedial excavation as part of the Science Building Capital Project. The 2000 remedial excavation resulted in the removal of all TPH-D contamination within WOF and east of WOF into PLT. The remedial excavation within PLT was limited by the presence of a sanitary sewer pipe. Although confirmation soil samples collected from the final limits of the remedial excavation verified the removal of the TPH-D contamination, field indicators of petroleum contamination (staining, sheen, odor, etc.) were observed beneath the sanitary sewer pipe. Subsequent borings east of the sanitary sewer pipe verified the limited extent of the residual contaminated soil. Currently, the localized pocket of residual TPH-D contaminated soil at this location (WOF Site) is capped with up to 8 feet of clean soil and the paved and/or gravel surfaces of the PLT pedestrian corridor.

The Science Building and associated surrounding hardscapes (sidewalks, pedestrian pathway) constructed between 2000 and 2013 prevent direct contact with the residual TPH-D contamination. Future impacts to groundwater (Qvi and Qva) are not anticipated due to the absence of the Qvi aquifer in this area and presence of the confining layer (i.e., Qvi silt) separating the residual TPH-D contamination (WOF Site) and the Qva aquifer. Additionally, the stormwater collection system and impermeable surface for the Science Building and surrounding area prevent the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater.

Additionally, there is a sufficient distance between the residual TPH-D contamination and the surrounding buildings to prevent the migration of contaminant vapors from entering occupied indoor spaces. The residual soil contamination is stable and is not in contact with groundwater (except where perched groundwater exists within the Qvi unit).

Soil and groundwater data for WOF are presented in Tables 6-4 and 6-5, respectively. The nature and extent of TPH-D (primary COC) in soil and groundwater are shown in plan view on Figure 6-1, by chemical/media on Figures 6-6 and 6-7, and in cross section on Figure 6-8.

7.0 REMEDIAL INVESTIGATION—PRAIRIE LINE TRAIL

7.1. Introduction

PLT is located within the Hood Street Corridor between South 17th Street and South 21st Street in Tacoma, Washington (Figures 7-1A/B). Environmental data collected during previous and more recent soil and groundwater investigations (Section 7.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of TPH-D, TPH-O, PAHs (naphthalene and total cPAHs), and metals (arsenic and lead) in soil at concentrations greater than their respective PCULs resulting from spills and/or releases during historical land use. Summary statistics for soil and groundwater identifying COCs for PLT are presented in Tables Q-7 and Q-8 (Appendix Q). Specifically, historical operations included a rail line with multiple spurs to adjacent properties which operated from the late 1880s to the late 1990s.

However, surficial soil within the PLT pedestrian corridor (up to approximately 3 feet) potentially impacted by historical rail operations was excavated and removed in 2013 in conjunction with the PLT Capital Project. The extent of residual TPH-D, TPH-O, naphthalene, cPAH, arsenic, and lead soil contamination within the PLT pedestrian corridor (PLT Site; Figure 7-1A/B) is currently capped beneath a geotextile fabric under approximately 1 foot of import fill and/or hardscapes (sidewalks, pedestrian pathway), which prevents

direct contact. Additionally, stormwater collection systems further prevent the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater. Residual TPH-D, TPH-O, naphthalene, cPAH, arsenic, and lead soil contamination within the PLT pedestrian corridor (PLT Site) is stable and is not impacting groundwater based on monitoring data presented for the PLT RI. Furthermore, engineering controls (sub-slab vapor mitigation system) installed during the Milgard Capital Project prevent the migration of contaminant vapors sourcing from residual TPH-D located adjacent to the new building from entering the occupied indoor spaces.

In addition, environmental data collected as part of the RI indicate the presence of two separate CVOC-contaminated groundwater plumes that extend beneath portions of PLT (Easterly and Northerly Plumes). CVOC (PCE and TCE)-contaminated soil and groundwater associated with the Northerly Plume (further discussed in Section 14.0) extends beneath the northern portion of PLT. CVOC (TCE and vinyl chloride)-contaminated soil and groundwater associated with the Easterly Plume (further discussed in Section 15.0) extends beneath the southern portion of PLT.

PLT (AOC 3 in the 2016 Agreed Order) and the PLT Site (residual TPH-D, TPH-O, naphthalene, cPAH, arsenic, and lead contamination in soil) are shown on Figures 7-1A/B relative to the surrounding features. Terminology for PLT referenced by this RI is described below:

- **PLT.** The source property or point of release for contamination associated with historic operations on portions of Pierce County Parcel No. 0320043155 (2.49-acre parcel). Historically "Prairie Line" was operated by Northern Pacific Railroad and BNSF Railway Company between South 21st Street and South 17th Street.
- **PLT Site.** The area and media containing residual contamination exceeding the PCUL associated with historic rail line operations. Based on the widespread distribution of contaminants within the PLT pedestrian corridor, the entirety of PLT is considered the PLT Site.
- **PLT Capital Project.** In 2013, the PLT Capital Project was constructed as the pedestrian corridor extending from South 17th Street and South 21st Street. PLT Capital Project included portions of the adjacent parcels for pedestrian access and utility connections for the new stormwater infrastructure.
- **Cragle.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019050027, which is further discussed in Section 5.0.
- **WOF.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2018060021, which is further discussed in Section 6.0.
- **Snoqualmie Library.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019050026, which is further discussed in Section 12.0.
- **Northerly Plume.** The extent of TPH-G, TPH-D, petroleum-related VOCs, and CVOC (PCE, TCE, cis-DCE, and vinyl chloride) contamination associated with historic operations at 1754 Pacific Avenue and 1754 Pacific Avenue, which is further discussed in Section 14.0.
- **Easterly Plume.** The extent of CVOC (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) contamination associated with historic operations at 1934-1938 Market Street and within Commerce Street and South C Street, which is further discussed in Section 15.0.

- **Southerly Plume**. The extent of BTEX and TPH contamination associated with historic operations at 1956 Jefferson Avenue, 1934-1938 Market Street, and Jet Parking, which is further discussed in Section 16.0.

Specific details regarding the historical property use leading to the release of contaminants, RI activities completed to date, the CSM, and the nature and extent of contamination associated with PLT and the PLT Site are summarized below.

7.2. Property Conditions

7.2.1. Location and Description

PLT is a north-south integrated multi-use trail with historic/cultural interpretation, public art, multimedia, and green features transecting the eastern portion of the UWT Campus. The PLT pedestrian corridor (approximately 80 feet wide) connects various UWT Campus buildings, parking lots, and pedestrian access points between South 21st Street and South 17th Street. The ground surface is predominantly paved and contains landscaped areas with trees, grass, and shrubs. The ground surface gently slopes toward the northeast from approximately elevation 96 feet to elevation 57 feet.

7.2.2. Historical Land Use

From 1873 to the late 1990s, the Northern Pacific Railroad and BNSF Railway Company operated the rail line known as the "Prairie Line" . The "Prairie Line" extended between South 17th Street and South 21st Street as shown on Figures 7-2A/B. Multiple rail spurs were connected to the east and west adjacent warehouses and/or laydown yards. Railroad ties were treated timbers placed upon a reinforced bedding layer (i.e., quarry spalls). Access to the adjacent warehouses was through elevated loading docks and rail spurs.

Historic land use and operations adjacent to PLT included wood and coal fuel storage, hay/grain/flour and feed storage, junk storage, paper wholesale, machine shop/oil filter services, sign painting, meat packaging, photo development, retail, power generation, and residential. The former buildings and operations of former and existing buildings along PLT are shown on Figure 7-2A/B. Specific land uses related to the Cragle, WOF, GWP Building, TPS Building, Jet Parking, and Snoqualmie Library Building are further described in other sections of this document as referenced above.

Photo 7-1. Circa 1899 photograph of the "Prairie Line" within the current PLT pedestrian corridor (looking north).

7.2.3. Current and Future Land Use

In the early 1990s, UW purchased the majority of the properties adjacent to the rail alignment. Structures on the adjacent properties have either been renovated or demolished and redeveloped as new campus buildings, parking lots, or pedestrian access. The PLT pedestrian corridor was gifted to UW in 2013. Redevelopment of the PLT pedestrian corridor (PLT Capital Project) was completed to integrate the multi-use trail with historic/cultural interpretation, public art, multimedia, and green features. The footprint of

the PLT Capital Project for the redevelopment of the PLT pedestrian corridor along with associated pedestrian pathways, stairs, retaining walls, stormwater, sewer utility infrastructure, green spaces, and adjacent UWT Campus buildings are shown on Figures 7-3A/B.

Future land use of this corridor is anticipated to remain multi-use to support access to the UWT Campus buildings, parking lots, and downtown Tacoma.

7.2.4. Utility Infrastructure

Current utility infrastructure within PLT with the potential to serve as preferential pathways for contaminant migration are shown on Figures 7-3A/B and includes the following:

- A north-south oriented 8-inch-diameter sanitary sewer runs the entire length of PLT located at a depth of approximately 5 to 8 feet bgs (approximately elevation 86 to 70 feet) with the flow direction oriented from the south to the north. Multiple sewer laterals to buildings west of PLT are present but the exact location of each lateral is not known.
- A flow-through stormwater treatment facility was installed in 2014 on the southern portion of PLT. The details of the stormwater treatment facility are further described in Section 2.3.2.
- A west-east oriented 10-inch-diameter stormwater pipe that was installed in 1973 in South 19th Street (current stairway) and extends across PLT. The pipe is constructed of unreinforced concrete and lined/cured in place with thermal setting resin by the City in 2013. Multiple laterals and associated catch basins are connected to the main stormwater pipe.
- An underground electrical and communication duct bank is located between the Tioga Library and Snoqualmie Library buildings. The duct bank is located approximately 4 to 6 feet bgs.
- East-west oriented utilidor crosses PLT in the area of the Dougan Building. The utilidor is encased in concrete and approximately 15 feet wide and 15 feet deep. Multiple utilities are housed in the utilidor with space allowing for maintenance access.

There are multiple shallow electrical and communication lines located throughout PLT and the surrounding area in addition to the utility infrastructure described above.

7.3. Field Investigations and Remedial Actions

Multiple environmental investigations have been completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations documenting soil and groundwater conditions, and remedial actions completed for PLT and/or the surrounding area are discussed in Sections 7.3.1 through 7.3.4 below. Sampling locations used to evaluate soil and groundwater conditions are shown on Figures 7-4A/B through 7-6A/B. Investigations completed for PLT and the surrounding area to support the development of the RI are summarized in Tables 7-1 and 7-2 and further discussed below (Sections 7.3.1 through 7.3.4). Construction details for permanent monitoring wells installed within PLT and the surrounding area are presented in Table 7-3. Soil and groundwater results for the subsurface investigations completed are presented in Tables 7-4 and 7-5, respectively.

7.3.1. Pre-1997 Agreed Order Investigations and Remedial Action

In 1993, a 110-gallon heating oil UST and a 350-gallon gasoline UST were removed from the parking area in the southeast portion of Jet Parking (further discussed in Section 16.0). Remedial excavation removed

approximately 650 cubic yards of TPH-contaminated soil. Confirmation soil samples collected at the final remedial excavation limits verified the removal of the TPH-contaminated soil, with the exception of soil represented by sample JP-S7, where TPH-G was detected at a depth of approximately 9 feet bgs along the eastern sidewall (adjacent to PLT). Subsequent investigation and remediation of soil represented by this sample within PLT are further discussed in Sections 7.3.2 through 7.3.4 below.

Sample JP-S7 and the remedial excavation of TPH-G contaminated soil released from the gasoline UST are shown on Figure 7-4A. Chemical analytical results for soil sample JP-S7 are presented in Table 7-4. Other confirmation samples and their chemical analytical results as they relate to the Southerly Plume are discussed in Section 14.0. Additional investigations and remedial actions on Cragle and Snoqualmie Library (adjacent properties) were completed prior to the 1997 Agreed Order. They did not extend into PLT. Investigations and remedial actions completed on Cragle are further discussed in Section 5.0. Investigations and remedial actions completed at Snoqualmie Library are further discussed in Section 12.0.

7.3.2. 1997 Agreed Order Investigation

Between 1998 and 2002, URS on behalf of UW completed an RI for the eastern portion of the UWT Campus under the 1997 Agreed Order. The 1997 Agreed Order did not specifically identify PLT as an area requiring investigation. Soil and groundwater samples were collected adjacent to or within PLT for portions of Cragle and Jet Parking and Commerce Street (where it bisects the north portion of PLT) as part of the 1997 Agreed Order investigation). They are further discussed below in Sections 7.3.2.1 through 7.3.2.3. Soil and groundwater sampling locations are shown on Figures 7-4A/B.

7.3.2.1. Cragle Soil and Groundwater Investigation Summary

In 1998 and 2000, investigations were performed to evaluate soil and groundwater conditions within the area of the former concrete and coal sheds (southeast portion of PLT, Figure 7-4A; 157). The concrete shed and concrete slab were demolished. A closure certificate report was submitted to Ecology (135) prior to the completion of these investigations. Investigations completed for this area included the collection of soil samples from DP soil borings and the collection of groundwater samples from both permanent and temporary monitoring wells. These investigations included the following:

- Completion of three DP soil borings (CR-C-B1 through CR-C-B3) to an approximate depth of 2.5 feet bgs within the waste storage area of the former concrete shed. Historically, the concrete shed was used as waste storage for waste oil and waste oil-contaminated water and light ballasts (161). The focus of this 1998 investigation was based on the historical use of this structure and observed cracks within the floor that could provide a preferential migration pathway for contaminants to enter the underlying soil. Soil samples collected from borings CR-C-B1 through CRC-B3 were submitted for chemical analysis of select VOCs. Benzene, ethylbenzene, and total xylenes were detected in shallow soil collected from boring CR-C-B2 at a depth of approximately 2.5 feet bgs. Other VOCs were not detected in the analyzed soil samples.
- Completion of two DP borings (CR-B6 and CR-B7) to a depth of approximately 12 feet bgs within the former concrete shed footprint in 2000 as part of the follow-up investigation of this area. Soil samples collected from borings CR-B6 and CR-B7 were submitted for chemical analysis of BTEX and naphthalene. BTEX and naphthalene were not detected in the analyzed soil samples collected at a depth of approximately 12 feet bgs. A grab groundwater sample was subsequently collected from a temporary well set in boring CR-B6 for chemical analysis. The grab groundwater sample collected in CR-B6 was submitted for chemical analysis of select VOCs. BTEX and other select VOCs were not

detected in the analyzed groundwater sample with the exception of CVOCs including TCE, DCE, cis-DCE, and trans-DCE. CVOC contamination is associated with the Easterly Plume, which is further discussed in Section 15.0.

7.3.2.2. Jet Parking (Southerly Plume) Soil and Groundwater Investigation Summary

Additional investigations were completed near the southeastern sample location JP-S7 (Figure 7-4A) to further evaluate whether TPH-G detected at this location extended further to the east of the previous remedial excavation area (126). As noted above, UST removal and remedial activities as well as other investigation activities completed for Jet Parking are further discussed in Section 13.0. Investigation activities completed for this area included the collection of soil samples from DP soil borings and the collection of groundwater samples from both permanent and temporary monitoring wells (161). These investigations included:

- Two DP soil borings (JP-B1 and JP-GW1) were advanced to approximate depths of 14 and 23 feet bgs, respectively, in August 1998 to evaluate soil and groundwater conditions. Soil samples collected at approximately 4 and 10 feet bgs in boring JP-B1 were submitted for chemical analysis of TPH-G. TPH-G was not detected in each of these samples. A grab water sample was also collected in boring JP-GW1 for chemical analysis of TPH-G, TPH-D, and TPH-O and select VOCs to evaluate groundwater conditions. These contaminants were not detected in the analyzed groundwater sample.
- One soil boring (JP-MW1) was advanced to an approximate depth of approximately 30 feet bgs, which was converted into a permanent monitoring well to further evaluate groundwater conditions. Well construction details are presented in Table 7-3. Quarterly groundwater monitoring at JP-MW1 was completed in October 1998, and January, April, and September 1999. Groundwater samples collected from well JP-MW1 were submitted for chemical analysis of TPH-G, TPH-D, TPH-O, and select VOCs during the quarterly sampling events. These contaminants were not detected in the analyzed groundwater samples collected in JP-MW1 during each of the four quarterly monitoring events.
- One DP soil boring (JP-GW2) was advanced to approximately 20 feet bgs in September 1999 to evaluate groundwater conditions. Grab water samples were collected from borings JP-GW1 and JPGW2 for chemical analysis of TPH-G, TPH-D, and TPH-O and select VOCs. These contaminants were not detected in the analyzed groundwater samples.

7.3.2.3. Commerce Street Soil Investigation Summary

Investigation activities were completed within the Commerce Street corridor to evaluate soil and groundwater conditions along the alignment of a former 16-inch gas main, a portion of which bisects PLT (157). Investigation activities completed within PLT included the following:

- Four borings (DMB-5 through DMB-8) were advanced to depths of approximately 9 feet bgs adjacent to the former gas main alignment in the northern portion of PLT. Soil samples collected from borings DMB-5 through DMB-8 were submitted for chemical analysis of TPH-G, TPH-D, TPH-O, BTEX, and select VOCs. TPH-D and/or naphthalene were detected in soil samples collected from borings DMB-6 and DMB-8 at depths of approximately 6 and 9 feet bgs, respectively. Other contaminants were not detected in the analyzed soil samples. Note that groundwater was not encountered during the completion of borings DMB-5 to DMB-8.

7.3.3. 2016 Agreed Order Investigation

Data gaps requiring further investigation as part of the 2016 Agreed Order RI were not identified for PLT based on the investigation results and subsequent remedial actions completed as part of the PLT Capital Project as well as other adjacent Capital Projects (discussed in Section 7.3.4). However, environmental data collected as part of the 2016 Agreed Order RI to evaluate soil and groundwater conditions for the Northerly Plume, Southerly Plume, and Cragle (summarized below) are being presented to further support the subsurface characterization of PLT and evaluation of contaminant nature and extent.

These activities included the collection of soil samples from boring A7-MW3S which was completed as a permanent monitoring well and the collection of groundwater samples wells JP-MW1R, PL-MW1, and PL-MW2 between 2016 and 2020. Exploration locations for the 2016 Agreed Order RI are shown on Figures 7-5A/B.

7.3.3.1. Soil Investigation Summary

Soil boring A7-MW3S was advanced to a depth of approximately 30 feet bgs and completed as a permanent monitoring well within the northern portion of PLT as part of the Northerly Plume RI under the 2016 Agreed Order. At this location, one shallow soil sample was collected from approximately 5 to 6 feet bgs and analyzed for TPH, VOCs (including CVOCs), PAHs, and metals. These contaminants were not detected in the analyzed soil sample. Additional soil sample analysis for this boring as it relates to the Northerly Plume is discussed in Section 14.0.

7.3.3.2. Groundwater Investigation Summary

Samples collected from wells JP-MW1R, PL-MW1, and PL-MW2 between 2016 and 2020 were analyzed for TPH-G and select VOCs to evaluate groundwater conditions for the Southerly Plume and Cragle under the 2016 Agreed Order RI. In addition, PAHs and/or PCBs were analyzed in groundwater samples collected from well PL-MW2 located within Cragle in 2016 and 2020. TPH-G, petroleum-related VOCs, PAHs, and PCBs were not detected in the analyzed groundwater samples. CVOCs including PCE, TCE, cis-DCE, trans-DCE, vinyl chloride, and/or chlorobenzene were detected in groundwater upgradient of PLT in monitoring wells JP-MW1R and PL-MW1 during one or more sampling events. CVOCs in groundwater are associated with the Easterly Plume, which is further discussed in Section 15.0.

7.3.4. Capital Projects

Investigation and remedial action activities were necessary to implement UW Capital Projects. Capital projects and investigation activities in the vicinity of PLT are summarized below in Sections 7.3.4.1 through 7.3.4.5. Soil and groundwater sampling locations are shown on Figures 7-5A/B.

7.3.4.1. Science Building Capital Project

Both geotechnical and environmental investigations were completed in 1998 as part of the planning and development of the Science Building Capital Project. Remedial excavation activities were completed during construction for the Science Building Capital Project in 2000 to address TPH contamination associated with releases from a product line from a former 1,800-gallon diesel UST encountered during demolition. However, the remedial excavation within PLT was limited by the presence of a sanitary sewer pipe located within the eastern portion of the remedial excavation area. Although confirmation soil samples collected from the final limits of the remedial excavation verified the removal of the TPH-D contamination, field indicators of petroleum contamination (staining, sheen, odor, etc.) were observed beneath the sanitary sewer pipe. Subsequent borings completed east of the sanitary sewer pipe as part of the PLT Capital Project

(further discussed in Section 7.3.4.3) verified the limited extent of the residual contaminated soil. Currently, a localized pocket of residual TPH-D contaminated soil remains in place beneath the elevation of the sanitary sewer to the depth of remedial excavation (approximately elevation 58 feet), which is capped with up to 6 feet of clean soil and the paved surfaces of the PLT pedestrian corridor.

Specific details of the previous investigation results and remedial excavation activities performed as part of the Science Building Capital Project are discussed in Section 6.0.

7.3.4.2. Tioga Library Building and Hood Street Corridor Capital Project

The Tioga Library Building (TLB) and Hood Street Corridor Capital Project completed in 2012 included building demolition and construction of a new four-story library with a sky bridge spanning the PLT pedestrian corridor providing access to the Snoqualmie Library Building (Figure 7-6A). An investigation was performed in conjunction with the TLB and Hood Street Corridor Capital Project to evaluate soil conditions within and adjacent to the footprint of the construction area to ensure proper soil management and disposal given its proximity to contamination on neighboring properties previously identified (Figures 7-1A; 200). The investigation activities within PLT included the completion of 23 TPs (TLB-TP10 through TLB-TP32; Figure 7-6A) along a proposed duct bank alignment, skyway bridge foundation, sanitary sewer line connection, and storm sewer trench line (referred to as the Hood Street Corridor). TP explorations were completed to depths ranging between approximately 5 to 12 feet bgs between May and September 2011.

Investigation locations and soil samples collected within PLT included the collection of discrete and composite samples for waste disposal characterization. Twenty discrete soil samples were submitted for chemical analysis based on the field screening results. In addition, 14 composite soil samples from selected TP explorations (summarized in Table 7-4) were collected and submitted for chemical analysis. Discrete and composite samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, select VOCs, PAHs, and Resource Conservation and Recovery Act (RCRA) metals with follow-up toxicity characteristic leaching procedure (TCLP) analysis for lead for waste disposal characterization. Discrete and composite soil sample results are presented in Table 7-4. Chemical analytical results identified total cPAH TEQ up to 1.8 mg/kg, arsenic at concentrations up to 110 mg/kg, and lead at concentrations up to 760 mg/kg[6]. In addition, TPH-D, TPH-O, PAHs, and other metals were detected in the soil samples submitted for chemical analysis. Soil represented by the discrete and composite samples was subsequently over-excavated and removed from within PLT for disposal at a permitted landfill during construction for the TLB and Hood Street Corridor Capital Project.

7.3.4.3. Prairie Line Trail Capital Project

Environmental investigation activities followed by remedial actions were completed between 2013 and 2014 within the footprint of PLT as part of the PLT Capital Project. Investigation activities included the completion of 52 DP soil borings (PLT-B1 through PLT-B39, PLT-BA2-1 through PLT-BA2-5, and PLT-BA6-1 through PLT-BA6-8) and 11 TP explorations (PLT-TP1 through PLT-TP11) in March and April 2013 to evaluate soil conditions within PLT (252, 258). DP and TP explorations were completed to depths ranging between 5 and 15 feet bgs. In addition, three permanent groundwater monitoring wells (JP-MW1R, PL-MW1, and PL-MW2) were installed and five temporary well points (PLT-B10, B12, B14, B15, and B29) were

[6] TCLP lead analysis indicated that the material represented by this sample was less than the dangerous waste characteristic threshold of 5 milligrams per liter (mg/L) (WAC 173-303-90).

sampled to evaluate groundwater conditions. The existing monitoring well JP-MW1 was also sampled prior to being decommissioned to facilitate the installation of the stormwater treatment facility in the southern portion of PLT. Exploration locations are shown relative to PLT on Figures 7-6A/B. Investigation activities and soil sample analysis completed as part of the PLT Capital Project included:

- Collection of 68 discrete soil samples from borings PLT-B1 through PLT-39 (excluding PLT-B2, PLT-B3, PLT-B19, PLT-B21, PLT-B22, and PLT-B32) along the PLT pedestrian corridor to evaluate soil conditions associated with historical rail operations and material to be excavated during construction for disposal characterization.
- Collection of four discrete soil samples from borings PLT-BA2-1, PLT-BA2-2, PLT-BA2-4, and PLT-BA2-5 to evaluate soil conditions east of Jet Parking.
- Collection of four discrete soil samples from borings PLT-BA6-3, PLT-BA6-5, PLT-BA6-7, and PLT-BA6-8 to evaluate soil conditions east of WOF.
- Collection of 18 composite samples (Composite A, B1, B2, C1, C2, C3, D, E, F, H, I, J1, K, L, M, N, O, and P) representing material to be excavated during construction for disposal characterization.
- Collection of 24 soil samples from TP locations PLT-TP1 through PLT-TP11 completed to depths ranging between approximately 3 to 7 feet along the PLT pedestrian corridor east of the TLB Capital Project area, in the vicinity of the former coal pile/shed (Cragle) and in the areas of the proposed deck and building foundation in the northern portion of PLT.
- Collection of five grab groundwater samples from borings PLT-B10, PLT-B12, PLT-B14, PLT-B15, and PLT-B29 to evaluate groundwater conditions for potential impacts resulting from historical land use.
- Installation and collection of groundwater samples from two new permanent monitoring wells (PL-MW1 and PL-MW2) to evaluate groundwater conditions within the Qvi aquifer upgradient and downgradient of PLT.
- Installation and collection of groundwater samples from a new permanent monitoring well (JP-MW1R) and existing monitoring well JP-MW1 to further evaluate groundwater conditions in the vicinity of two former USTs removed from the southeast corner of Jet Parking. Monitoring well JP-MW1R was installed as a replacement well for JP-MW1 in March 2013 in preparation for the PLT Capital Project. Monitoring well JP-MW1 was later decommissioned in August 2013.

Soil Chemical Analytical Results

Discrete and composite soil samples collected from the DP and TP explorations were submitted for chemical analysis utilizing a combination of TPH-HCID, TPH-G, TPH-D, TPH-D, BTEX, select VOCs, PAHs, metals, and PCBs (see Table 7-1) to evaluate potential impacts to the design and construction phases of the PLT Capital Project redevelopment. Soil analytical results are summarized in Table 7-4 and discussed below.

- TPH-G was detected in soil at a concentration of 4,000 mg/kg from approximately 6 to 7 feet bgs in soil boring PLT-BA2-2 located adjacent to Jet Parking.
- TPH-D was detected from approximately 0 to 3 feet bgs in soil borings PLT-B18, PLT-B34, and PLT-B39. TPH-D was detected at concentrations ranging from 41 to 1,800 mg/kg, with the highest detection from approximately ground surface to 0.5 feet bgs in PLT-B34.

- TPH-O was detected in soil collected between approximately 0.5 and 2 feet bgs in soil borings PLT-B6, PLT-B17, PLTB18, and PLT-B34 through PLT-B39 within PLT, and from approximately 6 to 7 feet bgs in soil boring PLT-BA6-5 located adjacent to WOF. TPH-O was detected at concentrations ranging from 160 to 16,000 mg/kg, with the highest detection in sample at PLT-BA6-5. TPH-O was not detected in the underlying soil sample at PLT-BA6-5 from approximately 9 to 10 feet bgs.
- PAH compounds were detected in soil generally throughout PLT as identified in samples collected in borings PLT-B4 through PLT-B39 and test pits PLT-TP1 through PLT-TP4, and PLT-TP9 through PLT-TP11 between approximately 0.5 to 7 feet bgs.
- Lead was detected in soil collected between approximately the ground surface to 4 feet bgs in multiple soil borings and test pits within PLT. Lead was detected at concentrations ranging from 5.8 to 14,000 mg/kg, with the highest detection in the sample at PLT-B5.
- Low level concentrations of metals including barium, cadmium, and/or chromium were detected in soil at depths ranging from approximately 0 to 7 feet bgs in soil borings PLT-B4 through PLT-B16, PLT-B18, PLT-B23 through PLT-B25 and in test pits PLT-TP5, PLT-TP6, PLT-TP8 through PLT-TP10, and PL-MW2. Low-level concentrations of arsenic were also detected in soil borings PLT-B16 and PLT-B18. Low-level concentrations of mercury were detected in soil boring PLT-B6.

In addition, select VOCs were detected in select soil samples at depths ranging between 0.5 to 15 feet bgs. Other contaminants were not detected in the analyzed soil samples.

Groundwater Chemical Analytical Results

Groundwater was encountered at depths ranging between approximately 8 and 12.5 feet bgs in soil borings PLT-B10, PLT-B12, PLT-B14, PLT-B15, and PLT-B29 during drilling activities (252). Grab groundwater samples were collected for chemical analysis of TPH-G, TPH-D, TPH-O, select VOCs, PAHs, and total and dissolved MTCA metals (Table 7-2). Groundwater samples were also collected from permanent monitoring wells PL-MW1, PL-MW2, JP-MW1, and JP-MW1R in April and July 2013 to evaluate groundwater conditions upgradient and downgradient of PLT. Groundwater samples collected from the permanent monitoring wells were submitted for chemical analysis using a combination of TPH-G, TPH-D, TPH-O, select VOCs, and total and dissolved MTCA metals (see Table 7-2). PAHs were detected in grab water samples at locations PLT-B10 and PLT-B14[7]. Metals and select VOCs were detected in water samples collected from PL-MW1.

Remedial Excavations and Chemical Analytical Results

Remedial excavation activities were completed under a Remedial Action Plan to address residual contamination identified during the soil investigation performed as part of the PLT Capital Project. The Remedial Action Plan included removal of TPH-contaminated soil to the maximum extent practical and cPAH-and metal-contaminated soil as necessary for the PLT Capital Project. The Plan also included the installation of engineering controls (i.e., cap) in selected areas within PLT to isolate residual contamination that was not removed.

[7] Note that in conjunction with groundwater investigation activities for Cragle, additional monitoring events at PL-MW2 were completed to further evaluate groundwater conditions downgradient of PLT (locations PLT-B10 and PLT-B14) and to evaluate potential contamination sourcing from historical operations at Cragle. During the December 2016 and March and September 2019 monitoring events, contaminants of potential concern including TPH, VOCs, PAHs and PCBs were not detected.

Ten remedial action areas (RAA A through RAA J) were identified in the Remedial Action Plan based on the results of the PLT Capital Project soil investigations (described above). An additional four remedial action areas (RAA K, RAA L, RAA M, and WOF) were identified during the construction activities. Specific details for the remedial action areas and excavation activities completed within PLT are discussed in the Prairie Line Trail Environmental Construction Report and summarized below (275).

Investigation results identified that shallow soil was contaminated with TPH, PAHs, select VOCs, and metals throughout PLT as mentioned above, particularly under the former railroad bed. Soil contamination identified during construction was either removed from 0 to 3 feet bgs or was capped in place with hardscape and/or geotextile with approximately 1 foot of imported soil/ballast. In addition, a historic rail line spur was removed in the southern portion of PLT adjacent to the TLB (Figure 7-2A). Remedial actions were modified in the field as necessary based on observations and/or supplemental chemical analytical results to meet the objectives of the Remedial Action Plan. Remedial excavation areas RAA C (completed to address soil represented by sample JP-S7) and WOF (completed to address soil represented by sample BA6-5-6-7) are shown on Figures 7-6A/B. Remedial action areas RAA A, RAA B, and RAA D through RAA M are not shown on Figures 7-6A/B as these areas span most of the remaining portions of PLT.

A total of 51 confirmation soil samples were collected to evaluate soil conditions during the remedial action between August 2013 and October 2014. Confirmation soil samples were submitted for chemical analysis using a combination of TPH-G, TPH-D, TPH-O, PAHs, BTEX, and metals. Select samples were over-excavated during construction. Analytical results for the confirmation samples representing current soil conditions are summarized in Table 7-4. The nature and extent of residual contamination following the PLT Capital Project remedial action are further discussed in Section 7.6.

7.3.4.4. Tacoma Paper and Stationery Capital Project

The TPS Capital Project (formerly known as Urban Solutions Center) was completed from 2014 to 2015 and included the redevelopment of the existing building (Figure 7-6B). An investigation was performed in conjunction with the TPS Capital Project to evaluate soil conditions within and adjacent to the footprint of the construction area to ensure proper soil management and disposal and to evaluate the TPS as a source of PCE-contaminated groundwater (Figure 7-1B). The investigation activities within PLT included the completion of two monitoring wells (USC-MW1S and USC-MW1D, Figure 7-6B). These borings were completed in October 2014 to depths of 25.5 and 56 feet bgs, respectively.

As part of the investigation activities, one shallow soil sample was collected from approximately 10 to 11.5 feet bgs and analyzed for VOCs. BTEX, petroleum-related VOCs, and naphthalene were not detected. Deeper soil and groundwater samples were analyzed for VOCs associated with the Northerly Plume (see Section 14.0).

7.3.4.5. Milgard Hall Capital Project

Excavation activities were completed within a portion of PLT in conjunction with the Milgard Hall Capital Project redevelopment. The excavation activities were performed in the vicinity of the former concrete and coal sheds (Figure 7-2A) associated with historical operations at Cragle but within PLT. Three soil samples were collected prior to excavation that included two composite samples (MIL-B5-0.0-7.0-COMP and MIL-B5-8.0-10.0-COMP) and one discrete sample (MIL-B5-7.0-8.0-DISC) from soil boring (MIL-B5) to further evaluate soil conditions and waste disposal characterization. Soil samples were submitted for chemical analysis of TPH-G, TPH-D, TPH-O, PAHs, and RCRA metals. Sample results are summarized in Table 7-4.

This area was excavated to an approximate depth of approximately 3 to 6 feet bgs during subsequent construction excavation for Milgard Hall. Five post-excavation confirmation soil samples (CONF-A2-1 through CONF-A2-4, and CONF-A1-7) were collected following excavation of the subgrade for the access ramps and stairs to further evaluate soil conditions. These confirmation samples were submitted for chemical analysis of VOCs. Samples CONF-A2-1 through CONF-A2-4 were also submitted for chemical analysis of TPH-D, TPH-O, and PAHs. Low-level concentrations of TPH-D, TPH-O, toluene, naphthalene, and/or PAHs were detected in the analyzed soil samples. Other VOCs were not detected.

7.4. Conceptual Site Model

Development of the CSM for PLT is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for PLT is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 7.4.1 through 7.4.5 describe the specific elements of the PLT CSM.

7.4.1. Physical Setting

Multiple capital projects have been completed following UW's acquisition of the UWT Campus property to retrofit existing facilities and/or construct new facilities to support the UWT Campus Master Plan for higher education and learning. The PLT Capital Project completed in 2013 resulted in an integrated multi-use trail with a combination of hardscapes and green spaces through the central portion of the UWT Campus for pedestrian access.

7.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic settings for PLT (described in the following sections) inform the distribution of contaminants in media of potential concern. Local geology and hydrogeology in the vicinity of PLT are described below in Sections 7.4.2.1 and 7.4.2.2.

7.4.2.1. Local Geology

Geologic conditions vary along the length of PLT. Geologic units present beneath PLT include the Qf, Qvi, and Qva deposits. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings within PLT and the surrounding area consists of locally derived, reworked ice-contact deposits or imported fill material. The fill ranges in thickness between approximately 0 to 5 feet bgs. Fill is generally deeper in areas where previous remedial excavations occurred, including the area adjacent to WOF and near Jet Parking, and extends from the ground surface to depths of up to 9 feet bgs.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till and subglacial channel materials deposited beneath the glacial ice and along the ice margin during the last glacial period. Qvi till-like deposits beneath PLT range in thickness from approximately 5 to 10 feet and overlie up to approximately 15 feet of Qvi channel deposits. Qvi silt deposits are present in the southern portion of PLT but are generally absent to the north.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** Qva deposits consisting of stratified sand with silt and gravel layers are present to the explored depths beneath PLT.

Geologic conditions for PLT are shown relative to the UWT Campus on Figures 2-6, 2-8, and 2-11.

7.4.2.2. Local Hydrogeology

Groundwater in the eastern portion of the UWT Campus occurs within both the Qvi (shallow) and Qva (deep) aquifers (Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Specific areas where the Qvi and Qva aquifers are interpreted to be hydraulically connected and flow into each other are shown on Figure 2-14 to 2-19 and include the following as they relate to groundwater flow beneath PLT and the surrounding area:

- **Prairie Line Trail—South**. Incision of the valley walls during the last glacier retreat (approximately 10,000 to 13,000 years ago) has locally resulted in the absence of the confining layer separating the Qvi and Qva aquifer (i.e., Qvi and/or Qva silt) in this vicinity. As a result, the Qvi and Qva aquifers are locally hydraulically connected. In this vicinity, groundwater within the Qvi aquifer is interpreted to drain into and mix with groundwater from the underlying Qva aquifer (see Figure 2-12).
- **Prairie Line Trail—Central**. The Qvi aquifer is absent in the area beneath and immediately surrounding the central portion of PLT as a result of the valley wall incision west of this location. Groundwater flow from within the Qvi aquifer is upgradient of the central portion of PLT drains into the Qva aquifer as shown on Figure 2-13. Additionally, the Qvi aquifer was not observed during the drilling of the temporary monitoring well at PLT-B14 (Figure 7-4A) or at monitoring well A11-MW11S located upgradient from the central portion of PLT (Figure 2-13). Locally, groundwater within the Qvi unit occurs as perched and discontinuous lenses.
- **Prairie Line Trail—North**. The Qvi aquifer is absent along the northern portion of PLT within the vicinity of the temporary monitoring well PLT-B15 (Figure 7-4B). The absence of the Qvi aquifer in this area may be related to erosion or the absence of low permeable Qvi silt and Qva silt layers in this area. As a result, the Qvi aquifer in this area is depleted (i.e., Qvi groundwater is interpreted to drain into the Qva aquifer).

Local groundwater occurrence and flow for the Qvi and Qva aquifers are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer is unconfined where present and occurs at depths ranging between approximately 7 and 18 feet bgs (Table 7-5). In the southern portion of PLT, the Qvi and Qva aquifers are locally hydraulically connected as a result of erosion and incision during the glacial retreat as described above and flow primarily within the channel deposits and sand and gravel seams within the upper Qvi deposits. In the central and northern portions of PLT, the Qvi aquifer is generally absent or occurs as perched and discontinuous lenses within the fill or upper Qvi deposits, however, is not considered representative of groundwater levels in the Qvi aquifer. In the eastern portion of the UWT Campus, the overall inferred groundwater flow direction in the Qvi aquifer across PLT is generally northeasterly toward the Thea Foss Waterway (Figures 2-14 and 2-19).

The local estimated average linear groundwater velocity within the Qvi aquifer ranges between approximately 1.9 and 8.1 ft/day with a hydraulic gradient of 0.08 ft/ft. Determination of the groundwater

flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

Qva Groundwater Occurrence and Flow

The Qva aquifer is present beneath PLT (underlying the Qvi aquifer where present) with an inferred groundwater flow direction that is generally east-northeasterly based on the UWT Campus-wide Qva flow direction (Figures 2-17 and 2-19).

In the southern portion of PLT, the estimated Qva average linear groundwater velocity ranges from approximately 1.5 and 2 ft/day with a hydraulic gradient of 0.08 ft/ft. In the northern portion of PLT, the estimated Qva average linear groundwater velocity ranges from approximately 0.08 to 4.15 ft/day. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

7.4.3. Sources of Contamination

The primary source of contamination at PLT is associated with the historical use of rail line operations which includes drips, leaks, and/or spills from rail cars and adjacent operations utilizing the railway. Other potential sources of contamination include the placement of contaminated fill material from unknown sources and grading material used to support the railway, treated timbers used to support the rail tracks and atmospheric deposition from historical combustion (vehicle emissions, burning, etc.) and/or industrial operations that may contain metals and PAHs.

Additional sources of contamination to PLT from adjacent properties include the following:

- TPH-D contamination due to historical releases from a former heating oil UST and associated product piping on WOF that migrated onto PLT (see Section 6.0 for additional details).
- CVOC contamination due to releases from historical operations and land use for the Northerly and Easterly Plumes that migrated onto PLT (See Sections 14.0 and 15.0 for additional details).
- TPH-G and TPH-D contamination due to historical releases from the former heating oil and gasoline USTs located on Jet Parking (Southerly Plume) that migrated onto PLT (see Section 16.0 for additional details).

7.4.4. Potential Receptors and Exposure Pathways

Current and future land use were considered when evaluating potential receptors and exposure pathways for PLT. The current and planned future land use is a multi-use public pathway and access corridor which consist primarily of impervious surfaces except for bordering landscape areas. Precipitation falling to the ground surface either infiltrates into the ground (unpaved areas) or is captured by catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway. The surrounding area is commercial and academic. It is assumed that future land use will be similar to its current use. Based on the current and anticipated future land use, the following exposure pathways and receptors have been identified:

- **Direct Contact**. The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers

are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities.

- **Drinking Water.** Groundwater within the Qvi and Qva aquifers beneath PLT and the UWT Campus as a whole is not considered to be a current source of drinking water since domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.
- **Surface Water.** Surface water discharges from PLT are not considered to be a current exposure pathway because the majority of ground surface is capped with geotextile and/or hardscaped, stormwater is directed to stormwater utilities, and the Thea Foss Waterway is more than 1,500 feet east of the UWT Campus.
- **Indoor Air**. Multiple buildings (Tioga Library/Tioga Building, Snoqualmie Library, Science Building, Keystone Building, TPS Building, Dougan Building, and Milgard Hall Building) are located adjacent to PLT. VI into these buildings is not considered to be a current exposure pathway because of the type of residual contamination remaining in place (TPH-D in soil) and location of the residual contamination relative to the enclosed spaces (i.e., inclusion distance greater than 15 feet vertical or 30 feet horizontal) or the sub-slab vapor mitigation system installed beneath Milgard Hall. The potential for VI is further discussed in Section 7.6.4.

Potential receptors and exposure pathways for CVOC (PCE, TCE, and vinyl chloride) contamination in this area associated with the Northerly and Easterly Plumes are further discussed in Sections 14.0 and 15.0.

7.5. Proposed Cleanup Levels

PCULs were developed for PLT for the protection of both human health and the environment for soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (Chapter 173-340 WAC), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water uses, potential exposure pathways, and the potential receptors specific to PLT. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for PLT is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels.** PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b). Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).

- **Proposed Indoor Air Cleanup Levels.** Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

7.6. Nature and Extent of Contamination

7.6.1. Contaminants and Media of Concern

Characterization data for PLT are summarized in Tables 7-4 and 7-5 and were evaluated to determine contaminants and media of concern for the PLT Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions (i.e., post-remedial excavation confirmation samples and samples from soil explorations collected beyond the final remedial excavation limit) is presented in Table Q-7 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2020 as well as groundwater samples collected as part to the 2013 PLT Capital Project within the PLT pedestrian corridor) is presented in Table Q-8 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-9, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-7 through Q-9) include the following:

- **Soil.** TPH-D, TPH-O, PAHs including naphthalene and cPAHs, and metals including arsenic and lead were identified as primary soil COCs for the PLT Site based on the source of contamination to soil and the site characterization results. However, most of this contamination was removed as a result of the remedial actions completed during the PLT Capital Project (see Section 7.3). Residual soil contamination remains in place beneath 1 foot of topsoil, geotextile, and/or paved surfaces of the PLT pedestrian corridor. The nature and extent of PLT Site contaminants are further discussed in Section 7.6.2.
- **Groundwater.** Total cPAH TEQ exceeded the groundwater PCUL in a grab sample collected from PLT-B10 as part of the PLT Capital Project. However, cPAHs were not detected in subsequent groundwater samples collected as part of the 2016 Agreed Order RI. Other COCs (with the exception of CVOCs) were not detected in groundwater at a concentration greater than the PCUL. CVOCs (PCE, TCE, and vinyl chloride) are associated with the Northerly and Easterly Plumes, which are further discussed in Sections 14.0 and 15.0. Therefore, groundwater is not considered a media of concern. A discussion of sampling results is presented in Section 7.6.3.
- **Soil Vapor.** Based on screening of soil and groundwater data, TPH-D was identified as COC with the potential to migrate into enclosed spaces at a concentration that could exceed the Method B indoor air PCUL and/or the SL for the protection of commercial workers. An evaluation for VI potential is further discussed in Section 7.6.4.

In addition, benzene and CVOCs were observed in soil and/or groundwater beneath portions of PLT. Benzene was detected in sample MIL-B5-7.0-8.0_DISC collected adjacent to Cragle at a depth of approximately 7 feet bgs. CVOCs (PCE, TCE, and vinyl chloride) were detected in monitoring wells both upgradient and downgradient of PLT. The occurrence of CVOCs in soil and groundwater is attributed to the

Northerly and Easterly Plumes as discussed further in Sections 14.0 and 15.0. Benzene in sample MIL-B5-7.0-8.0_DISC is attributed to Cragle and is future discussed in Section 5.0.

Primary COCs (TPH-D, TPH-O, naphthalene, cPAHs, arsenic, and lead) for soil and groundwater are shown in plan view on Figures 7-7A/B through 7-18A/B. The nature and extent of COCs in media of concern are further discussed below.

7.6.2. Soil

Remedial excavation activities completed between 1993 and 2020 removed a significant portion of the identified soil contamination associated with historic railroad operations and other operations on adjacent properties within the PLT pedestrian corridor and as described in Section 7.3. However, the environmental data indicates the presence of TPH-D-impacted soil remaining in place adjacent to Cragle as well as TPH-D and TPH-O contaminated soil remaining in place beneath the sanitary sewer line east of WOF (AOC 2). Additionally, soil with naphthalene, total cPAH TEQ, arsenic, and lead concentrations greater than the PCUL remains in place along portions of the PLT pedestrian corridor. The nature and extent of COCs in soil are summarized below. COCs identified for the PLT Site (TPH-D, TPH-O, PAHs [naphthalene and total cPAH TEQ], and metals [arsenic and lead] are shown in plan view on Figures 7-7A/B through 7-9A/B.

- **PLT South.** Soil containing TPH-D was detected at a concentration of 410 mg/kg exceeding the SL of 250 mg/kg for the protection of VI at sample location MIL-A2-CONF-3 located within the footprint of the former concrete shed/drum storage area west of Cragle. An evaluation for potential VI is discussed in Section 7.6.4, below. In addition, total cPAH TEQ (up to 0.30 mg/kg) and/or lead (up to 260 mg/kg) were detected in shallow soil (less than approximately 6 feet bgs) at locations PLT-B36, PLT-TP2, MIL-B5, and PLT-RAAF-SG-1 located east of Jet Parking. The nature of these contaminants appears to be random in distribution and likely represents residual contamination remaining in place following the completion of the 2013 remedial action completed as part of the PLT Capital Project and the 2021 remedial action completed as part of the Milgard Hall Capital Project.
- **PLT Central.** Soil containing TPH-D was reportedly left in place in the vicinity of the sanitary sewer line to avoid damaging the utility as part of the Science Building Capital Project (further discussed in Section 6.3.5). Residual contamination at this location conservatively represented by sample WOF-EW-10 is isolated by up to approximately 6 feet of imported fill soil and is capped by the hardscape/landscape features completed in conjunction with the PLT Capital Project. In addition, soil containing TPH-O at concentrations ranging between 2,000 and 18,000 mg/kg represented by samples WOF-CSE-6.5, WOF-CSW-4.5, and WOF-CSW-6.5 remains in place at depths ranging between approximately 4 and 9 feet bgs east of the Science Building following remedial actions completed as part of the PLT Capital Project (Section 7.3.4). The TPH-O contaminated soil could not be removed at this location due to the presence of existing utilities and is currently capped by the hardscape/landscape features completed in conjunction with the PLT Capital Project. East of the Tioga and Science Buildings, naphthalene (up to 5.7 mg/kg) and/or total cPAH TEQ (up to 9 mg/kg) were detected in shallow soil (below the hardscape/landscape cap completed in conjunction with the PLT Capital Project) at locations PLT-B14, PLT-TP4, PLT-RAAE-BR-B-2, and PLT-RAAE-BR-S-6. The nature of these contaminants appears to be random in distribution and likely represent residual contamination remaining in place following completion the 2013 remedial action completed as part of the PLT Capital Project.
- **PLT North.** Soil containing arsenic at a concentration of 35 mg/kg slightly exceeding the PCUL of 20 mg/kg remains in place at a depth of approximately 4 to 5 feet bgs at PLT-B16 located west of the

Joy Building. In addition, soil containing total cPAH TEQ at concentrations ranging between 0.25 and 0.62 mg/kg remains in shallow soil (less than 5 feet bgs) and multiple locations west of the Joy Building. Naphthalene was detected in soil at a concentration of 0.637 mg/kg in boring DMB-8 at a depth of 9 feet bgs. The soil at these locations are capped by a geotextile with a minimum of 1 foot of clean soil and hardscapes.

The residual TPH-D concentration exceeds the SLs for the protection of VI east of the Science Building and adjacent to Milgard Hall. The potential for VI from the residual TPH-D is further discussed in Section 7.6.4.

7.6.3. Groundwater

Groundwater associated with the Qvi aquifer (southern portion of PLT) and Qva aquifer (central and northern portions of PLT) is present at depths ranging between approximately 7 and 18 feet bgs. A comparison of the groundwater data from grab samples collected in borings within the PLT pedestrian corridor during the 2013 PLT Capital Project and permanent monitoring wells located downgradient of the PLT pedestrian corridor completed as part of the UWT Campus-wide RI did not identify exceedances of the PCULs, with one exception. The total cPAH TEQ concentration in a grab sample at location PLT-B10 (Figure 7-8A) collected in 2013 was detected at a concentration of 0.8316 micrograms per liter (µg/L), which exceeded the PCUL of 0.2 µg/L. This PCUL exceedance is attributed to the elevated turbidity observed in the sample and is not considered a true representation of groundwater conditions at this location. Additional monitoring events at PL-MW2 completed between 2016 and 2020 downgradient of locations PLT-B10 did not identify detectable concentrations of cPAHs in groundwater. The nature and extent of TPH, PAHs, and metals in groundwater within and surrounding the PLT pedestrian corridor for comparison to the soil results are shown on Figures 10A/B through 12A/B.

CVOC (PCE, TCE, and vinyl chloride) groundwater contamination on the PLT Site within the Qvi and Qva aquifers is sourced from the Northerly and Easterly Plume, which is discussed further in Sections 14.0 and 15.0.

7.6.4. Soil Vapor and Indoor Air

Based on the soil and/or groundwater sampling results representing current conditions, TPH-D and CVOCs (PCE, TCE and vinyl chloride) were identified as contaminants with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SL for the protection of commercial workers. The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination.** Petroleum-related contaminants in soil were evaluated for potential VI based on Ecology's 2022 VI Guidance. Ecology's guidance states buildings located within the inclusion area (30-foot horizontal and 15-foot vertical separation distance) of soil with TPH-D concentrations greater than 250 mg/kg may be at risk of VI into indoor air (1064). An evaluation of the potential for VI based on current conditions at WOF and the surrounding area is discussed below:
    - Residual TPH-D-contaminated soil at location MIL-A2-CONF-3 is located adjacent to Milgard Hall within 30 lateral feet. However, engineering controls (i.e., chemical vapor barrier and passive vent system) have been incorporated into the Milgard Hall Building construction project to address the observed TPH-D contamination at this location. Therefore, the residual TPH-D contamination is not considered a potential threat for VI in this area. Note that indoor air sampling was completed in December 2022 for Milgard Hall Building to verify compliance with the indoor air PCULs. Sampling results indicate that VI is not occurring (see Section 5.6.4).

- Residual TPH-D-contaminated conservatively represented by soil sample WOF-EW-10 is located east of the Science Building within 30 lateral feet. However, the separation between the Science Building and the TPH-D-impacted soil is approximately 20 feet horizontal, 13 feet vertical, with an angled distance of approximately 28 feet through compacted engineered fill. In accordance with Ecology's VI Guidance, a 15-foot horizontal separation is likely sufficient to allow for biodegradation of TPH-D in the soil vapor because TPH-D is limited to contaminated soil and not groundwater. Therefore, TPH-D impacts to indoor air in the Science Building are not anticipated (see Section 6.6.4 for additional discussion).

- **Petroleum-Related Groundwater Contamination.** Petroleum-related contaminants either were not detected or were detected at concentrations less than the SL for groundwater VI, therefore, are not considered a potential threat.
- **Other Contaminants**. CVOCs including PCE, TCE, and vinyl chloride exceeded the SL for groundwater VI. The potential for VI resulting from CVOCs associated with the Northerly and Easterly Plumes, which extends beneath portions of PLT, is further discussed in Sections 14.0 and 15.0.

7.7. Contaminant Fate and Transport

The chemical properties of contaminants and the physical, chemical, and biological processes that they are exposed to affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed on a UWT Campus-wide basis in Section 18.0. Locally, soil contamination associated with PLT is located in shallow soil (less than 10 feet) at various locations along the PLT pedestrian corridor. However, residual TPH, metals, and PAH-contaminated soil remaining in place following remedial actions as part of the PLT Capital Project are capped with geotextile fabric under approximately 1 foot of import fill and/or paving, which prevents direct human contact with the general public accessing this area (Figures 7-1A/B). Residual soil contamination within the PLT Site is stable and is not leaching to groundwater based on the groundwater RI sampling results. Furthermore, stormwater is captured by drainage systems that convey the stormwater away from PLT to prevent the vertical migration of contamination through the soil column via leaching.

7.8. Summary

From the late 1880s to the late 1990s, PLT historically operated as a rail line with multiple spurs to adjacent properties. These historical operations resulted in the release of petroleum hydrocarbons (TPH-G, TPH-D, and TPH-O), PAHs including naphthalene and cPAHs, and metals including arsenic and lead to the soil. The majority of the contaminated soil was excavated and removed in conjunction with the PLT Capital Project as well as during the adjacent Milgard Hall Capital Project and Science Building Capital Project . The placement of geotextile fabric under approximately 1 foot of imported fill and/or placement of hardscape following excavation resulted in the isolation of these contaminants to prevent direct human contact. Residual soil contamination within the PLT Site is stable based on the groundwater sampling results and is not migrating off the property. Additionally, paving activities and stormwater collection systems further prevent the infiltration of precipitation that may lead to potential contaminant leaching from soil to groundwater. As discussed above, the adjacent buildings are a sufficient distance from TPH-D contaminated soil or include a vapor mitigation system (Milgard Hall) to prevent VI into enclosed spaces.

The nature and extent of TPH, PAHs, and metals in soil and groundwater are shown in plan view on Figure 7-1A/B and by chemical/media on Figures 7-7A/B through 7-12A/B.

8.0 REMEDIAL INVESTIGATION—1742 JEFFERSON (FORMER STANDARD OIL STATION)

8.1. Introduction

The former Standard Oil service station located at 1742 Jefferson Avenue (1742 Jefferson) near the intersection of South 19th Street and Jefferson Avenue in Tacoma, Washington (Figure 8-1). Environmental data collected during soil and groundwater studies (Section 8.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the contamination. These data indicate the presence of TPH-G, TPH-D, benzene, and ethylbenzene in soil at concentrations greater than their respective PCULs. Summary statistics for soil and groundwater identifying COCs for 1742 Jefferson are presented in Tables Q-10 and Q-11 (Appendix Q). Historical operations included a fuel and service station owned and operated by Standard Oil Company of California between 1932 and 1965.

Most of the petroleum-related soil contamination was removed in 2012 during a remedial action which required: (1) the closure of a gasoline UST, (2) the closure of a waste oil UST, (3) and removal of a hydraulic hoist. The extent of residual TPH-G, TPH-D, benzene and ethylbenzene soil contamination (1742 Jefferson Site; Figure 8-1) is currently limited to the east of the property beneath the Jefferson Avenue ROW which is capped with asphalt and/or concrete pavement and approximately 6 feet of soil. The soil and pavement prevent direct contact with the residual contamination and the surrounding buildings are located at a sufficient distance to prevent the migration of contaminant vapors from entering the occupied indoor spaces. Currently, the stormwater collection system for the Jefferson Avenue ROW prevents the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater. Residual soil contamination for the 1742 Jefferson Site (as defined by the TPH-G, TPH-D, benzene, and/or ethylbenzene PCUL exceedances) based on the post-remedial action results is generally stable and not impacting groundwater in this area based on the monitoring data presented for the 1742 Jefferson RI.

In addition, environmental data indicates the presence of TCE contamination in soil and groundwater resulting from releases from service station operations (i.e., the use of cleaning or degreasing solvents containing TCE). TCE contamination is discussed in the context of the Westerly Plume (Section 13.0) due to the commingled nature of this contamination with CVOC (TCE) contamination from other upgradient source areas.

1742 Jefferson (AOC 4 in the 2016 Agreed Order) and the 1742 Jefferson Site (residual TPH-G, TPH-D, benzene, and ethylbenzene contamination in soil) are shown on Figure 8-1 relative to the surrounding features. Terminology for 1742 Jefferson referenced by this RI is described below:

- **1742 Jefferson.** The source property or point of release for contamination associated with historic operations (Pierce County Parcel No. 2017060030) (0.41-acre parcel).
- **1742 Jefferson Site.** Area and media containing contamination exceeding PCULs associated with historical operations and/or land use.
- **Westerly Plume.** The extent of CVOC (PCE, TCE, DCE, cis-DCE, vinyl chloride, and DCA)contamination associated with historic operations and/or land use at 1701 Tacoma Avenue South, 1722 Tacoma Avenue South, 1904-1908 Tacoma Avenue South, 1922 Tacoma Avenue South, 1934-1938 Tacoma Avenue South, Tacoma Avenue South Sanitary Sewer, 1755 Fawcett Avenue, and 1742 Jefferson Avenue, which is further discussed in Section 13.0.

Specific details regarding historical property uses leading to the release of contaminants, RI activities, the CSM, and the nature and extent of contamination associated with 1742 Jefferson are summarized below.

8.2. Property Conditions

8.2.1. Location and Description

1742 Jefferson is a triangular-shaped property on the northeast side of the UWT Campus. The property is bounded by Court C to the west, Jefferson Avenue to the southeast, and a Pierce Transit facility to the north. The former service station was located in the central and southern portions of the property (Figure 8-2). The ground surface is currently paved with compact gravel and asphalt. It is used as a UWT Campus parking lot. The ground surface slopes gently from the south to the north ranging from approximately elevation 100 to 92 feet.

8.2.2. Historical Land Use

Between 1935 and the 1960s, a Standard Oil service station operated at 1742 Jefferson Avenue. City directories, historical photographs, and development plans, indicate:

- **1932-1942**. Standard Stations Inc. is operated by "Neil Mazza."
- **1947-1953**. Mfassa N A gas station.
- **1953-1963**. Vacant.
- **1963-1965**. Fred Clipper Service Station.

Three USTs connected to a pump island with fuel dispensers, a tire rack, and a service bay with a hydraulic lift and floor drain/sump were in use based on historical development plans. Aboveground structures associated with the former service station are no longer visible by 1979. Photo 8-1 provides an overview of the service station circa 1951.

Photo 8-1. Circa 1951 photograph of the Standard Oil service station at 1742 Jefferson Avenue.

The locations of the three former USTs (UST A, UST B, and UST #3) that were in use during former fuel and service station operations are shown on Photo 8-2. UST A, located near the former service station, was likely used to store waste oil, while the other two (UST B and UST #3), located near the former fuel island, were likely used to store gasoline and "ethyl" gasoline based on available historical records. Remedial excavations were performed to address petroleum-contaminated soil and required removal and closure of the USTs (further discussed in Section 8-3). The 2012 remedial excavation boundary encompassed the suspected location of UST #3 but only buried debris was observed at this location. It was surmised that UST #3 was previously removed from the property based on these observations, but records of its removal were not available.

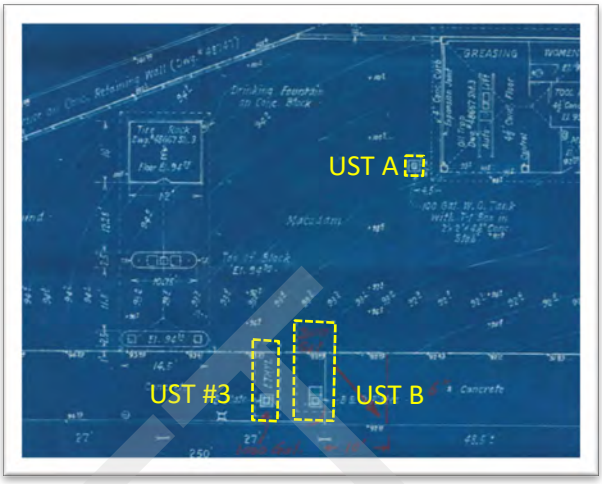


Photo 8-2. Image of 1931 development plans of former Standard Oil service station.

This property has been used as a parking lot since 1973. The southern portion of the property was repaved with asphalt in 2012 following remedial excavation. Historical land use, structures, and features for Jefferson and the surrounding area are shown on Figure 8-2.

8.2.3. Current and Future Land Use

1742 Jefferson includes a paved and gravel public parking lot. Anticipated future land use in this area is to remain academic to support the UWT Campus with new buildings, parking lots, surface streets, and pedestrian access. The adjacent property uses include the ROW for the City (Jefferson Avenue and Court C, located east and west respectively) and a UWT Campus gravel parking lot to the north. An approximate 8-foot retaining wall separates Court C from 1742 Jefferson.

Academic buildings for the UWT Campus are located east of Jefferson Avenue. A green space and residence hall are located west of Court C. Future land use is anticipated to remain UWT Campus parking.

8.2.4. Utility Infrastructure

Current utility infrastructure within and adjacent to 1742 Jefferson with the potential to serve as preferential pathways for contaminant migration are shown on Figure 8-3 and includes the following:

- A street light utility is located beneath the sidewalk on the west side of Jefferson Avenue.
- A north-south oriented 8-inch-diameter sanitary sewer line is located within Court C and Jefferson Avenue ROW. The elevation of the sewer pipe in Court C ranges between 88 and 95 feet with a slope of 1.7 to 2.1 percent. The elevation of the sewer pipe in Jefferson Avenue ranges between 79 and 88 feet with a slope of 3 percent. The pipe is composed of terra cotta and was installed in the early 1900s.
- A 4-inch sanitary sewer lateral was observed in the 2012 remedial excavation. The pipe within the excavation was removed and connected to the former sump and floor drain. The pipe was capped on

the southeast edge of the edge of the excavation. The connection between the sewer lateral and the main sanitary sewer is not known.

- The City installed a 60-inch-diameter storm concrete pipe in Jefferson Avenue to a depth of 15 feet bgs in 2016 (shown as existing in Figure 8-3). The City also completed the installation of the remainder of the 60-inch-diameter storm pipe in 2022 (shown as proposed in Figure 8-3). Petroleum-contaminated soil was not encountered during the excavation of the new storm utility based on an interview completed with the City's 2016 construction inspector and 2022 project manager (2001 and 2003).

8.3. Field Investigations and Remedial Actions

Multiple environmental investigations have been completed to evaluate subsurface conditions as described in Section 4.0. Environmental investigations documenting soil and groundwater conditions and remedial actions for 1742 Jefferson and/or the surrounding area are discussed in Sections 8.3.1 through 8.3.5 below. Sampling locations used to evaluate soil and groundwater conditions are shown on Figures 8-4 and 8-5. Investigations completed for Jefferson and the surrounding area to support the development of the RI are summarized in Tables 8-1 and 8-2 and further discussed below (Sections 8.3.1 through 8.3.5). Construction details for permanent monitoring wells installed within 1742 Jefferson and the surrounding area are presented in Table 8-3. Soil and groundwater results for the subsurface investigations completed are presented in Tables 8-4 and 8-5, respectively.

8.3.1. 1997 Agreed Order Remedial Investigation

In 1998, URS on behalf of UW completed an RI for 1742 Jefferson in accordance with the 1997 Agreed Order (161). As part of the 1997 Agreed Order, investigation activities were completed within 1742 Jefferson to evaluate soil and groundwater conditions relative to the former Standard Oil service station's historical operations. Environmental investigations to evaluate soil and groundwater conditions in this area are in Sections 8.3.1.1 through 8.3.1.2, below. Soil and groundwater sampling locations are shown on Figure 8-4.

8.3.1.1. Soil Investigation Summary

Soil investigations completed for 1742 Jefferson as part of the 1997 Agreed Order RI included:

- **Former Service Station Building and Waste Oil UST.** Seven DP borings (JS-B1 through JS-B7) were completed to depths between approximately 8 and 15 feet bgs to evaluate soil conditions in this area. A total of 18 soil samples collected from the boring explorations ranging in depth from 1.5 to approximately 12 feet bgs were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, select VOCs, lead and PCBs. TPH-G, TPH-D, TPH-O, BTEX, 1,2,4-TMB, 1,3,5-TMB and lead were detected in one or more of the soil samples collected at depths ranging from approximately 1.5 and 9.5 feet bgs. Additionally, CVOCs (TCE, DCE, chlorobenzene) were also detected in soil collected at a depth of approximately 3 feet bgs in boring JS-B7. Other contaminants were not detected in the analyzed soil samples.
- **Former Fuel UST and Island.** Two DP borings (JS-B8 through JS-B9) were completed to depths of approximately 15 feet bgs to evaluate soil conditions in this area. Six soil samples collected from the borings ranging in depth from 2 to 12 feet bgs were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX and lead. TPH and BTEX were not detected in the analyzed soil samples. Low-level concentrations of lead were detected in the soil samples analyzed. Other contaminants were not detected in the analyzed soil samples.

- **Downgradient of Former Service Station Building.** Two HSA borings (JS-MW1 and JSMW2) were completed downgradient of the former service station building to depths ranging between approximately 38 and 49 feet bgs. Four soil samples were collected from 10 to 35 feet bgs and analyzed for TPH-D, TPH-O and BTEX. Contaminants were not detected in the analyzed soil samples.

8.3.1.2. Groundwater Investigation Summary

Groundwater samples were collected from four permanent monitoring wells and six temporary wells (see Tables 8-2 and 8-3) as a part of the 1997 Agreed Order investigation. Grab groundwater samples from temporary wells were collected at the time of soil exploration activities. Permanent monitoring wells JS-MW1 and JS-MW2 were sampled on a quarterly basis between October 1998 and September 1999 with two additional rounds of monitoring at well JS-MW2 completed in April 2000 and September 2000. In addition, UG-MW3 was sampled in October 1998, April 1999, April 2000, and September 2000, and monitoring well JS-MW3 was sampled in April 2001. Groundwater samples were analyzed for a combination of TPH, petroleum-related VOCs, and CVOCs.

At grab sampling locations (screened within the Qvi aquifer), TPH-G was detected in groundwater in borings JS-B8, JS-B9, and JS-B10 within a maximum detected concentration of 766 µg/L at location JS-B10. TPH-D and/or TPH-O were detected in groundwater in borings JS-B5, JS-B8, and JS-B9 with a maximum detection TPH-D concentration of 21,000 µg/L and a maximum detection TPH-O concentration of 13,000 µg/L at location JS-B5. Boring JS-B5 is located within the former service station building. BTEX compounds were also detected in grab groundwater at borings JS-B9 and JS-B10 located along the southeastern portion of Jefferson.

At permanent monitoring wells (screened within the Qva aquifer), TPH and petroleum-related VOCs were not detected in the analyzed groundwater samples. However, CVOCs (TCE) were detected in monitoring wells UG-MW3 (upgradient well), JS-MW2 (central well), and JS-MW3 (downgradient well) during one or more monitoring events.

8.3.2. 1997 Agreed Order Remedial Action

A remedial action was completed in 2012 under the 1997 Agreed Order to remove the former service station infrastructure and associated petroleum-contaminated soil to the extent feasible. A supplemental investigation was performed by GeoEngineers to further evaluate soil conditions and confirm the locations of UST A, UST B, and UST #3 in preparation for the remedial action. Investigation activities followed by UST removal and closure and remedial excavation activities were completed between August and September 2012. MTCA Method A cleanup levels for unrestricted land use were used in 2012 to guide the remedial excavation. A detailed discussion of the TP investigation activities and results is presented in the "Jefferson Street Association Parcel—UST Closure and Remediation" report (246) and summarized below.

8.3.2.1. Test Pit Investigation Summary

Eight TPs were completed during the 2012 investigation to identify the locations of the three USTs reportedly in use during service station operations along with associated vent and fuel lines (Section 8.2.2). The locations of UST A (130-gallon waste oil UST) and UST B (3,000-gallon gasoline UST) were verified during the TP investigation activities. However, only broken chunks of concrete with petroleum staining were observed at the suspected location of UST #3 (ethyl gasoline UST of unknown capacity). Based on these observations, it was assumed that the former property owner removed UST #3 and backfilled the

UST excavation with demolished concrete during the demolition of the former service station and dispenser island. UST locations are shown on Figure 8-4.

8.3.2.2. UST Removal and Closure, and Remedial Action Summary

Remedial excavation and subsequent confirmation soil sampling activities were completed between August and September 2012(Figure 8-4). Remedial excavation activities resulted in the removal of approximately 300 cubic yards of petroleum and/or CVOC-contaminated soil from two general areas (as described below). Results of confirmation soil samples collected at the final remedial excavation limits confirmed the removal of the previously identified petroleum-contaminated soil with the exception of (1) soil represented by samples JSP-CS-TP6BASE and JSP-CS-TP6SW collected at depths ranging between approximately 4 and 7.5 feet bgs from the base of the service station remedial excavation, and (2) sample JSP-CS-B1SE collected at a depth of approximately 6 feet bgs along the eastern property boundary (eastern sidewall of the UST B excavation area).

Details of the remedial excavation and UST removal addressing petroleum contamination are summarized below. USTs, remedial excavation areas, and confirmation soil samples are shown on Figure 8-4.

- **Former Service Station Area and Waste Oil UST (UST A).** One 130-gallon waste oil UST and associated product piping were removed in August 2012. The remedial excavation for UST A measured approximately 7 feet long by 8 feet wide by 5 feet deep. The remedial excavation merged with the remedial excavation beneath the former service station building that addressed petroleum-related contamination associated with the former hydraulic lift, floor drain/sump and 4-inch-diameter sewer line (Figure 8-4). The remedial excavation for the former service station building measured approximately 32 feet long by 25 feet wide by 7.5 feet deep. A total of 11 confirmation samples were collected from locations JSP-CS-A Base, -AS and -AW, JSP-CS-TP6BASE, -N, -NE, -NW, -S, -SE, -SW and -PCS at the final remedial excavation limit to evaluate soil conditions at the sidewalls of the excavation. Soil samples collected from these locations were analyzed for a combination of TPH, petroleum-related VOCs, CVOCs, PAHs, and lead. TPH-D, TPH-O, naphthalene, cPAH TEQ, and/or CVOCs (TCE) were detected in confirmation samples JSP-CS-AW, JSP-CS-TP6NE-5.5 and TP6-4 PCS collected on the east sidewall of the UST removal excavation (approximately 2.5 feet bgs) and at base of the service station excavation (approximately 4 to 5.5 feet bgs). Soil represented by sample TP6-4 PCS was subsequently over-excavated and removed from the property.
- **Former Gasoline UST (UST B and #3) and Fuel Island.** Remedial excavation in August 2012 required removal of one 3,000-gallon gasoline UST and associated product piping and fuel pumps. The remedial excavation associated with UST B and UST #3 measured approximately 30 feet long by 20 feet wide by 10 to 12 feet deep. The remedial excavation for the product/vent lines and fuel pumps measured approximately 27 feet long by 2 feet wide by 2 feet deep and approximately 25 feet long by 2 to 5 feet wide by 2 feet deep, respectively. A total of 12 confirmation samples were collected from locations JSP-CS-TP7BASE, -B1BASE, -B1S, -B1SE, -B1SW, -B2BASE, -B2N, -B2NW, -B2NE, -TP8, -TP5-2NE and -TP5-BOTTOM at the final remedial excavation limit to evaluate soil conditions at the sidewalls of the excavation. Soil samples collected from these locations were analyzed for TPH-G, BTEX, and lead. TPH-G, benzene, ethylbenzene, and total xylenes were detected in sidewall sample CS-B1SE-6.0 collected adjacent to Jefferson Avenue at a depth of approximately 6 feet bgs. Additional remedial excavation was not completed at this location due to access constraints and to maintain soil stability for the underground utilities and the roadway. Additionally, low-level total xylene and TPH-G were

detected in sample CS-BNE-7 collected along the northeast sidewall of UST B remedial excavation. Low level concentrations of lead were detected in one or more confirmation samples.

Remedial excavations were performed to address soil contamination based on observations during the TP investigation, observations during construction activities to remove the USTs and other service station infrastructure, and previous investigation results. Note that the remedial excavation included the removal of contaminated soil previously identified in borings JS-B1 and JS-B7. The 2002 RI indicated that boring JS-B1 was located south and adjacent to UST A. However, the actual location of UST A was approximately 10 feet north of the location indicated by the 2002 RI. It is therefore presumed that the actual location of boring JS-B1 was also located approximately 10 feet north of the location indicated by the 2002 RI. One TP was completed at the mapped location of boring JS-B1 during the 2012 TP investigation (described above) to confirm this. At this location, soil sample CS-TP7BASE-2.0 was collected at a depth of approximately 2 feet bgs for analysis of TPH-G and BTEX. TPH-G and BTEX were not detected in the analyzed sample verifying that the actual location of boring JS-B1 was positioned north of the previously mapped location. Therefore, residual soil contamination identified in boring JS-B1 is presumed to have been excavated and removed from Jefferson during the removal of UST A as part of the 2012 remedial activities.

8.3.3. Supplemental Investigations Under the 1997 Agreed Order

Supplemental investigation activities were completed in accordance with the 1997 Agreed Order to further evaluate soil and groundwater conditions associated with 1742 Jefferson and the surrounding area. Investigation activities are summarized in Sections 8.3.3.1 and 8.3.3.2 below. Supplemental soil and groundwater sampling locations are shown on Figure 8-4.

8.3.3.1. Soil Investigation Summary

One DP boring (2B-B2) and three sonic borings (JS-MW3S, JS-MW7, and JS-MW7A) were advanced to depths ranging between approximately 10 and 22 feet bgs. Borings JS-MW3S, JS-MW7, and JS-MW7A were completed as a permanent monitoring well south and east of 1742 Jefferson to further evaluate soil and groundwater conditions in 2013. A total of 23 soil samples collected from the borings at depths ranging from the ground surface to approximately 25 feet bgs were analyzed for a combination of TPH, petroleum-related VOCs, CVOCs, PAHs and metals. TPH-O, naphthalene, cPAHs, and/or lead were detected in shallow soil (approximately 0 to 2 feet bgs) in borings B2-2B and JS-MW7A. Other contaminants were not detected in the analyzed samples.

8.3.3.2. Groundwater Investigation Summary

Between 2013 and 2014, supplemental groundwater monitoring for 1742 Jefferson included the collection of samples from newly installed wells JS-MW7A[8] and existing monitoring wells JS MW1, JS-MW2, JS-MW3, JS-MW3S, and UG-MW3. Water samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, petroleum-related VOCs, CVOCs, PAHs and metals. TPH-D (310 µg/L) was detected at low concentrations in well JS-MW3S east (downgradient) of the remedial action area. CVOCs (TCE, TCA, and DCA) were detected in wells JS-MW1, JS-MW2, JS-MW7A, and UG-MW3 within and upgradient (west) of 1742 Jefferson. Other contaminants were not detected. CVOC contamination is associated with the Westerly Plume, which is further discussed in Section 13.0.

[8] JS-MW7A is a replacement well for JS-MW7 because JS-MW7 was dry.

8.3.4. 2016 Agreed Order Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions at 1742 Jefferson in accordance with the RI Work Plan and subsequent addenda (Section 4.0) are summarized in Sections 8.3.4.1 and 8.3.4.2 below. These activities included collection of soil samples from two soil borings and the collection of groundwater samples from seven permanent groundwater monitoring wells (see Tables 8-1 and 8-2). Exploration locations for the 2016 Agreed Order RI are shown on Figure 8-5.

8.3.4.1. Soil Investigation Summary

Additional RI soil data gaps at 1742 Jefferson were not identified in the RI Work Plan based on the results of previous investigations (Section 8.3.1 through 8.3.3) and the results of capital projects completed in the vicinity of 1742 Jefferson (Section 8.3.5). However, soil samples were collected from boring JS-MW1S within 1742 Jefferson and A7-MW2S northeast of 1742 Jefferson (Figure 8-5) to evaluate the nature and extent of contamination associated with the Westerly Plume and Northerly Plume. This data was also used to further evaluate soil conditions associated with 1742 Jefferson.

Ten discrete soil samples were collected from these borings at approximate depths ranging between 5 and 30 feet bgs and analyzed for select VOCs. Two soil samples were collected from approximately 5 and 9 feet bgs and were also analyzed for TPH-HCID, BTEX, PAHs and metals. Contaminants were not detected in these samples with the exception of metals. CVOCs (TCE) detected in boring JS-MW1S are associated with the Westerly Plume and are further discussed in Section 13.0.

8.3.4.2. Groundwater Investigation Summary

Between 2016 and 2020, 33 groundwater samples (including duplicates) were collected from the network of new and existing monitoring wells (see Table 8-2) to further evaluate groundwater conditions and define the nature and extent of contamination resulting from historical operations at 1742 Jefferson, Westerly Plume, and Northerly Plume. Groundwater samples were analyzed for select VOCs at well locations screened within the Qvi and Qva aquifers (geologic and hydrogeologic conditions in the vicinity of 1742 Jefferson are further discussed in Section 8.4.2). Groundwater samples collected from wells JS-MW1 and JS-MW2 in March 2019 were also analyzed for TPH-G. Groundwater monitoring activities and results associated with Jefferson are discussed below.

- During the 2016 Agreed Order RI, 13 groundwater samples were collected from three permanent monitoring wells (JS-MW1S, JS-MW3S, and JS-MW7A) screened within the Qvi aquifer within, cross-gradient and downgradient from 1742 Jefferson. Well A7-MW2S was dry. Groundwater samples collected within the Qvi aquifer identified CVOCs in two wells (JS-MW7A and JS-MW1S) with the highest detected concentrations from monitoring well JS-MW1S downgradient of the former service station building. The CVOCs (TCE and cis-DCE) are discussed further in Section 13.0 (Westerly Plume). Petroleum-related VOCs associated with 1706 Jefferson were not detected in the Qvi groundwater samples.

- Twenty groundwater samples were collected from three permanent monitoring wells (JS-MW1, JS-MW2 and JS-MW3) screened within the Qva aquifer located within, upgradient, and downgradient from 1742 Jefferson during the 2016 Agreed Order RI. Results of groundwater samples collected within the Qvi aquifer identified CVOCs (TCE, cis-DCE, and/or DCA) in three of the wells (JS-MW1, JS-MW2, and UG-MW3) with the highest detected concentrations from monitoring well UG-MW3 located upgradient

of the former service station building. These CVOCs are discussed further in Section 13.0 (Westerly Plume). Petroleum-related contaminants associated with 1742 Jefferson were not detected in the Qva groundwater samples.

8.3.5. Capital Projects

Investigation activities were necessary to implement UW Capital Projects. Capital projects and investigation activities in the vicinity of 1742 Jefferson are summarized in Section 8.3.5.1 below. Sample locations are shown on Figure 8-5.

8.3.5.1. Tacoma Paper and Stationery Capital Project

Groundwater samples were collected from two monitoring wells (JS-MW3 and JS-MW3S) in October 2014 as part of the Tacoma Paper and Stationery Capital Project (former Urban Solutions Center). The groundwater samples were analyzed for VOCs and TPH-D (JS-MW3S only). VOCs and TPH-D were not detected in the analyzed groundwater samples.

8.4. Conceptual Site Model

Development of the CSM for 1742 Jefferson is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for 1742 Jefferson is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. The following sections (Sections 8.4.1 through 8.4.4) describe the specific elements of the 1742 Jefferson CSM.

8.4.1. Physical Setting

Remedial excavation has been completed following acquisition of the Campus property by UW in the early 1990s to support the UWT Campus Master Plan for higher education and learning. Currently, 1742 Jefferson provides parking for the UWT Campus and the general public. The groundwater surface is paved either with compact gravel (northern portion) or asphalt (southern portion).

8.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic setting for Jefferson (described in the following sections) inform the distribution of contaminants in media of potential concern. Local geology and hydrogeology in the vicinity of Jefferson are described below in Sections 8.4.2.1 and 8.4.2.2.

8.4.2.1. Local Geology

Geologic units present beneath Jefferson include the Qf, Qvi, and Qva. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill has been encountered in the borings completed at 1742 Jefferson and the surrounding area and consists of locally derived, reworked ice-contact deposits or imported fill. The fill consists of silty sand with gravel from below the surface to depths ranging from approximately 4 to 7 feet bgs.
- **Vashon Ice-Contact Deposits (Qvi).** The Qvi unit is characterized by till, subglacial channel, and lacustrine deposits that were deposited along the ice margin and beneath the ice during glacial retreat. Sub-units of the Qvi identified in the vicinity of 1742 Jefferson include the following:

- **Qvi Till-Like Deposits.** Till-like deposits in the vicinity of the UWT Campus consist of silty gravel with sand containing approximately 1-foot-thick sand and gravel seams. In general, these deposits have relatively low permeability. However, the sand and gravel seams where present readily contain and transmit shallow groundwater. Qvi till-like deposits are present across 1742 Jefferson underlying the Qf within a thickness ranging between 6 and 12 feet bgs.
- **Qvi Silt Deposits.** A silt layer is present at the base of the Qvi unit which acts as a semi-confining unit to limit groundwater flow and influences contaminant fate and transport at 1742 Jefferson. The Qvi silt layer generally consists of a gray to gray/brown silt layer with gravel and is present on the southern portion of 1742 Jefferson. The Qvi silt unit measures from approximately 5 to 10 feet thick in this area, however, is generally absent where incision during the last glaciation has occurred (northern portion of 1742 Jefferson).
- **Qvi Channel Deposits.** The Qvi channel deposits are interpreted to be derived from pro-glacial or sub-glacial fluvial deposition near the end of the Pleistocene. These deposits generally consist of oxidized sand and gravel in distinct channel forms (see Figure 2-6). The channel deposits Qvi are present beneath the Qvi till-like deposits with an approximate thickness of 8 to 20 feet. These deposits are observed in borings JS-B3, JS-B5, JS-B6, JS-B7, JS-MW1S, JS-MW1, and UG-MW3. These deposits may terminate near Jefferson Avenue based on observed soil conditions within A7-MW2S and JS-MW3S. Locally, the Qvi channel deposits appear to incise through the Qvi silt and into the underlying Qva deposits. Where incised, the Qvi aquifer enters the Qva aquifer and the Qvi aquifer is no longer present.

- **Glacial Outwash Deposits (Qva).** The Qva unit underlies the Qvi deposits. The contact between the Qva and the overlying Qvi deposits dips to the east at generally the same slope as the natural topography. Sub-units of the Qva identified in the vicinity of the 1742 Jefferson include the following:
  - **Qva Sand and Gravel Deposits.** Sand and gravel deposits within the Qva typically consist of a layer of light gray fine- to coarse-grained gravel.
  - **Qva Silt.** The silt layers within the Qva are generally flat-lying, consisting of relatively clean silt to sandy silt with thicknesses ranging between approximately 5 to 15 feet. A generally flat-lying silt is present within the Qva (Qva silt) beneath 1742 Jefferson and acts as a confining layer limiting vertical groundwater flow (See Cross Section C-C' Figure 2-9). The Qva silt forms the boundary between the Qvi and Qva units at 1742 Jefferson. The Qva silt is located at an approximate depth of 29 feet bgs and is approximately 4 to 5 feet thick in this area. The Qva silt terminates approximately 20 feet east of 1742 Jefferson within the area of the TPS Building based on observations noted during the drilling of boring USC-MW1D.

Geologic conditions in the vicinity of Jefferson are shown relative to the UWT Campus on Figure 2-9.

8.4.2.2. Local Hydrogeology

Groundwater in the southeast portion of the UWT Campus occurs within both the Qvi (shallow) and Qva (deep) aquifers (Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Specific areas where the Qvi and Qva aquifers are interpreted to be hydraulically connected and flow into each other are shown on Figure 2-14 to 2-19 and include the following as they relate to groundwater flow beneath 1742 Jefferson and the surrounding area:

- **1742 Jefferson—North.** Incision of the valley walls during the last glacier retreat (approximately 10,000 to 13,000 years ago) has locally resulted in the absence of the confining layer separating the Qvi and Qva aquifers (i.e., Qvi and/or Qva silt) in this vicinity. As a result, the Qvi and Qva aquifers are locally

hydraulically connected. In this vicinity, groundwater within the Qvi aquifer is interpreted to drain into and mix with groundwater from the underlying Qva aquifer (see Figure 2-9).

Local groundwater occurrence and flow for the Qvi and Qva aquifers are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer is unconfined and occurs and flows primarily within the channel deposits and sand and gravel seams within the upper Qvi deposits at depths between approximately 4 and 21 feet bgs (Table 8-5). The inferred groundwater flow direction in the Qvi aquifer across Jefferson is generally easterly toward the Thea Foss Waterway, which is consistent with the generally easterly UWT Campus-wide Qvi groundwater flow direction (Figures 2-13 and 2-14). In the northern portion of 1742 Jefferson, the Qvi and Qva aquifers are locally hydraulically connected as a result of erosion and incision during glacial retreat as described above and occurs and flows primarily within the channel deposits and sand and gravel seams within the upper Qvi deposits into the underlying Qva sand and gravel deposits.

The local estimated average linear groundwater velocity within the Qvi aquifer is approximately 34 ft/day with a hydraulic gradient of 0.21 ft/ft. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L

Qva Aquifer Groundwater Occurrence and Flow

The Qva aquifer is present beneath 1742 Jefferson with an inferred groundwater flow direction that is generally east-northeasterly based on the UWT Campus-wide Qva flow direction (Figures 2-17 through 2-19). Locally, the Qvi and Qva aquifers are hydraulically connected where the Qvi silt layer is absent. However, the Qva silt located between approximately 29 and 35 feet bgs limits the vertical flow of groundwater in this area (Figure 2-9).

The local estimated average linear groundwater velocity within the Qva aquifer is approximately 0.87 ft/day with a hydraulic gradient of 0.14 ft/ft. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

8.4.3. Sources of Contamination

The primary source of contamination at 1742 Jefferson is associated with the historical sale of fuel and service station operations. As described above, the fuel and service station operations occurred between 1932 and the late 1960s. The potential release mechanism for petroleum-related contamination and solvents (TCE) includes drips, leaks and/spills from tanks including USTs, drums and/or other equipment (ex. hydraulic hoists, floor drains, sumps) directly to soil with the potential to leach to groundwater.

In addition to the local release of petroleum-related contaminants and solvents to shallow soil, CVOCs (TCE, cis-DCE and DCA) associated with upgradient and off-property releases (Westerly Plume) have been identified. Due to the commingled nature of CVOC contamination sourcing from 1742 Jefferson and other upgradient areas, CVOC contamination associated with 1742 Jefferson is discussed in the context of the Westerly Plume (Section 13.0). Other potential sources of contamination include the placement of contaminated fill material from unknown sources and grading material used at the property prior to

development and/or to backfill the remedial excavations, atmospheric deposition from historical combustion (vehicle emissions, burning, etc.) and/or historical land use not specifically identified above.

8.4.4. Potential Receptors and Exposure Pathways

Current and future land uses were considered when evaluating potential receptors and exposure pathways 1742 Jefferson. The current land use is a public parking lot which is paved with asphalt (southern portions) and compact gravel (northern portion). Limited landscaping is present along the western portion of the property. Precipitation falling to the ground surface is either captured catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway (i.e., asphalt paved area) or infiltrates into the ground where unpaved (i.e., compact gravel and landscaped areas). Future land use may remain as a public parking lot or may include the redevelopment of the property with a new building for residential use as part of the continued UWT Campus growth. It is assumed that future land use will include a new residential building for purposes of this CSM. The current and future use of the surrounding area is commercial and academic.

Based on the current and anticipated future land use the following exposure pathways and receptors have been identified:

- **Direct Contact.** The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities.
- **Drinking Water.** Groundwater within the Qvi and Qva aquifers beneath 1742 Jefferson and the UWT Campus as a whole are not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.
- **Surface Water.** Surface water discharge from 1742 Jefferson is not considered to be a current exposure pathway because the majority of ground surface is capped with hardscaped, stormwater is directed to stormwater utilities, and the Thea Foss Waterway is more than 1,500 feet east of the UWT Campus. Stormwater utilities are located within Jefferson Avenue at an elevation below the groundwater table for the Qvi aquifer, however, trench dams were installed within the stormwater line to prevent a preferential flow pathway for contaminants along the utility pipe and within the backfill.
- **Indoor Air.** Residual TPH-G, TPH-D, and benzene remain in place following the completion of the 2012 remedial action. Although the current land use of 1742 Jefferson and the surrounding area make negate the potential for VI into enclosed spaces (i.e., current use is a parking lot and the nearest building with the potential for VI is greater than 80 horizontal feet from the residual contamination), future land use may include the redevelopment of the property for residential use by the UWT Campus. Under this scenario, residual TPH-G, TPH-D, and benzene may have the potential to volatize in the vadose zone and migrate into the future enclosed spaces. As a result, the migration of petroleum vapors into the adjacent buildings is not considered a complete exposure pathway per Ecology's VI guidance (1064). However, future VI is considered a potential complete exposure pathway.

Potential receptors and exposure pathways for CVOC (TCE, cis-DCE, and DCA) contamination in this area associated with the Westerly Plume is further discussed in Section 15.0. Potential receptors and exposure

pathways for PAHs and lead contamination within this area are further discussed in Section 17.0 (Area-Wide Soil).

8.5. Proposed Cleanup Levels

PCULs were developed for Jefferson for the protection of human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (WAC 173-340), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water uses, potential exposure pathways, and the potential receptors specific to 1742 Jefferson. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for 1742 Jefferson is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels.** PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b). Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels.** Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173-340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

8.6. Nature and Extent of Contamination

8.6.1. Contaminants and Media of Concern

Characterization data for 1742 Jefferson are summarized in Tables 8-4 and 8-5 and were evaluated to determine contaminants and media of concern for the 1742 Jefferson Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions (i.e., post-remedial excavation confirmation samples and samples from soil explorations collected beyond the final remedial excavation limit) is presented in Table Q-10 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2020 as well as groundwater samples collected following the 2012 remedial action) is presented in Table Q-11 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were

screened to evaluate the potential for VI (Table Q-12, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-10 through Q-12) include the following:

- **Soil**. Petroleum-related contaminants including TPH-G, TPH-D, benzene and ethylbenzene were identified as primary soil COCs for the 1742 Jefferson Site based on the source of contamination to soil and the characterization results. However, most of this contamination was removed during the 2012 remedial action as described in Section 8.3. Currently, residual TPHG, benzene, and ethylbenzene remain at concentrations exceeding the PCULs in soil. The nature and extent of 1742 Jefferson Site contaminants are further discussed in Section 8.6.2.
- **Groundwater**. Petroleum-related contaminants were not detected in groundwater at a concentration greater than the PCUL. A discussion of sampling results for petroleum-related contaminants is presented in Section 8.6.3.
- **Soil Vapor.** A potential for contaminants to migrate into enclosed spaces at a concentration that could exceed the Method B indoor air PCUL and/or the SL for the protection of commercial workers was not identified under current land use assumptions based on screening of soil and groundwater data. However, TPH-G and TPH-D were identified as COC under a future land use scenario with the potential to migrate into enclosed spaces at a concentration that could exceed the Method B indoor air PCUL and/or the SL for the protection of commercial workers. An evaluation for VI potential is further discussed in Section 8.6.4.

TCE was also identified as a primary soil and groundwater COC for the 1742 Jefferson Site based on historical operations including the use of solvents at the former service station and shallow soil sample results prior to the 2012 remedial excavation. Due to the commingled nature of TCE with other upgradient sources, TCE contamination at this location is discussed further within the context of the Westerly Plume (Section 13.0). Other contaminants including naphthalene, total cPAHs, and lead were identified in shallow soil (less than 4 feet) at location JS-MW7A on the southern portion of 1742 Jefferson. These contaminants are not considered to have been sourced from 1742 Jefferson based on historical uses and are attributed to Area-Wide Soil (see Section 17.0).

Primary COCs (TPH-G, TPH-D, and BTEX) for soil and corresponding COCs in groundwater are shown in plan view on Figures 8-6 though-8-11 and in cross section on Figure 8-12. The nature and extent of COCs in media of concern are further discussed below.

8.6.2. Soil

Remedial excavation activities completed in 2012 removed the majority of the identified contamination associated with historic fuel and service station operations as described in Section 8.3. However, environmental data indicate the presence of TPH-G, TPH-D, benzene, ethylbenzene, and TCE-contaminated soil remaining in place at the 1742 Jefferson Site associated with historical operations. The nature and extent of COCs in soil are summarized below. Primary COCs identified for the 1742 Jefferson Site (TPH-G, TPH-D, benzene, and ethylbenzene) representing current conditions are shown in plan view on Figures 8-6 through 8-8. The nature and extent of TCE in soil is further discussed in Section 13.0 (Westerly Plume).

- **Former Gasoline UST (UST B and UST#3) and Fuel Island.** Soil containing residual TPH-G, benzene, and ethylbenzene exceeding the PCUL remains in place east of 1742 Jefferson directly adjacent to and downgradient from the former Fuel USTs (Figures 8-6 through 8-9). Primary COCs in soil include residual

TPH-G (110 mg/kg), benzene (0.059 mg/kg), and ethylbenzene (0.43 mg/kg) at a depth of 6 feet bgs (location JSP-CS-S1SE) on the eastern sidewall of the 2012 remedial excavation along Jefferson Avenue. Additional excavation at this location was limited by access constraints due to utilities within Jefferson Avenue. Further east of this location, field indicators of petroleum-impacted soil (sheen, odor, staining, etc.) were not encountered during excavation for the new stormwater utilities to a depth of 15 feet bgs.

- **Former Service Station Area and Waste Oil UST (UST A).** Residual TPH-D (1,500 mg/kg) remains in place at the southeast sidewall of the 2012 remedial excavation in confirmation sample JSP-CS-TP6NE collected at a depth of approximately 5.5 feet bgs.

The residual TPH-G and TPH-D concentrations exceed the SLs for the protection of VI beneath portions of 1742 Jefferson. The potential for VI from the residual TPH-G and TPH-D is further discussed in Section 8.6.4. Residual TCE in soil at 1742 Jefferson is further discussed in Section 13.0 (Westerly Plume).

8.6.3. Groundwater

Environmental data indicate the presence of TCE contaminated groundwater at the 1742 Jefferson Site associated with the historical service station. Due to the commingled nature of this with other upgradient sources, the nature and extent of TCE in groundwater is being further discussed in Section 13.0 (Westerly Plume). Other COCs (including TPH-G, TPH-D, benzene, and ethylbenzene (primary soil COCs) either were not detected in groundwater or were detected at concentrations less than the PCULs. The nature and extent of TPH-G, TPH-D and BTEX in groundwater for comparison to the soil results within and surrounding 1742 Jefferson are shown on Figures 8-9 through 8-11.

8.6.4. Soil Vapor and Indoor Air

Based on the soil and/or groundwater sampling results representing current conditions, TPH-G, TPH-D and TCE were identified as contaminants with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SL for the protection of commercial workers under the future land use scenario (i.e., future residential building for the UWT Campus). The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination.** Petroleum-related contaminants in soil were evaluated for potential VI based on Ecology's 2022 VI Guidance. Ecology's guidance states buildings located within the inclusion area (30 foot horizontal and 15-foot vertical separation distance) of soil with TPH-G and TPH-D concentrations greater than 100 and 250 mg/kg, respectively, may be at risk of VI into indoor air (1064). An evaluation of the potential for VI based on current conditions at 1742 Jefferson and the surrounding area is discussed below:
    - Residual TPH-G-contaminated soil at location JSP-CS-B1SE is located within Jefferson Avenue adjacent to 1742 Jefferson. Although there is no current potential for VI (i.e., no occupied spaces within 30 lateral feet), future redevelopment of the property for a residential use may have the potential for VI. If and when future residential redevelopment occurs, the potential for VI should be considered as part of the building design and construction.
    - Residual TPH-D-contaminated soil at location JSP-CS-TP6NE is located beneath the former service station centrally located within 1742 Jefferson. Although there is no current potential for VI (i.e., no occupied spaces within 30 lateral feet), future redevelopment of the property for residential use may have the potential for VI. If and when future residential redevelopment

occurs, the potential for VI should be considered as part of the building design and construction.

- **Petroleum-Related Groundwater Contamination.** Petroleum-related contaminants either were not detected or were detected at concentrations less than the SL for groundwater VI, therefore, are not considered a potential threat.
- **Other Contaminants**. CVOCs (TCE) exceeded the SL for groundwater VI. The potential for VI resulting from CVOCs associated with the Westerly Plume, which extends beneath 1742 Jefferson, is further discussed in Section 13.0.

8.7. Contaminant Fate and Transport

The chemical properties of contaminants and the physical, chemical, and biological processes that they are exposed to affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed on a UWT Campus-wide basis in Section 18.0. Locally, soil contamination associated with historical service station and fuel operations is located in shallow soil (less than 6 feet) within the central portion of 1742 Jefferson and east of 1742 Jefferson within the Jefferson Avenue ROW. However, residual TPH, benzene, and ethylbenzene in the soil remaining in place are capped with asphalt or compact gravel surfaces under at least 5 feet of soil, which prevents direct human contact with the general public accessing this area (Figures 8-1 and 8-12). Residual soil contamination within the 1742 Jefferson Site is stable and not leaching to groundwater based on the groundwater sampling results completed following the 2012 remedial action and during the 2016 Agreed Order RI. Furthermore, stormwater is captured by drainage systems that convey the stormwater away from 1742 Jefferson to prevent the vertical migration of contamination through the soil column via leaching.

Contaminant fate and transport for TCE sourcing from historical dry cleaner and potentially the motorcycle service operations are further discussed in Section 13.0 (Westerly Plume).

8.8. Summary

Between 1935 and the late 1960s, use of 1742 Jefferson included a fuel sales and service station. These historical uses resulted in the release of TPH, BTEX, and TCE to soil and/or groundwater. Most of the contaminated soil was removed during a 2012 remedial action which also involved removal of service station infrastructure (USTs, hydraulic hoist, fuel island, pumps, service station, etc.) and subsequent soil excavation. Residual TPH-G, TPH-D, benzene, and ethylbenzene contamination in soil is limited and has not impacted groundwater based on RI results. Additionally, the area is capped with pavement (asphalt or compact gravel) and the stormwater collection system further prevents the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater. Residual TPH-G and TPH-D soil contamination is stable based on RI monitoring data and does not pose a potential for VI under current land use. The potential for VI will be re-evaluated if the property is redeveloped in the future.

Soil and groundwater data for 1742 Jefferson are presented in Tables 8-4 and 8-5, respectively. The nature and extent of TPH-G, TPH-D, and BTEX in soil and groundwater are shown in plan view on Figure 8-1, by chemical/media on Figures 8-6 through 8-11, and in cross section on Figure 8-12. TCE in soil and groundwater resulting from releases and/or spills during historical operations are further discussed in Section 13.0 (Westerly Plume).

9.0 REMEDIAL INVESTIGATION—DERVILLE

9.1. Introduction

Derville is located north of the intersection of South 19th Street and Court E (historical address of 1737 Tacoma Avenue South) in Tacoma, Washington (Figure 9-1). Environmental data collected during previous and more recent soil and/or groundwater studies (further discussed in Section 9.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. While historical data suggested that TPH-O may have been present in the groundwater at a concentration slightly exceeding the PCUL based on a 2013 sample result, results of the 2016 Agreed Order RI did not identify a potential TPH-O source to groundwater from Derville based on the soil sampling results. Additionally, groundwater sampling completed as part of the 2016 Agreed Order RI did not identify PCUL exceedances of TPH-O or other petroleum-related contaminants that could have potentially been sourced from Derville. Summary statistics for soil and groundwater based on the results of the 2016 Agreed Order RI are presented in Tables Q-13 and Q-14 (Appendix Q).

In addition, environmental data collected as part of the RI indicate the presence of a CVOC (TCE)-contaminated groundwater plume that extends beneath Derville associated with the Westerly Plume. Groundwater contamination associated with the Westerly Plume is further discussed in Section 13.0. In soil, environmental data collected as part of the RI indicate surficial metal and PAH-contaminated soil on and surrounding Derville. Surficial soil contamination is further discussed in Section 17.0 (Area-Wide Soil).

Derville (AOC 8 in the 2016 Agreed Order) is shown relative to the surrounding features on Figure 9-1 (note that no contamination Site at Derville was identified based on the RI results). Terminology for Derville referenced by this RI is described below:

- **Derville.** The 0.14-acre historical parcel (historical Pierce County Parcel No. 2017110110) identified in the 2016 Agreed Order as AOC 8 with a historical address of 1737 Tacoma Avenue South.
- **Pierce County Parcel No. 2017110041.** The current extent of 1.56-acre parcel boundary containing the former Derville parcel (historical Pierce County Parcel No. 2017110110) and historical parcels to the north and south are shown on Figure 9-2. The historical parcels were consolidated from multiple parcels located between 1715 and 1755 Tacoma Avenue South prior to 2016. The current address for Pierce County Parcel No. 2017110041 is 1715 Tacoma Avenue South. The date of parcel consolidation in this area is after 1995.
- **Westerly Plume:** The extent of CVOC (PCE, TCE, DCE, cis-DCE, vinyl chloride, and DCA) contamination associated with historic operations and/or land use at 1701 Tacoma Avenue South, 1722 Tacoma Avenue South, 1904-1908 Tacoma Avenue South, 1922 Tacoma Avenue South, 1934-1938 Tacoma Avenue South, Tacoma Avenue South Sanitary Sewer, 1755 Fawcett Avenue, and 1742 Jefferson Avenue, which is further discussed in Section 13.0.

Specific details regarding the historical property uses, RI activities, the CSM and the nature and extent of contamination associated with Derville are summarized below.

9.2. Property Conditions

9.2.1. Location and Description

Derville was historically located at 1737 Tacoma Avenue South within the west-central portion of the UWT Campus (Figure 9-1). The 0.14-acre historic parcel was consolidated with adjacent properties to the north and south after 1995 based on available tax records and is currently contained within a 1.56-acre parcel (Pierce County Parcel No. 2017110041) bounded to the north by Upton parcel (further discussed in Section 13.0), south by South 19th Street, to the west by Tacoma Avenue South and to the east by Court E. The property is currently vacant and is predominantly paved with compact gravel for UWT Campus parking and equipment storage. The western portion of the property is vegetated with grass and occasional trees. The ground surface across the property slopes gently from the west to the east ranging from an approximate elevation of 205 to 195 feet.

9.2.2. Historical Land Use

The Derville parcel was largely undeveloped in the historical record but appears to have been used as a storage area for adjacent properties prior to the 1970s. A residential garage was historically present north of Derville from 1940 to at least 1973 based on a review of Sanborn maps and historical aerial photographs. The specific use of the garage is not known. However, it is presumed to be associated with the general maintenance and care of vehicles and appears to have been connected to a north adjacent residence as shown in a circa 1940 aerial photograph (see Photo 9-1). To the south, historical wood fuel operations were present as shown in Photo 9-1. The south adjacent wood fuel operations (Sound Fuel, Central Fuel, Doty and Son Fuel [wood]) were historically located at 1755 Tacoma Avenue South and operated from the mid-1930s until 1961 based on information provided in City directories and contained two woodsheds and an office next to South 19th Street based on a review of circa 1950 Sanborn fire insurance maps (Figure 9 -2). Derville and the surrounding area appear to be overgrown in a circa 1973 aerial photograph indicating the end of historical operations for this area.

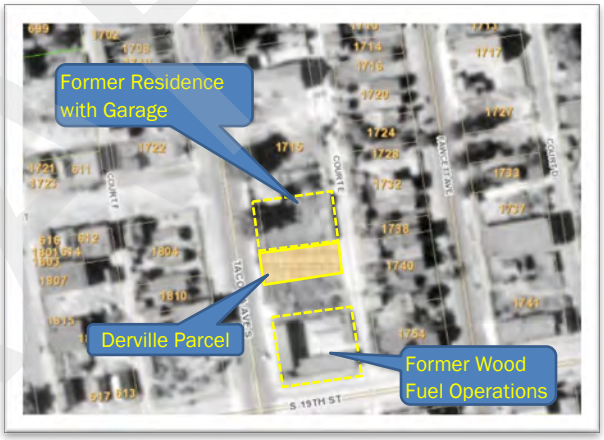


Photo 9-1. Circa 1940 photograph of the Derville Parcel and surrounding features.

Aerial photographs show that Derville and adjacent properties remained largely undeveloped between 1973 and 2005. In 2005, the land was cleared for use as a construction and/or UW facilities laydown yard until 2018 when Derville and the surrounding area were redeveloped for use as a gravel parking lot and storage area by UW facilities.

The adjacent property uses include ROW for the City (Tacoma Avenue South and Court E west and east) and a UWT Campus gravel parking lot to the north and south. The surrounding area is currently vacant. Historical land use, structures and features for Derville and the surrounding area are shown on Figure 9-2.

9.2.3. Current and Future Land Use

UW purchased the Derville property and adjacent properties in the 1990s/early 2000s. The current property layout includes a gravel parking lot and storage yard for the UWT Campus. The western portion of the property slopes up to Tacoma Avenue South and is vegetated with grass, brush, and occasional trees. Anticipated future land use in this area will remain academic to support the UWT Campus with new buildings, parking lots, surface streets and pedestrian access.

9.2.4. Utility Infrastructure

Current utility infrastructure within and adjacent to Derville with the potential to serve as preferential pathways for contaminant migration is shown on Figure 9-3 and includes the following:

- An 8-inch-diameter terra cotta sanitary sewer line is located to the east within the Court E ROW. The depth of the pipe is approximately 9.5 feet bgs (elevation 185 feet).

Several additional utilities are located south and west of Derville within portions of Tacoma Avenue South and South 19th Street. However, the west and south adjacent utilities are not considered potential preferential pathways given the location of these utilities relative to Derville and observed groundwater flow direction (i.e., upgradient and cross-gradient), and therefore are not discussed further.

9.3. Field Investigations

Multiple environmental investigations were completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations completed documenting soil and groundwater conditions for Derville are discussed in Sections 9.3.1 and 9.3.2 below. Sampling locations used to evaluate soil and groundwater conditions are shown on Figures 9-4 and 9-5. Investigations completed for Derville and the surrounding area to support the development of the RI are summarized in Tables 9-1 and 9-2. Construction details for permanent monitoring wells installed within Derville and the surrounding area are presented in Table 9-3. Soil and groundwater results for the subsurface investigations completed are presented in Tables 9-4 and 9-5, respectively.

9.3.1. Supplemental Investigations Under the 1997 Agreed Order

Supplemental investigation activities were completed in accordance with the 1997 Agreed Order to further evaluate soil and groundwater conditions within the western portion of the UWT Campus based on the results of the initial 1997 Agreed Order investigation activities. Supplemental investigation activities in the western portion of the UWT Campus in 2013 and 2015 included the completion of additional borings and the installation of new monitoring wells to identify potential source areas for previously identified groundwater contamination. Investigation activities related to Derville are summarized in Sections 9.3.1.1 and 9.3.1.2 below. Supplemental soil and groundwater sampling locations are shown on Figure 9-4.

9.3.1.1. 2013 Soil and Groundwater Investigation Summary

GeoEngineers, on behalf of UW, completed investigation activities between June and September 2013 on and surrounding Derville as part of a supplement investigation to the 1997 Agreed Order (263). The investigation included the completion of an EM/GPR survey, TP and sonic explorations, installation of new monitoring wells, and soil and groundwater sampling within Derville and adjacent properties. The EM/GPR survey was completed to evaluate the presence of potential USTs while TPs 1B-TP1 through 1B-TP3 were completed to depths of approximately 3.5 to 8 feet bgs to evaluate conditions within the fill soil (each test

pit was terminated when native soil was encountered). In addition, soil borings UG-MW24 and UG-MW37 were advanced to depths of approximately 100 and 14 feet bgs, respectively, and completed as permanent groundwater monitoring wells as part of the UWT Campus-wide investigation to further evaluate the nature and extent of CVOCs observed in other portions of the UWT Campus (i.e., Westerly Plume). Monitoring well UG-MW37 was installed within the Qvi aquifer while well UG-MW24 was installed in the Qva aquifer.

The results of the EM/GPR survey identified one magnetic anomaly (1B-A6; Figure 9-4) north of Derville indicating the potential presence of a UST at this location. In addition, 10 soil samples collected from TPs 1B-TP1 through 1B-TP3 and soil boring UG-MW37 were submitted for chemical analysis of TPH, VOCs, PAHs, and/or RCRA metals. The results of the soil sample analysis identified TPH-O at concentrations ranging between 320 and 1,700 mg/kg in five of the analyzed soil samples collected at depths between the ground surface and 3 feet bgs (Table 9-4). TPH-D was also detected at concentrations ranging between 45 and 86 mg/kg in three of the five soil samples analyzed. TPH-G was not detected in the analyzed soil samples.

In addition, low-level concentrations of naphthalenes, cPAHs, and metals were also observed in shallow soil with the exception of lead in sample 1B-TP2-2-3, which was detected at a concentration of 350 mg/kg. CVOC-related contaminants including PCE, TCE, and cis-DCE were detected at depths ranging from approximately 9 to 28 feet bgs beneath the central portion of Derville in boring UG-MW37 and to the south of Derville in boring UG-MW24. PAH and metal detections in shallow soil are further discussed in Section 17.0. CVOC-related contaminant detections are further discussed in Section 13.0.

Groundwater samples collected from monitoring wells UG-MW37 and UG-MW24 in September 2013 were submitted for chemical analysis of TPH, PAHs, metals, and VOCs. TPH-O was detected at a concentration of 550 µg/L in groundwater collected from UG-MW37 (Table 9-4). In addition, cPAHs were detected in groundwater collected from UG-MW37 at a concentration of 0.00865 µg/L. Other contaminants were not detected in the analyzed groundwater samples.

9.3.1.2. 2015 Well Replacement

Groundwater monitoring well UG-MW37 was reportedly damaged by heavy equipment during operations at the construction laydown yard on Derville in 2015. Well UG-MW37 was subsequently decommissioned in April 2015 followed by the installation of replacement groundwater monitoring well UG-MW37R (273). Monitoring well UG-MW37R was installed approximately 16 feet west of the decommissioned UG-MW37 well in an area that would not be disturbed by ongoing construction laydown yard operations (Figure 9-4). Soil and groundwater samples were not submitted for chemical analysis in 2015 as part of the well replacement activities.

9.3.2. 2016 Agreed Order Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions and to fill data gaps identified for Derville in accordance with the RI Work Plan and subsequent addenda (Section 4.0) are summarized in Sections 9.3.2.1 and 9.3.2.2 below. Data gaps specifically identified in the RI Work Plan for Derville are summarized as follows:

- The source of the petroleum contamination in groundwater is unknown. Derville may potentially be the source property for the petroleum contamination based on historical use and the anomaly (potential UST) identified during the EM/GPR survey. However, there are currently no groundwater wells situated directly upgradient (west) or downgradient (east) of Derville to further evaluate groundwater conditions.

- The vertical extent of petroleum contamination in groundwater is unknown. Monitoring well UG-MW37 is screened within the Qvi aquifer. A well is not screened in the Qva aquifer in the vicinity of UG-MW37.
- The lateral extent of petroleum contamination within the shallow aquifer is unknown.
- One magnetic anomaly (1B-A6) was identified in 2013 north of Derville possibly indicating a UST may be present at that location. Magnetic anomaly 1B-A6 was not investigated in 2013 because it was located near a former residence and potential USTs associated with residences were not evaluated in 2013.

Soil and groundwater investigation activities to address the identified data gaps are included in a collection of soil samples from four soil borings, and the collection of groundwater samples from seven permanent monitoring wells (see Tables 9-1 and 9-2). Exploration locations for the 2016 Agreed Order RI are shown on Figure 9-5. Note that monitoring well A8-MW2S was removed from the RI Work Plan under a subsequent addendum. Additionally, a TP was not completed in the vicinity of the previously identified anomaly at 1B-A6 because this area was regraded in 2018 and a potential UST was not observed (see Section 9.3.3).

9.3.2.1. Soil Investigation and Summary

As part of the soil investigation, five sonic borings (A8-MW2S, A8-MW3S, UG-MW24S, UG-MW37RD, and UG-MW37RR; each completed as a permanent monitoring well) were advanced within or adjacent to Derville. A total of 36 discrete soil samples including one field duplicate were collected from these borings at approximate depths ranging between the ground surface and 45 feet bgs and analyzed for select VOCs. In addition, soil samples collected at depths shallower than 20 feet bgs were also analyzed for a combination of TPH-HCID, TPH-G, TPH-D, TPH-O, petroleum-related VOCs, PAHs and metals.

TPH-O was detected in three samples at concentrations ranging between 320 to 960 mg/kg from depths of 0 to 1.5 feet bgs in borings A8-MW2S and A8-MW3S. TPH-D and TPH-O were not detected in the remaining analyzed samples. Petroleum-related VOCs (toluene and naphthalene) were also detected in surficial soil samples collected from boring A8-MW2S at concentrations between 0.0039 and 0.0066 mg/kg. Soil conditions related to PAHs and metal detections associated with the UWT Campus-wide fill material evaluation are further discussed in Section 17.0 (Area-Wide Soil). CVOCs associated with the Westerly Plume are further discussed in Section 13.0.

9.3.2.2. Groundwater Investigation and Summary

A total of 34 groundwater samples (including duplicates) were collected between 2016 and 2020 as part of the 2016 Agreed Order RI from a network of new and existing monitoring wells (see Table 9-2) to further evaluate groundwater conditions and define the nature and extent of contamination resulting from historical operations at Derville and the larger Westerly Plume. Groundwater samples were analyzed for a combination of TPH-D, TPH-O, and VOCs including BTEX and CVOCs at well locations screened within both the Qvi and Qva aquifers (geologic and hydrogeologic conditions in the vicinity of Derville are further discussed in Section 9.4.2)[9]. TPH-G and PAHs were also analyzed during the select monitoring events. Groundwater monitoring activities and results associated with Derville are discussed below.

- A total of 21 groundwater samples were collected from five permanent monitoring wells (A8-MW2S, A8-MW3S, UG-MW24S, UG-MW37R and UG-MW37RR) screened within the Qvi aquifer within, cross-

[9] Groundwater samples from A8-MW2S and A8-MW3S collected in September 2019 were not analyzed for TPH-D and TPH-O due to a field error.

gradient and downgradient from Derville during the RI. TPH-D was detected at a concentration of 250 µg/L in one groundwater sample collected from well A8-MW2S in March 2020. Other contaminants associated with Derville (TPH, petroleum-related VOC, and PAHs) were not detected in the analyzed groundwater samples. CVOCs including PCE, TCE, and cis-DCE detected are discussed further Section 13.0 (Westerly Plume).

- A total of 13 groundwater samples were collected from two permanent monitoring wells (UG-MW24 and UG-MW37RD) screened within the Qva aquifer located within, cross-gradient and downgradient from Derville during the RI. Contaminants associated with Derville (TPH, petroleum-related VOC and PAHs) were not detected in the Qva groundwater samples. CVOCs including TCE and cis-DCE detected in these samples are discussed further Section 13.0 (Westerly Plume).

9.3.3. Capital Projects

Investigation activities were necessary to implement UW Capital Projects. Capital projects completed in the vicinity of the Derville are summarized in Section 9.3.3.1 below.

9.3.3.1. Parking Lot Development Capital Project

Derville and the property to the north and south were regraded to develop a gravel parking lot in 2018. The regrading included areas where additional subsurface investigation (i.e., 2016 Agreed Order RI discussed below) was planned for anomaly 1B-A6 identified as part of the 2013 EM/GPR survey. At this location, no evidence of a UST or other buried objects was observed. The planned investigation activities for this area as described in the RI Work Plan were not performed as a result.

9.4. Conceptual Site Model

Development of the CSM for Derville is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for Derville is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 9.4.1 through 9.4.4 describe the specific elements of the Derville CSM.

9.4.1. Physical Setting

Construction of a gravel parking lot has been completed following the acquisition of the UWT Campus property by UW to support parking for construction crews working on projects in the area. Portions of Derville to the west are vegetated with grass, brush and occasional trees.

9.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic settings for Derville (described in the following sections) inform the distribution of contaminants in media of potential concern. Local geology and hydrogeology in the vicinity of Derville are described below in Sections 9.4.2.1 and 9.4.2.2

9.4.2.1. Local Geology

Geologic units present beneath Derville include the Qf, Qvi and Qva deposits. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill has been encountered in the borings completed at Derville and surrounding area and consists of locally derived, reworked ice-contact deposits or imported fill. The fill extends to depths between approximately 5 to 7 feet bgs. Debris consisting of metal and bricks were observed in the fill material.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till, subglacial channel deposits, and lacustrine materials deposited along the glacial ice margin and beneath glacial ice during the last glacial period. Qvi till-like deposits beneath Derville are present 5 to 20 feet bgs and are comprised of relatively low-permeability silty sand with gravel with sand and gravel seams that readily contain and transmit groundwater in borings UG-MW37R, UG-MW37RR, A8-MW2S, and A8-MW3S. Qvi channel deposits have an approximate thickness of 10 feet at Derville and underlie the Qvi till-like deposits. Underlying Qvi silt deposits are interpreted to be present across Derville at a thickness of approximately 6 feet.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** Qva deposits consisting of stratified sand with silt and gravel layers were observed at the maximum depths explored within Derville.

Geologic conditions for the UWT Campus, including portions of Derville are shown on Figure 2-13.

9.4.2.2. Local Hydrogeology

Groundwater in the northwest portion of the UWT Campus occurs within both the Qvi (shallow) and Qva (deep) aquifers (see Figures 2-14 through 2-19 and cross section G-G' [Figure 2-13]). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Additionally, the Qvi aquifer is locally confined in the southern portion of Tacoma Avenue South where till-like material contained within the channel deposits acts as a confining layer. Locally, the presence of Qvi silt deposits inhibits the vertical movement of groundwater between the Qvi and Qva aquifers.

Local groundwater occurrence and flow for the Qvi and Qva aquifers are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer is confined by the silty portions of the Qvi till-like deposits and occurs and flows primarily within the Qvi channel deposits and sand and gravel seams within the Qvi till-like deposits. The potentiometric surface of the Qvi aquifer ranges from approximately 1 and 14.5 feet bgs (Table 9-5). Perched groundwater may be present at some locations within the fill, however, is not considered representative of groundwater levels in the Qvi aquifer. The inferred groundwater flow direction in the Qvi aquifer across Derville is generally easterly toward the Thea Foss Waterway consistent with the generally easterly UWT Campus-wide Qvi groundwater flow direction (Figures 2-14 and 2-16).

The estimated Qvi average linear groundwater velocity was approximately 0.33 ft/day across Derville with a hydraulic gradient of 0.15 ft/ft based on the April 2021 groundwater results. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

Qva Groundwater Occurrence and Flow

The Qva aquifer is present beneath Derville with an inferred groundwater flow direction that is generally east-northeasterly based on the UWT Campus-wide Qva flow direction (Figures 2-17 through 2-19). The Qva

silt located approximately 80 feet bgs likely inhibits the vertical flow of groundwater in this area (Figure 2-13). The local estimated average linear velocity and hydraulic gradient for the Qva aquifer beneath Derville were not estimated due to the limited number of wells screened within the Qva aquifer in the vicinity of Derville.

9.4.1. Sources of Contamination

The primary source of petroleum contamination is likely historical releases from de minimis spills during former automobile garage and wood fuel yard operations prior to the 1970s as well as de minimis spills during property use as a laydown yard and parking lot after 1990. In addition to the local release of de minimis petroleum-related contaminants to shallow soil, CVOCs including PCE, TCE, and cis-DCE associated with upgradient and off-property releases (Westerly Plume) have been identified. CVOC contamination associated with the Westerly Plume is further discussed in Section 13.0.

9.4.2. Potential Receptors and Exposure Pathways

Current and future land use were considered when evaluating potential receptors and exposure pathways for Derville. The current and planned future land uses of Derville and surrounding properties are commercial and academic. Derville and the surrounding area are currently vacant but are planned for redevelopment as part of the UWT Master Plan. The future use is not known at this time but may range between buildings with classrooms, offices, or housing. Alternatively, the area could be redeveloped as a green space/park. Based on the current and anticipated future land use, the following exposure pathways and receptors have been identified:

- **Direct Contact.** The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities.
- **Drinking Water.** Groundwater within the Qvi/Qva aquifers beneath Derville and the UWT Campus, as a whole, are not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered a potential exposure pathway as required by Ecology.
- **Surface Water.** Surface water is not an exposure pathway for Derville. Stormwater infiltrates within Derville limiting surficial sheet flow and lateral migration to the Thea Foss Waterway marine surface water body, which is located more than 2,000 feet downgradient of Derville. Additionally, future development of the property with buildings with classrooms, offices, or housing would also require the installation of stormwater collection facilities that would capture and convey stormwater toward the Thea Foss Waterway prior to contact with soil. As a result, surface water is not considered an exposure pathway.
- **Vapor Intrusion.** Based on the screening of soil and groundwater data, petroleum-related contaminants do not have the potential to volatize in the vadose zone and enter future buildings. Therefore, VI is not considered a complete exposure pathway.

Potential receptors and exposure pathways for CVOC contamination within this area are further discussed in Section 13.0 (Westerly Plume). Potential receptors and exposure pathways for PAH and metal contamination within this area are further discussed in Section 17.0 (Area-Wide Soil).

9.5. Proposed Cleanup Levels

PCULs were developed for Derville to protect human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (WAC 173-340), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water uses, potential exposure pathways, and the potential receptors specific to Derville. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for Derville is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels**. PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b). Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels**. Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173-340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

9.6. Nature and Extent of Contamination

9.6.1. Contaminants and Media of Concern

Characterization data for Derville are summarized in Tables 9-4 and 9-5 and were evaluated to determine whether contaminants and media of concern were impacted by TPH and petroleum-related contaminants. An evaluation of soil sample results representing current conditions is presented in Table Q-13 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2020) is presented in Table Q-14 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-15, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-13 through Q-15) include the following:

- **Soil**. Petroleum-related contaminants were not detected in soil at a concentration greater than the PCUL. A discussion of sampling results for petroleum-related contaminants is presented in Section 9.6.2.

- **Groundwater**. Petroleum-related contaminants were not detected in groundwater at a concentration greater than the PCUL. A discussion of sampling results for petroleum-related contaminants is presented in Section 9.6.3.
- **Soil Vapor.** Based on screening of soil and groundwater data, a potential for contaminants to migrate into enclosed spaces at a concentration that could exceed the Method B indoor air PCUL and/or the SL for the protection of commercial workers was not identified under current and/or future land use assumptions.

Other contaminants including naphthalenes, cPAHs, lead, and CVOCs (PCE, TCE, and 1,2-DCE) were detected in soil and/or groundwater in the vicinity of Derville. The occurrence of CVOCs in groundwater is attributed to the Westerly Plume and is discussed further in Section 13.0. The occurrence of naphthalene, cPAHs, and lead identified in shallow soil (less than 2 feet) at locations 1B-TP2 and A8-MW2S located north of Derville and along the easterly property line is further discussed in Section 17.0 as it relates to Area-Wide Soil.

Primary COC (TPH-O) for soil and groundwater are shown in plan view on Figures 9-6 and 9-7. The nature and extent of COCs in media of concern are further discussed below.

9.6.2. Soil

Historically, TPH-O was identified in groundwater within the portion of Derville. Subsequent investigations of the soil in this area did not identify a potential source to groundwater contamination. Investigation results indicated that TPH-O was either not detected or detected at concentrations less than the PCUL in soil samples collected as part of the Derville RI. The results for TPH-O in soil are shown on Figure 9-6.

9.6.3. Groundwater

Historically, TPH-O was identified in groundwater within the central portion of Derville in monitoring well UG-MW37. Monitoring well UG-MW37 was inadvertently damaged in 2015 before resampling could occur to verify the September 2013 result. However, TPH-O was not detected in groundwater samples collected from new wells installed near UG-MW37 (replacement wells UG-MW37R and UG-MW37RR) or at concentrations exceeding the PCUL in downgradient wells A8-MW2S and A8-MW3S during the 2016 Agreed Order semi-annual sampling events completed between March 2019 and September 2020 as shown on Figure 9-7.

9.7. Contaminant Fate and Transport

The chemical properties of contaminants and the physical, chemical, and biological processes that they are exposed to affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed on a UWT Campus-wide basis in Section 18.0. Locally, soil and groundwater contamination associated with Derville was not identified at concentrations exceeding the PCUL.

9.8. Summary

The results of the RI indicate that although petroleum-related releases through de minimis spills likely occurred to surficial soil at Derville, these releases did not result in soil or groundwater contamination at concentrations exceeding the PCULs. Historically, TPH-O was detected at a concentration slightly greater than the PCUL during the September 2013 monitoring event at UG-MW37. However, supplemental

sampling of groundwater as part of the 2016 Agreed Order RI (up to six rounds), indicated that TPH-O in groundwater is less than the PCUL in the vicinity of UG-MW37 and in other portions of Derville and the surrounding area (note that monitoring well UG-MW37 was damaged after the September 2013 monitoring event and replacement wells UG-MW37R and UG-MW37RR were installed to further evaluate groundwater conditions at this location). Based on the results of the RI, the detected concentration of TPH-O at UG-MW37 either attenuated between the 2013 and 2016 monitoring event or the detected concentration was the result of cross-contamination during the construction of the monitoring well and not representative of the actual groundwater condition. Therefore, Derville does not currently constitute a "Site" as defined by MTCA.

Other contaminants including naphthalenes, cPAHs, lead and CVOCs (PCE, TCE, and 1,2-DCE) were detected in soil and/or groundwater in the vicinity of Derville at concentrations greater than the PCUL. The occurrence of CVOCs in groundwater is attributed to the Westerly Plume and is discussed further in Section 13.0. The occurrence of naphthalene, cPAHs and lead identified in shallow soil (less than 2 feet) is further discussed in Section 17.0 (Area-Wide Soil).

10.0 REMEDIAL INVESTIGATION—KELLY

10.1. Introduction

Kelly is located at the current address of 1741 Fawcett Avenue (historical addresses of 1741 to 1755 Fawcett Avenue) in Tacoma, Washington (Figure 10-1). Environmental data collected during previous and more recent soil and groundwater environmental investigations (further discussed in Section 10.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of TPH-G in soil at concentrations greater than the PCUL resulting from spills and/or releases during historical motorcycle service operations between 1942 and 1969. Summary statistics for soil and groundwater identifying COCs for Kelly are presented in Tables Q-16 and Q-17 (Appendix Q).

The extent of residual TPH-G soil contamination (Kelly Site; Figure 10-1) is currently limited to the southeast portion of Kelly from approximately 7 to 8 feet bgs and is not adversely impacting groundwater based on the RI results. Kelly is currently developed with an asphalt paved UWT Campus parking lot that prevents direct contact with the residual contamination remaining in place. The nearest building is greater than 30 feet from the residual TPH-G contaminated soil, which is considered a sufficient distance to prevent the migration of contaminant vapors from entering the occupied indoor spaces. Additionally, the stormwater collection system for Kelly and the surrounding area limits the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater. Residual soil contamination for the Kelly Site (as defined by the TPH-G PCUL exceedances) is generally stable and not spreading to groundwater or further downgradient of this area based on the monitoring data presented for the Kelly RI.

In addition, environmental data indicate the presence of TCE contamination in soil and groundwater at Kelly resulting from releases from historical cleaner operations prior to 1931 and potentially during historical motorcycle service operations (i.e., use of cleaning solvents containing TCE). However, TCE contamination released during the historical operations (including nature and extent) is discussed in the context of the Westerly Plume (Section 13.0) due to the commingled nature of this contamination with CVOC (TCE) contamination from other upgradient source areas.

Kelly (AOC 9 in the 2016 Agreed Order) and the Kelly Site (residual TPH-G contamination in soil) are shown relative to surrounding features on Figure 10-1. Terminology for the Kelly RI referenced in the subsections below is as follows:

- **Kelly.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2017090111 (0.56-acre parcel).
- **Kelly Site.** The area and media containing contamination exceeding PCULs associated with historical operations and/or land use.
- **Westerly Plume.** The extent of CVOC (PCE, TCE, DCE, cis-DCE, vinyl chloride, and DCA) contamination associated with historic operations and/or land use at 1701 Tacoma Avenue South, 1722 Tacoma Avenue South, 1904-1908 Tacoma Avenue South, 1922 Tacoma Avenue South, 1934-1938 Tacoma Avenue South, Tacoma Avenue South Sanitary Sewer, 1755 Fawcett Avenue, and 1742 Jefferson Avenue, which is further discussed in Section 13.0.

Specific details regarding the historical property use leading to the release of contaminants, RI activities completed to date, the CSM, and the nature and extent of contamination associated with Kelly are summarized below.

10.2. Property Conditions

10.2.1. Location and Description

The current address for Kelly is 1741 Fawcett Avenue located in the west-central portion of the UWT Campus on the corner of South 19th Street and Fawcett Avenue (Figure 10-1). Kelly has been redeveloped with a surface parking lot serving the UWT Campus. The ground surface is predominantly covered by pavement except for limited landscaped areas. The parking lot has a gentle slope to the southeast with elevations ranging from approximately 160 to 150 feet. Court D is located adjacent to Kelly to the east, which is approximately 5 feet lower in elevation and separated by a stacked rock retaining wall. Fawcett Avenue is located adjacent to Kelly to the west, which is approximately 7 feet higher in elevation and is also separated by a stacked rock retaining wall. The UWT Campus parking lot is accessed from South 19th Street located adjacent to and west of Kelly with a steep slope to the east with elevations ranging from approximately 163 feet to 146 feet.

10.2.2. Historical Land Use

Residential buildings and associated exterior garages were present on Kelly starting in at least 1888. The majority of the residences were demolished by the late 1920s when a larger commercial building was developed on the southern portion of the property (1755 Fawcett Avenue) and an apartment building was developed on the northern portion of the property (1741 Fawcett Avenue). The last residence (1745 Fawcett Avenue) was demolished between 1955 and 1969. One additional building ("automobile garage" in Sanborn map) was constructed in the central portion of the property by 1969. The apartment

building, central garage, and southern commercial building are shown on Figure 10-2. The southern building (1755 Fawcett Avenue) was used by various commercial businesses, including:

- **1926 to 1931**. Former cleaner (Union Steam Laundry and E I Cleaners) (eastern portion of the building).
- **1931 to 1936**. Winery, indoor golf, and grocer (western portion of the building).
- **1942 to 1947**. Motorcycle sales and service shop (Potter Clarence Co.), which presumably occupied the entire building.
- **1947 to 1969**. Montgomery Motorcycle (presumably the entire building; see Photo 10-1).
- **1969 to 1992.** Vacant.

Photo 10-1. Circa 1948 photograph of the motorcycle repair shop operating at 1755 Fawcett Avenue.

A garage was present in the center of Kelly between at least 1969 and the early 1990s and presumably used for storage by the businesses operating in the southern building on the property. The commercial and apartment buildings and the garage were demolished by the mid-1990s. UW subsequently acquired the property and redeveloped it as a paved parking lot for UWT Campus use by 1998. The parking lot was expanded to the north in 2019/2020.

10.2.3. Current and Future Land Use

UW purchased the Kelly property and properties adjacent to Kelly in the 1990s. The redevelopment of the two parcels directly adjacent to the north of Kelly (19th and Fawcett Parking Lot Capital Project) was completed in 2019/2020 to expand the existing parking lot on Kelly to support continuing academic growth of the UWT Campus. The adjacent properties are shown on Figure 10-3.

Anticipated future land use in this area is to remain academic with buildings and parking lots supporting the UWT Campus.

10.2.4. Utility Infrastructure

Current utility infrastructure within and adjacent to Kelly with the potential to serve as preferential pathways for contaminant migration is shown on Figure 10-3 and includes the following:

- A north-south oriented sanitary sewer line located within Court D. The estimated depth of the sanitary sewer line is approximately 5 to 9 feet bgs. A sewer lateral to the former buildings on Kelly is likely present but its location is not known.
- A stormwater line exists at a depth between approximately 3 and 8 feet bgs along the eastern edge of Kelly. This stormwater line directs flow to the south toward the larger drainage network within South 19th Street. A new stormwater main was installed in South 19th Street in 2022 as part of the Jefferson and Hood Street Surface Water Interceptor Capital Project (shown as proposed on Figure 10-3).

10.3. Field Investigations

Multiple environmental investigations have been completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations completed documenting soil and groundwater conditions for Kelly are discussed in Sections 10.3.1 and 10.3.2 below. In addition, capital projects for parcels adjacent to Kelly resulting in the collection of additional environmental data are also discussed (Section 10.3.3). Sampling locations used to evaluate soil and groundwater conditions are shown on Figures 10-4 through 10-6. Investigations completed for Kelly and the surrounding area to support the development of the RI are summarized in Tables 10-1 and 10-2. Construction details for permanent monitoring wells installed within Kelly and the surrounding area are presented in Table 10-3. Soil and groundwater results for the subsurface investigations completed are presented in Tables 10-4 and 10-5, respectively.

10.3.1. Supplemental Investigations Under the 1997 Agreed Order

Supplemental investigation activities were completed in accordance with the 1997 Agreed Order to further evaluate soil and groundwater conditions within the western portion of the UWT Campus based on the results of the initial 1997 Agreed Order investigation activities. Supplemental investigation activities in the western portion of the UWT Campus in 2009 and 2013 included the completion of additional borings and installation of new monitoring wells to identify potential source areas for previously identified groundwater contamination. Investigation activities related to Kelly are summarized in Sections 10.3.1.1 and 10.3.1.2 below. Supplemental soil and groundwater sampling locations are shown on Figure 10-4.

10.3.1.1. 2009 Groundwater Investigation Summary

URS conducted supplemental groundwater investigation activities within the Market Street area and areas upgradient of Market Street to further evaluate potential source areas for the CVOC-related contaminants identified as part of the 1997 Agreed Order RI and supplemental subsequent investigations (currently referred to as the Westerly Plume, see Section 13.0). As part of this investigation, borings UG-MW16 and UG-MW17 were advanced within Kelly to depths of 18 and 22 feet bgs within the footprint of the former building and completed as permanent monitoring wells. Water samples collected from these wells in May 2009 were analyzed for TPH and VOCs (including BTEX and CVOCs).

TPH-G and CVOCs (PCE, TCE, and cis-DCE) were detected in the analyzed groundwater samples. TPH-D, TPH-O, BTEX and other petroleum-related VOCs were not detected. CVOCs, as they relate to the Westerly Plume, are discussed in Section 13.0.

10.3.1.2. 2013 Soil and Groundwater Investigation Summary

A subsequent soil and groundwater investigation was completed in 2013 by GeoEngineers on behalf of UW to further evaluate soil and groundwater conditions at Kelly and the surrounding area. Investigation activities included the collection of soil samples from sonic borings, DP borings, and TP explorations followed by the collection of groundwater samples from temporary and permanent monitoring wells. A GPR survey was performed for Kelly to identify potential anomalies (including potential USTs) associated with former infrastructure in addition to the soil and groundwater investigation activities summarized below. A heating oil UST in the southeast corner of the property was suspected based on the relative age of the former building and a review of a City demolition permit for the property that indicated a heating oil UST was left in place following demolition. The findings of the GPR survey did not identify any anomalies indicative of a potential UST. However, the GPR survey did not include the southeast corner of the property due to the presence of a fence, vegetation, and retaining wall in this area at the time of the survey.

Soil and groundwater investigation activities as part of the 2013 investigation included:

- Completion of 12 DP borings (1D-B2, 1F-B1 through 1F-B7, 1G-B1, and 1G-B3 through 1G-B5) between June and July 2013 to approximate depths ranging between 4 and 17 feet bgs spanning the Kelly property and surrounding area.
- Completion of two sonic borings (UG-MW27 and UG-MW31) in August 2013 to approximate depths ranging between 18 and 56 feet bgs. Both borings were completed as permanent monitoring wells.

A total of 40 samples collected from the borings were analyzed for a combination of TPH, VOCs (including BTEX and CVOCs), PAHs, metals, and PCBs. TPH-G, TPH-D, and TPH-O were detected in the soil samples collected from approximately 7 to 8 feet bgs in boring 1F-B2 located in the southeast portion of the property. TPH-O was also detected east of Kelly in borings 1G-B4 and 1G-TP2 at depths of 1 to 2 feet bgs and 3 to 4 feet bgs, respectively. Low-level detections of VOCs (not including CVOCs), PAHs, and lead were detected in multiple samples collected from shallow fill above approximately 10 feet bgs. CVOC contamination associated with the Westerly Plume including PCE and TCE detected in soil at this location is further discussed in Section 13.0.

Groundwater samples collected from permanent monitoring wells UG-MW16, UG-MW17, UG-MW27, UG-MW31 and grab samples collected from temporary wells at locations 1F-B3, 1F-B5, and 1F-B7 were analyzed for a combination of TPH, VOCs (including BTEX and CVOCs), PAHs, total and dissolved metals and PCBs. Groundwater results as they relate to the Qvi and Qva aquifers (further discussed in Section 10.4.2 and shown on Figure 10-4) are summarized as follows:

- **Qvi Aquifer** (UG-MW16, UG-MW17, UG-MW31, 1F-B3, 1F-B5, 1F-B7). TPH-G and BTEX were not detected in the analyzed groundwater samples. TPH-D and TPH-O were detected in the groundwater sample from temporary well 1F-B5 and PAHs were detected in the sample from temporary well 1F-B7. TCE was detected in the analyzed groundwater samples. Other CVOCs including PCE were detected in select groundwater samples. CVOC contamination is associated with the Westerly Plume, which is further discussed in Section 13.0. Total and dissolved lead and PCBs were not detected in the analyzed samples.
- **Qva Aquifer** (UG-MW27). No contaminants of concern were detected above laboratory reporting limits.

10.3.2. 2016 Agreed Order Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions and to fill data gaps identified for Kelly in accordance with the RI Work Plan and subsequent addenda (Section 4.0) are summarized in Sections 10.3.2.1 and 10.3.2.2 below. Data gaps specifically identified in the RI Work Plan for Kelly are summarized as follows:

- The lateral extents of TPH-G contaminated soil north, west, and east of boring 1F-B2 were not delineated.
- A potential UST was suspected along Court D and South 19th Street based on City permit records.
- The source of TCE in groundwater in the vicinity of Kelly had not been identified.
- The lithology of the well screens of permanent wells UG-MW16 and UG-MW17 had not been confirmed such that the screened aquifer (Qvi versus Qva) could be identified.

These activities included collection of soil samples from 10 soil borings and the collection of groundwater samples from nine permanent groundwater monitoring wells (see Tables 10-1 and 10-2). Exploration locations for the 2016 Agreed Order RI are shown on Figure 10-5.

10.3.2.1. Soil Investigation Summary

As part of the soil investigation, five sonic borings (A9-MW1D, A9-MW1S, A11-MW9D, A11-MW9S, and UG-MW27S—each completed as a permanent monitoring well) and five direct-push borings (A12-B5 through A12-B9) were advanced within and adjacent to Kelly. A total of 70 discrete soil samples including field duplicates were collected from the borings at depths ranging from the ground surface to approximately 70 feet bgs. Soil samples were analyzed for TPH, VOCs (including BTEX and CVOCs), PAHs and metals.

TPH-G was detected in the soil sample collected from approximately 7 to 8 feet bgs in boring A12-B6 located in the vicinity of boring 1F-B2 (where TPH-G had previously been identified). In addition:

- TPH-O was detected in shallow soil samples collected to depths up to approximately 2 feet bgs in borings A9-MW1D, A11-MW9D, A11-MW9S, and A12-B9.
- Toluene was detected in two soil samples from boring A11-MW9D at depths of 0- to 1-foot bgs and 3 to 4 feet bgs.
- PAHs including naphthalene, benzo(a)pyrene, and total cPAHs were detected in soil samples from shallow soil above 4 feet bgs from borings A9-MW1D, A11-MW9D, A11-MW9S, and A12-B9.
- Metals were detected in each of the analyzed samples.
- TCE was detected in multiple soil samples from borings A9-MW1D, A11-MW9D, A11-MW9S, and A12-B6 at depths ranging from 3 to 36.5 feet bgs. TCE and other CVOCs associated with the Westerly Plume are further discussed in Section 13.0.

10.3.2.2. Groundwater Investigation Summary

A total of 49 groundwater samples (including duplicates) were collected between 2016 and 2020 for the 2016 Agreed Order RI from the network of new and existing monitoring wells (see Table 10-2) to further evaluate groundwater conditions and define the nature and extent of contamination resulting from historical operations at Kelly and the larger Westerly Plume. Groundwater samples were analyzed for a combination of TPH-G, VOCs including BTEX and CVOCs, and metals at well locations screened within the Qvi and Qva aquifers (geologic and hydrogeologic conditions in the vicinity of Kelly are further discussed in Section 10.4.2). Groundwater monitoring activities and results associated with Kelly are discussed below.

- A total of 35 groundwater samples were collected from six permanent monitoring wells screened within the Qvi aquifer within, cross-gradient and downgradient from Kelly during the RI. Results of groundwater samples collected within the Qvi aquifer identified PCE, TCE, and cis-DCE with the highest detected concentrations from monitoring well UG-MW17 located near the southwest corner of Kelly within the footprint of the former building where the motorcycle shop previously operated. The detected CVOCs are discussed further Section 13.0 (Westerly Plume).
- A total of 14 groundwater samples were collected from three permanent monitoring wells screened within the Qva aquifer located within, cross-gradient and downgradient from Kelly during the RI. Contaminants associated with Kelly were not detected in the Qva aquifer groundwater samples.

10.3.3. Capital Projects

Investigation activities were necessary to implement UW Capital Projects. Capital projects and investigation activities in the vicinity of Kelly are summarized in Sections 10.3.3.1 through 10.3.3.2 below.

10.3.3.1. 19th and Fawcett Parking Lot Capital Project

Soil samples were collected in 2020 on the north-adjacent property to Kelly as part of the construction of the 19th and Fawcett Parking Lot project. Two soil samples were collected on the parcel directly north adjacent to Kelly from the newly excavated ground surface to document soil conditions left in place beneath the new parking lot. Soil samples were analyzed for PAHs and metals based on previous detections of soil samples collected from the parking lot parcels. PAHs and metals were detected in both surface soil samples. Soil sample locations are shown on Figure 10-6 and chemical analytical results are presented in Table 10-4. The detected PAHs and metals are discussed further in Section 17.0 (Area-Wide Soil).

10.3.3.2. Health Center Capital Project

One seep groundwater sample was collected in 2011 on a parcel east (downgradient) of Kelly across Court D as part of the planning and development of the Health Center Capital Project (HS_TW1). The sample was collected of groundwater seeping from the cut slope adjacent to the Health Center Building. The groundwater sample was analyzed for VOCs including BTEX and CVOCs based on the results of previous investigations in the area. Petroleum-related VOCs and CVOCs were not detected in the analyzed groundwater sample. The groundwater sample location (HS_TW1) is shown on Figure 10-6 and chemical analytical results are presented in Table 10-5.

10.4. Conceptual Site Model

Development of the CSM for Kelly is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for Kelly is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 10.4.1 through 10.4.4 describe the specific elements of the Kelly CSM.

10.4.1. Physical Setting

Demolition of former structures and construction of a surface parking lot were completed following acquisition of the UWT Campus property by UW in the early 1990s to support the UWT Campus Master Plan for higher education and learning. The parking lot was expanded in 2020 to continue to support the UWT Campus.

10.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic settings for Kelly (described in the following sections) inform the distribution of contaminants in media of potential concern. Local geology and hydrogeology in the vicinity of Kelly are described below in Sections 10.4.2.1 and 10.4.2.2.

10.4.2.1. Local Geology

Geologic units present beneath Kelly include the Qf, Qvi and Qva deposits. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings within Kelly and the surrounding area consists of locally derived, reworked ice-contact deposits or imported fill material used beneath the former buildings or the existing parking lot. Fill extends to depths between approximately 2.5 and 5 feet bgs and is primarily composed of sand with varying amounts of gravel and silt.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till and subglacial channel materials deposited beneath the glacial ice along the ice margin during the last glacial period. Qvi till-like deposits beneath Kelly are approximately 7 feet thick and overlie up to approximately 25 feet of Qvi channel deposits. Underlying Qvi silt deposits are interpreted to be present across Kelly at thicknesses ranging from approximately 2.5 to 4 feet.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** Qva deposits consisting of stratified sand with silt and gravel layers were observed at the maximum depths explored within Kelly. Two Qva silt deposits were observed within the Kelly area at approximately 38 feet bgs and 65 feet bgs.

Geologic conditions in the vicinity of Kelly are shown relative to the UWT Campus on Figure 2-13.

10.4.2.2. Local Hydrogeology

Groundwater in the central portion of the UWT Campus occurs within both the Qvi (shallow) and Qva (deep) aquifers (see Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Locally, Qvi deposits inhibit the vertical movement of groundwater between the Qvi and Qva aquifers.

Local groundwater occurrence and flow for the Qvi and Qva aquifers are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer occurs and flows primarily within the channel deposits and sand and gravel seams within the upper Qvi till-like deposits at depths between approximately 3 and 15 feet bgs (Table 10-5). Perched groundwater is present at some locations within the fill but is not considered representative of groundwater levels in the Qvi aquifer. The inferred groundwater flow direction in the Qvi aquifer across Kelly is generally northeasterly toward the Thea Foss Waterway consistent with the generally easterly UWT Campus-wide Qvi groundwater flow direction (Figures 2-14 and 2-16).

The estimated average linear groundwater velocity within the Qvi aquifer is approximately 1.44 ft/day with a hydraulic gradient of 0.11 ft/ ft based on the April 2021 groundwater monitoring event data. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

Qva Groundwater Occurrence and Flow

The Qva aquifer is present beneath Kelly with an inferred groundwater flow direction that is generally east-northeasterly based on the UWT Campus-wide Qva flow direction (Figures 2-17 through 2-19). The Qvi silt located at approximately 36 feet bgs and the Qva silt located at depths of approximately 38 and 65 feet bgs inhibit the vertical flow of groundwater in this area (Section G-G', Figure 2-13).

The local estimated average linear velocity and hydraulic gradient for the Qva aquifer beneath Kelly were not estimated due to the limited number of wells screened within the Qva aquifer in the vicinity of Kelly. The estimated average linear groundwater velocity within the Qva aquifer for the area north of Kelly is approximately 0.56 ft/day with a hydraulic gradient of 0.26 ft/ft based on the April 2021 groundwater monitoring event data.

10.4.3. Sources of Contamination

The primary sources of the TPH and CVOC contamination at Kelly are associated with former cleaners (Union Steam Laundry and E I Cleaners) that operated in the eastern portion of the 1755 Fawcett building between 1926 and 1931, and the motorcycle sales and service shop (Potter Clarence Co. and Montgomery Motorcycle) that operated within the entire 1755 Fawcett Avenue building between 1942 and 1969.

The motorcycle sales and service operations are interpreted as a source of contamination for TPH based on historical uses and detections of TPH in the vicinity of the former operations and the 1755 Fawcett building. The former cleaners and motorcycle shop are interpreted as a source of contamination for TCE because TCE was detected in shallow soil (3 feet bgs) in the area of the former cleaners and motorcycle shop operations (boring A12-B6) and above the groundwater table. TCE is commingled with upgradient source areas as described in Section 13.0 (Westerly Plume).

Other potential sources of contamination (including near surface PAHs, metals, and toluene) include the placement of contaminated fill material from unknown sources, grading material used on or adjacent to the property prior to development, atmospheric deposition from historical combustion (vehicle emissions, burning, etc.) and/or historical land use not specifically identified above including localized drips, spills and/or other releases. These COCs are discussed in Section 17.0 (Area-Wide Soil).

10.4.4. Potential Receptors and Exposure Pathways

Current and future land use were considered when evaluating potential receptors and exposure pathways for Kelly. The current land use is a UWT Campus parking lot that consists primarily of impervious surfaces except for bordering landscape areas. Future land use may include academic buildings, parking lots, green space, and/or pedestrian pathways. Precipitation falling to the ground surface either infiltrates into the ground (limited to unpaved vegetation area) or is captured by catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway. The surrounding area is commercial and academic.

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

- **Direct Contact**. The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities.
- **Drinking Water.** Groundwater within the Qvi/Qva aquifers beneath Kelly and the UWT Campus as a whole are not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.

- **Surface Water.** Surface water discharge from Kelly is not considered to be a current exposure pathway because the majority of ground surface is capped with hardscape, stormwater is directed to stormwater utilities, and the Thea Foss Waterway is more than 1,900 feet east of Kelly. Potential receptors and exposure pathways for CVOC contamination within this area are further discussed in Section 13.0 (Westerly Plume).
- **Indoor Air**. VI is not considered to be a current exposure pathway based on current property use (surface parking). The Whitney Building, a non-UW-owned building on Fawcett Avenue, and the Security Building are located more than 30 feet from the TPH-impacted soil. Therefore, these buildings are not considered to be a current exposure pathway in accordance with Ecology's VI guidance. Future land use may include redevelopment of the property for residential use by the UWT Campus. Under this scenario, residual TPH-G may have the potential to volatize in the vadose zone and migrate into the future enclosed spaces. Future VI is considered as a potential complete exposure pathway. The potential for VI in future buildings is further discussed in Section 10.6.4.

10.5. Proposed Cleanup Levels

PCULs were developed for Kelly to protect human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (WAC 173-340), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water uses, potential exposure pathways, and the potential receptors specific to Kelly. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for Kelly is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels**. PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b). Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels**. Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173-340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

10.6. Nature and Extent of Contamination

10.6.1. Contaminants of Concern and Media of Concern

Characterization data for Kelly are summarized in Tables 10-4 and 10-5 and were evaluated to determine contaminants and media of concern for the Kelly Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions is presented in Table Q-16 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2020) is presented in Table Q-17 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-18, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-16 through Q-18) include the following:

- **Soil**. TPH-G was identified as the primary soil COCs for Kelly based on the suspected sources of contamination to soil (former property use) and RI results. The nature and extent of TPH-G is presented in Section 10.6.2.
- **Groundwater**. Petroleum-related contaminants were not detected in groundwater at a concentration greater than the PCUL. A discussion of sampling results for petroleum-related contaminants is presented in Section 10.6.3.
- **Soil Vapor.** Based on screening of soil and groundwater data, a potential for contaminants to migrate into enclosed spaces at a concentration that could exceed the Method B indoor air PCUL and/or the SL for the protection of commercial workers was not identified under current land use assumptions. However, under a future land use scenario, TPH-G was identified as a COC with the potential to migrate into enclosed spaces at a concentration that could exceed the Method B indoor air PCUL and/or the SL for the protection of commercial workers. An evaluation for VI potential is further discussed in Section 10.6.4.

TCE was also identified as a primary soil and groundwater COC for the Kelly Site based on historical operations including the use of solvents at the cleaners (and potentially during historical motorcycle service operations) based on the results of the RI. Due to the commingled nature of TCE with other upgradient sources, TCE contamination at this location is discussed further within the context of the Westerly Plume (Section 13.0). The occurrence of naphthalene and cPAHs identified in shallow soil (less than 1 foot) at location A11-MW9DS located north of Kelly is further discussed in Section 17.0 as it relates to Area-Wide Soil.

Primary COC (TPH-G) for soil and corresponding COCs in groundwater are shown in plan view on Figures 10-7 and 10-8 and in cross section on Figure 10-9. The nature and extent of COCs in media of concern are further discussed below.

10.6.2.Soil

Environmental data indicate the presence of TPH-G and TCE contaminated soil at Kelly associated with historical operations and land uses including cleaner and motorcycle service operations. The nature and extent of TCE in soil are further discussed in Section 13.0 (Westerly Plume). The area of TPH-G contamination on Kelly appears very localized near the southeast corner of the property (Figure 10-7). TPH-G has been detected above the PCUL of 30 mg/kg in soil samples collected from borings A12-B6 and 1F-B2, each at a depth of approximately 7 to 8 feet bgs. TPH-G contamination at this location is bounded

both vertically and laterally by soil samples collected at borings A12-B6 and 1F-B2 and surrounding borings A12-B7, A12-B8, A12-B9, and 1F-B1. The nature and extent of TPH-G in soil (Kelly Site) is shown in plan view on Figure 10-7 and in cross section on Figure 10-9.

10.6.3. Groundwater

Environmental data indicate the presence of TCE contaminated groundwater at Kelly associated with historical cleaners and potentially the motorcycle service operations. The nature and extent of TCE in groundwater are further discussed in Section 13.0 (Westerly Plume). Other COCs (including TPH-G shown on Figure 10-8) were not detected in groundwater at concentrations greater than the PCUL. Groundwater data collected after 2016 are considered to be representative of current conditions as noted in previous sections of this RI. Therefore, investigation results prior to 2016 are not being used to evaluate contaminant nature and extent in groundwater. The nature and extent of TPH-G in groundwater for comparison to the soil results are shown in plan view on Figure 10-8.

10.6.4. Soil Vapor and Indoor Air

Based on the soil and/or groundwater sampling results representing current conditions, TPH-G and TCE were identified as contaminants with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SLs for the protection of commercial workers under the future land use scenario (i.e., future building for the UWT Campus). The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination**. Petroleum-related contaminants in soil were evaluated for potential VI based on Ecology's 2022 VI Guidance. Ecology's guidance states buildings located within the inclusion area (30 feet horizontal and 15 feet vertical separation distance) of soil with TPH-G concentrations greater than 100 mg/kg may be at risk of VI into indoor air (1064). An evaluation of the potential for VI based on current conditions at Kelly and the surrounding area is discussed below:
    - Residual TPH-G-contaminated soil at locations A12-B6 and 1F-B2 in the southeast corner of Kelly. Although there is no current potential for VI (i.e., no occupied spaces within 30 lateral feet), future redevelopment of the property for a residential use may have the potential for VI. The potential for VI should be considered as part of the building design and construction if and when future residential redevelopment occurs.
- **Petroleum-Related Groundwater Contamination.** Petroleum-related contaminants either were not detected or were detected at concentrations less than the SL for groundwater VI and therefore are not considered a potential threat.
- **Other Contaminants**. CVOCs (TCE), exceeded the SL for groundwater VI. The potential for VI resulting from CVOCs associated with the Westerly Plume, which extends beneath Kelly, is further discussed in Section 13.0.

10.7. Contaminant Fate and Transport

The chemical properties of contaminants and the physical, chemical, and biological processes that they are exposed to affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed on a UWT Campus-wide basis in Section 18.0. Locally, soil contamination associated with Kelly is capped with pavement, which has resulted in the isolation of contaminants to prevent direct human contact with the general public accessing this area (Figures 10-1 and 10-9). Additionally, the stormwater collection system and impermeable surface in the area prevent the

infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater. The residual TPH-G impacted soil is sufficient distance from current buildings and is therefore not a potential concern for VI in this area.

Residual TPH-G soil contamination within Kelly is isolated, stable, and is not migrating to groundwater based on the groundwater sampling results. Contaminant fate and transport for TCE sourcing from historical cleaners and potentially the motorcycle service operations are further discussed in Section 13.0 (Westerly Plume).

10.8. Summary

Historical land use of Kelly included a cleaner (the year 1931) and motorcycle sales and service (the years 1942 through 1969). These historical uses resulted in the release of TPH-G and TCE to soil and/or groundwater. Residual TPH-G contamination in soil on Kelly is limited in extent, capped with pavement to prevent direct exposure, and not in contact with groundwater based on the results of the RI. TPH-G has not impacted groundwater based on the results of the RI. Additionally, the area is capped with pavement and the stormwater collection system further prevents the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater (Figures 10-1 and 10-9). Residual soil contamination at the Kelly Site is stable based on the monitoring data presented in this RI. The residual TPH-G impacted soil is sufficient distance from current buildings and is therefore not a potential threat for VI in this area. However, the TPH-G may pose a potential for VI if future property redevelopment includes buildings with enclosed spaces in proximity to the residual contamination.

TCE in soil and groundwater resulting from releases and/or spills during historical cleaner (and potentially the motorcycle service) operations are further discussed in Section 13.0 (Westerly Plume). Soil and groundwater data for Kelly are presented in Tables 10-4 and 10-5. The nature and extent of TPH-G (primary COC) in soil and groundwater are shown in plan view on Figure 10-1, by chemical/media on Figures 10-7 and 10-8, and in cross section on Figure 10-9.

11.0 REMEDIAL INVESTIGATION—SHAUB-ELLISON

11.1. Introduction

Shaub-Ellison was historically located at 1902 Pacific Avenue in Tacoma, Washington (Figure 11-1). Environmental data collected during previous and more recent soil and groundwater environmental investigations (further discussed in Section 11.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of TPH-G in groundwater, at a concentration greater than the PCULs, resulting from spills and/or releases during historical operations and land use. Summary statistics for soil and groundwater identifying COCs for Shaub-Ellison are presented in Tables Q-19 and Q-20 (Appendix Q). Specifically, historical operations included automobile tire sales/service and fuel supply by the Goodyear Tire Company (also known as Shaub-Ellison Company) which operated between 1932 and 1993 and utilized multiple USTs, a hydraulic hoist, and an oil/lube pit with associated floor drains.

Previously, TPH-G, TPH-D, TPH-O, and/or BTEX were detected in soil and groundwater at concentrations greater than their respective PCULs. However, most of the identified contamination was removed through

multiple phases of remedial action including remedial excavation and in-situ treatment between the 1990s and 2010. Confirmation soil samples collected following the remedial excavation and performance monitoring results during the operation of an in-situ remediation system (further discussed in Section 11.3.3) at this location verified the contaminant removal from the property, with the exception of TPH-G in groundwater east of the former Shaub-Ellison property (i.e., Shaub-Ellison Site; Figure 11-1). The property and surrounding area currently consist of a paved plaza and pedestrian pathway constructed in the late 1990s. Engineering controls including hardscapes (sidewalks, pedestrian paths, and pavement in Pacific Avenue) prevent direct contact with the residual contamination remaining in place, and the surrounding buildings are located at a sufficient distance to prevent the potential migration of contaminant vapors from entering the occupied indoor spaces. Residual groundwater contamination for the Shaub-Ellison Site (as defined by the TPH-G PCUL exceedances) based on post-remedial action results is generally stable and not migrating further downgradient of this area based on the monitoring data presented for the Shaub-Ellison RI.

In addition, environmental data collected as part of the RI indicate the presence of a CVOC-contaminated groundwater plume (TCE, cis-DCE, and vinyl chloride) that extends beneath Shaub-Ellison associated with the Easterly Plume. Groundwater contamination associated with the Easterly Plume is further discussed in Section 15.0.

Shaub-Ellison (former AOC in the 1997 Agreed Order) and the Shaub-Ellison Site (residual TPH-G contamination in groundwater) are shown relative to surrounding features on Figure 11-1. Terminology for Shaub-Ellison referenced by this RI is described below:

- **Shaub-Ellison.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019040010 (0.5-acre current parcel and 0.25-acre historic parcel).
- **Shaub-Ellison Site.** The area and media containing contamination exceeding PCULs associated with historical operations and/or land use.
- **Snoqualmie Library.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019050026, which is further discussed in Section 12.0.
- **Easterly Plume.** The extent of CVOC (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) contamination associated with historic operations at 1934-1938 Market Street (Pierce County Parcel No. 2018040090) and within Commerce and South C Street, which is further discussed in Section 16.0.

Specific details regarding the historical property use leading to the release of contaminants, RI activities completed to date, The CSM and the nature and extent of contamination associated with Shaub-Ellison are summarized below.

11.2. Property Conditions

11.2.1. Location and Description

Historical operations for Shaub-Ellison were located at 1902 Pacific Avenue in the east-central portion of the UWT Campus between Commerce and Pacific Avenues (Figure 11-1). Currently, the property is a terraced plaza and pedestrian pathway connecting Jefferson Avenue and Pacific Avenue through the central

portion of the UWT Campus. The ground surface is predominantly covered by pavement except for limited landscaped areas. Elevations in the vicinity of Shaub-Ellison and the surrounding area slope down to the east with ground surface elevations ranging from approximately 64 to 49 feet.

11.2.2. Historical Land Use

Between 1896 and at least 1912 a "junk storage" building was present on the northern portion of Shaub--Ellison. The building was removed and a two-story L-shaped building was constructed on the property by 1931. The ground floor elevation of the new building was similar to Pacific Avenue at approximately 49 feet.

Photo 11-1: Circa 1932 photograph of the Shaub-Ellison building and associated dispenser island at the corner of former South 19th Street and Pacific Avenue.

An automobile tire sales/service/retreading and vulcanization business operated between at least 1932 and 1993 based on City directories and previous reports. The operations also included automobile fuel supply between 1932 and at least 1950, but the date when the fuel supply operations ceased is not known. The only recorded business operating at the address was identified as "The Goodyear Tire and Rubber Company," also known as Shaub-Ellison Company (119). The former building footprint covered most of the western and southern portions of the property with a concrete-paved parking lot occupying the remaining portion of the property. The lower floor of the building was accessible via Pacific Avenue and contained two service bays with a hydraulic lift in each bay. The second floor was used for tire retreading and "buffing." A garage door was located on the west side of the building to provide access to Commerce Street (111). The building included a hydraulic hoist, oil lube pit, floor drain, alignment pit, and loading dock with a dust collection system. The hydraulic hoist, oil lube pit, floor drain, and alignment pit were located inside the service bays on the west side of the building (Figure 11-2). Dust collected from rubber tire retreading activities was collected in the dust collection system and waste was stored in the western loading dock until disposed of by a rubber recycler (105).

Five USTs including three 500-gallon USTs, one 1,000-gallon UST and one 8,000-gallon UST, and a fuel dispenser were located within the northeastern portion of the property based on a review of historical documents. These features were removed between 1994 and 1995.

Historical land use, structures and features for Shaub-Ellison and the surrounding area including railway operations (now abandoned), and storage and power distribution (electrical transformer house) operations are shown on Figure 11-2.

11.2.3. Current and Future Land Use

UW purchased the Shaub-Ellison property and adjacent properties in the early 1990s including the properties containing the Snoqualmie Library. South 19th Street and Commerce were subsequently vacated in the mid-1990s and the historical parcel containing Shaub-Ellison was extended to the north into the former South 19th Street ROW (see Appendix B). Between 1995 and 1998, UW constructed a terraced and

landscaped plaza running east-west through the central portion of the UWT Campus spanning from Pacific Avenue to Jefferson Avenue, which included the Shaub-Ellison property for pedestrian access.

The ground surface of the former Shaub-Ellison property was terraced with the surrounding slope and raised approximately 3 to 16 feet during redevelopment. UW also renovated the adjacent Walsh Gardner building with the northern portion of the building now extending onto the southern portion of the former Shaub-Ellison property. The structures on the other adjacent properties have either been renovated (or demolished) and redeveloped as new UWT Campus buildings or pedestrian access currently. The footprint of the plaza and associated subsurface utilities and adjacent properties are shown on Figure 11-3. Utility infrastructure is further discussed below in Section 11.2.4.

11.2.4. Utility Infrastructure

Current utility infrastructure within and adjacent to Shaub-Ellison with the potential to serve as preferential pathways for contaminant migration is shown on Figure 11-3 and includes the following:

- A north-south oriented 14-inch-diameter sanitary sewer line is located within the Pacific Avenue ROW with an inlet elevation of approximately 35.5 feet. Sewer laterals to the former buildings on Shaub-Ellison are likely present but their locations are unknown.
- A north-south and east-west oriented 8-inch sanitary sewer line installed between 1995 and 1998 is located west of the former Shaub-Ellison property within Pacific Avenue with an inlet elevation of approximately 35 feet and north of the former Shaub-Ellison property (within the current pedestrian pathway) with an inlet elevation of approximately 48 feet.
- A north-south oriented utilidor (approximately 10 feet wide and 10 feet deep) is located under the sidewalk west of Shaub-Ellison. The elevation of the floor of the utilidor ranges from 51 to 52 feet. The utilidor is a walkable tunnel with various utilities.
- An east-west oriented 18-inch stormwater line is located on the northern portion of Shaub-Ellison with an inlet elevation of approximately 57 feet to the west, and 42 feet to the east. A stormwater catch basin and associated piping are present within the terraced plaza and are directed to the City's stormwater system.

Other utilities present include a water line and electrical wiring for lighting. However, these utilities do not have the potential to serve as preferential flow pathways.

11.3. Field Investigations and Remedial Actions

Multiple environmental investigations have been completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations completed documenting soil and groundwater conditions for Shaub-Ellison are discussed in Sections 11.3.1 through 11.3.4 below. Sampling locations used to evaluate soil and groundwater conditions are shown on Figures 11-4 and 11-5. Investigations completed for Shaub-Ellison and the surrounding area to support the development of the RI are summarized in Tables 11-1 and 11-2 and further discussed in Sections 11.3.1 through 11.3.4 below. Construction details for permanent monitoring wells installed within Shaub-Ellison and the surrounding area are presented in Table 11-3. Soil and groundwater results for the subsurface investigations completed are presented in Tables 11-4 and 11-5, respectively.

11.3.1. Pre-1997 Agreed Order Investigations and Remedial Action

An environmental investigation and remedial action were completed on Shaub-Ellison prior to the 1997 Agreed Order to evaluate soil and groundwater conditions along with a subsequent remedial action. UW initiated the environmental investigation as a part of the property acquisition in 1993 with the remedial action completed between 1994 and 1995. The investigation and remedial actions completed are described further below. Soil and groundwater sampling locations completed are shown on Figure 11-4.

11.3.1.1. Soil and Groundwater Investigation Summary

AGI completed investigation activities to evaluate soil and groundwater conditions on behalf of UW in 1993. Investigation activities included the collection of soil samples from HSA and hand auger borings and the collection of groundwater samples from permanent monitoring wells. These investigations included the following:

- Completion of five HSA borings (SH-MW1 through SH-MW5) advanced to approximate depths ranging between approximately 20.5 and 29 feet bgs and completed as permanent monitoring wells. Soil samples collected from the borings that ranged in depth from approximately 3 to 28 feet bgs were submitted for a combination of analyses including TPH-HCID, TPHG, TPH-D, TPH-O, and BTEX. TPH-G, TPH-D, benzene, ethylbenzene, and/or total xylenes were detected in soil samples collected at depths of approximately 10 to 28 feet bgs in borings SH-MW1, SH-MW2, and SH-MW4. Other contaminants were not detected in the analyzed samples. Groundwater samples collected in monitoring wells SH-MW1 through SH-MW5 were analyzed for TPHG, TPH-D, and select VOCs. TPH-G, TPH-D, and/or BTEX were detected in each of the groundwater samples analyzed. In addition, CVOCs including TCE and mixed DCI isomers were detected in one or more of these wells. CVOC contamination associated with the Easterly Plume is further discussed in Section 15.0.
- Completion of two hand auger soil borings (SH-SS1 and SH-SS2) to approximate depths of 1-foot bgs beneath the loading dock west of the building. Shallow soil samples collected from these borings were submitted for a combination of analyses including TPH-G, TPH-D, select VOCs, and metals. TPH-D, TPH-O, and metals were detected in the soil samples. Other contaminants were not detected in the analyzed samples.

11.3.1.2. UST Removal and Remedial Action Summary

Remedial excavation and subsequent confirmation soil sampling activities were completed between 1994 and 1995 and included the removal and closure of the five USTs and service station infrastructure historically used at the property. Remedial excavation activities resulted in the removal of approximately 2,325 cubic yards of petroleum-contaminated soil based on the initial soil characterization (described above) from three separate areas (described below). Results of the confirmation soil samples collected at the final remedial excavation limits confirmed the removal of the previously identified petroleum-contaminated soil at the base and on the southern and western sidewalls of the remedial excavation. However, petroleum-contaminated soil remained in place along the northern and eastern sidewalls of the remedial excavation up to 17 feet bgs from the previous ground surface.

The remedial excavation was grouped into three general areas. Details of the infrastructure and UST removal areas including the initial sampling completed and the remedial excavation activities completed to address the observed petroleum contamination are summarized below. Remedial excavation areas and confirmation soil samples are shown on Figure 11-4.

- **UST and Fuel Dispenser Area**. Five USTs (three 500-gallon USTs, one 1,000-gallon UST, and one 8,000-gallon UST) and associated piping were removed in April 1994. One of the USTs (500 gallons) reportedly was noted to have a gasoline odor. The other four USTs were reportedly previously closed in place and filled with CDF prior to removal. The actual locations of the USTs were not reported and could not be verified. In addition, the contents of the USTs were not reported but likely contained gasoline and diesel fuel to support the former fuel dispenser island based on the results of the soil data. Remedial excavation activities were completed in two phases and included the decommissioning of monitoring wells SH-MW1 through SH-MW5. The first phase of excavation was completed in 1994 following the removal of the USTs. The second phase of excavation was completed in 1995 following the installation of shoring along South 19th Street and Pacific Avenue. Overall, the remedial excavation was completed to an average depth of approximately 24 feet bgs on the east side and 16 feet bgs on the west side and encompassed the USTs in the northeast portion of the property as shown on Figure 11-4. Confirmation soil samples collected from the base and sidewalls of the remedial excavation were submitted for TPH-G, TPHD, TPH-O, and BTEX analysis. Confirmation soil samples SH-SE-SS-2 and SH-SE-SS-3 collected during the 1994 excavation were subsequently removed during the 1995 remedial excavation. The remaining 27 confirmation soil samples (including duplicates; Table 11-4) confirmed the removal of petroleum-related contamination from the base, southern, and western excavation limits. However, elevated concentrations of petroleum-related contaminants remained in place along the northern and eastern excavation sidewalls.
- **Hydraulic Hoist and Service Pit Area.** Five hand-auger borings (SH-HA1 to SH-HA5) were completed in the vicinity of the hydraulic hoist, lube pit, and wheel alignment pit to initially characterize soil conditions. A total of six soil samples collected from these borings ranging in depth from approximately 2.5 and 6.5 feet bgs were submitted for a combination of TPH-HCID, TPH-D, and TPH-O analysis. TPH-D and TPH-O were detected in soil collected at a depth of approximately 5 feet bgs in boring SH-HA1. Other contaminants were not detected in the analyzed samples. The hydraulic hoist, floor drain, and lube pit were subsequently removed in July 1994 and remedial excavation activities were completed to address observed petroleum contamination at this location (Figure 11-4). The remedial excavation encompassed the floor drain, hydraulic hoist, and lube oil pit and extended to an approximate depth of 14 feet bgs. Confirmation soil samples collected from locations SH-S4, SH-S5A, SH-S6, SH-S11, and SH-Hoist verified the removal of petroleum-related contamination from this area. Note that soil represented by sample SH-S5A was over-excavated from this area.
- **Loading Dock Area**. Remedial excavation activities were completed to an approximate depth of 2.5 feet bgs within the loading dock area in July 1994. Soil samples SH-S1, SH-S2 and SH-S3 collected at the final remedial excavation limit confirmed the removal of the petroleum-related contamination.

Wastewater (i.e., groundwater infiltrating into the excavation area) generated during the excavation was transferred to a temporary holding tank for chemical analysis prior to being discharged to the City's sanitary sewer. A total of 103,000 gallons of water was generated during the remedial action. Additionally, approximately 1,225 cubic yards of excavated soil where petroleum-related contaminants either were not detected or were detected at concentrations less than the cleanup criteria established for the remedial action were used as backfill in the excavation. Petroleum-contaminated soil (approximately 2,325 cubic yards) generated by the remedial excavation was mechanically screened, mixed with reagents, and land farmed on Jet Parking to promote enhanced ex-situ biological degradation of the petroleum constituents. Upon confirmation that the land-farmed soil met the reuse criteria established by the remedial action, this material was transferred back to Shaub-Ellison and used as backfill for the remedial excavation

(126). The treated soil was placed between ground surface to depths ranging from approximately 1.5 to 12 feet bgs within the excavation area along with overburden material and imported soil to meet finished grades.

11.3.2. 1997 Agreed Order Investigations

URS, on behalf of UW, completed an RI for the eastern portion of the UWT Campus between 1997 and 2002 in accordance with the 1997 Agreed Order. As part of the 1997 Agreed Order RI, investigation activities were completed within Shaub-Ellison and the surrounding area to further evaluate soil and groundwater conditions in areas where petroleum-related contaminants were previously identified, and in areas not previously investigated. Specifically, investigation activities were completed to evaluate subsurface conditions in the following areas:

- Surrounding the former UST and Fuel Dispenser Area to define the limits of TPH-impacted soil at Shaub-Ellison and downgradient of the former UST Excavation Area at Snoqualmie Library (further discussed in Section 12.0).
- West of Shaub-Ellison to evaluate soil conditions in the vicinity of an abandoned natural gas pipeline.

Investigation activities are summarized in Sections 11.3.2.1 and 11.3.2.2 below.

11.3.2.1. Soil Investigation Summary

Soil investigations completed for Shaub-Ellison as part of the 1997 Agreed Order RI included the following:

- **UST and Fuel Dispenser Area.** Seven borings (PS-MW8, SH-B1, SH-B2, SH-B3, SH-GW3, SH-MW6, and SH-MW7) were completed to depths between 15 and 31 feet bgs to evaluate soil conditions in the former UST and fuel dispenser area. Borings PS-MW8, PS-MW9, SH-MW6, and SH-MW7 were completed as permanent monitoring wells to evaluate groundwater conditions as described below (Section 11.3.2.2). A total of 14 soil samples collected from the borings at varying depths were analyzed for a combination of TPHG, TPH-D, TPH-O, and BTEX. Select VOCs were also analyzed from two soil samples collected from boring SH-MW6. TPHG, TPH-D, TPH-O, and toluene were detected in soil borings SH-B1, SH-B3, SH-MW6, and SH-MW7 at depths ranging between 12 and 20 feet bgs. Other contaminants were not detected in the remaining analyzed soil samples. The greatest concentrations were detected at borings SH-B1 and SH-B3 located north of Shaub-Ellison at approximately 14.5 and 20 feet bgs, respectively.
- **Former Natural Gas Pipeline.** Three DP borings (DMB-15 to DMB-18) were completed to a depth of approximately 9 feet bgs to evaluate soil conditions in former Commerce Street adjacent to an abandoned natural gas pipeline (unrelated to Shaub-Ellison). From these borings, a total of three shallow soil samples collected at a depth of approximately 6 feet bgs were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, select VOCs and PAHs. Low level concentrations of TPH-O were detected in one sample collected from boring DMB-15 at 6 feet bgs. Other contaminants were not detected in the analyzed soil samples.

11.3.2.2. Groundwater Investigation Summary

A total of 34 groundwater samples were collected from seven new permanent monitoring wells (BL-MW4, PS-MW8, PS-MW9, SH-MW6, SH-MW6, SH-MW7, and SH-MW8) and eight temporary wells (see Table 11-3) as a part of the 1997 Agreed Order investigation. Grab groundwater samples from temporary wells were collected at the time of soil exploration activities. Permanent monitoring wells were sampled on a quarterly

basis between October 1998 and September 1999 with two additional rounds of monitoring completed in April 2000 and September 2000. Groundwater samples were analyzed for TPH-G, TPH-D, TPH-O, BTEX, and other select VOCs with two exceptions. Grab samples collected from SH-B2 and SH-B3 were only analyzed for TPH-G, TPH-D, TPH-O and BTEX. Grab samples from PS-GW5 and SH-GW1 were only analyzed for BTEX and other select VOCs.

TPH-G, TPH-D, TPH-O, BTEX, and CVOCs (PCE, TCE, cis-DCE, trans-DCE, and/or vinyl chloride) were detected in multiple samples with the highest concentrations detected in wells located downgradient from the UST and Fuel Dispenser Area (temporary well SH-B3 and permanent well SH-MW7; Table 11-5). TPH-D was also detected west and upgradient of Shaub-Ellison and downgradient of the Snoqualmie Library in the groundwater samples collected from PS-MW8 (see additional discussion in Section 12.0). CVOCs detected in groundwater are associated with the Easterly Plume, which is further discussed in Section 15.0.

11.3.3. Supplemental Remedial Action and Investigations Under the 1997 Agreed Order

Remedial actions followed by supplemental groundwater investigation activities were completed in accordance with the 1997 Agreed Order to address residual petroleum-related contaminants identified to the north and east of the UST and fuel dispenser area remedial excavation. Remedial actions and supplemental investigation activities are summarized in Sections 11.3.3.1 and 11.3.3.2 below. Components of the in-situ remedial system and supplemental groundwater sampling locations are shown on Figure 11-4.

11.3.3.1. 2006 Remedial Action

An in-situ remediation system was installed in 2006 as part of the approved Interim Cleanup Action Plan (ICAP) to treat petroleum-contaminated soil and groundwater at Shaub-Ellison (198, 199). The in-situ remediation system consisted of low-pressure bioventing for treatment of contaminated soil in the vadose zone (above the groundwater table) and in-situ submerged oxygen curtain (iSOC™) technology for treatment of saturated-zone soil and groundwater. These technologies were designed to enhance the biodegradation of TPH by increasing the amount of oxygen supplied to the subsurface. Overall, the treatment system consisted of five dual-purpose treatment wells (SH-R-1 through SH-R-5) installed to 30 feet bgs connected to a centralized treatment compound via horizontal conveyance piping. The iSOC™ system operated from October 2006 to September 2010, which generally involved the periodic rotation of four iSOC™ units between the wells. The bioventing system operated from February 2007 to September 2010.

Soil samples were collected at depths ranging from 15 to 25 feet bgs from each well boring during treatment well installation to verify subsurface conditions. These soil samples were analyzed for TPH-G, TPH-D, TPH-O, and BTEX. TPH-G, TPH-D, TPH-O, and/or BTEX were detected in soil samples collected from wells SH-R-2, SH-R-3 and SH-R-5 with the greatest TPH-G and BTEX concentrations detected in the soil sample collected from SH-R-3 located downgradient of the former UST and Fuel Dispenser Area and near temporary well SH-B3.

During the operation of the in-situ treatment system, 14 monitoring events were completed between 2005 and 2011 at locations SH-R-1 through SH-R-5, SH-MW6, SH-MW7, SH-MW8, and PS-MW9 to evaluate the remediation system performance. The monitoring events included one pre-treatment baseline event in 2005, eight quarterly performance monitoring events in 2006 and 2007, four semi-annual performance monitoring events in 2009 and 2010, and one post-treatment event in 2011. Monitoring activities included the collection of water samples for TPH-G, TPH-D, TPH-O, and BTEX as well as the collection of field

parameters and soil gas. Groundwater field parameters typically included DO content, ORP, pH, electrical conductivity (EC), temperature, ferrous iron, and turbidity. Soil gas included oxygen, carbon dioxide, and organic vapor. Additionally, groundwater samples from a subset of the monitoring wells were submitted for nitrate, sulfate, and dissolved manganese. Groundwater analytical results are presented in Table 11-5.

TPH-G, TPH-D, TPH-O, and BTEX were detected in multiple samples collected during the performance monitoring period. However, there was an overall decrease in contaminant concentrations between 2005 and 2010. After the performance monitoring period (November 2009 and May 2010 events), TPH-G, TPH-D, TPH-O, and BTEX were not detected at concentrations of regulatory concern. As a result, Ecology agreed with UW's request to shut down the remediation system and begin post-cleanup compliance monitoring in a letter dated September 10, 2010. Post-cleanup monitoring included the collection of one round of samples in May 2011. Contaminants either were not detected or were detected less than PCULs (further discussed in Section 11.5). The remediation system was later decommissioned, and the infrastructure was removed in 2012 (235, 242).

11.3.3.2. 2013 Groundwater Investigation Summary

Supplemental groundwater monitoring for Shaub-Ellison included the collection of samples from monitoring wells BL-MW4, PS-MW8, PS-MW9, SH-MW6, and SH-MW7 in July 2013. Groundwater samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, and VOCs. TPH-G, total xylene, 1,2,4-TMB, and n-propylbenzene were detected in the groundwater sample collected from well SH-MW7. In addition, CVOCs including TCE, cis-DCE, trans-DCE, and vinyl chloride were detected in multiple wells. CVOC contamination is associated with the Easterly Plume, which is further discussed in Section 16.0. Other contaminants were not detected in the analyzed samples.

11.3.4. 2016 Agreed Order Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions for the UWT Campus in accordance with the RI Work Plan and subsequent addenda (Section 4.0) are summarized in Sections 11.3.4.1 and 11.3.4.2 below. Exploration locations completed under the 2016 Agreed Order RI in the vicinity of Shaub-Ellison are shown on Figure 11-5.

11.3.4.1. Soil Investigation Summary

Soil data gaps requiring further investigation as part of the 2016 Agreed Order RI were not identified based on the previous investigation results and remedial actions (remedial excavation and in-situ treatment) completed for Shaub-Ellison between 1994 and 2010. However, environmental data collected as part of the 2016 Agreed Order RI to evaluate soil and groundwater conditions for the Easterly Plume (summarized below) are being presented to further support the subsurface characterization of Shaub-Ellison and evaluation of contaminant nature and extent.

These activities included collection of soil samples from borings A11-MW23D and A11-MW23S, which were completed as permanent monitoring wells. A total of 17 discrete soil samples including one field duplicate were collected from these borings at approximate depths ranging between 6 and 70 feet bgs and submitted for a combination of TPH-G, TPH-D, TPH-O, VOC, PAH, and metal analysis. Low level concentrations of TPH-O and cPAHs were detected in soil samples collected from approximately 6 to 7 feet bgs. Other contaminants were not detected in the analyzed soil samples.

11.3.4.2. Groundwater Investigation Summary

A total of 36 groundwater samples (including duplicates) were collected between 2016 and 2020 for the 2016 Agreed Order RI from the network of new and existing monitoring wells (see Table 11-2) to further evaluate groundwater conditions and define the nature and extent of contamination resulting from historical operations at Shaub-Ellison. Groundwater samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, and other select VOCs at well locations screened within the Qvi/Qva aquifers where wells are screened across both deposits and the Qva aquifer (geologic and hydrogeologic conditions in the vicinity of Shaub-Ellison are further discussed in Section 11.4.2). Groundwater monitoring activities and results associated with Shaub-Ellison are discussed below.

- A total of 13 groundwater samples were collected from permanent monitoring wells A11-MW23S, SH-MW8, and BL-MW4 screened within the Qvi/Qva aquifers located downgradient, upgradient, and cross gradient of Shaub-Ellison during the RI. Contaminants associated with Shaub-Ellison were not detected at this location.
- A total of 23 groundwater samples were collected from permanent monitoring wells A11-MW23D, PS-MW8, PS-MW9, SH-MW6, and SH-MW7 screened within the Qva aquifer located downgradient and upgradient of Shaub-Ellison during the RI. Results of groundwater samples collected within the Qva aquifer indicate TPH-G was detected in wells SH-MW7 and SH-MW8. Ethylbenzene, total xylenes, 1,2,4-TMB, 1,3,5-TMB, and n-propylbenzene were detected in groundwater samples collected from SH-MW7. Other contaminants associated with Shaub-Ellison were not detected.

CVOCs including TCE, cis-DCE, trans-DCE, DCE and vinyl chloride detected in groundwater are associated with the Easterly Plume, which is further discussed Section 16.0.

11.4. Conceptual Site Model

Development of the CSM for Shaub-Ellison is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for Shaub-Ellison is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 11.4.1 through 11.4.4 describe the specific elements of the Shaub-Ellison CSM.

11.4.1. Physical Setting

Multiple phases of remedial excavation and in-situ treatment have been completed following the acquisition of the property by UW between 1994 and 2010 to address petroleum-related releases associated with historical land use. The area encompassing Shaub-Ellison currently contains a terraced and pedestrian pathway providing access to the central portion of the UWT Campus, which includes both hardscape and landscaped areas.

11.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic setting for Shaub-Ellison (described in the following sections) informs the distribution of contaminants in media of potential concern. Local geology and hydrogeology in the vicinity of Shaub-Ellison are described below in Sections 11.4.2.1 and 11.4.2.2.

11.4.2.1. Local Geology

Geologic units present beneath Shaub-Ellison include the Qf and Qva deposits. Qvi deposits are present upgradient and downgradient of Shaub-Ellison. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings within Shaub-Ellison and the surrounding area consists of locally derived reworked and treated ice-contact deposits and glacial outwash deposits or imported fill material used within the former remedial excavations and construction of the terraced plaza area. Fill extends to depths between approximately 2 and 34 feet bgs (current grade) and is primarily composed of sand with varying amounts of gravel and silt. Oversized rocks and quarry spalls are also present at the limits of the remedial excavation area surrounding the former USTs. The fill is deepest in areas of the remedial excavation and the western portion of the Shaub-Ellison property where the area of the former building was located. Fill is shallowest in the former South 19th Street ROW.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till and subglacial channel materials deposited beneath the glacial ice along the ice margin during the last glacial period. Qvi till-like deposits are not present beneath Shaub-Ellison as the material has been previously excavated. However, Qvi till-like deposits are present in the area surrounding Shaub-Ellison (wells A11-MW23S, BL-MW4, and SH-MW8) with a thickness of approximately 5 to 6 feet underlying the fill.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** Qva deposits consisting of stratified sand with silt and gravel layers were observed at the maximum depths explored beneath Shaub-Ellison and the surrounding area.

Geologic conditions in the vicinity of Shaub-Ellison are shown relative to the UWT Campus on Figure 2-7.

11.4.2.2. Local Hydrogeology

Groundwater in the eastern portion of the UWT Campus occurs within both the Qvi (shallow) and Qva (deep) aquifers (Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Beneath and to the east of Pacific Avenue, the Qvi unit is absent altogether and the Qva aquifer is unconfined. Locally, the confining silt layers have been removed as a result of construction for Shaub-Ellison and the Snoqualmie Library and GWP Buildings. As a result, groundwater from the Qvi aquifer flows into the Qva aquifer in this area. To the east of Shaub-Ellison, the Qvi deposits/aquifer is absent and as a result, the Qva aquifer becomes unconfined.

Local groundwater occurrence and flow for the Qvi/Qva aquifers are summarized below.

Qvi/Qva Groundwater Occurrence and Flow

The Qvi aquifer is not present in the vicinity of Shaub-Ellison. The confining silt layer is generally absent as a result of construction activities in this area. As a result, groundwater in this vicinity occurs primarily within the Qva aquifer, which is locally unconfined and occurs and flows primarily within the sand and gravel layers at depths between approximately 11 and 22 feet bgs (Table 11-5). The inferred groundwater flow direction in the Qva aquifer across Shaub-Ellison is generally northeasterly toward the Thea Foss Waterway, which is consistent with the generally easterly UWT Campus-wide Qvi and Qva groundwater flow directions (Figures 2-14 and 2-19).

The local estimated average linear groundwater velocity within the Qva aquifer is approximately 1.50 ft/day with a hydraulic gradient of 0.05 ft/ft. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

11.4.3. Sources of Contamination

The primary source of contamination at Shaub-Ellison is associated with the historical use of automobile tire sales/service and fuel supply. As described above, automobile tire sales/service operations by Goodyear Tire Company/Shaub-Ellison Company occurred between 1932 and 1993. The fuel supply operations stopped before 1993 but the date is not known. Potential release mechanisms for petroleum-related contamination include drips, leaks and/spills from tanks including USTs, drums and/or other equipment (i.e., hydraulic hoists, floor drains, sumps) directly to soil from which contaminants migrated to groundwater. In addition to the local release of petroleum-related contaminants to soil and groundwater, additional sources of contamination to Shaub-Ellison include the following:

- CVOCs including PCE, TCE, cis-DCE, trans-DCE and vinyl chloride associated with upgradient and off-property releases (i.e., Easterly Plume) have been identified. CVOC contamination that has migrated onto Shaub-Ellison, due to releases from historical operations and land use for source areas contained within the Easterly Plume are further discussed in Section 16.0.
- TPH associated with upgradient and off-property releases (i.e., Snoqualmie Library) have been identified. TPH contamination is present upgradient of Shaub-Ellison due to releases from historical operations and land use associated with the Snoqualmie Library and is further discussed in Section 12.0.

11.4.4. Potential Receptors and Exposure Pathways

Current and future land use were considered when evaluating potential receptors and exposure pathways for Shaub-Ellison. The current and planned future land use is a terraced plaza and pedestrian path that consists primarily of impervious surfaces except for bordering landscape areas. Precipitation falling to the ground surface either infiltrates into the ground (unpaved areas) or is captured by catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway. The surrounding area is commercial and academic. It is assumed that future land use will be similar to its current use.

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

- **Direct Contact**. The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities.

- **Drinking Water.** Groundwater within the Qvi/Qva aquifers beneath Shaub-Ellison and the UWT Campus as a whole is not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.

- **Surface Water.** Surface water discharge from Shaub-Ellison is not considered to be a current exposure pathway because the majority of ground surface is capped with hardscape, stormwater is directed to stormwater utilities, and the Thea Foss Waterway is more than 1,000 feet east of the UWT Campus.
- **Indoor Air**. Buildings surrounding Shaub-Ellison (Snoqualmie Library, GWP, Walsh Gardner Buildings, and Washington State History Museum) are located more than 30 feet from the TPH-impacted soil, therefore, are not considered to be current exposure pathways in accordance with Ecology's VI guidance. The potential for VI is further discussed in Section 11.6.4.

11.5. Proposed Cleanup Levels

PCULs were developed for Shaub-Ellison to protect human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (WAC 173-340), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water use, potential exposure pathways, and the potential receptors specific to Shaub-Ellison. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for Shaub-Ellison is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels**. PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b). Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels**. Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

11.6. Nature and Extent of Contamination

11.6.1. Contaminants and Media of Concern

Characterization data for Shaub-Ellison are summarized in Tables 11-4 and 11-5 and were evaluated to determine contaminants and media of concern for the Shaub-Ellison Site (as defined by soil and/or groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions is presented in Table Q-19 (Appendix Q). An evaluation of groundwater sample results representing current

conditions (i.e., groundwater samples collected between 2016 and 2020 as well as groundwater data collected following the in-situ treatment system performance monitoring period) is presented in Table Q-20 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-21, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-19 through Q-21) include the following:

- **Soil**. Previously, concentrations of TPH-G, TPH-D, TPH-O and/or BTEX were detected in soil and groundwater at concentrations greater than their respective PCULs. However, most of the identified contamination was removed through multiple phases of remedial action including remedial excavation and in-situ treatment between the 1990s and 2010. Confirmation soil samples collected following the remedial excavation and groundwater samples collected during operation of an in-situ remediation system (discussed in Section 11.3.3) verified the contaminant removal from the property, with the exception of TPH-G in groundwater east of the former Shaub-Ellison property. Therefore, soil is not considered a media of concern. A discussion of sampling results for petroleum-related contaminants is presented in Section 11.6.2.
- **Groundwater**. As noted above, TPH-G (primary COC) remains in groundwater east of Shaub-Ellison at concentrations greater than the PCUL. The nature and extent of TPH-G in groundwater are further discussed in Section 11.6.3.
- **Soil Vapor.** Based on screening of soil and groundwater data, a potential for contaminants to migrate into enclosed spaces at a concentration that could exceed the Method B indoor air PCUL and/or the SL for the protection of commercial workers was not identified under current and future land use assumptions.

Other contaminants including CVOCs including TCE, cis-DCE, and vinyl chloride were detected at concentrations greater than the PCUL in groundwater in the vicinity of Shaub-Ellison. The occurrence of CVOCs in groundwater is attributed to the Easterly Plume and is discussed further in Section 15.0.

Primary COCs (TPH-G, TPH-D, TPH-O, and BTEX) for soil and groundwater are shown in plan view on Figures 11-6 through 11-13 and in cross section on Figure 11-14. The nature and extent of COCs in media of concern are further discussed below.

11.6.2. Soil

Remedial excavation activities completed in 1994 and 1995 resulted in the removal of the majority of the identified petroleum-related contamination associated with historical land uses as well as primary sources (i.e., former USTs utilized as part of the historical fuel distribution and/or service station operations). Following the remedial excavation activities, residual TPH-G (up to 11,000 mg/kg), TPH-D (up to 9,800 mg/kg), TPH-O (up to 11,000 mg/kg), benzene (up to 9.68 mg/kg), toluene (up to 8.56 mg/kg), ethylbenzene (up to 11.3 mg/kg) and xylenes (up to 25 mg/kg) were detected in soil samples collected to the north and east of the remedial excavation area at depths ranging between 14.5 and 25 feet bgs current grade. In 2006, an iSOC/bioventing in-situ remediation system was installed to address this residual contamination and operated until May 2010. After the performance monitoring period, TPH-G, TPH-D, TPH-O, and BTEX were not detected greater than the PCULs, and the system was deactivated with Ecology concurrence. Post-cleanup monitoring results confirmed compliance with the cleanup standards and the in-situ treatment system was subsequently decommissioned in 2012. Soil is no longer considered a medium of concern based on the successful treatment of TPH-G, TPH-D, TPH-O, and BTEX.

The nature and extent of TPH-G, TPH-D, TPH-O, and BTEX in soil are shown on Figures 11-6 through 11-9. As indicated on these figures, the locations where TPH-G, TPH-D, TPH-O, and/or BTEX previously exceeded the PCULs prior to in-situ treatment are identified. However, soil sample results at the identified locations on Figures 11-6 through 11-9 are not considered to represent current conditions based on the treatment system performance monitoring results as discussed above.

11.6.3. Groundwater

In-situ treatment of groundwater was completed between 2006 and 2010 as discussed above to address TPH-G, TPH-D, TPH-O, and BTEX in groundwater as a result of historical land use. Following in-situ treatment, TPH-G, TPH-D, TPH-O, and BTEX no longer exceeded the PCUL with the exception of TPH-G in groundwater at SH-MW7 located east of the former UST and fuel dispenser area. At this location, TPH-G was detected in the Qva aquifer at concentrations up to 1,400 µg/L that exceeds the PCUL of 1,000 µg/L. The TPH-G exceedance in groundwater at this location is generally bounded by wells SH-MW8, BL-MW4, and SH-MW6. Other petroleum-related contaminants either were not detected or were detected at concentrations less than the PCUL following in-situ groundwater treatment.

The results for TPH-G, TPH-D, TPH-O, and BTEX in groundwater for comparison to soil are shown in plan view on Figures 11-10 through 11-13 and cross section on Figure 11-14. CVOCs detected in groundwater greater than the PCUL (TCE, cis-DCE, and vinyl chloride) are associated with the Easterly Plume and are discussed further in Section 15.0.

11.7. Contaminant Fate and Transport

The fate and transport of contaminants are affected by the contaminant's chemical properties and the physical, chemical, and biological processes to which they are exposed. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed on a UWT Campus-wide basis in Section 18.0. Locally, groundwater contamination associated with Shaub-Ellison is located beneath the hardscape areas (sidewalks and paved portions of Pacific Avenue), which prevents direct exposure (Figures 11-1 and 11-14). Additionally, mobilization of COCs from precipitation is limited by stormwater collection and drainage systems that convey the stormwater away from this area. Utility infrastructure that could provide a preferential pathway for contaminant migration is located at an elevation above the groundwater water table. VI is not considered a risk because residual contamination in groundwater is situated at distances greater than the 30-foot horizontal and 15-foot vertical separation distance recommended in Ecology's VI Guidance.

TPH-G contamination in groundwater associated with Shaub-Ellison is limited to the area immediately east and downgradient of the former UST and fuel dispensing area. Groundwater data indicated that TPH-G is relatively stable and has been significantly reduced following in-situ treatment. Additionally, the Shaub-Ellison Site is located within the Easterly CVOC plume. Collocation of CVOCs with petroleum typically facilitates the biodegradation of the petroleum. Overall, comparative values for these geochemical indicators within and outside the plume suggest that biodegradation may be occurring within the plume.

11.8. Summary

Historical land use of Shaub-Ellison has included automobile tire sales/service and fuel supply operations at the property between 1932 and 1993. These historical uses resulted in the release of TPH and BTEX to soil and/or groundwater. However, most of the identified contamination was removed through multiple

phases of remedial action including remedial excavation and in-situ treatment between the 1990s and 2010. Confirmation soil samples collected following the remedial excavation and performance monitoring results during operation of an in-situ remediation system that utilized bioventing and iSOC™ technologies have verified the contaminant removal from the property, with the exception of TPH-G in groundwater east of the former Shaub-Ellison property. Currently, TPH-G exceeds the groundwater PCUL in the Qva aquifer immediately downgradient of the remedial excavation area (SH-MW7) beneath portions of Pacific Avenue (Figure 11-1 and Figure 11-14). Groundwater data indicated that TPH-G is relatively stable and has been significantly reduced following in-situ treatment. Currently, groundwater contamination associated with Shaub-Ellison is located beneath impervious areas (sidewalks and paved portions of Pacific Avenue) that prevents direct exposure. Additionally, mobilization of COCs from precipitation is likely limited by stormwater collection and drainage systems that convey the stormwater away from this area. VI is not considered a risk because residual contamination in groundwater is situated at distances greater than the 30-foot horizontal and 15-foot vertical separation distance recommended in Ecology's VI Guidance.

Soil and groundwater data for Shaub-Ellison are presented in Tables 11-4 and 11-5, respectively. The results for TPH-G, TPH-D, TPH-O, and BTEX in soil and the locations where TPH-G, TPH-D, TPH-O, and/or BTEX previously exceeded the PCULs prior to in-situ treatment are shown on Figures 11-6 through 11-9. However, as discussed above, these results are not considered representative of current conditions based on the treatment system performance monitoring results. For consistency with the soil data, groundwater results representing current conditions (i.e., post-treatment results) for TPH-G, TPH-D, TPH-O, and BTEX are shown on Figures 11-10 through 11-13. Residual TPH-G contamination remaining in groundwater east of Shaub-Ellison is shown in cross section on Figure 11-14.

12.0 REMEDIAL INVESTIGATION—SNOQUALMIE LIBRARY

12.1. Introduction

Snoqualmie Library is located within the east central portion of the UWT Campus at 1902 Commerce Street in Tacoma, Washington (Figure 12-1). Environmental data collected during previous and more recent soil and groundwater studies (further discussed in Section 12.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of TPH-G and TPH-D in soil and TPH-D in groundwater at concentrations greater than their respective PCULs resulting from spills and/or releases during historical operations and land use. Summary statistics for soil and groundwater identifying COCs for Snoqualmie Library are presented in Tables Q-22 and Q-23 (Appendix Q). Specifically, these historical operations include fuel distribution operations on the southern portion of Snoqualmie Library by the Griffin Fuel Company, which operated between at least 1912 and at least 1969, and operations of a power distribution house on the northern portion of Snoqualmie Library between at least 1912 and 1958.

Most of the identified soil contamination was removed through remedial excavation and soil treatment activities completed between 1994 and 1995. The extent of residual TPH-D and TPH-G soil contamination (Snoqualmie Library Site; Figure 12-1) currently is limited to the eastern portion of Snoqualmie Library within portions of the Commerce Pedestrian Corridor from approximately 5 to 18 feet bgs. In groundwater, localized exceedances and periodic TPH-D and TPH-G LNAPL were observed in the Qva aquifer immediately downgradient of the remedial excavation area (within the Commerce Pedestrian Corridor). Note that the Qvi aquifer is absent from this area.

The Snoqualmie Library Building and the associated hardscape and landscape area to the east (Commerce Pedestrian Corridor), constructed between 1995 and 1998, prevent direct contact with this residual contamination. The stormwater collection system for the Snoqualmie Library Building and the surrounding area prevents the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater. Additionally, there is a sufficient distance between the residual TPH-D and TPH-G contamination and the surrounding buildings to prevent the migration of contaminant vapors from entering occupied indoor spaces. Residual soil and groundwater contamination for the Snoqualmie Library Site (as defined by the TPH-D and/or TPH-G PCUL exceedances) based on the post-remedial action results is generally stable and not migrating further downgradient of this area based on the monitoring data presented for the Snoqualmie Library RI.

In addition, environmental data collected as part of the RI indicate the presence of a CVOC-contaminated groundwater plume (TCE, cis-DCE, and vinyl chloride) that extends beneath the central and northern portions of Snoqualmie Library associated with the Easterly Plume. Groundwater contamination associated with the Easterly Plume is further discussed in Section 15.0.

Snoqualmie Library (former AOC in the 1997 Agreed Order) and the Snoqualmie Library Site (residual the TPH-G and TPH-D contamination) are shown relative to the surrounding features on Figure 12-1. Terminology for Snoqualmie Library referenced by this RI is described below:

- **Snoqualmie Library.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019050026. Historically, the parcels were occupied by two separate buildings with addresses of 1902 Commerce (northern building; historic Pierce County Parcel No. 2019050010) and 1910 Commerce (southern building; historic Pierce County Parcel No. 2019050024).
- **Snoqualmie Site.** The area and media containing contamination exceeding PCULs associated with historical operations and/or land use.
- **Snoqualmie Library Building.** Building currently occupying Snoqualmie Library. The building consists of the redeveloped power distribution house building on the northern portion and new construction on the southern portion.
- **Easterly Plume.** The extent of CVOC (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) contamination associated with historic operations at 1934-1938 Market Street and within Commerce Street and South C Street, which is further discussed in Section 16.0.
- **Shaub-Ellison**. The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019040010, which is further discussed in Section 11.0.

Specific details regarding the historical property use leading to the release of contaminants, RI activities completed to date, the CSM and the nature and extent of contamination associated with Snoqualmie Library are summarized below.

12.2. Property Conditions

12.2.1. Location and Description

Snoqualmie Library is located at 1902 Commerce Street within the east central portion of the UWT Campus and is situated between the South 19th Street stairs, Milgard Hall building, and the PLT and Commerce

Pedestrian Corridors (Figure 12-1). The ground surface surrounding Snoqualmie Library is predominantly covered by pavement and the Snoqualmie Library building except for limited landscaped areas. The finished floor elevation of the Snoqualmie Library building ranges between 72 and 75 feet. A storage basement is present beneath the former power distribution house with a finished floor elevation of 66 feet. The surrounding area slopes down to the north with ground surface elevations ranging from approximately 69 to 65 feet within the Commerce pedestrian corridor.

12.2.2. Historical Land Use

Historically, land uses have differed in the northern and southern portions of Snoqualmie Library. A former power distribution house was historically in use in the northern portion of the property while the Griffin Fuel Company operated in the southern portion of the property (Figure 12-2). Historical operations in the northern and southern portions of the Snoqualmie Library are as follows:

- **Northern Portion of Snoqualmie Library.** The Snoqualmie Falls Power Company built a three-story building to house its power distribution house in the northern portion of the Snoqualmie Library property in the early 1900s, which included nine water-cooled electrical transformers. The original address for the power distribution house was 1902 South C Street (later known as Commerce Street). The power distribution house continued operations by various power companies, including the Seattle Tacoma Power Company and Puget Sound Power and Light Company between about 1912 and 1958. After this time, the transformer house was converted into a warehouse for storage and later used by the Shaub-Ellison Company to house its tire vulcanization business starting sometime between 1959 and 1983. The Shaub-Ellison Company continued operations at this location until 1993.

Photo 12-1: Circa 1940 Photograph of the Griffin Fuel Company office building in the foreground and the power distribution house in the background.

- **Southern Portion of Snoqualmie Library.** A wood yard and small building were present on the southern portion of the Snoqualmie Library property in 1896. At this location, the Griffin Fuel Company operated between at least 1912 and at least 1969 and may have started operations as early as 1889 when Griffin Fuel's business started. Wood, coal, and fuel products were stored within the southern portion of the Snoqualmie Library property for distribution and sales during the historical operations. Several coal and wood storage areas were present in the 1912 Sanborn map (Figure 12-2). A one-story building with an adjoining canopy located south of the power distribution house was reportedly used as an office by the Griffin Fuel Company during its operations between at least 1940 and 1969 (Photo 12-1). Operations at this location between the 1970s and 1990s are not known based on the available resources. Additional details regarding operations to the south (within Cragle) are further discussed in Section 5.0.

12.2.3. Current and Future Land Use

UW purchased the Snoqualmie Library property and adjacent properties in the early 1990s. The surrounding ROW (portions of Commerce Street and South 19th Street) was vacated between the late 1990s and 2002 and the historical parcel expanded to the current parcel boundary (Figure 12-3). UW was gifted the PLT property from BNSF in 2013.

The building in the southern portion of Snoqualmie Library was demolished in the mid-1990s to construct the new Snoqualmie Library Building. At this time, the former power distribution house was renovated and incorporated into the new Snoqualmie Library Building. The areas to the north and east were also redeveloped by UW for the construction of the Commerce Pedestrian Corridor and plaza, and the South 19th Street stairs. The structures on the adjacent properties have either been renovated or demolished and redeveloped as new campus buildings or pedestrian access since that time. The Snoqualmie Library Building footprint and associated subsurface utilities and adjacent properties are shown on Figure 12-3.

Anticipated future land use in this area will remain academic to support the UWT Campus with surface streets, street parking and pedestrian access.

12.2.4. Utility Infrastructure

Current utility infrastructure within and adjacent to Snoqualmie Library with the potential to serve as preferential pathways for contaminant migration is shown on Figure 12-3 and includes the following:

- One north-south oriented electrical duct bank is present in the plaza. The base of the duct bank is elevation 66 feet on the southern portion of Snoqualmie Library and 55 feet north of Snoqualmie Library (approximately 5 to 8 feet bgs).
- One east-west oriented utilidor is present south of the former power distribution house. The elevation of the floor of the utilidor ranges between 63 feet adjacent to the Snoqualmie Library Building (approximately 7 feet bgs) and drops to 54 feet (approximately 14 feet bgs) as the utilidor floor crosses below the north-south oriented duct bank described above.
- One north-south oriented 8-inch-diameter sanitary sewer line is present in the plaza with an inlet elevation of 59 feet on the southern portion of Snoqualmie Library (approximately 10 feet bgs) and elevation of 48 feet north of Snoqualmie Library (approximately 16 feet bgs). The sanitary sewer is constructed of PVC and replaced the former sanitary sewer between 1995 and 1998. Two sanitary sewer laterals enter the Snoqualmie Library Building.
- One north-south oriented 12-inch-diameter storm sewer line with multiple connections and catch basins in the plaza is present. The invert elevations of the main stormwater line are between 62 feet and 57 feet (approximately 5 to 7 feet bgs).
- One north-south oriented utilidor (approximately 10 feet wide and 10 feet deep) located west of the Walsh Gardner, William W. Philip Hall, and Cherry Parkes Buildings). The elevation of the floor of the utilidor is 48.6 feet.

Additionally, multiple other utilities service the Snoqualmie Library Building.

12.3. Field Investigations and Remedial Actions

Multiple environmental investigations have been completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations documenting soil and groundwater conditions and remedial actions completed for Snoqualmie Library and/or the surrounding area are discussed in Sections 12.3.1 through 12.3.5 below. Sampling locations used to evaluate soil and groundwater conditions are shown on Figures 12-4 through 12-6. Investigations completed for Snoqualmie Library and the surrounding area to support the development of the RI are summarized in Tables 12-1 and 12-2. Construction details for permanent monitoring wells installed within Snoqualmie Library and the surrounding area are presented in Table 12-3. Soil and groundwater results for the subsurface investigations completed are presented in Tables 12-4 and 12-5, respectively.

12.3.1. Pre 1997 Agreed Order Investigations and Remedial Action

An environmental investigation was completed at Snoqualmie Library prior to the 1997 Agreed Order to evaluate soil and groundwater conditions along with subsequent remedial action. UW initiated the environmental investigation as a part of the property acquisition in 1993. The investigation and remedial actions are described further below. Soil and groundwater sampling locations are shown relative to Snoqualmie Library on Figure 12-4.

12.3.1.1. Soil and Groundwater Investigation Summary

Investigation activities were completed at Snoqualmie Library by AGI to evaluate soil and groundwater conditions on behalf of UW between 1993 and 1994. Investigation activities included the collection of soil samples from HSA and hand auger borings, TP explorations, and the collection of groundwater samples from permanent monitoring wells. These investigations included the following:

- Completion of seven HSA borings (PS-MW1 through PS-MW5, SH-MW3, and SH-MW4) to approximate depths ranging between 13 and 29 feet bgs. These borings were completed as permanent monitoring wells. Soil samples collected from approximately 2.5 to 28 feet bgs in the borings were submitted for a combination of analyses including TPH-HCID, TPHG, TPH-D, and BTEX. Two samples collected at 7.5 and 12.5 feet bgs from boring location PS-MW1 were also analyzed for metals and the other select VOCs. TPH-G, TPH-D, and metals were detected in soil samples collected between 2.5 and 12.5 feet bgs in boring PS-MW1. TPH-G, TPH-D, ethylbenzene, and/or total xylenes were also detected in a soil sample collected from boring PS-MW5 at 12.5 feet bgs; TPH-G and TPH-D were detected in a soil sample collected at 28 feet bgs in boring SH-MW4. Other contaminants were not detected in the analyzed samples. Groundwater samples collected in June 1993 and April 1994 from monitoring wells PS-MW1 through PS-MW5, SH-MW3, and SH-MW4 were analyzed for TPHG, TPH-D and select VOCs. TPH-G, TPH-D, and/or BTEX were detected in groundwater samples collected from PS-MW1, PS-MW2, PS-MW5, and SH-MW4. In addition, CVOCs (TCE and mixed DCEs) associated with the Easterly Plume were detected in one or more of these wells. DCA was detected in one well (PS-MW1) in one of the two monitoring events. CVOC contamination is further discussed in Section 15.0.
- Completion of three TPs (PS-TP1 through PS-TP3) to depths ranging between approximately 8 and 9 feet bgs in March 1994 (115). Four soil samples (two from test pit TP-1 and one each from test pits PS-TP2 and PS-TP3) were collected from depths ranging between approximately 6 and 9 feet bgs for chemical analysis of TPH. The soil sample from test pit PS-TP1 was also submitted for chemical analysis of BTEX. TPH and BTEX were not detected in the analyzed soil samples.

- Completion of a hand auger soil boring (SH-SS1) to an approximate depth of 1-foot bgs beneath the loading dock west of the former Shaub-Ellison Building. Shallow soil samples collected at a depth of approximately 1-foot bgs in this boring were submitted for a combination of analyses including TPH-G, TPH-D, select VOCs, and metals. TPHD, TPH-O and metals were detected in the soil samples. Other contaminants were not detected in the analyzed samples.

12.3.1.2. UST Removal and Remedial Action Summary

Remedial excavation and subsequent confirmation soil sampling activities were completed between 1994 and 1995 following the removal and closure of three USTs from the property (Figure 12-4). Remedial excavation activities resulted in the removal of approximately 1,600 cubic yards of petroleum-contaminated soil based on the initial soil characterization (described above) from two separate areas (described below). Results of the confirmation soil samples collected at the final remedial excavation limits verified the removal of the previously identified petroleum-contaminated soil with the exception of soil represented by samples PS-S1, PS-S2, PS-S5, PS-S6, PS-S7, and PS-S15, collected at depths ranging between 7 to 18 feet bgs on the northern and eastern boundaries of the excavation.

USTs were generally grouped into two general areas. Details of the UST removal areas are summarized below including the initial sampling completed, and the remedial excavation activities completed to address the observed petroleum contamination. USTs, remedial excavation areas and confirmation soil samples are shown on Figure 12-4.

- **Heating Oil UST Area**. One 500-gallon heating oil UST and associated piping were removed in March 1994. The condition of the heating oil UST was not noted during UST removal and the volume of soil removed was not reported following the remedial excavation activities. However, two composite soil samples were reportedly collected at 6 feet bgs (PS-SS-3 from the south and west sidewalls and PS-SS-4 from the north and east sidewalls of the excavation) for chemical analysis of TPH-G and TPH-D. A base soil sample was not collected due to the presence of groundwater within the excavation. TPH-G and TPH-D were not detected in the analyzed soil samples.
- **Gasoline/Diesel UST Area.** One 1,000 gasoline UST was removed in March 1994. Corrosion holes were reportedly observed on the side of the gasoline UST following removal. The dimensions for the 1994 gasoline UST excavation reportedly measured approximately 4 feet wide by 9 feet long by 7 feet deep. Approximately 15 cubic yards of soil were removed from this area. Five soil samples (P-SS-5 through PS-SS-9) were collected at the final UST removal excavation limit to evaluate soil conditions at the sidewalls and base of the excavation. Soil samples were analyzed for TPH-G and BTEX. TPH-G, ethylbenzene and total xylenes were detected in three of the four soil samples collected at depths ranging from approximately 5 and 7 feet bgs. An additional 950-gallon diesel UST was encountered and subsequently removed from this area in July/August 1995 during remedial excavation. The 950-gallon diesel UST was discovered adjacent to a previously removed gasoline UST during excavation in 1995. The tank was reportedly heavily oxidized with abundant pits and multiple corrosion holes were observed during removal (118 and 121).

  Remedial excavation activities were performed in this area in 1995 (1995 Remedial Action) to depths ranging from approximately 16 to 21 feet bgs to remove soil with TPH-G, TPH-D ethylbenzene, and total xylenes based on the results of the UST removal and sampling completed for the gasoline and diesel USTs and surrounding area. Shoring was installed on the eastern boundary of the planned remedial excavation adjacent to the former Commerce Street ROW. Fifteen discrete confirmation soil samples (PS-S1 through PS-S15) were collected from the base and sidewalls of the remedial excavation to verify

the removal of the petroleum-contaminated soil and were submitted for a combination of analyses including TPH-G, TPH-D, TPH-O, BTEX, and lead. Soil represented by sample PS-S-UST-1 was subsequently over-excavated based on the confirmation sample results. The new excavation limit was resampled (sample PS-S5) to confirm the removal of the petroleum contamination. TPH-G and TPH-D were detected in five of the confirmation soil samples (PS-S1, PS-S2, PS-S5, PS-S6, PS-S7, and PS-S15) collected from the final limits of the excavation. Toluene, ethylbenzene, and total xylenes were detected in three of the final soil samples (PS-S1, PS-S2, PS-S5, and PS-S6). Approximately 20,000 gallons of wastewater were generated as a result of dewatering during the remedial excavation and discharged into the City's sanitary sewer following treatment.

Soil generated from the remedial excavations was mechanically screened, mixed with reagents, and land farmed on Cragle and Jet Parking to promote enhanced ex-situ biological degradation of the petroleum constituents. The land-farmed soil was used as backfill for the remedial excavation upon confirmation that the soil met the reuse criteria established for the project (126). Treated soil was mixed with imported soil and placed to meet finished grades. The depth at which the treated soil was placed was not documented.

12.3.2. 1997 Agreed Order Remedial Investigation

URS on behalf of UW, completed an RI for the eastern portion of the UWT Campus between 1997 and 2002 in accordance with the 1997 Agreed Order. As part of the 1997 Agreed Order RI, investigation activities were generally completed east (downgradient) of Snoqualmie Library to further evaluate soil and groundwater conditions in areas where petroleum-related contaminants were previously identified, to evaluate soil and groundwater conditions associated with adjacent properties (i.e., Cragle [Section 5.0] and Shaub-Ellison [Section 11.0]), to evaluate soil conditions in the vicinity of an abandoned natural gas pipeline, and in areas not previously investigated. Investigation locations are shown on Figure 12-4.

12.3.2.1. Soil Investigation Summary

Soil investigations completed in the vicinity of Snoqualmie Library as part of the 1997 Agreed Order RI included the following:

- Completion of four borings (PS-GW2, PS-MW6, PS-MW7, and PS-MW8) to depths ranging between approximately 9 to 38 feet bgs to evaluate soil and groundwater conditions in this area. Borings PS-MW6, PS-MW7 and PS-MW8 were completed as permanent monitoring wells to evaluate groundwater conditions as described below (Section 11.3.2.2). A total of 10 soil samples collected from these borings at varying depths were analyzed for TPH-G, TPH-D, TPH-O and BTEX. TPH-G and/or TPH-D were detected in soil borings PS-MW6 and PS-MW7 at depths ranging between 12.5 to 15 feet bgs. Other contaminants were not detected in the remaining analyzed soil samples.
- Completion of five DP borings (DMB-17 to DMB-21) to depths ranging between approximately 9 and 12 feet bgs to evaluate soil conditions in the former Commerce Street ROW adjacent to an abandoned natural gas pipeline. A total of seven shallow soil samples collected from these borings at depths of 6 to 9 feet bgs were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, and PAHs. One sample collected at 9 feet bgs in DMB-18 was also analyzed for select VOCs. Ethylbenzene and 1,2,4-TMB were detected in the soil sample collected from boring DMB-18 at 9 feet bgs. Other contaminants were not detected in the analyzed soil samples.
- Completion of one boring (BL-MW6) to further evaluate benzene and CVOCs in groundwater downgradient of the Bleckert parcel located south of Snoqualmie Library. BL-MW6 was completed

approximately 110 feet southeast of the 1995 Remedial Action Area. One soil sample collected from this boring at approximately 30 feet bgs was analyzed for select VOCs including BTEX and TCE. VOCs were not detected in the analyzed soil sample.

12.3.2.2. Groundwater Investigation Summary

A total of 48 groundwater samples were collected from seven permanent monitoring wells and 12 temporary wells (see Tables 12-2 and 12-3) as a part of the 1997 Agreed Order investigation. Grab groundwater samples from temporary wells were also collected at the time of soil exploration activities. Permanent monitoring wells were sampled on a quarterly basis between October 1998 and September 1999 with two additional rounds of monitoring completed in April 2000 and September 2000. Groundwater samples were analyzed for TPH-G, TPH-D, TPH-O, BTEX, and select VOCs, except for grab samples collected from BL-GW3_TW1, BL-GW3_TW2, BL-GW4_TW1, BL-GW4_TW2, BL-GW5, BL-MW6_TW1, and BL-MW6_TW2, which were only analyzed for BTEX and other select VOCs. Groundwater from DMB-21 was only analyzed for TPH-G and select VOCs.

TPH-G, TPH-D, TPH-O, and/or BTEX were detected in multiple samples with the highest concentrations detected in wells located downgradient from the 1995 Remedial Action area (Figure 12-4). The greatest concentrations were detected in temporary wells PS-GW1 and PS-GW2 and permanent wells PS-MW6 and PS-MW7. CVOCs including TCE, cis-DCE, trans-DCE, DCE and vinyl chloride associated with the Easterly Plume were also detected in groundwater, which is further discussed in Section 15.0.

12.3.3. Supplemental Investigations Under the 1997 Agreed Order

Supplemental investigation activities were completed in accordance with the 1997 Agreed Order to further evaluate groundwater conditions for Snoqualmie Library and the surrounding area in 2013. Supplemental investigation activities are summarized in Section 12.3.3.1 below. Investigation locations are shown on Figure 12-4.

Supplemental groundwater monitoring for Snoqualmie Library included the collection of samples from nine existing monitoring wells (see Table 12-2) generally located east of the 1995 Remedial Action area. Water samples were analyzed for a combination of TPH-G, TPH-D, TPH-O and VOCs. One sample collected from BL-MW3 was also analyzed for PAHs and metals. TPH-D and n-propylbenzene were detected in wells PS-MW6 and PS-MW7. In addition, CVOCs (TCE, cis-DCE, trans-DCE, DCE, and vinyl chloride) and/or metals were detected in multiple wells. CVOC contamination is associated with the Easterly Plume, which is further discussed in Section 15.0. Metals detected in well BL-MW3 are further discussed in Section 5.0 (Cragle).

12.3.4. 2016 Agreed Order Remedial Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions for Snoqualmie Library in accordance with the RI Work Plan and subsequent addenda (Section 4.0) are summarized in Sections 12.3.4.1 and 12.3.4.2 below. These activities included the collection of soil samples from one supplemental soil boring and the collection of groundwater samples from seven permanent groundwater monitoring wells (see Tables 12-1 and 12-2). Exploration locations for the 2016 Agreed Order RI are shown on Figure 12-5.

12.3.4.1. Soil Investigation Summary

Additional soil data gaps requiring further investigation for Snoqualmie Library as part of the RI were not identified by the RI Work Plan based on the results of previous investigations (described above) and the

results of capital projects completed on adjacent properties (described below). However, soil samples collected from boring A11-MW26S completed east of Snoqualmie Library (Figure 12-5) to evaluate the nature and extent of contamination associated with the Easterly Plume were also used to further evaluate soil conditions associated with Snoqualmie Library. From this location, a total of seven soil samples collected at approximate depths ranging between 5 to 30 feet bgs were analyzed for TPH-G, TPH-D, TPH-O, BTEX, and select VOCs. In addition, a soil sample collected from approximately 5 feet bgs was also analyzed for PAHs and metals in addition to the TPH and VOC analysis. TPH-D was detected at a depth of 22 to 23 feet bgs in one soil sample and naphthalene was detected in one soil sample collected from 5 feet bgs. CVOCs (TCE) associated with the Easterly Plume were also detected in select soil samples and are further discussed in Section 15.0. Other contaminants were not detected in the analyzed soil samples.

12.3.4.2. Groundwater Investigation Summary

A total of 41 groundwater samples (including duplicates) were collected between 2016 and 2020 for the 2016 Agreed Order RI from the network of new and existing monitoring wells (see Table 12-2) to further evaluate groundwater conditions and define the nature and extent of contamination resulting from historical operations at Snoqualmie Library. Groundwater samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, and select VOCs at well locations screened within the Qvi aquifer, Qvi/Qva aquifers where the Qvi and Qva silt layers are absent, and Qva aquifer (geologic and hydrogeologic conditions in the vicinity of Snoqualmie Library are further discussed in Section 12.4.2). Groundwater monitoring activities and results associated with Snoqualmie Library are discussed below.

- A total of six groundwater samples were collected from monitoring well BL-MW3 screened within the Qvi aquifer located downgradient of the Snoqualmie Library Building during the RI. Petroleum-related contaminants associated with Snoqualmie Library were not detected in the analyzed groundwater samples at this location.
- A total of 19 groundwater samples were collected from monitoring wells BL-MW4, BL-MW6, A11-MW26S, and CR-MW12 screened within the Qvi/Qva aquifers (where hydraulically connected) located downgradient of the Snoqualmie Library Building during the RI. Results of groundwater samples collected within the Qvi aquifer identified TPH-G, TPH-D, and n-propylbenzene in well A11-MW26S. Other contaminants were not detected in the analyzed samples.
- A total of 16 groundwater samples were collected from monitoring wells PS-MW6, PS-MW7, and PS-MW8 screened within the Qva aquifer located downgradient of the Snoqualmie Library Building during the RI. Results of groundwater samples collected within the Qva aquifer identified TPH-G, TPH-D, TPH-O benzene, total xylene, 1,2,4-TMB, and/or n-propylbenzene in wells PS-MW6 and PS-MW7. The laboratory flagged select detected TPH-G and TPH-O concentrations and indicated the detection in the TPH-D range was impacting the TPH-G and TPH-O results. Low-level concentrations of TPH-O were also detected in well PS-MW8 during the 2016 sampling event. Additionally, abnormally high concentrations of TPH-D, TPH-G, and TPH-D were detected in groundwater samples collected from monitoring well PS-MW7 in September 2019 (see Table 12-5) and were interpreted to be potential LNAPL. LNAPL is an immiscible organic liquid that is less dense than water (1035). Therefore, groundwater sampling protocols were updated following the September 2019 groundwater monitoring event to include LNAPL measurements during groundwater sampling of wells A11-MW26S and PS-MW6 through PS-MW9. LNAPL was observed in wells PS-MW6 and PS-MW7 during subsequent monitoring events as follows:
  - **PS-MW6**. 0.03 feet of LNAPL was measured during the March 2020 monitoring event.
  - **PS-MW7**. 0.03 feet of LNAPL was measured during the September 2020 monitoring event.

LNAPL was not observed during other sampling events or other wells. CVOCs (TCE, trans-DCE, cis-DCE, DCE and vinyl chloride) associated with the Easterly Plume were also detected in select groundwater samples and are further discussed in Section 15.0.

12.3.5. Capital Projects

Investigation and remedial action activities were necessary to implement UW Capital Projects. Capital projects and investigation activities in the vicinity of Snoqualmie Library are summarized in Sections 12.3.5.1 through 12.3.5.3. Soil and groundwater sampling locations are shown on Figure 12-7.

12.3.5.1. Phase IIB Utility Capital Project

Environmental investigations were completed in 2002 as part of the planning and design for landscaping and utility installation activities to be completed west of Cherry Parkes Buildings (155). As part of this investigation, five borings (Phase II B-17 through Phase II B-20 and BL-MW7) were completed to depths up to approximately 30.5 feet bgs to evaluate soil in this area. Boring BL-MW7 was completed as a permanent groundwater well. A total of 10 soil samples collected from these borings at varying depths were analyzed for TPH-G, TPH-D, TPH-O, BTEX and select VOCs. Two shallow samples collected from BL-MW7 and Phase II B-20 were only submitted for metals. TPH-G and total xylenes were detected in soil from boring Phase II B-18 at a depth of approximately 15.5 to 16 feet bgs. Metals were detected in the soil samples collected from BL-MW7 and Phase II B-20. Other contaminants were not detected in the remaining analyzed soil samples. Soil represented by these samples was subsequently excavated and removed from this area as part of the utility work completed.

12.3.5.1.Walsh Gardner Capital Project

A 575-gallon heating oil UST was removed from within the Walsh Gardner Building located at 1908 Pacific Avenue in April 1996. Visual inspection of the UST indicated slight corrosion and pitting, but no visible holes. Approximately 5 cubic yards of soil were excavated and transported to Jet Parking for treatment during UST removal activities. A total of five soil samples were collected at the final limit of the UST removal excavation and analyzed for TPH and BTEX. Low level concentrations of TPH-O were detected in two soil samples collected from the north and west sidewalls. Other contaminants were not detected. In addition, approximately 20,000 gallons of groundwater generated as part of the Walsh Gardner Capital Project were stored in a storage tank for treatment and discharged to the City's sanitary sewer.

12.3.5.2. Cherry Parkes Capital Project

Three soil borings (CP-B3, CP-B4A, CP-B4B) were completed in April 2002 at the Cherry Parkes Building Capital Project located east of Snoqualmie Library. The purpose of the investigation was to characterize property soil and shallow groundwater in preparation for construction. The borings were completed to depths ranging between approximately 6 to 40 feet bgs. In addition, one groundwater sample was collected from a temporary well at CP-B4A. Soil and groundwater samples collected from the borings were analyzed for a combination of TPH, VOCs and metals. Metals were detected in the analyzed soil samples. TPH and VOCs were not detected in the analyzed soil samples. Toluene was detected in the analyzed groundwater sample. Other contaminants were not detected in the groundwater sample.

12.3.5.3.William W. Philip Hall Capital Project

Six soil borings (AH-B01 through AH-B06) were completed at the William W. Philip Hall (former Assembly Hall) Building located at 1912 Pacific Avenue between 2004 and 2006 to characterize property soils in preparation for the construction of the William W. Philip Hall Building. The borings were completed to depths ranging between approximately 5 to 15 feet bgs. In addition, two borings (AH-BOX-01 and

AH-BOX-02) were completed to depths between approximately 3 to 5.5 feet bgs to characterize material used to infill a former concrete vault in the southern portion of this property (not shown on Figure 12-7). Soil samples collected from the borings were analyzed for TPH, metals, VOCs and PAHs.

TPH and VOCs were not detected in the analyzed soil samples. Other potential contaminants of concern including total cPAHs and metals were identified in the analyzed soil samples. Metals and cPAHs from this area are further discussed in Section 17.0 (Area-Wide Soil).

12.4. Conceptual Site Model

Development of the CSM for Snoqualmie Library is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for Snoqualmie Library is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 12.4.1 through 12.4.4 describe the specific elements of the Snoqualmie Library CSM.

12.4.1. Physical Setting

Snoqualmie Library is located in the east-central portion of the UWT Campus. Demolition of former structures and remedial excavation was completed following property acquisition by UW in the early 2000s to support the UWT Campus Master Plan for higher education and learning. The Snoqualmie Library and the east adjacent Commerce Pedestrian Corridor were completed in the late 1990s.

12.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic settings for Snoqualmie Library (described in the following sections) inform the distribution of contaminants in media of potential concern. Local geology and hydrogeology in the vicinity of Snoqualmie Library are described below in Sections 12.4.2.1 and 12.4.2.2.

12.4.2.1. Local Geology

Geologic units present beneath Snoqualmie include the Qf, Qvi and Qva deposits. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings beneath Snoqualmie Library and the surrounding area consists of locally derived reworked and treated ice-contact deposits and glacial outwash deposits or imported fill material used within the former remedial excavations and construction of the terraced plaza area. Fill extends to depths of between approximately 8 and 21 feet bgs (approximate elevation 58 to 44 feet[10]) within the 1995 remedial excavation footprint west of the former Commerce Street ROW. The imported fill is composed of silty sand with trace gravel. Fill material in the area east of the Snoqualmie Library is composed of brown and gray silty sand, and sand with silt and gravel that extends to depths between approximately 6 and 14 feet bgs.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till, subglacial channel materials and lacustrine materials deposited beneath the glacial ice along the ice margin during the last glacial period. The Qvi

[10] Previous ground surface elevation 66 feet based on 1995 Grading and Drainage Plan (Sheet C2.00).

deposits were observed east and south of Snoqualmie Library and range in thicknesses of 2 to 8 feet and consist of Qvi till-like deposits and Qvi channel deposits.

- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** Qva deposits beneath Snoqualmie Library consist of sand/gravel to the full depth explored.

12.4.2.2. Local Hydrogeology

Groundwater in the southeast portion of the UWT Campus occurs within both the Qvi (shallow) and Qva (deep) aquifers (Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Locally, the confining silt layers have been removed as a result of construction for the Snoqualmie Library. Additionally, incision during the last glacier retreat (approximately 10,000 to 13,000 years ago) has locally resulted in the absence of the confining layer separating the Qvi and Qva aquifer (i.e., Qvi and/or Qva silt) to the south of Snoqualmie Library (further discussed in Section 5.4). As a result, groundwater contained within the Qvi aquifer either drains into the underlying Qva aquifer or is locally absent.

Local groundwater occurrence and flow for the Qvi/Qva aquifers are summarized below.

Qvi/Qva Groundwater Occurrence and Flow

The Qvi aquifer is generally not observed in the vicinity of Snoqualmie Library except to the west and north of this location (Figures 2-14 through 2-16). Where present, the Qvi aquifer is primarily contained within the sand and gravel seams of the Qvi till-like deposits and Qvi channel deposits. Monitoring wells east of Snoqualmie Library are screened across both the Qvi and Qva deposits where the confining silt layers are absent. The underlying Qva aquifer is locally unconfined and occurs and flows primarily within the sand and gravel layers at depths between approximately 13 and 2 feet bgs (Table 12-5). The inferred groundwater flow direction in the Qvi/Qva aquifers across Snoqualmie Library is generally east-northeast toward the Thea Foss Waterway, which is consistent with the generally easterly UWT Campus-wide Qvi and Qva groundwater flow directions (Figures 2-14 and 2-19).

The local estimated average linear groundwater velocity within the Qva aquifer is approximately 1.50 ft/day with a hydraulic gradient of 0.05 ft/ft. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

12.4.3. Sources of Contamination

The primary source of petroleum contamination is historical releases from the former gasoline and diesel USTs that were in place at the Snoqualmie Library Site prior to removal in 1994 and 1995. Other non-petroleum COCs Associated with off-Snoqualmie Library sources that have migrated onto the Snoqualmie Library Site are not included in this section and are discussed in other plume-specific sections of this RI Report (Section 15.0 Easterly Plume).

12.4.4. Potential Receptors and Exposure Pathways

Current and future land use were considered when evaluating potential receptors and exposure pathways for Snoqualmie Library. The current and planned future land use is a UWT Campus Building

(Snoqualmie Library) with adjacent UWT Campus parking and pedestrian corridors, which consist primarily of impervious surfaces except for bordering landscape areas. Precipitation falling to the ground surface either infiltrates into the ground (unpaved areas) or is captured by roof drains and catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway. The surrounding area is commercial and academic. It is assumed that future land use will be similar to its current use.

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

- **Direct Contact**. The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities.
- **Drinking Water.** Groundwater within the Qvi/Qva aquifers beneath Snoqualmie Library and the UWT Campus as a whole is not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.
- **Surface Water.** Surface water discharge from Snoqualmie Library is not considered to be a current exposure pathway because the majority of the ground surface is capped with hardscapes, stormwater is directed to stormwater utilities, and the Thea Foss Waterway is more than 1,000 feet east of the UWT Campus.
- **Indoor Air**. VI into the Snoqualmie Library Building and surrounding buildings is considered an exposure pathway based on the concentrations and location of TPH-impacted soil and groundwater. The potential for VI and impacts to indoor air is further discussed below in Section 12.6.4.

12.5. Proposed Cleanup Levels

PCULs were developed for the Snoqualmie Library for the protection of human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (WAC 173-340), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water use, potential exposure pathways, and the potential receptors specific to Snoqualmie Library. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for Snoqualmie Library is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels.** PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b). Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being

applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).

- **Proposed Indoor Air Cleanup Levels.** Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of vapor intrusion were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

12.6. Nature and Extent of Contamination

12.6.1. Contaminants and Media Concern

Characterization data for Snoqualmie Library are summarized in Tables 12-4 and 12-5 and were evaluated to determine contaminants and media of concern for the Snoqualmie Library Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions (i.e., post-remedial excavation confirmation samples and samples from soil explorations collected beyond the final remedial excavation limit) is presented in Table Q-22 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2020) is presented in Table Q-23 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-24, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-22 through Q-24) include the following:

- **Soil.** TPH-G and TPH-D were identified as primary soil COCs for Snoqualmie Library based on the source of contamination to soil (historical releases from gasoline and diesel USTs) and the characterization results. Most of this contamination was removed as a result of the 1994/1995 Remedial Action as described in Section 12.3. Residual TPHG and TPH-D remain in place at concentrations exceeding the soil PCULs east of the 1994/1995 Remedial Action area. In addition, ethylbenzene and xylenes were identified as secondary soil COCs for Snoqualmie Library. Ethylbenzene and total xylene are considered secondary COCs because these contaminants either are collocated with one or more primary soil COC and infrequently exceed the PCULs. Furthermore, the results of the 2016 Agreed Order RI indicate ethylbenzene and total xylene are not adversely impacting groundwater indicating that the soil to groundwater exposure pathway is incomplete. The nature and extent of soil COCs (both primary and secondary) are further discussed in Section 12.6.2.
- **Groundwater.** TPH-D was identified as a primary groundwater COC for Snoqualmie Library based on results of the 2016 Agreed Order groundwater investigation in which TPH-D exceeded the groundwater PCUL during one or more monitoring events results between 2016 and 2020. TPH-G and TPH-O are not considered COCs because these chemicals exceeded the PCUL during one sample event (March 2019) when LNAPL was interpreted to be analyzed and the laboratory indicated the detected TPH-G and TPH-O concentrations were due to overlap with the TPH-D range and considered estimated. As indicated above, previous investigation results are not considered representative of current conditions, therefore are not used to identify groundwater COCs. The nature and extent of groundwater COCs are further discussed in Section 12.6.3.

- **Soil Vapor.** Based on the screening of soil and groundwater data, TPH-G and TPH-D were identified as COCs with the potential to migrate into enclosed spaces at concentrations that could exceed the Method B indoor air PCULs and/or the SLs for the protection of commercial workers. An evaluation of VI potential is further discussed in Section 12.6.4.

Naphthalene, 1,2,4-TMB, and ethylbenzene were detected in boring DMB-18 at concentrations greater than the PCUL. However, these contaminants were not detected within the Snoqualmie Library source area and/or are located a significant distance away from the source area. The nature and extent of naphthalene, 1,2,4-TMB, and ethylbenzene in boring DMB-18 are discussed further in Section 17.0 (Area-Wide Soil). Additionally, CVOCs (TCE) were detected in soil in boring A11-MW26S, located east of Snoqualmie Library, and in groundwater at multiple locations upgradient and downgradient of the Snoqualmie Library at concentrations greater than the PCUL. The occurrence of CVOCs (TCE, cis-DCE, and vinyl chloride) in soil and groundwater is attributed to the Easterly Plume, as discussed further in Section 15.0, which sources upgradient of Snoqualmie Library and has migrated beneath Snoqualmie Library.

Petroleum-related COCs (TPH-G, TPH-D, and BTEX) for soil and groundwater are shown in plan view on Figures 12-7 through 12-12 and in cross section on Figure 12-13. The nature and extent of COCs in media of concern are further discussed below.

12.6.2.Soil

Remedial excavation activities completed between 1994 and 1995 resulted in the removal of the majority of the identified petroleum-related contamination associated with historical land uses (i.e., former USTs utilized as a part of the historical fuel distribution). Following the remedial excavation activities, residual TPH-G (up to 2,700 mg/kg), TPH-D (up to 5,660 mg/kg), ethylbenzene (up to 0.51 mg/kg), and xylenes (up to 2.6 mg/kg) were detected in soil samples collected along the eastern sidewall of the remedial excavation area at depths ranging between 5 to 18 feet below current grade. Based on the relative age of the soil samples (greater than 20 years old), it is anticipated that some degree of natural attenuation has occurred at this location to reduce the overall contaminant mass based on the overall decrease in contaminant concentrations observed in groundwater. In addition, TPH-G was also detected at a concentration of 40 mg/kg in soil, which slightly exceeded the PCUL of 30 mg/kg in a 1993 sample collected in boring SH-MW4 at a depth of 28 feet bgs. It is believed that the soil represented by this sample has attenuated and is no longer considered representative of current conditions due to the relative age of this sample (more than 30 years old) and magnitude of exceedance.

The nature and extent of TPH-G, TPH-D, and BTEX in soil are shown on Figures 12-7 through 12-9. The residual TPH-G and TPH-D concentrations exceed the SLs for the protection of VI at multiple locations. The potential for VI from the residual TPH-G and TPH-D is further discussed in Section 12.6.4.

12.6.3. Groundwater

The nature and extent of groundwater COCs (TPH-D) for Snoqualmie Library are based on the results of the 2016 Agreed Order RI, which is representative of current conditions. As previously discussed, abnormally high concentrations of TPH-G, TPH-D, and TPH-O were detected in a groundwater sample collected from monitoring well PS-MW7 in September 2019. This result is interpreted to be biased by the presence of LNAPL in the sample observed at this location and is not considered to be representative of current groundwater conditions based on subsequent monitoring events in which TPH-G and TPH-O either were not detected or were detected at concentrations less than the PCUL. TPH-D contamination was detected in the

Qva aquifer during more than one monitoring event during the 2016 Agreed Order RI in wells PS-MW6, PS-MW7, and/or A11-MW26S east and downgradient of the 1995 Remedial Action area, which is considered to represent actual groundwater conditions.

TPH-D was detected at concentrations greater than the PCUL ranging from 620 to 21,000 µg/L (excluding the September 2019 result) in this area. LNAPL was also periodically measured up to 0.03 feet in wells PS-MW6 and PS-MW7. The extent of LNAPL in the vicinity of these wells is estimated to be approximately 280 square feet with an estimated volume of 125 gallons. The downgradient extent of TPH-D contamination in groundwater is estimated to be in close proximity to well A11-MW26S in which TPH-D ranged from non-detect up to 690 µg/L. TPH-D was not detected in groundwater at locations PS-MW8 and BL-MW4.

TPH-D groundwater data from December 2016 and the semi-annual sampling events completed between March 2019 and September 2020 as well as groundwater data for TPH-G and BTEX (for comparison to the soil results) are shown on Figures 12-10 through 12-12. CVOC (TCE, cis-DCE, and vinyl chloride) contamination in groundwater in the vicinity of Snoqualmie Library is discussed further in Section 15.0.

12.6.4. Soil Vapor and Indoor Air

TPH-G and TPH-D were identified as COCs with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SL for the protection of commercial workers based on the results of the soil and groundwater representing current conditions. The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination**. Petroleum-related contaminants in soil were evaluated for potential VI based on Ecology's 2022 VI Guidance. Ecology's guidance states buildings located within the inclusion area (30 feet horizontal and 15 feet vertical separation distance) of soil with TPH-D concentrations greater than 250 mg/kg and TPH-G concentrations greater than 100 mg/kg may be at risk of VI into indoor air (1064). An evaluation of the potential for VI based on current conditions at Snoqualmie Library and the surrounding area is discussed below:
    - Residual TPH-D and TPH-G contamination at locations PS-MW5, PS-S1, PS-SS-6, and PS-MW7 are located at a distance greater than the recommended 30 feet separation distance recommended by Ecology under the VI guidance from any enclosed space. Therefore, the residual TPH-D and TPH-G contamination is not a potential threat for VI in this area.
    - Residual TPH-D and TPH-G contamination at locations PS-S6 and PS-S7 are located at a distance within the recommended 30 feet separation distance, but greater than the 15 feet vertical separation recommended by Ecology under the VI guidance from any enclosed space. The base of the sanitary sewer and utilidor is within 15 vertical feet of the TPH-D contaminated soil and may serve as preferential pathways for soil vapor. However, the horizontal distance along the utility trenches to the Snoqualmie Library Building is approximately 40 feet bgs, which is likely a sufficient distance to allow for the biodegradation of vapors based on the distance. Additionally, the Snoqualmie Library Building is considered a commercial building with an HVAC system that maintains a positive pressure and at least 0.5 air exchanges per hour, further reducing the potential for vapor intrusion. Therefore, the residual TPH-D and TPH-G contamination is not a potential threat for VI in this area.
- **Petroleum-Related Groundwater Contamination.** LNAPL was measured periodically in wells PS-MW6 and PS-MW7 and the anticipated extent of LNAPL is shown on Figure 12-11. The anticipated extent of LNAPL is greater than 30 feet from nearby buildings which is sufficient distance to allow for the biodegradation of vapors. Therefore, TPH is not considered a potential threat.

- **Other Contaminants**. CVOCs including TCE, cis-DCE, and vinyl chloride exceeded the SL for groundwater VI. The potential for VI resulting from CVOCs associated with the Easterly Plume, which extends beneath Snoqualmie Library, is further discussed in Section 15.0.

12.7. Contaminant Fate and Transport

The chemical properties of contaminants and the physical, chemical, and biological processes that they are exposed to affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed on a UWT Campus-wide basis in Section 18.0. Locally, soil and groundwater contamination associated with Snoqualmie Library is located beneath the landscape and hardscape areas with limited vegetation areas that prevent direct exposure (Figures 12-1 and 12-13). Additionally, mobilization of COCs from precipitation is likely limited by stormwater collection and drainage systems that convey the stormwater away from this area. Utility infrastructure that could provide a preferential pathway for contaminant migration is located at an elevation above the groundwater water table and sufficient distance from buildings to prevent vapor intrusion.

Overall, groundwater monitoring completed for the 2016 Agreed Order RI indicates that soil COCs except for TPH-D are not impacting groundwater. Although present, TPH-D contamination in groundwater associated with Snoqualmie Library is limited to the area immediately downgradient of the residual soil contamination remaining in place at the eastern boundary of the 1995 Remedial Action area within Commerce Pedestrian Corridor. While limited LNAPL was observed in wells adjacent to the 1994/1995 Remedial Action Area, groundwater data indicate the TPH concentrations in groundwater are stable and/or are slowly decreasing over time through natural attenuation processes. As previously discussed, natural attenuation refers to naturally occurring processes in soil and groundwater that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of chemicals in those media. These processes may include biodegradation, adsorption, dispersion, dilution, volatilization, and chemical or biological stabilization or destruction of the chemicals (1029).

Adsorption and biodegradation are believed to be the likely active plume-stabilizing processes occurring for the Snoqualmie Library Site to limit the migration of the observed LNAPL based on the results of the RI. Additionally, fine-grained soil with a low effective porosity observed within the Qva aquifer in borings at this location serves to slow the downgradient migration of TPH-D by providing a matrix for ongoing diesel adsorption. TPH-D mobility and concentration are reduced as diesel sorbes to the soil matrix. Biodegradation is a destructive attenuation mechanism whereby microbes in the subsurface oxidize TPH through metabolic processes and is most effective in aerobic conditions (1055). Comparing average values for geochemical parameters such as DO, ORP, nitrate, sulfate, and methane for groundwater in monitoring wells within the plume (A11-MW26S, PS-MW6, and PS-MW7) to those outside the plume (BL-MW3, BL-MW4, BL-MW6, PS-MW8, and PS-MW9) can provide an indication as to whether biodegradation is occurring. Increasing concentrations of methane, and decreasing concentrations of DO, nitrate, sulfate, and ORP values are indicative of active biodegradation. Additionally, the Snoqualmie Library Site is within the Easterly CVOC plume footprint. Collocation of CVOCs with petroleum typically facilitates the biodegradation of petroleum. Overall, comparative values for these geochemical indicators within and outside the plume suggest that biodegradation may be occurring within the plume.

12.8. Summary

Historical land use of Snoqualmie Library has included fuel supply and distribution operations by the Griffin Fuel Company, which operated between at least 1912 and at least 1969, and Snoqualmie Falls

Power Company operations in the northern building. These historical uses resulted in the release of TPH-D, TPH-G, and/or BTEX to soil and/or groundwater. However, most of the identified soil contamination was removed through remedial excavation completed between 1994 and 1995. The extent of residual soil contamination is currently limited to the eastern portion of Snoqualmie Library beneath portions of the Commerce Pedestrian Corridor from approximately 5 to 18 feet bgs (current grade) based on the results of the RI (Figure 12-1 and 12-13). Residual contamination for the Snoqualmie Library Site (as defined by soil and groundwater PCUL exceedances based on current conditions) is generally stable and not migrating further downgradient of this area due to biodegradation and potential adsorption based on the groundwater monitoring data. Periodic LNAPL has been observed in wells PS-MW6 and PS-MW7 between 2019 and 2020 in the Qva aquifer immediately downgradient of the 1994/1995 Remedial Action area.

The Snoqualmie Library Building and associated surrounding hardscapes (sidewalks) constructed between 1995 and 1998 prevent direct contact with contaminants. The stormwater collection system for the Snoqualmie Library Building and the surrounding area prevents the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater. Additionally, there is a sufficient distance between the residual TPH-D and TPH-G contamination and the surrounding buildings to prevent the migration of contaminant vapors from entering occupied indoor spaces.

Soil and groundwater data for the Snoqualmie Library RI are presented in Tables 12-4 and 12-5, respectively. The nature and extent of COCs in soil and groundwater constituting the Snoqualmie Library Site are shown in plan view on Figure 12-1, by chemical/media on Figures 12-7 through 12-12, and in cross section on Figure 12-13.

13.0 REMEDIAL INVESTIGATION—WESTERLY PLUME

13.1. Introduction

The Westerly Plume is generally located between Court F and Jefferson Avenue (west-east) and north of South 17th Street and north of South 21st Street (north-south) in Tacoma, Washington (Figure 13-1). The Westerly Plume consists of multiple commingled plumes in two aquifers from eight identified source areas. Environmental data collected during previous and more recent soil and/or groundwater environmental studies (further discussed in Section 13.3) provide the information needed to define the nature and extent of contamination in media of concern to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of CVOCs including PCE, TCE, DCE, cis-DCE, vinyl chloride, and/or DCA in soil and groundwater at concentrations greater than their respective PCULs resulting from spills and/or releases associated with historical operations and land use from eight separate source areas including discharge of process water with solvents to the City of Tacoma sanitary sewer and a potential dry well in the Tacoma Avenue South. The potential dry well may have been connected to former operations at one of the source areas. Summary statistics for soil and groundwater identifying COCs for the Westerly Plume are presented in Tables Q-25 and Q-26 (Appendix Q).

Primary source areas to the Westerly Plume include: (1) 1701 Tacoma Avenue South, (2) 1755 Fawcett Avenue, and (3) 1742 Jefferson Avenue located within the UWT Campus, plus five additional sources located upgradient (west) of UWT Campus including: (1) 1722 Tacoma Avenue South, (2) 1904-1908 Tacoma Avenue South, (3) 1922 Tacoma Avenue South, (4) 1934-1938 Tacoma Avenue South, and (5) discharges from the City's sanitary sewer located within the Tacoma Avenue South ROW (Figure 13-1).

Other potential contaminant sources to the Westerly Plume were identified based on historical operations and land use as discussed in the RI Work Plan. However, the results of the RI confirm that these potential source areas are not contributing to the Westerly Plume.

PCE and TCE were identified as the primary COCs in soil and groundwater due to their widespread nature throughout the Westerly Plume. Other COCs including cis-DCE, DCE, vinyl chloride, and DCA are generally located in close proximity to the source area and are limited in extent. The contaminant distribution of the Westerly Plume is highly influenced by the chemical properties of contaminants, the location of the eight sources of contamination, underlying geology and hydrogeology, and the presence of building drains and storm utilities. The greatest concentrations of COCs in soil and groundwater are located in the area of Tacoma Avenue South. In soil, the highest detected concentrations are generally within the vicinity of Tacoma Avenue South and near the intersection of South 19th Street and Market Street. COCs were detected at concentrations exceeding the PCUL in soil range from near the ground surface (within the individual source areas) up to approximately 60 feet bgs. In groundwater, TCE is widespread throughout the Westerly Plume in both the Qvi and Qva aquifers extending east to Jefferson Avenue with the greatest TCE concentrations in the vicinity of Tacoma Avenue South. Other contaminants including PCE, cis-DCE, DCE, vinyl chloride, and DCA are limited in extent and are generally limited to the Qvi aquifer between Tacoma Avenue South and Fawcett Avenue.

Soil and groundwater contamination for the Westerly Plume Site (as defined by PCE, TCE, cis-DCE, DCE, vinyl chloride, and DCA PCUL exceedances; Figure 13-1) is predominantly beneath portions of the UWT Campus that are capped by paved ROWs, parking lots, and/or buildings preventing direct exposure. However, CVOC-contaminated groundwater collected by building drains discharging to the City's stormwater system and/or groundwater infiltration into the City's stormwater pipes (each of which discharges to the Thea Foss Waterway) may be a complete exposure pathway to surface water. Modeling results based on sub-slab vapor sampling and indoor air sampling indicate that there is a low potential for VI into the occupied spaces at a concentration that would exceed the indoor air cleanup criteria. Overall, groundwater monitoring completed as part of the 2016 Agreed Order RI indicates that the leading edge of the Westerly Plume Site is stable and is not continuing to migrate toward the Thea Foss Waterway.

The Westerly Plume is shown relative to the surrounding features on Figure 13-1. Terminology for the Westerly Plume referenced by this RI is described below:

- **Westerly Plume**. The extent of CVOC (PCE, TCE, DCE, cis-DCE, vinyl chloride, and DCA) contamination associated with historic operations and/or land use. Sources to the Westerly Plume include the following:
    - **1701 Tacoma Avenue South (Upton—UWT Campus Source Area).** The source or point of release for contamination associated with historic dry cleaner operations on Pierce County Parcel No. 2017110010 (1701 Tacoma Avenue South).
    - **1742 Jefferson Avenue (1742 Jefferson—UWT Campus Source Area).** The source or point of release for CVOC contamination associated with the use of solvents during historic automotive service station operations on Pierce County Parcel No. 2017060030. Petroleum-related contamination associated with historic automotive service station operations at 1742 Jefferson Avenue (Standard Oil Station) is further discussed in Section 8.0.
    - **1755 Fawcett Avenue (Kelly—UWT Campus Source Area).** The source or point of release for CVOC contamination associated with historic cleaner operations on Pierce County Parcel No.

201709011. Petroleum-related contamination associated with historical motorcycle repair operations at Kelly is further discussed in Section 10.0.

- **1722 Tacoma Avenue South (Upgradient Source Area to the UWT Campus).** The source or point of release for CVOC (and potentially benzene) contamination associated with historic photo metal engraving operations on Pierce County Parcel No. 2017120080. The current owner (1722 Tacoma Ave, LLC) was designated a potentially liable party (PLP) by Ecology on March 4, 2020.
- **1904-1908 Tacoma Avenue South (Upgradient Source Area to the UWT Campus).** The source or point of release for CVOC contamination associated with historic auto repair operations on Pierce County Parcel Nos. 2019120010 and 2019120020.
- **1922 Tacoma Avenue South (Upgradient Source Area to the UWT Campus).** The source or point of release for CVOC contamination associated with historic brake repair and tire service operations on historical Pierce County Parcel Nos. 2019120030, 2019120040, and 2019120050. The current Pierce County Parcel No. 2019120131 is a compilation of 10 historic parcels including source property 1934-1938 Tacoma Avenue South.
- **1934-1938 Tacoma Avenue (Upgradient Source Area to the UWT Campus).** The source or point of release for CVOC contamination associated with historic camshaft repair operations on historical Pierce County Parcel Nos. 2019120009, 2019120010, 2019120012, and 2019120013. The current Pierce County Parcel No. 2019120131 is a compilation of 10 historic parcels including source property 1922 Tacoma Avenue South.
- **Tacoma Avenue South Sanitary Sewer (Upgradient Source Area to the UWT Campus).** The source or point of release for CVOC contamination associated with releases from an approximate 1,075-foot section of the City-owned sanitary sewer utility located in the Tacoma Avenue South ROW generally between South 17th Street and South 21st Street.

Specific details regarding the historical property use leading to the release of contaminants, RI activities completed to date, the CSM, and the nature and extent of contamination associated with the Westerly Plume are summarized below.

13.2. Property Conditions

General property conditions for the Westerly Plume area are described in Section 13.2.1. Property conditions specific to the eight individual source areas including location, historical land use, current and future land use, and utility infrastructure are described in Sections 13.2.2 through 13.2.9.

13.2.1. Westerly Plume

13.2.1.1. Location and Description

The Westerly Plume is located within UWT Campus generally west of Jefferson Avenue and includes areas to the west and north of the UWT Campus boundary. The Westerly Plume is generally located between Court F (western extent), South 17th Street (northern extent), South 21st Street (southern extent), and Jefferson Avenue (eastern extent). This area is predominantly occupied by vegetated (grass) lots with paved parking lots and buildings for academic, residential, and commercial purposes. The ground surface across this area generally slopes east toward the Thea Foss Waterway from approximately elevation 250 feet along Court F to elevation 90 feet at Jefferson Avenue over an approximate distance of 2,000 feet.

13.2.1.2. Historical Land Use

General historic land use in the western portion of the UWT Campus is primarily residential with commercial and residential buildings. Historical building footprints and associated commercial uses and/or features are shown on Figure 13-2. Historical residential structures are not shown on Figure 13-2 for simplicity.

13.2.1.3. Current and Future Land Use

The land encompassing the Westerly Plume currently contains paved City ROWs and vacant lots as well as residential, commercial, and academic buildings. UW acquired a majority of the properties contained within the Westerly Plume since the mid-1990s. However, some properties within the UW Master Campus boundary are not owned by UW as shown on Figure 13-3. Properties may be acquired under the UWT Campus Master Plan as they become available for purchase.

Future land use is anticipated to remain a mix of residential, commercial, and academic with pedestrian paths/parks and parking lots. Future land use for properties located beyond the UWT Campus boundary (i.e., west of Tacoma Avenue South and north of South 17th Street) are unknown but are anticipated to generally be consistent with their current use.

13.2.1.4. Utility Infrastructure

Current utility infrastructure present in the ROW and individual properties include sanitary sewer, storm sewer, drinking water, natural gas, underground electrical, overhead electrical, and communications. Utility infrastructure within and adjacent to the Westerly Plume with the potential to serve as preferential pathways for contaminant migration is shown on Figure 13-3 and includes the following:

- **Sanitary Sewer Utility.** Multiple 8-inch sanitary sewer pipes are located within the City ROWs. The catchment area for the sanitary sewer within the Westerly Plume is generally from South 15th Street to South 21st Street and Yakima Avenue to Pacific Avenue. Laterals present on individual properties connect to 8-inch mainline pipes located in the north-south oriented streets. The mainline pipes are sloped south toward South 21st between 0.5 and 2 percent. The 10-inch mainline pipe within South 21st Street slopes east at approximately 14 percent. The majority of the pipes are constructed of terra cotta that were installed in the early 1900s under a City work order. Portions of the sanitary sewer network have been either replaced with modern PVC piping or have been lined with a resin based on a review of the City's resources website as described below.
    - A City of Tacoma utility project in 2022 replaced the following sanitary sewer utilities:
        - On Fawcett Avenue between South 19th Street and South 21st Street.
        - On Court E between 100 feet south of South 19th Street and South 21st Street.
        - On South 21st Street between Tacoma Avenue South and Jefferson Avenue.
    - A City of Tacoma project in 2020 repaired the pipe with cured-in-place thermosetting resin in the sanitary sewer pipe on Fawcett Avenue between South 15th Street and South 19th Street.
    - A City of Tacoma project in 2013 repaired the pipe with cured-in-place thermosetting resin in the sanitary sewer pipe on Market Street between South 15th Street and South 17th Street.
    - A City of Tacoma project in 2012 replaced the sanitary sewer pipe in Market Street from South 17th Street to South 21st Street.
- **Stormwater Utility.** The stormwater network within the Westerly Plume consists of a series of north/south feeder lines and east/west main lines on South 17th Street, South 19th Street, and South 21st Street. The system is comprised of two stormwater sub-basins with discharge to the

Thea Foss Waterway as described in Section 2.3.2.2. Most of the stormwater mainline pipe located in the vicinity of the Westerly Plume was installed between the early 1900s and 1950, except for the stormwater pipe on South 19th Street that was installed in 1973. Multiple sections of the stormwater pipe were replaced between the 1990s and 2022, most notably the north-south pipes on Market Street. As of December 2022, a new 48- to 60-inch-diameter stormwater pipe has been installed within South 19th Street and Jefferson Avenue as part of the Jefferson and Hood Street Surface Water Interceptor Capital Project. The interceptor reroutes stormwater flow across portions of the UWT Campus to Outfall 230.

The majority of the existing stormwater pipes are constructed of unreinforced concrete with newer sections of PVC, HDPE, reinforced concrete, and LDPE or ductile iron. Multiple sections have also been retrofitted with cured-in-place thermosetting resin including the length of South 19th Street except for the section between Tacoma Avenue South and Fawcett Avenue. The slope of the pipes on the east-west streets is approximately 12 to 19 percent. The slope of the pipe on the north-south streets is between 0.5 and 3 percent.

Multiple building drains are connected to the stormwater system, most notably the building drains located at the intersection of South 17th Street and Fawcett Avenue (Y Student Center, Court 17 Apartments, Koz Apartments). The building drains for parcels located at 1904-1908 Tacoma Avenue may also be connected to the stormwater system based on the elevation of the groundwater relative to the building slab.

13.2.2. 1701 Tacoma Avenue South Source Area (Upton—UWT Campus Source Area)

The property at 1701 Tacoma Avenue South was initially developed as an "icehouse" in 1888 on the east side of the property adjacent to the alley. The northeast portion of the property later included a boarding house between 1896 through at least 1912 and potentially through the 1930s. The western portion of the existing building was constructed in 1961. Glow Cleaners and Towne Cleaners (former cleaner businesses) operated at this location until the early 1970s. CVOCs are typically used as solvents in cleaner operations and their use during dry cleaning operations is interpreted to be the primary source of CVOC contamination at the 1701 Tacoma Avenue South Source Area. Upton Electric (sales and rental) began operation at the property in 1974 and continued until about 1988. The footprint of the western portion of the building was expanded to its current configuration during this time. The property was subsequently purchased by UW in the 1990s and has since operated as a music recording studio. Future anticipated use of this property will remain mixed use for commercial/retail or academic under the UWT Campus Master Plan although specific plans for this property have not been identified at this time.

Historical utilities and their use at this location are unknown. Current stormwater drainage consists of catch basins and roof downspouts. The drainage system may be connected to the City's stormwater system although a connection has not been verified. The existing building is likely connected to the sanitary sewer located in Court D because a lateral was not observed in the Tacoma Avenue South sanitary sewer pipe video survey.

13.2.3. 1742 Jefferson Avenue Source Area (1742 Jefferson—UWT Campus Source Area)

A Standard Oil Service Station was formerly located at 1742 Jefferson Avenue situated on the northeast side of the UWT Campus. Standard Oil developed the fuel station in 1932. The station was operated by various entities between 1935 and the 1960s based on City directories, historical photographs and development plans. UW acquired the property in the 1990s and has used the property as a UWT Campus parking lot since that time. Historical land use and operations, service station and utility infrastructure, and current and future land use for 1742 Jefferson are further discussed in Section 8.0.

13.2.4. 1755 Fawcett Avenue Source Area (Kelly–UWT Campus Source Area)

Historically, two former buildings were present at 1755 Fawcett Avenue including a large building on the southern portion of the property and a smaller outbuilding (automobile garage) near the central portion of the property (Figure 13-2). The larger building was used by various commercial businesses between 1931 and 1969. Both the building and the garage were demolished in 1992. At this time, UW acquired this property, which was later developed as a paved parking lot for UWT Campus use by 1998. The parking lot was expanded to the north in 2019. Historical land use and operations, utility infrastructure, and current and future land use for Kelly are further discussed in Section 10.0.

13.2.5. 1722 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus)

The existing building was constructed in 1956 and was historically used for metal photoengraving operations until 1989. West Coast Engravers operated between at least 1958 and 1983 followed by Western Metal Arts to at least 1988. Mastermark of Tacoma is also listed as a business in 1983 in City directories. These operations generated various acids, bases, and solvents based on information from Ecology's Hazardous Waste Division files from 1986 to 1990. Solvents including TCE, TCA, and methyl ethyl ketone (MEK) were recorded as being in use at the property during this time as noted in the hazardous waste files. Other solvents including nitric acid and ferric chloride were also noted as being in use and were typically redistilled and reused at the property. Neutralized nitric acid was reportedly discharged from the property to the sanitary sewer system between 1986 and 1988 based on notes included on the hazardous waste forms.

Permit records and blueprints from 1956 show that the building was designed with up to 16 sinks/wash basins and two floor drains. Three sinks were labeled as "chem sinks" or "etch mach" in 1956 plumbing plans. A floor plan depicting the plumbing system and denoting various building uses was included in a 1992 letter titled "1722 Tacoma Avenue Building" from Pacific Rim Real Estate Group. Locations of floor drains, plumbing lines, and the sump were identified in the letter as well as the layout and use of each room in the building that included the following: solvent room, dark rooms, paint room, compressor room, red rooms, restrooms, lunchroom, offices, and a shipping and receiving area. A report generated in 1992 included a floor plan showing the floor drain system extending to the southwest portion of the building with a total of 12 floor drains. However, this information is inconsistent with the 1956 building plans. The 1956 building plans depict the chemical sinks and floor drains on the western and northern portions of the building draining to a terra cotta sump in this area. The layout of sinks and floor drains representing historical operations is shown on Figure 13-2. The historical sump discharged to a 4-inch-diameter lateral pipe along the north side of the building transferring waste streams to the sanitary sewer within Tacoma Avenue South. The existing bathrooms and kitchen are connected to the sanitary sewer. The roof downspouts are piped underground. The terminus of the downspouts and the presence of a building drain are unknown.

More recently, an awning installation company has operated in the southern and western portions of the building since the late 1980s with multiple business names (Pac Therm, EasyRoll USA, Sunscreen Co, Troger Awnings, and Sunscreen). The northeast portion of the building is currently vacant office space. UW does not currently own this property and it is not part of the UWT Campus Master Plan for future development to support academic growth. The future anticipated use of this property is likely to remain commercial/retail or it may be redeveloped as a residential property based on the area zoning (i.e., Downtown Residential) and current use.

13.2.6. 1904-1908 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus)

A three-story building was constructed on the northern parcel (Pierce County Parcel No. 201920010) in 1891 encompassing three addresses (1902, 1904, and 1906 Tacoma Avenue South) with storefronts along Tacoma Avenue South and apartments on the upper floors (Figure 13-2). Garage and storage areas were present west of the building (1908 Tacoma Avenue South) based on a review of available aerial photographs and the Sanborn fire insurance maps. Historical use of 1904 and/or 1906 Tacoma Avenue South properties related to potential CVOC releases included:

- **1942 to 1947**. K W Factory Warehouse Auto Supplies
- **1953 to 1958**. Allen Motorcycle Sales
- **1963**. Walls Transmission Service
- **1963**. M&G Garage Automobile Repair.

A used car lot operated on Pierce County Parcel No. 2019120020 (1908 Tacoma Avenue South) by 1953 based on City permit records (Elwood Company). The used car lot in this area appears to have been unpaved with multiple vehicles stored in the reviewed aerial photographs up until 1980. Operations from the former automobile repair facility at the 1904 and 1906 Tacoma Avenue South addresses may have extended onto 1908 Tacoma Avenue South. 1908 Tacoma Avenue South property may also have been encroached upon from the brake and tire repair facility to the south (1922 Tacoma Avenue South; further discussed in Section 13.2.6). The building located at 1902–1906 Tacoma Avenue South was demolished in 1988 followed by the construction of the current building and parking lot.

The current two-story building was constructed in the late 1980s/early 1990s on the north parcel (Pierce County Parcel No. 201920010). The first floor is built on a concrete slab with a sloped one-story crawl space on the west side of the building beneath the loading dock. Norco Medical Supplies has operated at this location since the construction of the new building. The southern portion of this property (1908 Tacoma Avenue South) was developed with a parking lot associated with the new building. UW does not currently own this property and it is not part of the UWT Campus Master Plan for future development to support academic growth. The future anticipated use of this property is likely to remain commercial/retail or may be redeveloped as a residential property based on the area zoning (i.e., Downtown Residential) and current use.

13.2.7. 1922 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus)

The property was initially developed in 1953 with a 2,000-square-foot building providing automotive tire, brake, and alignment services at 1922 Tacoma Avenue South (Figure 13-2). OK Auto Float Tire (Photo 13-1) operated at this location between 1958 to at least 1969 and Baldwin Tire and Brake Service operated from at least 1969 to 1993 based on information provided in City directories and historical photographs. Former buildings and structures included a canopy with underlying hoists, two sheds, and a small outbuilding of unknown use based on historical photographs. The northern parking lot appears to have been expanded between 1969 and 1973.

This building was demolished in 1999. The demolition contractor found evidence of soil contamination in the vicinity of the tank as noted on the final inspection permit from the City. Ecology and/or the Tacoma-Pierce County Health Department (TPCHD) do not have records related to a UST removal or remediation in the area and the location and use of the former UST at 1922 South Tacoma Street is unknown.

Photo 13-1. Circa 1969 Photograph of OK Auto Float Tire when Baldwin Tire took ownership.

In July 2020, a manhole was identified within Tacoma Avenue South ROW directly east of the 1922 Tacoma Avenue South property that appears to have been used as a dry well. The location of this manhole is shown on Figure 13-2 and is labeled "Potential Dry Well." Further inspection of this manhole following water and sediment removal indicated that the structure was "L"-shaped extending approximately 3 feet west of the manhole lid toward the 1922 Tacoma Avenue South property. The base of the manhole was a mix of rock, soil, and brick. The lower sidewalls on the east, north, and south were observed to be brick with limited mortar. The upper sidewall and the entire west sidewall were observed to be a concrete overlay. An approximately 4-inch pipe was observed extending west from the base of the manhole structure. This pipe was observed to be sealed and/or blocked and further evidence of its origin could not be identified. No other pipes were observed within the manhole. City video survey records for the sanitary sewer in Tacoma Avenue South indicated no apparent connection between the manhole and the sanitary sewer line. Additionally, the City of Tacoma Environmental Services does not have records of the manhole at this location nor is aware of its use according to Kurt Fremont with the City. Additionally, a GPR survey completed in 2021 identified potentially abandoned underground utilities on the east side of the property. However, the types of potentially abandoned underground utilities are not known.

Currently, this parcel (Pierce County Parcel No. 2019120131) is a consolidation of 10 other historical parcels (see Figures 13-2 and 13-3) and is currently vacant land. UW does not currently own this property and it is not part of the UWT Campus Master Plan for future development to support academic growth. The future anticipated use of this property is likely to remain commercial/retail or may be redeveloped as a residential property based on the area zoning (i.e., Downtown Residential) and current use.

13.2.8. 1934-1938 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus)

Three buildings were formerly located within the 1934-1938 Tacoma Avenue South property as shown on Figure 13-2. The main building was constructed in 1951. The additional structures were constructed between 1996 and 1997 based on a review of City permits. These structures were demolished in 2010. Other structures on the property included single-family residences from at least 1931 up to 1968 based on historical aerial photographs. An access road to Court F was present on the west side of the main building structures as shown on Photo 13-2. From approximately 1983 to 2010, a camshaft repair facility business (Delta Camshaft) operated from this location. Operations at Delta Camshaft included grinding, cutting, milling, and coating camshafts for the engine-building industry based on information provided by the City. Other uses of the property included the organization "Knights of Columbus" as well as various general contractor companies (Doric Lath and Plaster, Kaman KH, Monarch Specialty Contractors) and a security systems company. The property is currently undeveloped and vacant.

Photo 13-2: Circa 2008 Photograph of the former Delta Camshaft Repair Building located at 1934-1938 19Tacoma Avenue South (looking west).

Ecology and the City completed inspections of Delta Camshaft between 2008 and 2010 in response to a complaint filed with Ecology. Very poor housekeeping (see Photo 13-3) was noted by the City's inspection records including multiple open drums and evidence of petroleum/solvent releases from the camshaft rinse areas during the inspections. A manhole of unknown use was also observed during the inspection in the parking area west of the main building. However, this manhole is no longer present. Inspection records indicate that process water from washing the floors was discharged to the sanitary sewer without a permit. The business was "red tagged" by the City in 2010 with the building subsequently demolished soon thereafter.

Photo 13-3: Circa 2008 photograph showing an example of the poor housekeeping practices with open containers and evidence of petroleum and solvent releases from the camshaft rinse areas.

TCE was a typical solvent for cleaning metal and motor vehicle parts during this time period. Delta Camshaft was required to treat the water and obtain an industrial wastewater permit following the City inspection of the property. However, an industrial wastewater permit was not obtained prior to closure.

Currently, this parcel (Pierce County Parcel No. 2019120131) is a consolidation of 10 other historical parcels (see Figures 13-2 and 13-3) and is currently vacant land. UW does not currently own this property and it is not part of the UWT Campus Master Plan for future development to support academic growth. The future anticipated use of this property is likely to remain commercial/retail or may be redeveloped as a residential property based on the area zoning (i.e., Downtown Residential) and current use.

13.2.9. Tacoma Avenue South Sanitary Sewer Source Area (Upgradient Source Area to the UWT Campus)

The sanitary sewer utility within Tacoma Avenue South between South 17th Street and South 21st Street (herein referenced as the Sewer) was constructed in the early 1900s and is composed of terra cotta clay. The 1,075-foot section of Sewer (Figure 13-1) is a "facility" as defined by the MTCA based on the following lines of evidence:

- The City's acceptance of process water to the Sewer generated as part of the historical operations at 1722 Tacoma Avenue (Section 13.2.3).
- Potential discharge of CVOC containing process water as part of historical operations at other Tacoma Avenue South sources (Sections 13.2.4 to 13.2.6).
- Poor condition of the Sewer (i.e., multiple Grade 4 and 5 cracks), which allowed for the exfiltration of CVOC-related contaminants to soil and groundwater downgradient of this location.

The base of the Sewer is situated approximately 7 to 8 feet bgs with a 0.6 to 0.8 percent slope from north to south. Reconnaissance videos by the City and structural damage reports (1011 to 1015) indicate multiple discontinuities (including cracks, fractures, holes, etc.). These discontinuities are classified by the City on a scale of 1 through 5, with Grades 1 through 3 having increasing degrees of cracks/fractures, Grade 4 having multiple fractures, and Grade 5 having holes. The reviewed City reports also show multiple private laterals are present and oriented toward existing and former buildings. The results of the Sewer reconnaissance and observed conditions are presented in Appendix M. Locations of documented Grades 4 and 5 damage to the Sewer within Tacoma Avenue South are shown on Figure 13-3 and illustrated in Photo 13-4.

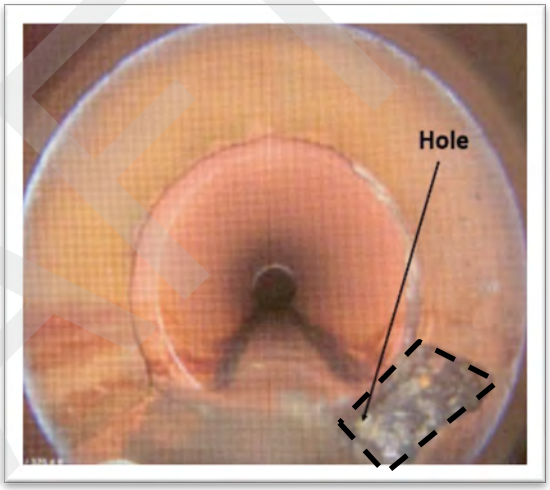


Photo 13-4. 2011 sewer inspection image showing a Grade 5 hole in the pipe.

In addition to the documented damaged portions of the Sewer, multiple laterals that intersect with the main pipe through factory taps or "break-ins" were observed along this alignment. Factory taps not in use appeared to be capped with wood. Currently, the sanitary sewer at this location is used as a primary utility for transporting sewage from properties situated along Tacoma Avenue South from South 15th Street to South 21st Street.

13.3. Field Investigations

Multiple environmental investigations have been completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations documenting soil, soil vapor/air, groundwater, and stormwater conditions associated with the Westerly Plume and/or surrounding area are discussed in Sections 13.3.1 through 13.3.5 below. Sampling locations to evaluate soil, groundwater, and soil vapor conditions associated with the Westerly Plume are shown on Figures 13-4A/B through 13-6A/B. Investigations completed for the Westerly Plume and the surrounding area to support the development of the RI are summarized in Tables 13-1 through 13-4. Construction details for temporary and permanent monitoring wells installed within the Westerly Plume footprint and the surrounding area are presented in

Table 13-5. Soil, groundwater, soil vapor/air, and stormwater investigation results are presented in Tables 13-6 through 13-9.

13.3.1. 1997 Agreed Order Remedial Investigation

URS on behalf of UW, completed an RI for the UWT Campus between 1998 and 2002 in accordance with the 1997 Agreed Order. The Westerly Plume was not specifically identified as an area requiring investigation under the 1997 Agreed Order. However, investigation activities completed in this vicinity included the collection of soil and groundwater samples for 1742 Jefferson as well as other UWT Campus-wide investigations under the 1997 Agreed Order RI. In general, the focus of the 1997 Agreed Order RI in the vicinity of the Westerly Plume was to evaluate the nature and extent of previously identified petroleum-related contamination for the 1742 Jefferson Avenue property located near the intersection of South 19th Street and Jefferson Avenue. Investigation activities for 1742 Jefferson Avenue and other UWT Campus-wide investigations to evaluate soil and/or groundwater conditions relating to the Westerly Plume (i.e., CVOCs) are further discussed in Sections 13.3.1.1 and 13.3.1.2 below. Investigation locations are shown on Figure 13-4.

13.3.1.1. Soil Investigation Summary

Investigation activities to evaluate CVOCs in soil included the completion of borings JS-GW2, JS-B5, JS-B6, and JS-B8 to varying depths up to approximately 60 feet bgs in the vicinity of 1742 Jefferson between 1998 and 2002. A total of seven soil samples collected from these borings were analyzed for TPH, VOCs including petroleum-related VOCs and CVOCs, PCBs, and metals. Petroleum-related contaminants associated with former Standard Oil service station operations are discussed in Section 8.0. CVOCs associated with the Westerly Plume were not detected in the analyzed soil samples with the following exception:

- TCE (1.13 mg/kg), cis-DCE (1.27 mg/kg), chlorobenzene (1.12 mg/kg), and benzene (1.12 mg/kg) were detected in soil at a depth of approximately 3 feet bgs in boring JS-B7 located near the former service station sump.

13.3.1.2. Groundwater Investigation Summary

Investigation activities to evaluate CVOCs in groundwater included the collection of a grab sample from boring JS-GW2 as well as the installation and sampling of permanent groundwater monitoring wells JS-MW1, JS-MW2, and JS-MW3 located in the vicinity of 1742 Jefferson. Additionally, investigation activities included the installation and sampling of permanent groundwater monitoring wells UG-MW3, UG-MW4, UG-MW7, and UG-MW8 located in other portions of the UWT Campus. A total of 16 groundwater samples collected from these temporary and permanent well locations were analyzed for COPCs including CVOCs associated with the Westerly Plume (see Tables 13-2 and 13-7). CVOCs were detected in 11 of the 16 groundwater samples, including the following:

- TCE was detected in groundwater samples collected from JS-MW2, UG-MW3, UG-MW4 and UG-MW8 with a maximum concentration of 204 µg/L in well UG-MW8.
- Cis-DCE (up to 230 µg/L), DCE (up to 2.44 µg/L) and vinyl chloride (up to 75.3 µg/L) were detected in well UW-MW1.
- Chloroform (up to 2.8 µg/L) was detected in wells UG-MW4 and UG-MW8.

In addition to CVOCs, benzene (up to 553 µg/L) as well as other select VOCs were detected in groundwater in one or more wells (see Table 13-7). Groundwater with the greatest CVOC concentrations was observed at UG-MW8 generally located on the east side of 1742 Jefferson.

13.3.2. Supplemental Investigations Under the 1997 Agreed Order

UW completed multiple supplemental rounds of investigation between 2002 and 2015 to further evaluate the source and extent of the CVOC contamination identified in soil and groundwater in the vicinity of South 19th Street and Market Street (upgradient of 1742 Jefferson) during the 1997 Agreed Order RI. Supplemental investigation activities included collection of additional soil and groundwater samples within and upgradient of 1742 Jefferson as well as in other areas planned for redevelopment by UW (including 1701 Jefferson Avenue and 1755 Fawcett Avenue) to further define CVOC contamination associated with the Westerly Plume.

Investigation activities included the completion of 79 borings and 14 TPs with the installation of 39 permanent wells and the collection of grab samples from 11 temporary wells in the western portion of the UWT Campus. Soil borings were completed to depths ranging between 2 and 100 feet bgs with permanent monitoring wells screened across both the Qvi and Qva aquifers. A total of 377 soil samples collected from the soil borings were analyzed for a combination of TPH, VOCs including petroleum-related VOCs and CVOCs, PAHs, PCBs and metals (see Tables 13-1 and 13-6) to further evaluate soil conditions in this area. In addition, a total of 80 groundwater samples collected from the temporary and permanent wells were also analyzed for a combination of TPH, VOCs including petroleum-related VOCs and CVOCs, PAHs, PCBs and metals (see Tables 13-2 and 13-7) to further evaluate groundwater conditions in this area.

Investigation activities and remedial actions specific to the Westerly Plume completed as part of the supplemental investigation under the 1997 Agreed Order are summarized in Sections 13.3.2.1 through 13.3.2.5 below.

13.3.2.1. 2004 Targeted Brownfields Assessment Summary

UW obtained a Targeted Brownfields Assessment grant in 2004 from the EPA to further investigate soil and groundwater conditions at the Campus. EPA contracted Weston Solutions to complete the investigation which included the installation, and collection of soil and/or groundwater samples from monitoring wells BA-MW2 located west of Market Street and north of South 19th Street (Figure 13-4B) as part of this investigation. Two soil samples and one groundwater sample collected at this location were analyzed for select CVOCs. TCE was detected at a concentration of 0.002 mg/kg in one of the two analyzed soil samples. TCE was also detected at a concentration of 0.42 µg/L in the analyzed groundwater sample. Other CVOCs were not detected in the analyzed samples.

Soil and groundwater chemical analytical results are summarized in Tables 13-6 and 13-7, respectively.

13.3.2.2. 2007 TCE Groundwater Investigation Summary

URS conducted a supplemental investigation in 2007 within Market Street and north of the South 19th Street area to further evaluate potential source areas for CVOC-related contaminants in groundwater previously identified as part of the 1997 Agreed Order RI and subsequent investigations. The investigation was conducted in three phases. The first phase of the investigation consisted of completing borings MS-SB01, MS-SB02, and MS-SB03 located directly downgradient of the sanitary sewer line in the Market Street ROW and the collection of soil and grab groundwater samples from the shallow groundwater (i.e., Qvi aquifer further discussed in Section 13.4.2). The second phase consisted of the installation of monitoring

well UG-MW9 on the west side of Market Street. Additionally, groundwater samples were collected from monitoring wells BA-MW2, DD-MW1, UG-MW7, UG-MW8, and UG-MW9. Phase 3 consisted of completing and installing monitoring well UG-MW13 in the center line of Market Street. Soil and groundwater samples collected from these borings and monitoring wells are further discussed below.

Soil Investigation Summary

A total of five borings were completed to varying depths up to approximately 70 feet bgs with a total of 10 soil samples submitted for VOC analysis. TCE was detected in four samples from three locations (MS-SB02, UG-MW9, and UG-MW13) at depths ranging between 20 and 43 feet bgs. The greatest concentrations ranged between 1.31 and 4.11 mg/kg at these three locations from depths of approximately 35 to 43 feet bgs. In addition, DCE was also detected in one soil sample collected from boring UG-MW3 at an approximate depth of 11 feet bgs. Other VOCs were not detected in the analyzed soil samples.

Groundwater Investigation Summary

A total of 11 groundwater samples collected from three temporary (i.e., grab) and six permanent monitoring wells were submitted for CVOC analysis as part of the supplemental investigation under the 1997 Agreed Order. PCE, TCE, cis-DCE, DCE, TCA, DCA, and benzene were detected in multiple samples analyzed (see Table 13-7). TCE was detected in the majority of the samples collected with the greatest concentration of 204 µg/L detected in well UG-MW8 located on the east side of Market Street.

13.3.2.3. 2008/2009 TCE Groundwater Investigation Summary

URS conducted a supplemental investigation in 2008 and 2009 around South 19th Street and between Market Street and Tacoma Avenue South to further evaluate potential source areas for the CVOC-related contaminants in groundwater previously identified as part of the 1997 Agreed Order RI and subsequent investigations (described above). Eight wells (UG-MW14 and UG-MW16 to UG-MW22) were installed as part of this supplemental investigation. Groundwater samples collected from each of the newly installed wells were analyzed for CVOC-related contaminants. In addition, one soil sample was analyzed from boring UG-MW14 collected from approximately 37.5 feet bgs.

TCE was detected at a concentration of 0.0055 mg/kg in the analyzed soil sample. TCE was detected in each analyzed groundwater sample. In addition, PCE, cis-DCE, DCE, vinyl chloride, TCA, DCA, chloroform, and chlorobenzene were also detected in one or more of the analyzed samples. Groundwater with the highest TCE concentrations (up to 1,170 µg/L) was observed in wells UG-MW18 and UG-MW19 located hydraulically downgradient of 1904-1908 and 1922 Tacoma Avenue South and the City's sanitary sewer line within Tacoma Avenue South.

13.3.2.4. 2013 Soil and Groundwater Investigation Summary

An environmental investigation was completed by UW in 2013 to further evaluate potential contaminant sources for groundwater contamination identified within the UWT Campus Master Plan boundary within the area of the Westerly Plume. The investigation also evaluated soil and groundwater conditions in areas identified by UW as potential development areas. The investigation within the Westerly Plume was completed in multiple areas across the UWT Campus and included the completion of 27 sonic borings, 40 DP borings, and 14 TP explorations followed by the installation of 27 new monitoring wells and the collection of groundwater samples from 85 permanent and four temporary monitoring wells (212; see Tables 13-1 and 13-2). Investigation activities completed as part of this investigation are summarized below.

Soil Investigation Summary

A total of 356 soil samples collected from the completed soil borings and TP explorations were analyzed for a combination of petroleum hydrocarbons, VOCs, SVOCs, PAHs, metals and PCBs (see Table 13-1). Detected concentrations of CVOCs included PCE, TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, TCA, DCA, and MEK in multiple samples analyzed as part of this investigation. In addition, benzene was also detected. TCE was the most frequent of the detected CVOCs (i.e., 78 of the 356 samples analyzed). The highest concentrations of CVOCs in soil were within three general areas including:

- Downgradient of 1722 Tacoma Avenue South in borings UG-MW25D/UG-MW25S. TCE (3.2 mg/kg), cis-DCE (0.0026 mg/kg), DCE (0.0067 mg/kg), TCA (0.0028 mg/kg), DCA (0.0038 mg/kg), MEK (0.0067 mg/kg), and benzene (0.0017 mg/kg) were detected in soil ranging between approximately 2.5 and 43 feet bgs in these borings.
- At 1701 Tacoma Avenue within the 1A borings. PCE (0.098 mg/kg), TCE (0.011 mg/kg), cis-DCE (0.022 mg/kg), trans-DCE (0.0020 mg/kg), vinyl chloride (0.0018 mg/kg) and MEK (0.010 mg/kg) were detected at depths ranging between approximately 15 and 26 feet bgs in these borings.
- Downgradient of the South 19th Street and Tacoma Avenue South intersection in boring UG-MW24. TCE (0.34 mg/kg), PCE (0.0036 mg/kg), and cis-DCE (0.00096 mg/kg) were detected in soil ranging in depths between approximately 9 and 28 feet bgs at this location.

Groundwater Investigation Summary

Groundwater investigation activities associated with the Westerly Plume included the collection of 53 groundwater samples from four temporary and 45 new and existing monitoring wells for a combination of chemical analyses including petroleum hydrocarbons, VOCs, SVOCs, PAHs, metals, and PCBs (see Table 13-2). Detected concentrations of CVOCs included PCE, TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, TCA, and DCA. In addition, benzene was also detected. Similar to the soil results, TCE was the most frequently detected CVOC (i.e., 31 of the 49 samples analyzed). The highest concentrations of CVOCs in groundwater coincided with the soil sample results and were within the three following general areas:

- Downgradient of 1722 Tacoma Avenue South in well UG-MW25S. TCE (290 µg/L), cis-DCE (6.0 µg/L), DCE (12 µg/L), DCA (15 µg/L), and benzene (2.2 µg/L) were detected at this location.
- 1701 Tacoma Avenue South at temporary well location 1A-B2. PCE (6.5 µg/L), TCE (4.8 µg/L), cis-DCE (45 µg/L), trans-DCE (2.9 µg/L), and vinyl chloride (6.9 µg/L) were detected at this location.
- Downgradient of the South 19th Street and Tacoma Avenue south intersection in well UG-MW18. TCE (1,200 µg/L), and PCE (12 µg/L) were detected at this location.

In addition, chloroform was detected in groundwater samples collected in September 2013 and January 2014 from well JS-MW3S. Dibromochloromethane and dichlorobromomethane were also detected in the groundwater sample collected during the September 2013 monitoring event. The presence of chloroform, dibromochloromethane, and dichlorobromomethane at this location has been attributed to chlorinated water added during drilling.

13.3.2.5. 1742 Jefferson Remedial Action Summary

A remedial action was completed in 2012 to remove the former Standard Oil service station infrastructure and previously identified petroleum-related contaminants in soil at 1742 Jefferson Avenue. GeoEngineers,

on behalf of UW, completed a supplemental investigation prior to the remedial action to further evaluate soil conditions and evaluate whether the USTs that historically operated at this property were still present. The supplemental investigation included the completion of a TP investigation followed by a UST removal, a sump and hydraulic lift removal, and remedial excavation activities between August 27 and September 6, 2012 (239). A detailed description of the UST removal and remedial activities is summarized in Section 8.0.

Ten confirmation soil samples were collected at the final limit of remedial excavation from the base and sidewalls (Table 13-1) in the area of the service station and a former waste oil UST. The samples were submitted for a combination of analyses including TPH-G, TPH-D, TPH-O, VOCs, lead, and PAHs. TCE was detected in confirmation base and sidewall samples CS-TP6BASE-7.5 and CS-TP6SW-4 collected at approximately 7.5 and 4 feet bgs in the vicinity of boring JS-B7 completed in 1998 as part of the 1997 Agreed Order Investigation in which TCE was previously detected at approximately 3 feet bgs. Note that the detected concentration was approximately three orders of magnitude less than the TCE concentration detected in boring JS-B7 completed in 1998, verifying that former service station operations at 1742 Jefferson were a source of CVOCs in this area.

13.3.2.6. 2015 Well Replacement

Groundwater monitoring well UG-MW37 was reportedly damaged by heavy equipment during operations at the construction laydown yard 2015 located west of Court E and north of South 19th Street. Well UG-MW37 was subsequently decommissioned in April 2015 followed by the installation of replacement groundwater monitoring well UG-MW37R (273). Monitoring well UG-MW37R was installed approximately 16 feet west of the decommissioned UG-MW37 well in an area that would not be disturbed by ongoing construction laydown yard operations. Soil and groundwater samples were not submitted for chemical analysis in 2015 as part of the well replacement activities.

13.3.3. 2016 Agreed Order Remedial Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2021 to further evaluate soil and groundwater conditions were completed in accordance with the RI Work Plan and subsequent addenda (Section 4.0). RI activities within the Westerly Plume and surrounding area included collection of soil samples from 178 soil borings, groundwater samples from existing and new temporary and permanent groundwater monitoring wells, 65 passive soil vapor samples, collection of sediment and water samples from one potential dry well, and collection of samples from the nine separate manhole basins (see Tables 13-1 through 13-4). Specific areas of interest include:

- **General Area UWT Campus-Wide Soil, Groundwater, and Stormwater Investigation.** Investigation activities were completed throughout the UWT Campus area between South 21st Street, South 17th Street, Yakima Avenue, and Jefferson Avenue to assess soil and groundwater conditions in the Westerly Plume area between 2016 and 2020. These investigation activities included the completion of 93 borings, installation and sampling of one temporary monitoring well (A11-MW7D-TW1), installation of 93 monitoring wells, and associated groundwater monitoring of new and existing wells in December 2016, October 2018, March, and September 2019, and March and September 2020 to evaluate the lateral and vertical extent of CVOCs in groundwater within the western portion of the UWT Campus. In addition, water samples from nine stormwater manholes were also collected during the groundwater sampling events to evaluate the presence of water and COCs in this system at least 24 hours after a rain event greater than 0.1 inch.

- **Focused 1701 Tacoma Avenue (Upton) South Source Area Investigation.** Additional investigation activities were completed within the 1701 Tacoma Avenue South Source Area to evaluate CVOC contamination in soil associated with the former dry cleaner that historically operated at this location. Ten soil borings (A6-B1 to A6-B10; Figure 13-5A) were completed to depths up to approximately 30 feet bgs at this location. Two borings planned in the RI Work Plan east of the current building (A6-B11 and A6-B12) were not completed due to access constraints.
- **Focused Tacoma Avenue South (Upgradient) Source Area Investigation.** Additional investigation activities were completed in Tacoma Avenue South and four upgradient potential source properties including the 1934-1938 Tacoma Avenue South, 1922 Tacoma Avenue South, 1904-1908 Tacoma Avenue South, and 1722 Tacoma Avenue South Source Areas located west (upgradient) of the UWT Campus in 2019 to early 2021. The purpose of the investigation was to evaluate potential impacts resulting from releases from the City's sanitary sewer line and releases within the source properties as a follow-up to the general investigation completed between 2016 and 2020. The investigation generally consisted of the following.
    - Collection of one sediment and two water samples within the potential dry well located in Tacoma Avenue South ROW located downgradient of 1722 Tacoma Avenue South. The sediment and water were removed via vacuum truck from the dry well in December 2020 in order to video the manhole.
    - Installation of 29 passive soil vapor samplers approximately 3 feet bgs directly above the sanitary sewer and west/upgradient of the sanitary sewer line in May 2019. Five samplers were also placed within sanitary sewer manholes along Tacoma Avenue South.
    - Collection of 36 passive vapor samples beneath the 1722 Tacoma Avenue South building slab.
    - Completion of 16 borings (A11-B1 through A11-B15 and A11-B17) and five permanent monitoring wells (A11-MW39S, A11-MW39D, A11-MW40S, A11-MW40D, and A11-MW41D) within the Tacoma Avenue South ROW to further evaluate subsurface conditions based on the results of the May 2019 soil vapor sampling. Boring A11-B16, which was planned for a location west of the sanitary sewer line as part of the RI Work Plan, was not completed due to the presence of utilities in the area. A new location was not established due to the proximity of this boring to the other completed borings. Boring A11-B10 was relocated approximately 10 feet north due to the presence of utilities. Additionally, wells A11-MW40S and A11-MW40D were relocated approximately 10 feet east due to the presence of utilities. No other deviations to the RI Work Plan were noted.
    - Completion of 54 soil borings (Table 13-1) within the source properties west of Tacoma Avenue South to further evaluate subsurface conditions. Fifteen borings were installed as permanent wells and 12 borings were completed as temporary wells. Groundwater samples were collected from the new permanent and temporary wells and select existing wells within Tacoma Avenue South.
- **Geophysical Studies.** A microgravity and a borehole imagery survey were completed to evaluate the presence of a void observed during drilling of boring A6-MW5D between approximately 30 and 42.5 feet bgs (elevation 174.2 to 161.7 feet) and estimated to be 3 feet wide. The results of the microgravity survey indicated the presence of two linear 6-foot-long anomalies oriented north-south and east-west at this location (see 1701 Tacoma Avenue South investigation area detail on Figure 13-5A). Geophysical survey results are presented in Appendix O. A GPR survey was also completed in the area of South 19th Street and Court D to identify a potential UST in the area, and an anomaly indicating a potential UST was present in the sidewalk area. However, the UST was not encountered during sidewalk replacement in 2019 (see Section 9.0 for additional details).

Investigation locations for the 2016 Agreed Order RI are shown on Figure 13-5A/B. Well construction details are summarized in Table 13-5. Soil and groundwater analytical results are summarized in Tables 13-6 and 13-7. Passive soil vapor sample results are summarized in Table 13-8, and water sample results collected from the City's stormwater system at select manhole locations are summarized in Table 13-9. Investigations completed between 2016 and 2021 as part of the 2016 Agreed Order RI are summarized in Sections 13.3.3.1 through 13.3.3.5.

13.3.3.1. Soil Investigation Summary

A total of 1,497 soil samples were collected from 170 borings completed within the Westerly Plume and surrounding area between 2016 and 2021 to further evaluate soil conditions and define the nature and extent of CVOC contamination resulting from historical operations west of Tacoma Avenue South (i.e., 1722 Tacoma Avenue South, 1904-1908 Tacoma Avenue South, 1922 Tacoma Avenue South, and 1934-1938 Tacoma Avenue South Source Areas) and the spread of CVOC contamination along Tacoma Avenue South resulting from releases from the City's sanitary sewer as well as CVOC releases from UW-owned properties 1701 Tacoma Avenue South (Upton), 1742 Jefferson Avenue (1742 Jefferson) and 1755 Fawcett Avenue (Kelly) resulting from historical operations and land uses. In general, the highest detected concentrations in soil are in the vicinity of the Tacoma Avenue South Source Areas and downgradient of these areas. Soil sampling results associated with the Westerly Plume are further discussed below. Boring locations are shown on Figures 13-5A/B.

- TCE was the most frequently detected contaminant for the Westerly Plume. TCE was detected in over 478 of the analyzed soil samples. The highest concentrations of TCE were detected within the 1722 Tacoma Avenue South Source Area at locations PS7-DP3 and PS7-DP7, within Tacoma Avenue South below the sanitary sewer at locations A11-B5, A11-B6, A11-MW40D, and downgradient of the South 19th Street and Tacoma Avenue South intersection at location UG-MW24S. Lower levels of TCE were detected throughout the Westerly Plume at depths down to approximately 90 feet bgs.
- PCE was the second most frequently detected contaminant for the Westerly Plume. PCE was detected in 190 soil samples. The highest concentrations of PCE were within the borings completed within 1701 Tacoma Avenue South at location A6-B10 between approximately 6.5 and 10 bgs and within the 1722 Tacoma Avenue South Source Area at location PS7-DP3 at approximately 0.5 to 1.5 feet bgs. Lower levels of PCE were detected downgradient of 1701 Tacoma Avenue South, in Tacoma Avenue South near the sanitary sewer, downgradient of the South 19th Street and Tacoma Avenue Area intersection, and within the 1922 Tacoma Avenue South and 1904-1908 Tacoma Avenue South Source Areas at depths up to approximately 40 feet bgs.
- TCA was detected at depths up to approximately 10 feet bgs in a limited number of samples collected within and downgradient of the 1722 Tacoma Avenue South Source Area.
- Other VOCs including cis-DCE, trans-DCE, DCE, benzene, MEK, chloroform, chlorobenzene, and methyl isobutyl ketone (MIBK) were detected at low levels in a limited number of soil samples within the Westerly Plume.

13.3.3.2. Sediment Investigation Summary

One sediment sample was collected at the base of the potential dry well identified within Tacoma Avenue South (TAC-Manhole shown on Figure 13-5A). The potential dry well appears to have been connected to former service station operations at 1922 Tacoma Avenue South (see Section 13.2.5). PCE, TCE, TCA, and

chloroform were detected in this sample. TCE (primary contaminant identified for the Westerly Plume) was detected at 1.9 mg/kg.

13.3.3.3. Groundwater Chemical Analytical Results

A total of 689 groundwater samples were collected between 2016 and 2021 for the 2016 Agreed Order RI from the network of new and existing monitoring wells to further evaluate groundwater conditions and define the nature and extent of CVOC contamination resulting from releases during historical operations along Tacoma Avenue South and on UW-owned source properties. Groundwater sampling activities and their results associated with the Westerly Plume are further discussed below. Well locations are shown in Figures 13-5A/B.

- A total of 391 groundwater samples were collected from 103 permanent or temporary monitoring wells screened within the Qvi aquifer during the RI. PCE and TCE were identified as the primary contaminants in the Qvi aquifer based on the results of this investigation. The highest PCE concentrations were detected in groundwater downgradient of 1701 Tacoma Avenue South (South 17th Street and Tacoma Avenue) and the area of the South 19th Street and Tacoma Avenue South intersection. The highest TCE concentrations were detected in groundwater downgradient of 1722 Tacoma Avenue South and near the intersection of South 19th Street and Tacoma Avenue South. Other VOCs in the Qvi aquifer are as follows:
    - PCE and TCE breakdown products (trans-, cis-DCE, and DCE) were detected in a limited number of samples within the Westerly Plume. Vinyl chloride was only detected downgradient of 1701 Tacoma Avenue South.
    - TCA and/or the associated breakdown product DCA were detected downgradient of 1722 Tacoma Avenue South and near the intersection of South 19th Street and Tacoma Avenue South.
    - MEK was detected in the Qvi aquifer in four wells downgradient of the 1722 Tacoma Avenue South Source Area.
    - Chloroform was detected in several wells located in the vicinity of Tacoma Avenue South sanitary sewer lines.
    - Benzene was detected in wells downgradient of 1722 Tacoma Avenue South Source Area.
- A total of 17 groundwater samples were collected during the 2016 Agreed Order RI from three permanent monitoring wells screened within both the Qvi and Qva aquifers where the Qvi/Qva confining layers are generally absent (DD-MW1, A11-MW11D near the intersection of South 19th Street and Market Street, and A6-MW1D near the intersection of South 17th Street and Fawcett Avenue shown on Figures 13-5A/B). PCE, TCE, and cis-DCE were detected with the highest concentrations in monitoring well DD-MW1 located at the intersection of South 19th Street and Market Street.
- A total of 281 groundwater samples were collected from 68 permanent monitoring wells screened within the Qva aquifer during the 2016 Agreed Order RI. PCE and TCE were identified as the primary contaminants in the Qva aquifer. The highest PCE concentrations were detected in the vicinity of the South 19th Street and Tacoma Avenue South intersection. The highest TCE concentrations were detected downgradient of the 1722 Tacoma Avenue South Source Area, 1701 Tacoma Avenue South, and in the vicinity of the South 19th Street and Tacoma Avenue South intersection. Other CVOCs in the Qva aquifer are as follows:
    - PCE and TCE breakdown products (trans-DCE, cis-DCE, and DCE) were detected in a limited number of groundwater samples within the Westerly Plume.

- DCA and MEK were detected in a limited number of groundwater samples within the Westerly Plume.

- Water samples were collected in 2019 and 2020 within the apparent dry well located in Tacoma Avenue South, which is likely associated with the historical operations at 1922 Tacoma Avenue South (TAC-Manhole on Figure 13-5A). The samples were analyzed for VOCs. CVOCs including TCE, PCE, TCA, and chloroform were detected in the analyzed water samples. TCE was detected at a concentration of 200 µg/L during the July 2020 sampling event. Other VOCs of concern were not detected.

13.3.3.4. Stormwater Investigation Summary

Fifteen stormwater manholes were checked during groundwater sampling events within and upgradient of the Westerly Plume between 2016 and 2020 during a period of dry weather to evaluate base flow during the 2016 Agreed Order RI. Water was observed in nine of the stormwater manholes and 38 water samples were collected for chemical analyses. CVOCs were detected in manholes on the east-west oriented stormwater lines within South 17th Street and South 19th Street as follows:

- TCE was consistently detected in water samples collected from manholes MH:6751942, MH:6767230, and MH:6767239 located within South 19th Street between Tacoma Avenue South and Market Street at concentrations ranging between 0.38 and 15 µg/L (Figures 13-5A/B). PCE was also detected in the water samples collected from these manholes.

- PCE, TCE, and/or chloroform were detected in manholes MH:6751818 and MH:6751795 located within South 17th Street between I Street and Tacoma Avenue South during one sampling event (Figures 13-5A/B). Note that these manholes are located west and cross-gradient of the Westerly Plume. Additionally, TCE and/or PCE were detected in samples during four of the six sampling events collected from manhole MH:6767107 located at South 17th Street and Market Street.

13.3.3.5. Passive Soil Vapor Investigation Summary

Two passive soil vapor surveys were completed. One was completed in 2019 in three test areas along Tacoma Avenue South and one was completed in 2020 within the footprint of the 1722 Tacoma Avenue South Building (see Figure 13-5A). The purpose of the passive soil vapor sampling was to provide a high-resolution dataset to characterize soil vapor to assist in identifying locations for follow-up soil and groundwater sampling. A detailed summary of these investigation activities and their results is presented in Appendix N and is described below.

2019 Survey in Tacoma Avenue South

The 2019 soil vapor sampling was limited to three test areas to evaluate the feasibility of this sampling approach. A follow-up investigation was completed based on the results of the initial investigation that included the collection of 29 subsurface passive soil vapor samples from borings and/or monitoring wells completed along the Tacoma Avenue alignment (Table 13-4 and Figure 13-5A). In addition, passive vapor samplers were also placed within sanitary sewer manholes MH:6767276, MH:6767330, MH:6767390, and MH:6782992[11]. The passive samplers consisted of an adsorbent to collect VOCs in soil vapor over a three-day period. The results of the passive sampling identified TCE as the primary contaminant in 17 of the 29 analyzed samples along the Tacoma Avenue South downpipe of the 1722 Tacoma Avenue South Source Area where solvent discharges into the sanitary sewer were known to have occurred during historical

[11] A sampler was also placed in sanitary sewer manhole MH:6767438 but the sampler was vandalized, and the data were not usable.

building operations. Other contaminants were also periodically detected including PCE, DCA, and chloroform. CVOCs were not detected in the analyzed soil vapor samples located up-pipe from the 1722 Tacoma Avenue South Source Area. Note that benzene was detected in 23 soil vapor samples. However, these results were not consistently collocated with the CVOC results. Soil vapor sample results for other CVOCs are summarized in Table 13-9.

2020 Survey within the 1722 Tacoma Avenue South Building

The 2020 passive soil vapor sampling was performed within the footprint of the 1722 Tacoma Avenue South building to screen for contaminants previously identified in soil and groundwater downgradient of the building. A building condition survey was also completed to document the locations of historic plumbing features. Thirty-five subsurface passive soil vapor samplers were installed beneath the building slab during this study. The soil vapor samplers were located to correspond to historic building features and areas where solvents may have been handled and/or disposed of, including around former plumbing features (sinks and floor drains), and at the locations of rooms/areas identified as having a chemical use (solvent room, acid room, dark room, and paint room). The passive soil vapor samplers were installed below the building slab at each of these locations. The samplers consisted of an adsorbent to collect select VOCs in soil vapor over a six-day period. The results of this study are summarized below.

- TCE and PCE were detected in each of the 35 soil vapor samples covering most of the building footprint. The highest concentrations of TCE were detected in the samples obtained beneath the former lunchroom and bathroom areas where several sinks and floor drains were located. The highest concentrations of PCE were detected in the samples located along the western edge of the building beneath the former acid room, dark room, and sinks/wash basin areas.
- TCA was detected in 34 of the 35 soil vapor samples. The highest concentrations of TCA were detected in the samples obtained beneath the former lunchroom and bathroom areas.
- Benzene was detected in most of the soil vapor samples with the highest concentrations along the southern end of the building near the former dark room and the northern portion of the building near the paint room, compressor room, and chemical sink.

Soil vapor sample results for other CVOCs are summarized in Table 13-9.

13.3.4. Environmental Due Diligence

Environmental due diligence activities completed to evaluate soil and/or groundwater conditions in connection with property acquisitions by UW within the Westerly Plume and surrounding area are summarized in Sections 13.3.4.1 through 13.3.4.6. In addition, investigation activities completed by Farallon on behalf of 1920 Tacoma Ave., LLC for the 1922-1938 Tacoma Avenue South Source Area are summarized in Section 13.3.4.7. Soil and groundwater sampling locations are shown on Figures 13-6A/B.

13.3.4.1. Merlino and Laborers Environmental Due Diligence Summary

A Phase II ESA was conducted downgradient of the Merlino and Laborers properties in connection with the purchase of the properties by UW in 2002 (Figure 13-6B). The Phase II ESA consisted of the installation and sampling of two monitoring wells. The Laborers property is located at 1742 Market Street (Pierce County Parcel No. 2017080090) and one well (DD-MW1) was installed downgradient of the property in Market Street. The Merlino property is located at 1945 and 1953 Fawcett Avenue (Pierce County Parcel Nos. 2019090153 and 2019090154) and one well (DD-MW2) was installed east and downgradient

of the property in Court D. One groundwater sample was collected and analyzed for VOCs from each well. PCE, TCE, cis-TCE, and TCA were detected in the analyzed groundwater sample from DD-MW1. VOCs were not detected in the analyzed groundwater sample from DD-MW2. Soil samples were not collected for chemical analysis.

13.3.4.2. Kosin Environmental Due Diligence Summary

Phase I and Phase II ESAs were conducted at the Kosin property located at 1902, 1908, and 1914 Market Street (Pierce County Parcel Nos. 2019080010, 2019080020, and 2019080030) in 2003 in connection with the purchase of the properties by UW (Figure 13-6B). The Phase II ESA consisted of nine soil borings (KS-KB-1 through KS-KB-6 and KS-KHA1 through KS-KHA3) and the collection of soil samples for chemical analyses for TPH and VOCs. COCs associated with the Westerly Plume were not detected in the analyzed soil samples. Groundwater samples were not analyzed as part of this investigation. The results of other contaminants not associated with the Westerly Plume are summarized in Section 17.0 (Area-Wide Soil).

13.3.4.3. Strom Environmental Due Diligence and Remedial Action Summary

Phase I and Phase II ESAs followed by a remedial action were completed at the Strom Building located between 1727, 1733, 1735, and 1737 Fawcett Avenue (Pierce County Parcel Nos. 2017090060, 2017090070, 2017090080, and 2017090090) in 2003 and 2004 in connection with the purchase of the property by UW (Figure 13-6B). The Phase II ESA consisted of the completion of four shallow borings (SO-SB001 through SO-SB004) and four surface samples (SB-SS001 through SB-SS004). Soil samples were analyzed for a combination of TPH, VOCs, metals, PAHs, SVOCs, and PCBs. Groundwater samples were not analyzed as part of this investigation. CVOCs associated with Westerly Plume were not detected in the analyzed samples. Remedial actions completed by the former property owner to address other contaminants identified (TPH, PAHs, and metals) are summarized in Section 17.0 (Area-Wide Soil).

13.3.4.4. Merlino Environmental Due Diligence Summary

Phase I and Phase II ESAs were conducted at the Merlino property located at 1920 Fawcett Avenue (Pierce County Parcel No. 2019010040) in 2008 in connection with the attempted purchase of the property by UW (Figure 13-6B)[12]. The Phase II ESA consisted of the completion of 25 soil borings (MER-KSB-1 through MER-KSB-25). Soil samples were collected from 24 of the completed borings (Table 13-1). Grab groundwater samples were also collected from five temporary wells (Table 13-2). Soil and groundwater samples were analyzed for VOCs, TPH, total lead and arsenic, and TCLP lead. TCE and/or PCE were detected in two of the 24 analyzed soil samples and in each of the analyzed groundwater samples. Other CVOCs associated with Westerly Plume, with the exception of TCA, and chloroform were not detected. Ultimately, UW elected not to purchase the property and it is currently owned by a private entity.

13.3.4.5. Lam Environmental Due Diligence Summary

Phase I and Phase II ESAs were conducted at the Lam property located at 1726 Market Street (Pierce County Parcel No. 2017080040) in 2013 in connection with the purchase of the property by UW (Figure 13-6B). The Phase II ESA consisted of a GPR survey to investigate the potential presence of USTs on the property, the completion of three TPs, and the collection of soil samples. The results of the GPR survey did not identify USTs at the property. In addition, CVOCs were not detected in the analyzed TP samples. Other contaminants including TPH, VOCs, and metals either were not detected or were detected

[12] Three properties were owned by "Merlino" on Fawcett Avenue: 1920 Fawcett Avenue (Pierce County Parcel No. 2019010040) and 1945 and 1953 Fawcett Avenue (Pierce County Parcel Nos. 2019090153 and 2019090154).

at low concentrations (see Section 17.0 for sample results). UW elected to purchase the property based on the results of the Phase I and II ESAs.

13.3.4.6. Frederick Wilds Environmental Due Diligence Summary

Phase I and Phase II ESAs were conducted at the Frederick Wilds Building (Swiss Complex) located between 1910 and 1916 Jefferson Avenue (Pierce County Parcel No. 2019070020) in July 2013 in connection with the purchase of the property by UW (Figure 13-6B). The Phase II ESA consisted of a GPR survey to investigate the potential presence of USTs on the property and completion of nine soil borings (FW-B01 through FW-B08 and FW-B10) and collection of one sediment sample (FW-B09) from a manhole of unknown use located on the west side of the property. Soil samples collected from the nine borings and the manhole were analyzed for a combination of TPH, VOCs, metals, and PAHs. Two grab groundwater samples were collected from two borings and analyzed for a combination of TPH, VOCs, metals, and PAHs. CVOCs associated with the Westerly Plume were not detected in the analyzed soil samples. TCE was detected in one grab groundwater sample (GW-B2). The results for other contaminants not associated with this area of Westerly Plume are summarized in Section 17.0 (Area-Wide Soil).

13.3.4.7. 1922–1938 Tacoma Avenue South PLP Investigation Summary

Farallon, on behalf of 1920 Tacoma Ave., LLC, completed a site assessment on the 1934-1938 Tacoma Avenue South and 1922 Tacoma Avenue South Source Areas in 2019 to evaluate whether these properties contained a source(s) of TCE and PCE and to evaluate the potential for upgradient sources (Figure 13-6A). Farallon completed 11 soil borings (FB-01 through FB-08, FMW-01D, FMW-02D, and FMW-03S) as part of this investigation (Figure 13-6A). Temporary well casings were installed in four of the borings while borings FMW-01D, FMW-02D, and FMW-03S were completed as permanent groundwater monitoring wells screened within the Qvi aquifer. A total of 23 soil samples and seven groundwater samples were collected and analyzed for CVOCs.

The results of the investigation identified TCE in soil samples collected from borings FB-08 and FMW-02D between approximately 15 and 50 feet bgs and in groundwater within monitoring well FMW-03S.

13.3.5. Capital Projects

Investigation activities were necessary to implement UW Capital Projects. Similar investigations were conducted by the City to support planning and design for various ROW utility projects. Capital projects and investigation activities in the vicinity of the Westerly Plume are summarized in Sections 13.3.5.1 through 13.3.5.6 below. Soil and groundwater sampling locations are shown on Figures 13-6A/B.

13.3.5.1. Health Center Capital Project

GeoEngineers completed sampling to evaluate groundwater seeping from a 20-foot tall near vertical soil slope west of the current Security building at 1742 Market Street (formerly Merlino and Laborers property) during the Health Center project in 2011 (Figure 13-6B). The purpose of the sampling effort was to evaluate the potential presence of TCE in water seeping from the slope and entering a nearby catch basin. One water sample was collected and analyzed for VOCs as part of this project. CVOCs associated with the Westerly Plume were not detected in the analyzed water sample.

13.3.5.2. Market Street Utilities Capital Project

URS on behalf of UW, completed environmental monitoring and soil sampling in September and October 2012 during City replacement work for the sanitary sewer and stormwater lines located in Market Street between South 21st Street and South 17th Streets (245). The purpose of the work was to

collect soil samples during utility replacement work in areas where contaminants had been previously identified in soil and groundwater. Eleven soil samples (Table 13-1) were collected from the utility alignment north of South 19th Street at a depth of 6 feet bgs and analyzed for TPH and VOCs (Figure 13-6B). CVOCs associated with the Westerly Plume were not detected in the analyzed soil samples collected north of South 19th Street. The results for other contaminants not associated with the Westerly Plume are summarized in Section 17.0 (Area-Wide Soil).

13.3.5.3. Y Student Capital Project

The Y Student Capital Project completed in 2014 included building demolition and construction of a new two-story building for use as a student gym in the northern portion of the UWT Campus (Figure 13-6B). Investigation activities were performed in conjunction with the Y Student Capital Project to evaluate soil conditions within and adjacent to the footprint of the construction area to ensure proper soil management and disposal based on the presence of CVOC-impacted soil and groundwater directly upgradient (wells UG-MW29S and UG-MW29D). The environmental activities for the Y Student Capital Project included the completion of 34 soil borings to evaluate soil conditions to depths ranging from 3.5 to 50 feet bgs. Two locations were completed as temporary wells and 10 locations were completed as monitoring wells (see Table 13-2). Monitoring wells Y-MW2D, Y-MW5S, and UG-MW29D were decommissioned as part of the construction. In addition, other adjacent wells were lowered or raised to match the new grade. The wells were resurveyed following construction and the new elevations are shown in Table 13-5.

A total of 156 soil samples were submitted for chemical analysis of CVOCs as part of this investigation. Select samples were also analyzed for the full list of VOCs and TPH (Table 13-1). In addition, groundwater samples were collected from new and existing monitoring wells UG-MW28, UG-MW29S/D, Y-MW1S and D, Y-MW2S/D, Y-MW3S/D, Y-MW4S, Y-MW5S, Y-MW6S, and Y-MW7S and two grab samples from temporary monitoring wells Y-TMW-1 and Y-TMW-2. TCE was detected in 37 of 156 analyzed soil samples. TCE was detected in eight of the samples in the analyzed groundwater samples. Additionally, PCE and cis-DCE were detected at select sample locations. The results of other contaminants not associated with the Westerly Plume are summarized in Section 17.0 (Area-Wide Soil).

Environmental measures were developed and incorporated into the design to address potential impacts, including a modified structural retaining wall and drainage system to prevent cross-contamination between the Qvi and Qva aquifers based on the investigation results. In addition, CDF was placed where the building construction (elevator pit, footings, utilities, etc.) penetrated both aquifers to reduce the potential cross-contamination between the aquifers. CDF was also placed as trench dams along the sanitary sewer trench and building drainage to prevent a preferential flow pathway for contaminants along the utility pipe and within the backfill. The retaining wall drainage and building under slab drainage were designed to allow connection to the City's sanitary sewer or stormwater system based on post-construction analytical results. The building drain system was switched from sanitary to the stormwater sewer system in November 2014 in consultation with Ecology and the City based on building drain sampling results in which TCE concentrations were less than 30 µg/L (i.e., less than the 2014 Washington State Water Quality Standards for marine water).

In addition, a passive vent system and vapor barrier were installed to prevent the contaminant vapors from entering the enclosed spaces of the building. In 2015, indoor and outdoor samples were collected to evaluate the effectiveness of the vapor barrier. TCE was not detected in the analyzed samples. Analytical results are summarized in Table 13.9.

13.3.5.4. Tacoma Paper and Stationery Building Capital Project

Groundwater samples were collected from wells JS-MW3 and JS-MW3S in 2014 during the design of the TPS Building Capital Project (called Urban Solutions Building) for VOC analysis. Wells JS-MW3 and JS-MW3S are located upgradient of the TPS building in Jefferson Avenue and the downgradient portion of the Westerly Plume. VOCs were not detected in the analyzed groundwater samples. Sampling locations where select VOC samples were collected are summarized in Table 13-2 and are shown on Figure 13-6B. Chemical analytical results for these samples are summarized in Table 13-7.

13.3.5.5. City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project

Two soil borings (COT-MW4 and COT-MW5) were completed in December 2017 near the intersection of Jefferson Avenue and South 19th Street, and on South 19th Street in the vicinity of the planned stormwater replacement project. The borings were advanced to depths of approximately 46 feet bgs and completed as permanent monitoring wells. Soil and groundwater samples collected from the borings/monitoring wells were analyzed for TPH, VOCs and CVOCs. Groundwater was not encountered in COT-MW5. CVOCs were not detected in each of the analyzed samples. The results of other contaminants not associated with the Westerly Plume are summarized in Section 17.0 (Area-Wide Soil).

The stormwater line was connected to the existing stormwater line in the fall of 2022 by the City. The section of the stormwater line was replaced between Court D and Market Street on South 19th Street. A new pipe was installed within South 19th Street between Market Street and Jefferson Avenue. A new pipe was also installed on Jefferson Avenue. Water was observed flowing from the existing pipe and associated backfill at Court D and South 19th Street based on construction observations (2003).

13.3.5.6. Fawcett Utility Replacement Capital Project

Sixteen soil borings (see Table 13-1) were completed in October 2020 to evaluate soil and groundwater conditions in the vicinity of a planned utility replacement project. The borings were advanced to depths between approximately 10 and 18 feet bgs. Soil samples collected from the borings were analyzed for TPH, metals, VOCs and CVOCs. Groundwater samples collected from the two wells (FAW-MW-01 and FAW-MW-02) were analyzed for VOCs and TPH.

TCE was detected in soil from FAW-SB-14 at an approximate depth of 8.5 feet bgs. Soil represented by this sample was subsequently removed as part of this project. Other CVOCs were not detected in the other analyzed samples.

13.4. Conceptual Site Model

Development of the CSM for the Westerly Plume is based on the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for the Westerly Plume is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and it forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 13.4.1 through 13.4.4 describe the specific elements of the Westerly Plume CSM.

13.4.1. Physical Setting

The Westerly Plume encompasses portions of the eight source properties extending from Tacoma Avenue South to Jefferson Avenue west of the TPS Building (Figure 13-1). Land uses within this portion of the

UWT Campus include a variety of residential, commercial, and academic buildings, surface parking lots, vacant land, and City ROWs. Commercial use of the UWT Campus buildings primarily includes restaurants and retail services.

13.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic setting for the Westerly Plume (described in the following sections) informs the distribution of contaminants in media of potential concern for the Westerly Plume. Local geology and hydrogeology for the Westerly Plume and surrounding area are described below in Sections 13.4.2.1 and 13.4.2.2.

13.4.2.1. Local Geology

Geologic units present beneath the Westerly Plume include the Qf, Qvi, and Qva deposits. Geologic conditions for the UWT Campus including portions of the Westerly Plume are shown on generalized geologic cross sections on Figures 2-7 through 2-13. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings completed within the Westerly Plume and the surrounding area consists of locally derived, reworked ice-contact deposits and/or imported fill. The fill ranges in thickness between approximately 2 and 15 feet with an average thickness of approximately 5 feet.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till, subglacial channel deposits, and lacustrine materials. The consistency of the Qvi is highly variable across the UWT Campus due to the wide variety of geologic depositional environments of this geologic unit. The Qvi deposits range in thickness from 15 to 85 feet and consist of Qvi till-like deposits, Qvi channel deposits and Qvi silt. Qvi till-like deposits in this area vary in thickness from approximately 5 to 20 feet. Seams of sand and gravel are present within the Qvi till-like deposits. Qvi channel deposits are generally oriented in an east-west direction and range in thickness from up to 50 feet west of Tacoma Avenue South to 5 to 30 feet thick east of Tacoma Avenue South. Qvi silt deposits beneath the Westerly Plume are approximately 15 to 20 feet thick and are generally flat-lying beneath and immediately west of Tacoma Avenue South. The Qvi silt deposits dip steeply east of Tacoma Avenue South and thin to approximately 1 to 5 feet thick. The Qvi silt deposits are not present where the Qvi channel eroded the unit or human activities removed the unit as shown on Figure 2-6.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** Qva deposits beneath the Westerly Plume consist of alternating layers of sand/gravel and silt. Five to six flat-lying Qva silt units are present beneath the Westerly Plume with thicknesses typically between 5 and 15 feet. Qva sand and gravel are present between the Qva silt units. In general, the contact between the Qva and the overlying Qvi deposits generally dips to the east following the surface topography.

13.4.2.2. Local Hydrogeology

Groundwater within the Westerly Plume occurs within both the Qvi (shallow) and Qva (deep) aquifers (see Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Additionally, the Qvi aquifer is locally confined in the southern portion of Tacoma Avenue South where till-like material contained within the channel deposits acts as a confining

layer. Specific areas where the Qvi and Qva aquifers are interpreted to be hydraulically connected and flow into each other are shown on Figures 2-14 to 2-19 and include the following as they relate to groundwater flow for the Westerly Plume and the surrounding area:

- **Westerly Plume—Southern Portion (South 21st Street Area).** Qvi groundwater is generally not present in the southwest portion of the Westerly Plume in the areas of PS3-MW1S, A11-MW2D, A11-MW1D, A11-MW31D, and UG-MW21 due to erosion of the Qvi silt within the southern drainage channel and depletion of the Qvi aquifer in this area. The Qva aquifer flows into the Qvi aquifer east and downgradient of this area near UG-MW23. Geologic and hydrogeologic conditions in this vicinity are shown on cross section F-F' (Figure 2-12).
- **Westerly Plume—Central Portion (South 19th Street and Fawcett Avenue Area).** The Qvi and Qva aquifers are both present across the area and are hydraulically connected near the intersection of South 19th Street and Fawcett Avenue where the Qvi silt is absent. A portion of Qva aquifer groundwater flows into the Qvi aquifer in this area and along Fawcett Avenue where a Qva silt layer is interpreted to locally inhibit downward groundwater flow and directs flow eastward into the Qvi aquifer (see Figure 2-6). The Qvi aquifer is seasonally absent north of South 19th between approximately Court C and Fawcett Avenue. Geologic and hydrogeologic conditions in this vicinity are shown on cross section A-A' (Figure 2-7).
- **Westerly Plume—Eastern Portion (South 19th Street and Market Street Area).** The majority of Qvi groundwater in the vicinity of the South 19th Street and Market Street intersection flows into the Qva aquifer near the location of monitoring well DD-MW1. Downgradient of this location, the Qvi aquifer is depleted with the exception of locally perched and seasonal groundwater. The Qvi aquifer also enters the Qva aquifer near the intersection of Jefferson Avenue and Court C, resulting in localized depletion of the Qvi aquifer immediately downgradient of this location. Geologic and hydrogeologic conditions in this vicinity are shown on cross section G-G' (Figure 2-13).
- **Westerly Plume—Northern (South 17th and 18th Street Area).** The Qvi and Qva aquifers are both present across the area and are hydraulically connected in the area between Court E and Fawcett Avenue where the Qvi silt is absent and a portion of Qva aquifer groundwater flows into the Qvi aquifer near well A6-MW1D. Geologic and hydrogeologic conditions in this vicinity are shown on cross section E-E' (Figure 2-11).

Local groundwater occurrence and flow for the Qvi and Qva aquifers are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer is generally unconfined throughout the Westerly Plume. However, the Qvi aquifer is locally confined where Qvi till-like deposits are present and overlying the Qvi channel deposits containing the Qvi groundwater. The groundwater level in the Qvi aquifer ranges from approximately less than 1foot up to 49 feet bgs (Table 13-7) with an average depth of approximately 10 to 20 feet bgs. The Qvi aquifer is locally artesian at monitoring well UG-MW26[13] with the potentiometric surface occurring above the ground surface. Perched groundwater is present at some locations within the Qvi aquifer as observed in monitoring wells A11-MW11S, A11-MW17S, and A6-MW10S. However, this perched groundwater is not considered representative of groundwater levels in the Qvi aquifer. The inferred groundwater flow direction in the

[13] Located southeast of the intersection of South 17th Street and Tacoma Avenue South.

Qvi aquifer across the Westley Plume is generally easterly toward the Thea Foss Waterway. Qvi groundwater flow directions vary locally within the Qvi channel deposits. The Qvi aquifer is absent in portions of the Westerly Plume where groundwater is seasonally absent or the Qvi aquifer flows into the Qva aquifer as discussed above.

Groundwater gradients and estimated linear groundwater velocities were calculated for the Qvi aquifer. Qvi groundwater gradients are relatively low in the area west of Tacoma Avenue South and steeper east of Tacoma Avenue South. Qvi groundwater flow velocities and hydraulic gradients for the Westerly Plume are discussed below in three general areas relative to the eight source areas. See Appendix L for flow calculations.

- **Southwest Portion of Westerly Plume (1904-1908, 1922, and 1934-1938 Tacoma Avenue South, Portion of Tacoma Avenue South Sanitary Sewer).** The estimated Qvi average linear groundwater velocity for the area between South 19th Street and South 21st and in the area between South G Street and Fawcett Avenue ranges from approximately 0.12 to 2.5 ft/day with hydraulic gradients ranging from 0.0061 to 0.15 ft/ft based on the April 2021 groundwater monitoring event.
- **Northwest Portion of Westerly Plume (1701 and 1722 Tacoma Avenue South, Portion of Tacoma Avenue South Sanitary Sewer).** The estimated Qvi average linear groundwater velocity for the area between South 18th Street and South 17th Street and in the area between Court F and Market Street ranges from approximately 0.23 to 6.1 ft/day with hydraulic gradients ranging from 0.011 to 0.15 ft/ft based on the April 2021 groundwater monitoring event.
- **Central Portion of Westerly Plume (1755 Fawcett Avenue and 1742 Jefferson Avenue).** The estimated Qvi average linear groundwater velocity for the area of South 19th Street and in the area between Fawcett Avenue and Jefferson Avenue ranges from approximately 1.44 to 34 ft/day with hydraulic gradients ranging from 0.11 to 0.21 ft/ft based on the April 2021 groundwater monitoring event.

Qva Groundwater Occurrence and Flow

The Qva aquifer underlies the Qvi aquifer (where present) with a potentiometric surface ranging between approximately 6 and 97 feet bgs (Table 13-7) with an inferred groundwater flow direction that is generally east to northeasterly. The Qva aquifer alternates between unconfined and confined groundwater conditions throughout the Westerly Plume. The Qva aquifer is generally unconfined west of Tacoma Avenue South with a relatively flat water table occurring within the Qva sands. The Qva aquifer becomes confined east of Tacoma Avenue South with the potentiometric head occurring above the Qvi silt.

Groundwater gradients and estimated linear groundwater velocities were calculated for the Qva aquifer. Qva groundwater gradients are relatively low (flat) between South G Street and Fawcett Avenue and then become steeper in the area east and downgradient of Fawcett Avenue. Qva groundwater gradients are also in the area north of South 19th Street between Market Street and Jefferson Avenue. Qva groundwater flow velocities and hydraulic gradients for the Westerly Plume are discussed below in three general areas relative to the eight source areas.

- **Southwest Portion of Westerly Plume (1904-1908, 1922, and 1934-1938 Tacoma Avenue South, Portion of Tacoma Avenue South Sanitary Sewer).** The estimated Qva average linear groundwater velocity for the area between South 19th Street and South 21st and in the area between South G Street and Fawcett Avenue ranges from approximately 0.30 to 0.40 ft/day with hydraulic gradients ranging from 0.025 to 0.03 ft/ft based on the April 2021 groundwater monitoring event.

- **Northwest Portion of Westerly Plume (1701 and 1722 Tacoma Avenue South, Portion of Tacoma Avenue South Sanitary Sewer).** The estimated Qva average linear groundwater velocity for the area between South 18th Street and South 17th Street and in the area between Court F and Market Street ranges from approximately 0.19 to 0.77 ft/ day with hydraulic gradients ranging from 0.0055 to 0.12 ft/ft based on the April 2021 groundwater monitoring event.
- **Central Portion of Westerly Plume (1755 Fawcett Avenue and 1742 Jefferson Avenue).** The estimated Qva average linear groundwater velocity for the area of South 19th Street and in the area between Fawcett Avenue and Jefferson Avenue ranges from approximately 0.56 to 0.87 ft/day with hydraulic gradients ranging from 0.14 to 0.26 ft/ft based on the April 2021 groundwater monitoring event.

13.4.3. Sources of Contamination

Source areas for the Westerly Plume and lines of evidence supporting historical operations as the source(s) of contamination include the following based on the results of the RI:

- **1701 Tacoma Avenue South (Upton—UWT Campus Source Area—Primary Source).** Glow Cleaners and Towne Cleaners (former dry cleaner businesses) operated at 1701 Tacoma Avenue South from the early 1960s until the early 1970s. Dry cleaners during this period typically utilized PCE as part of their operations. Elevated concentrations of PCE including breakdown products (TCE, cis-DCE, and vinyl chloride) were identified in soil from approximately 3 to 55 feet bgs at this location as part of the 2016 RI. In addition, elevated concentrations of PCE including breakdown products (TCE, cis-DCE, and vinyl chloride) were also identified in the Qvi aquifer downgradient of this location.
- **1742 Jefferson Avenue (1742 Jefferson—UWT Campus Source Area—Secondary Source).** Investigation results identified TCE in shallow soil (approximately 3 feet bgs) at location JS-B7. TCE was identified in the soil at the base and sidewalls of the excavation following remedial actions. TCE was also identified in groundwater. The release of TCE to soil is likely associated with the use of solvents during historical automotive service center operations (Standard Oil) between 1932 and 1965. TCE is commingled with upgradient source areas as described above.
- **1755 Fawcett Avenue (Kelly—UWT Campus Source Area—Secondary Source).** Former cleaner (E I Cleaners) and motorcycle sales and service shops (Potter Clarence Co. and Montgomery Motorcycle) were historically operating at this location between 1931 and 1965. Solvents used during these operations (TCE) may have been released to the soil through drips, spills, and/or other discharges. Elevated concentrations of TCE were identified in soil from approximately 3 to 36 feet bgs at this location as part of the 2016 RI. In addition, elevated concentrations of TCE were also identified in the Qvi aquifer downgradient of this location. TCE is commingled with upgradient source properties as described above.
- **1722 Tacoma Avenue South (Upgradient Source Area to the UWT Campus—Primary Source).** Historical photoengraving operations including West Coast Engravers operating between at least 1958 and 1983 followed by Western Metal Arts to at least 1988 utilized various acids, bases, and solvents based on information from Ecology's Hazardous Waste Division files. Neutralized nitric acid was reportedly discharged from the property to the sanitary sewer system between 1986 and 1988 based on notes included on the hazardous waste forms. In addition, permit records and blueprints show that the building was designed with multiple sinks/wash basins and floor drains that were connected to the City's sanitary sewer through side laterals drain systems indicating process water used in photoengraving operations was also discharged to the City sanitary sewer. Elevated concentrations of

PCE, TCE and breakdown products (cis-DCE and DCE) were detected in soil from approximately 5 to 30 feet bgs at this location. In addition, elevated concentrations of PCE, TCE, and breakdown products (cis-DCE and DCE) and DCA were also identified in the Qvi aquifer at and/or downgradient of this location.

- **1904-1908 Tacoma Avenue South (Upgradient Source Area to the UWT Campus—Primary Source).** Automotive, motorcycle, and transmission services historically operated at this location between 1942 and 1963 and likely utilized solvents to clean various engine/transmission parts. PCE and TCE were released to the ground surface through leaks, spills, and/or discharges on the property as evidenced by elevated concentrations observed in soil from 6 to 65 feet bgs as well as elevated concentrations in groundwater at and downgradient of this location. In addition, potential upgradient sources of contamination were not identified.
- **1922 Tacoma Avenue South (Upgradient Source Area to the UWT Campus—Primary Source).** Automotive tire, brake, and alignment services historically operated at this location between 1953 and 1993 which likely utilized solvents to clean various brake system parts. PCE and TCE were released to the ground surface through leaks, spills and/or discharges on the property as evidenced by elevated concentrations observed in soil from 9 to 70 feet bgs as well as elevated concentrations in groundwater at and downgradient of this location. In addition, a potential dry well likely associated with these operations was identified east of the building store face. Elevated concentrations of PCE and TCE were detected in both sediment and water samples within the dry well. A review of the City's utility records indicated that this structure was not associated with their system. Additionally, the alignment of the drain into this structure is oriented back toward 1922 Tacoma Avenue South further supporting this as a source area. Lastly, potential upgradient sources of contamination at this location were not identified.
- **1934-1938 Tacoma Avenue South (Upgradient Source Area to the UWT Campus—Primary Source).** A camshaft repair facility business (Delta Camshaft) operated at this location from approximately 1983 to 2010. Operations at Delta Camshaft included grinding, cutting, milling, and coating camshafts for the engine-building industry based on information provided by the City. Other uses of the property included various general contractor companies, Knights of Columbus, and a security systems company. Inspections of Delta Camshaft in response to a complaint filed with Ecology identified "very poor" housekeeping including multiple open drums and evidence of petroleum/solvent releases (TCE) from the camshaft rinse areas during the inspections. TCE was released to the ground surface through leaks, spills and/or discharges on the property (and potentially to a manhole west of the former building) as evidenced by elevated concentrations observed in soil from 5 to 65 feet bgs as well as elevated concentrations in groundwater at and downgradient of this location. In addition, potential upgradient sources to contamination were not identified.
- **Tacoma Avenue South Sanitary Sewer (Upgradient Source Area to the UWT Campus—Primary Source).** Acids, bases, and potential solvents including PCE, TCE, and TCA generated during historical operations at 1722 Tacoma Avenue South were discharged to the City's sanitary sewer. Solvents may have also been discharged into the sanitary sewer from other sources along Tacoma Avenue South, 1904-1908 Tacoma Avenue South, 1922 Tacoma Avenue South, and the 1934-1938 Tacoma Avenue South Source Area. An approximate 1,075-foot section of early 1900s era terra cotta sanitary sewer pipe was identified as a source area (Figures 13-2 and 13-3) due to the City's acceptance of wastewater to the Sewer generated as part of the historical operations on adjacent properties and poor condition of the Sewer (i.e., multiple Grade 4 to 5 cracks), which allowed for the exfiltration of CVOC-related contaminants to soil. As such, the City's Sewer is a "facility" as defined by MTCA. These releases

subsequently migrated to groundwater and spread downgradient of this location where they commingled with releases from other source areas as evidenced by the soil, soil vapor, groundwater, and stormwater sample results.

Localized releases of petroleum-related contaminants (cPAHs and metals) to shallow soil have been identified in other portions of the UWT Campus and are further discussed in Section 8.0 (1742 Jefferson), Section 10.0 (Kelly) and Section 17.0 (Area-Wide Soil).

13.4.4. Potential Receptors and Exposure Pathways

Current and future land use were considered when evaluating potential receptors and exposure pathways. The current and planned future land use is for commercial and academic purposes. The Westerly Plume and surrounding area include multiple commercial, educational, and residential buildings, paved parking lots, ROWs, sidewalks, and vacant land. Precipitation falling to the ground surface either infiltrates into the ground (unpaved areas) or is captured by catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway. It is assumed that future land use will be similar to its current use with additional development on the vacant land.

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

- **Direct Contact.** The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil and/or groundwater during excavation activities.
- **Drinking Water.** Groundwater within the Qvi and Qva aquifers beneath the Westerly Plume and surrounding area is not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.
- **Surface Water**. The Westerly Plume is 1,300 feet from the Thea Foss Waterway. However, stormwater utilities are located within the Westerly Plume at an elevation below the groundwater table to the east of Tacoma Avenue South where unlined/sealed sections of pipe and/or early 1900s-era pipe are present which serve as a potential migration pathway for contaminants to reach the Thea Foss Waterway. Additionally, groundwater seepage captured by the Y Student Center building drains and potentially groundwater seepage to the current building drain for 1902 Tacoma Avenue South (1904-1908 Tacoma Avenue Source Area) also discharges to the stormwater system. Therefore, surface water is retained as a potential exposure pathway for CVOC contaminants. Soil and groundwater data for benzene indicate that the surface water exposure pathway is not complete based on the RI results in which areas of benzene exceedances are not in the vicinity of where stormwater utilities are below the groundwater table.
- **Indoor Air**. Multiple buildings (Figure 13-1) are located within the Westerly Plume footprint. CVOCs and benzene in groundwater (further discussed in Section 13.6) have the potential to volatilize and migrate through the vadose zone into enclosed building spaces in this area. As a result, the VI into the indoor air pathway is considered a potential exposure pathway. The potential for VI and impacts to indoor air is further discussed below in Section 13.6.5.

13.5. Proposed Cleanup Levels

PCULs were developed for the Westerly Plume for the protection of human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (Chapter 173-340 WAC), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water use, potential exposure pathways, and the potential receptors to the Westerly Plume area. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for the Westerly Plume is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels**. PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b) and numerical criteria protective of marine surface water cleanup levels. Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels**. Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

13.6. Nature and Extent of Contamination

13.6.1. Contaminants and Media of Concern

Characterization data for the Westerly Plume are summarized in Tables 13-6 through 13-9 and were evaluated to determine contaminants and media of concern for the Westerly Plume Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions is presented in Table Q-25 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2021 is presented in Table Q-26 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-27, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-25 through Q-27) include the following:

- **Soil.** PCE and TCE were identified as primary soil COCs for the Westerly Plume Site based on the source of contamination to soil and the characterization results. In addition, PCE/TCE breakdown products

(cis-DCE, DCE, and vinyl chloride) as well as DCA were identified as secondary soil COCs for the Westerly Plume. Cis-DCE, DCE, vinyl chloride, and DCA are considered secondary COCs because these contaminants either are collocated with one or more primary soil COC or infrequently exceed the PCULs (i.e., less than 10 percent). The nature and extent of soil COCs (both primary and secondary) are further discussed in Section 13.6.2.

- **Groundwater.** PCE and TCE were identified as primary groundwater COCs for the Westerly Plume Site based on results of the 2016 Agreed Order groundwater investigation in which PCE and TCE exceeded the groundwater PCUL during one or more monitoring events results between 2016 and 2020. PCE and TCE were also observed in portions of the stormwater system and TCE was also observed in groundwater seeping into the building drainage system for the Y Student Center. In addition, PCE/TCE breakdown products (cis-DCE, DCE and vinyl chloride) as well as DCA and benzene were identified as secondary groundwater COCs for the Westerly Plume because these contaminants either are collocated with one or more primary groundwater COCs or infrequently exceed the PCULs (i.e., less than 10 percent). The nature and extent of groundwater COCs are further discussed in Section 13.6.3.
- **Soil Vapor.** Based on screening of soil and groundwater data, TCE, vinyl chloride and DCA were identified as COCs with the potential to migrate into enclosed spaces at concentrations that could exceed the Method B indoor air PCULs and/or the SL for the protection of commercial workers. An evaluation for VI potential is further discussed in Section 13.6.4.

Other CVOC-related contaminants including trans-DCE, TCA, and chlorobenzene are not considered COCs because they do not exceed the PCUL in soil or groundwater at the Westerly Plume Site. Petroleum-related contaminants including benzene, xylenes, 1,2,4-TMB, 1,3,5-TMB, as well as naphthalenes, cPAHs, arsenic, and lead associated with Kelly, 1742 Jefferson or Area-Wide Soil are discussed in Sections 8.0, 10.0 and 17.0, respectively. Note that TCA and chloroform are further discussed below because they are considered tracer compounds. TCA detections provide a line of evidence for the 1722 Tacoma Avenue South Source Area based on the historical use of these products during the Western Arts operations. TCA may also be a tracer compound for brake and tire repair operations at the 1922 Tacoma Avenue South Source Area based on the presence of this compound within the dry well located downgradient of this property. Chloroform is also considered a tracer compound that provides a line of evidence of exfiltration from the sanitary sewer and associated chlorinated water in the soil surrounding this utility. No historical operation has been identified as a potential source of chloroform although chloroform was detected at concentrations greater than the PCUL at select locations in groundwater.

COCs (PCE, TCE, cis-DCE, vinyl chloride, DCA, and benzene) for soil and groundwater are shown in plan view on Figures 13-7 through 13-27. Primary COC (TCE) for the stormwater system is shown in plan view on Figure 13-28. COCs are shown in cross section on Figures 13-29 through 13-34. The nature and extent of COCs in media of concern are further discussed below.

13.6.2. Soil

The nature and extent of primary and secondary Westerly Plume COCs in soil are shown on Figures 13-7 through 13-13 and are further discussed in Sections 13.6.2.1 through 13.6.2.9 as they relate to each source area.

13.6.2.1. 1701 Tacoma Avenue South Source Area (Upton—UWT Campus Source Area)

Soil contamination associated with the 1701 Tacoma Avenue South Source Area is located within the area of the former dry cleaner located on the UWT Campus and directly east (downgradient) of this location which operated from the early 1960s until the early 1970s. The results of soil sampling completed in the vicinity of the 1701 Tacoma Avenue South Source Area identified PCE, TCE, cis-DCE, and vinyl chloride within and to the east of this location. Soil results are summarized below.

- PCE (primary COC for the 1701 Tacoma Avenue South Source Area) was detected in soil at concentrations greater than PCUL at depths ranging between approximately 3 and 26 feet bgs in multiple soil samples analyzed at this location. The highest PCE concentration (3.8 mg/kg) was detected in a sample collected from approximately 6.5 to 7.5 feet bgs in boring A6-B10 located directly east of the building where the former dry cleaner historically operated.
- TCE, cis-DCE, and vinyl chloride (secondary COCs) were also detected in soil at concentrations greater than the PCUL at this location and to the east in a limited number of samples at depths ranging between approximately 13 and 55 feet bgs. PCUL exceedances for TCE (up to 0.068 mg/kg), cis-DCE (up to 0.022 mg/kg), and vinyl chloride (up to 0.0018 mg/kg) are generally collocated with PCE in soil and may be due to degradation and/or associated with releases from 1722 Tacoma Avenue South that have migrated in groundwater downgradient and beneath the 1701 Tacoma Avenue South Source Area.

13.6.2.2. 1742 Jefferson Avenue Source Area (1742 Jefferson—UWT Campus Source)

Soil contamination associated with the 1742 Jefferson Avenue Source Area is located within the area of the former automotive service center (Standard Oil), located on the UWT Campus, which conducted operations between 1932 and 1965 on the UWT Campus. The results of soil sampling completed at the 1742 Jefferson Avenue Source Area identified TCE in soil within the previous service station building footprint. TCE-contaminated soil was detected above the groundwater table similar to the 1755 Fawcett Avenue Source Area indicating this as a source area to the overall Westerly Plume. TCE contamination commingles with other upgradient sources below the water table (described above). Soil results within the 1742 Jefferson Avenue Source Area are summarized below.

- TCE (up to 1.13 mg/kg) and other CVOCs were detected in a soil sample collected within the former service station near the floor drain at a depth of approximately 3 feet bgs (above the groundwater table) in boring JS-B7 in 1998. This soil was subsequently excavated in 2012. However, TCE was detected at concentrations greater than the PCUL at depths ranging between 4 and 30 feet bgs in soil that remains in place based on the results of confirmation samples CS-TP6SW-4 and CS-TP6BASE-7.5 and in boring JS-MW1S, completed in 2019. The TCE-contaminated soil appears to be related to former service station operations and potentially sorption from the upgradient TCE-contaminated groundwater plume.

Petroleum-contaminated soil associated with the 1742 Jefferson Avenue Source Area (1742 Jefferson - former Standard Oil Station) is further discussed in Section 8.0.

13.6.2.3. 1755 Fawcett Avenue Source Area (Kelly—UWT Campus Source Area)

Soil contamination associated with the 1755 Fawcett Avenue Source Area is located within the area of the former motorcycle repair facility that historically operated between 1931 and 1965 on the UWT Campus. The results of soil sampling completed for the 1755 Fawcett Avenue Source Area identified TCE in the soil within the previous building footprint at depths above the local groundwater table indicating this as a source area to the overall Westerly Plume. TCE contamination commingles with other upgradient sources

(described above) below the water table. Soil results within the 1755 Fawcett Avenue Source Area are summarized below.

- TCE was detected at concentrations greater than the PCUL above the groundwater table (approximately 9 feet bgs) at depths ranging between 3 and 6 feet bgs and ranging between 0.0016 and 0.0018 mg/kg in boring A12-B6 located within the eastern portion of the former building footprint.

Petroleum-contaminated soil associated with the 1755 Fawcett Avenue Source Area (Kelly) is further discussed in Section 10.0.

13.6.2.4. 1722 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus)

Soil contamination associated with the 1722 Tacoma Avenue South Source Area is located within the area of the photoengraving facility (upgradient of UWT Campus) and east and northeast (downgradient onto the UWT Campus) of this location, which historically operated from at least 1958 to at least 1988. The results of soil sampling completed in the vicinity of the 1722 Tacoma Avenue South Source Area identified TCE, PCE, cis-DCE, DCE, and DCA in soil within and/or to the east-northeast of this location. Soil results are summarized below.

- TCE (primary COC for the 1722 Tacoma Avenue South Source Area) was detected at concentrations greater than the PCUL at depths ranging between the ground surface and approximately 90 feet bgs in multiple soil samples analyzed at and downgradient (both east and northeast) of this location. The highest TCE concentrations were detected in samples collected from boring PS7-DP3 (up to 2.9 mg/kg) at a depth of 0.5 to 1.5 feet and from paired wells borings UG-MW25S and UG-MW25D (up to 3.2 mg/kg) between 11 and 14 feet bgs.
- PCE, cis-DCE, DCE, and DCA (secondary COCs) were also detected in soil at concentrations greater than the PCULs within the building and the area downgradient in a limited number of samples at depths ranging between the ground surface and approximately 16 feet bgs as follows:
    - PCE was detected at concentrations greater than the PCUL from the ground surface to a depth of approximately 1.5 feet bgs in soil samples collected in the northwest portion of the 1722 Tacoma Avenue South building (boring PS7-DP3) in the area of the former wash drains/sumps. PCE was detected at a concentration of 0.58 mg/kg at this location.
    - Cis-DCE was detected at a concentration (0.0093 mg/kg) greater than the PCUL from the ground surface to a depth of approximately 1-foot bgs in a soil sample collected from boring PS7-DP7.
    - DCE was detected in select soil samples collected within and downgradient of the 1722 Tacoma Avenue South Source Area in borings PS7-DP7 and UG-MW25S/D (up to 0.0067 mg/kg) at depths ranging from approximately 7.5 to 16 feet bgs.
    - DCA (breakdown product of TCA) was detected in the select soil samples collected downgradient of the 1722 Tacoma Avenue South Source Area in boring UG-MW25S/D at depths of approximately 7.5 to 16 feet bgs.

TCA is considered a tracer compound for the 1722 Tacoma Avenue South Source Area due to its historical documented use within the building although TCA was not detected greater than the PCUL. In soil, TCA was detected from the ground surface to a depth up to 10 feet bgs within the 1722 Tacoma Avenue South Source Area and downgradient to the east (UG-MW25S/D). The TCA detections are collocated with DCA PCUL exceedances in boring UG-MW25S/D at depths of 7.5 to 16 feet bgs.

13.6.2.5. 1904-1908 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus)

Soil contamination associated with the 1904-1908 Tacoma Avenue South Source Area is located within the area of the former auto repair and used car lot that historically operated at this location between 1942 and 1963. The results of soil sampling completed in the vicinity of the 1904-1908 Tacoma Avenue South Source Area identified TCE and PCE in the soil around the current building footprint (upgradient of UWT Campus), and to the east of this location, where they commingle with releases from the other Tacoma Avenue South sources. Soil results are summarized below.

- TCE was detected at concentrations greater than PCUL at depths ranging between approximately 5 and 60 feet bgs with the highest concentration (up to 0.39 mg/kg) detected in boring PS5-MW1D at a depth of approximately 34 feet bgs.
- PCE was detected at concentrations greater than the PCUL at depths ranging between approximately 9 and 30 feet bgs with the highest concentration (up to 0.0062 mg/kg) detected in boring PS5-MW1D at a depth of approximately 29 feet bgs.

13.6.2.6. 1922 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus)

Soil contamination associated with the 1922 Tacoma Avenue South Source Area is located within the area of the former brake and tire repair that historically operated between 1953 and 1993. The results of soil sampling completed in the vicinity of the 1922 Tacoma Avenue South Source Area identified PCE and TCE in the soil around the previous building footprint (upgradient of UWT Campus) and to the east of this location where they commingle with releases from the other Tacoma Avenue South sources. Soil results are summarized below.

- PCE was detected at concentrations greater than the PCUL at depths ranging between approximately 9 and 40 feet bgs with the highest PCE concentration (up to 0.011 mg/kg) detected in boring PS4-MW3S at a depth of approximately 24 feet bgs.
- TCE was detected at concentrations greater than the PCUL at depths ranging between approximately 6 and 68 feet bgs with the highest TCE concentration (0.11 mg/kg) detected in boring PS4-MW3D at a depth of approximately 34 feet bgs.

PCE (0.56 mg/kg) and TCE (1.9 mg/kg) were also detected in the sediment sample collected from the potential dry well (TAC-Manhole) located within Tacoma Avenue South, which appeared to be connected to the former building at 1922 Tacoma Avenue South during historical land use. Sediment observed in the TAC-Manhole was removed in December 2020 as part of the investigation activities completed for the 1922 Tacoma Avenue South Source Area.

13.6.2.7. 1934-1938 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus)

Soil contamination associated with the 1934-1938 Tacoma Avenue South Source Area is located within the area of the former camshaft repair facility that historically operated from 1983 to 2010. The results of soil sampling completed in the vicinity of the 1934-1938 Tacoma Avenue South Source Area identified TCE in the soil around the former building footprint (upgradient of UWT Campus), and to the east of this location, where TCE commingles with releases from the other Tacoma Avenue South sources. Soil results are summarized below.

- TCE was detected at concentrations greater than the PCUL at depths ranging between approximately 23 and 60 feet bgs with the highest TCE concentration (0.078 mg/kg) detected in boring PS3-MW2S at a depth of approximately 34 feet bgs.

13.6.2.8. Tacoma Avenue South Sanitary Sewer Source Area (Upgradient Source Area to the UWT Campus)

Soil contamination associated within Tacoma Avenue South Sanitary Sewer Source Area is associated with the exfiltration of PCE and TCE discharged to the sewer during historical operations from the 1722 Tacoma Avenue South Source Area. The results of soil sampling completed in the Tacoma Avenue South ROW (upgradient of UWT Campus) identified PCE and TCE in close proximity (both vertically and laterally) to areas in which City inspection records identified grade 4 and 5 breaks and/or cracks in the sewer pipe. Soil contamination also migrated east of this location where it commingles with releases from the other Tacoma Avenue South sources. Soil results within the ROW are summarized below.

- PCE (primary COC for the Tacoma Avenue South Sanitary Sewer Source Area) was detected at concentrations greater than the PCUL at depths ranging between approximately 8 and 32 feet bgs along the utility alignment between South 18th Street and South 21st Street. The highest PCE concentration (0.069 mg/kg) was detected at a depth of approximately 29 feet bgs in boring A11-B5 located near a documented break in the sanitary sewer pipe and within a flat-lying portion of the Qvi silt in this area (Figure 13-7).
- TCE (primary COC for the Tacoma Avenue South Sanitary Sewer Source Area) was detected at concentrations greater than the PCUL at depths ranging between approximately 5 and 65 feet bgs along the utility alignment between South 17th Street and South 21st Street. TCE was detected greater than 1 mg/kg in borings A11-B5 and A11-B6 located near a documented break in the sanitary sewer pipe and up to 2.8 mg/kg in boring A11-B5 collected at a depth of approximately 29 feet bgs within a flat-lying portion of the Qvi silt in this area. TCE was detected at a concentration of 1.2 mg/kg at a depth of approximately 8 feet bgs in boring A11-B6, which corresponds to the depth of the sanitary sewer base and at an area where sediment deposits were settling within the sanitary sewer pipe itself (based on City of Tacoma inspection reports). TCE was also detected at a concentration greater than 1 mg/kg directly downgradient of a hole in the sanitary sewer pipe at the intersection of South 19th Street and Tacoma Avenue South in boring UG-MW24S at a depth of approximately 17 feet bgs.

13.6.2.9. Other Areas and Commingling Plumes

Other locations of PCUL exceedances are shown on Figures 13-7 through 13-13 and appear to be related to sorption from the dissolved phase of the PCE and TCE groundwater plume based on the distribution of detected concentrations and proximately to the source areas described above. The nature and extent of PCE and TCE in groundwater are further discussed below (Section 13.6.3). Two exceptions include:

- TCE was detected at concentrations greater than 100 times the PCUL (greater than 1 mg/kg) at depths ranging between approximately 35 and 43 feet bgs near the intersection of South 19th Street and Market Street. The geology in this area includes relatively flat-lying Qva silt (Section G-G', Figure 2-13). It is inferred that TCE contamination at this location is from upgradient sources settled onto the flat-lying Qva silt where it accumulated leading to the increased TCE concentrations observed.
- Benzene was detected at concentrations greater than the PCUL in three wells located in the Jefferson Avenue ROW including well A11-MW40D located at South 19th Street and Tacoma Avenue South and wells COT-MW4 and COT-MW5 located at South 19th Street and Jefferson Avenue. Sources of benzene were not identified based on historical operations and land use.

13.6.3. Groundwater

The nature and extent of groundwater COCs for the Westerly Plume are based on the results of the 2016 Agreed Order RI and the investigation completed by 1920 Tacoma Ave., LLC, which are representative of current conditions. As noted above, PCE and TCE were identified as primary COCs based on PCUL exceedances during one or more monitoring events during the 2016 Agreed Order groundwater investigation. PCE/TCE breakdown products (cis-DCE, DCE and vinyl chloride) as well as DCA are considered secondary COCs for the Westerly Plume Site because they infrequently exceed the PCULs and are limited in extent where they do exceed.

As discussed in Section 13.4.2.2, the groundwater in the Qvi and Qva aquifers is hydraulically connected in various portions of the Westerly Plume area. As a result, contaminant distribution in the Qvi and Qva aquifers varies based on the geologic and hydrogeologic conditions in this area (i.e., glacial incision of the confining Qvi/Qva silt layers and/or preferential flow pathways through the Qvi till-like and channel deposits). This section describes where COCs are present in the Qvi and Qva aquifers. The contaminant fate and transport are further described in Section 13.7. CVOC and benzene groundwater data from the individual and/or semi-annual monitoring events completed between 2016 and March 2021 are shown on Figures 13-14 through 13-28 and in cross section on Figures 13-29 through 13-34. The nature and extent of contamination within the Qvi and Qva aquifers are further discussed in Sections 13.6.3.1 and 13.6.3.2 below.

13.6.3.1. Qvi Aquifer

The nature and extent of primary and secondary COCs associated with the Westerly Plume in the Qvi aquifer are discussed below relative to identified individual source areas. In general, TCE contamination within the Qvi aquifer is the most widespread contaminant throughout the Westerly Plume, which extends from Tacoma Avenue South to Jefferson Avenue as shown on Figure 13-15. PCE is generally limited to the area of South 19th Street and west of Fawcett Avenue in the vicinity of Tacoma Avenue South as shown on Figure 13-14. Other COCs including cis-DCE, DCE, vinyl chloride, and DCA are limited in extent to the area immediately downgradient of their respective source areas (Figures 13-18, 13-21, 13-22, and 13-24). Benzene was identified in two isolated areas at UG-MW25S east of the 1722 South Tacoma Avenue Source Area and at well COT-MW4 located in Jefferson Avenue east of the Swiss Complex (Figure 13-26). However, historical land uses of 1722 South Tacoma Avenue and the Swiss Complex did not identify the use of benzene.

- **1701 Tacoma Avenue South Source Area (Upton—UWT Campus Source Area).** PCE, TCE, cis-DCE, and vinyl chloride were detected in groundwater at concentrations greater than the PCUL within and/or downgradient of the 1701 Tacoma Avenue South Source Area. At this location, the PCE concentration (primary COC for the 1701 Tacoma Avenue South Source Area) ranges between 6.2 and 22 µg/L in well A6-MW1S. PCUL exceedances for cis-DCE (up to 23 µg/L) and vinyl chloride (up to 0.54 µg/L) are collocated with PCE in well A6-MW1S downgradient of the observed soil PCUL exceedances. TCE up to 160 µg/L was observed both upgradient and downgradient of the 1701 Tacoma Avenue South Source Area. As noted in Section 13.6.2.1, TCE, cis-DCE, and vinyl chloride observed in groundwater may be due to degradation of PCE and/or associated with releases from 1722 Tacoma Avenue South that have migrated in groundwater downgradient and beneath the 1701 Tacoma Avenue South Source Area.
- **1742 Jefferson Avenue Source Area (1742 Jefferson—UWT Campus Source Area).** TCE was detected at concentrations greater than the PCUL in groundwater within this source area. While the TCE is commingled with upgradient contaminant sources, TCE was also detected in shallow soil above the

groundwater table indicating 1742 Jefferson Avenue historical operations contributed to the larger TCE plume. PCUL exceedances of TCE range between 12 and 14 µg/L at this location. Jefferson Avenue to the east and downgradient of this location marks the terminus of the TCE in the Westerly Plume.

- **1755 Fawcett Avenue Source Area (Kelly—UWT Campus Source Area).** TCE was detected at concentrations greater than the PCUL in groundwater within this source area. While the TCE is commingled with upgradient contaminant sources, TCE was also detected in shallow soil above the groundwater table indicating historical operations at Kelly contributed to the larger TCE plume. TCE exceedances of the PCUL range between 69 and 280 µg/L at this location. TCE extends to Jefferson Avenue downgradient of this location.
- **1722 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus).** TCE, DCE, DCA and benzene were detected in groundwater at concentrations greater than the PCULs within and/or downgradient of the 1722 Tacoma Avenue South Source Area. The TCE concentration (primary COC for the 1722 Tacoma Avenue South Source Area) ranges between 100 and 1,100 µg/L with the highest TCE concentration detected in well UG-MW25S (230 to 1,100 µg/L). TCE exceedances of the PCUL in the Qvi groundwater are observed downgradient (both northeast and east) of the 1722 Tacoma Avenue South Source Area and it commingles with other contaminants released from other source areas, which extend to the area west of the intersection of Broadway and South 17th Street.
- **1904-1908 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus).** PCE and TCE (primary COCs for the 1904-1908 Tacoma Avenue South Source Area) were detected in groundwater at concentrations greater than the PCULs within the source area. PCUL exceedances of PCE range in concentration between 0.33 and 12 µg/L while PCUL exceedances for TCE range in concentration between 8.8 and 170 µg/L. TCE and PCE to the east and downgradient of this location commingle with releases from the Tacoma Avenue South Sanitary Sewer Source Area before further migrating to the east, which extends to Jefferson Avenue.
- **1922 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus).** PCE and TCE (primary COCs for the 1922 Tacoma Avenue South Source Area) were detected in groundwater at concentrations greater than the PCUL within the source area and in the water sample collected from the potential dry well located in the Tacoma Avenue South ROW east of this area. PCUL exceedances for PCE range in concentration between 0.60 and 12 µg/L while PCUL exceedances for TCE range in concentration between 0.24 and 150 µg/L.

  TCE was detected at a concentration of 200 µg/L with the PCE concentration detected at 18 µg/L in the water within the dry well. In addition, TCA (tracer compound) was detected in well PS4-MW1S located within the source area and within the water sample collected from the dry well, which provides an additional line of evidence that the dry well at this location was associated with historical operations and land use for 1922 Tacoma Avenue South. TCE and PCE commingle to the east and downgradient of this location with releases from the Tacoma Avenue South Sanitary Sewer Source Area before migrating farther to the east, to Jefferson Avenue.
- **1934-1938 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus).** TCE (primary COC for the 1934-1938 Tacoma Avenue South Source Area) was detected in the groundwater at a concentration greater than the PCUL within the source area. TCE exceedances of the PCUL range between 0.78 and 3.4 µg/L. TCE in groundwater extends to Court D to the east and downgradient of this location.

- **Tacoma Avenue Sanitary Sewer Source Area (Upgradient Source Area to the UWT Campus).** PCE and TCE were detected in the groundwater at concentrations greater than the PCUL within Tacoma Avenue South near South 19th Street. As previously discussed, PCE and TCE received from historical operations at 1722 Tacoma Avenue South were released from cracks/breaks within the terra cotta sanitary sewer pipe. PCE and TCE at this location comingle with contaminants in groundwater from the 1904-1908 Tacoma Avenue South and 1922 Tacoma Avenue South Source Areas before migrating east (downgradient). PCE exceedances of the PCUL range in concentration between 9.5 and 21 µg/L within the vicinity of Tacoma Avenue South. TCE exceedances of the PCUL range in concentration between 110 and 1,300 µg/L in the vicinity of Tacoma Avenue South. Furthermore, supporting lines of evidence include the detection of TCA in wells A11-MW14S and A11-MW40S as TCA is a contaminant identified for the 1722 Tacoma Avenue South Source Area. In addition, chloroform was detected in multiple wells adjacent to the sanitary sewer line, which provides supporting evidence that releases from the sewer pipe were occurring. PCE contamination extends to Fawcett Avenue while TCE extends to Jefferson Avenue downgradient of this location.

13.6.3.2. Qva Aquifer

The nature and extent of PCE and TCE in the Qva aquifer within the Westerly Plume are discussed below relative to the individual source areas identified. In general, TCE-contaminated groundwater within the Qva aquifer is the most widespread contaminant throughout the Westerly Plume (Figure 13-17). PCE-contaminated groundwater within the Qva aquifer is generally limited to the area downgradient of 1904-1908 and 1922 Tacoma Avenue South in the area west of Court E (Figure 13-15). Other CVOCs and benzene were either not detected or detected at concentrations less than the respective PCULs in groundwater samples collected in the Qva aquifer (Figures 13-19, 13-21, 13-23, 13-25 and 13-27).

- **1701 (Upton—UWT Campus Source Area) and 1722 Tacoma Avenue South (Upgradient Source Area to the UWT Campus) Source Areas.** TCE (primary COC) was detected in the groundwater at concentrations greater than the PCUL within and downgradient of the 1701 and 1722 Tacoma Avenue South Source Areas. TCE was detected at concentrations ranging between 1.8 and 140 µg/L within the Qva aquifer in the area of 1722 Tacoma Avenue South. TCE in the Qva aquifer in the area of 1701 Tacoma Avenue South appears to originate from 1722 Tacoma Avenue South Source Area. However, contributions from the 1701 Tacoma Avenue South Source Area could not be ruled out. TCE was detected at concentrations ranging between 10 and 150 µg/L within the Qva aquifer in the area of 1701 Tacoma Avenue South. TCE in the Qva aquifer generally does not extend past Fawcett Avenue with limited exceedances in Market Street in wells downgradient of the Y Student Center (Figures 13-17 and 13-32).
- **1742 Jefferson Avenue Source Area (1742 Jefferson—UWT Campus Source Area).** TCE was detected in groundwater at concentrations greater than the PCUL. TCE in the Qva aquifer in the area of 1742 Jefferson Avenue may originate from the upgradient source areas (described above). However, contributions from the 1742 Jefferson Avenue Source Area could not be ruled out. TCE was detected within the Qva aquifer at concentrations ranging between 1.8 and 140 µg/L in the area of 1742 Jefferson Avenue and does not extend beyond Jefferson Avenue (Figures 13-17 and 13-30).
- **1755 Fawcett Avenue Source Area (Kelly—UWT Campus Source Area).** COCs were not detected in the Qva aquifer in this source area (Figures 13-15, 13-17, 13-19, 13-21, 13-23, 13-25, 13-27).
- **1904-1908, 1922 Tacoma Avenue South and Tacoma Avenue South Sanitary Sewer Source Areas (Upgradient Source Areas to the UWT Campus).** TCE and PCE were detected in groundwater at

concentrations greater than the PCULs downgradient of the 1904-1908, 1922 Tacoma Avenue South, and Tacoma Avenue South Sanitary Sewer Source Areas. TCE exceedances of the PCUL range between 3.8 and 1,170 µg/L. PCE exceedances of the PCUL range in concentration between 3.1 and 14 µg/L. As noted above, PCE-contaminated groundwater within the Qva aquifer is generally limited to the area between South Tacoma Avenue and Court E in the vicinity of South 19th Street. TCE-contaminated groundwater within the Qva aquifer extends east to Jefferson Avenue (Figures 13-15, 13-17, 13-29, and 13-34).

- **1934-1938 Tacoma Avenue South Source Area (Upgradient Source Area to the UWT Campus).** TCE was detected in groundwater at concentrations greater than the PCUL downgradient of the 1934-1938 Tacoma Avenue South Source Area. TCE exceedances of the PCUL range in concentration between 3.3 and 9.3 µg/L. TCE-contaminated groundwater within the Qva aquifer downgradient of the 1934-1938 Tacoma Avenue South Source Area extends to the area of Fawcett Avenue where the solvents enter the Qvi aquifer (Figures 13-17 and 13-33).

13.6.4. Stormwater System and Building Drains

TCE was detected at concentrations greater than the PCUL in base flow water samples collected between 2016 and 2020 from the stormwater system manholes on South 17th Street and South 19th Street. TCE exceedance of the PCUL in the base flow samples ranges between 0.78 and 15 µg/L with the highest TCE concentration detected in manhole MH:6767230 located at the intersection of Fawcett Avenue and South 19th Street. Additionally, TCE was also detected in the Y Student Center building drains between 2014 and 2015 at concentrations ranging from 18.6 to 22.2 µg/L. As discussed in Section 13.3.5, the City and Ecology concurred the building drain could be connected to the stormwater line within Market Street based on the analytical results.

The stormwater system on South 17th Street is directed to Outfall 230. The stormwater system in South 19th Street and the Y Student Center building drain was directed south to the Regional Stormwater Treatment Facility in PLT and subsequently Outfall 235. The Jefferson and Hood Street Surface Water Interceptor Capital Project completed in December 2022 redirected the South 19th stormwater system to Outfall 230, however the Y Student Center is still connected to Outfall 235.

13.6.5. Soil Vapor and Indoor Air

Based on the soil and/or groundwater sampling results representing current conditions, TCE and vinyl chloride were identified as COCs with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SL for the protection of commercial workers. The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination.** TPH-G and TPH-D exceeded the SL for soil VI. The potential for VI resulting from TPH-G and TPH-G associated with the 1742 Jefferson, Kelly and Area-Wide Soil is further discussed in Sections 8.0, 10.0 and 17.0.
- **Petroleum-Related Groundwater Contamination.** Petroleum-related contaminants either were not detected or were detected at concentrations less than the SL for groundwater VI. Therefore, petroleum-related contaminants are not considered a potential threat.
- **Other Contaminants.** TCE at concentrations exceeding the MTCA Method B SL for VI were identified in groundwater samples collected from the Qvi aquifer within at least 100 feet of the footprint of one or

more UW-owned and non-UW-owned buildings based on the results of the 2016 Agreed Order RI. In addition, vinyl chloride concentrations exceeded the SL at one location collocated with TCE (A6-MW1S) located within 100 feet of one UW-owned building at South 17th Street and Tacoma Avenue South. TCE and vinyl chloride also were detected at concentrations exceeding the MTCA Method B SL for VI in the Qva aquifer. However, the exposure pathway from the Qva aquifer to the overlying Qvi aquifer is considered incomplete due to the presence of the Qvi and Qva silts and the Qvi aquifer preventing the potential for TCE-vapors from migrating into indoor air. Lastly, DCA concentrations exceeded the SL at one location collocated with location UG-MW25S. However, buildings with enclosed spaces are not located within 100 feet of this location. Therefore, there is no potential for VI under the current land use scenario. If buildings with enclosed spaces are constructed in this area, the potential for VI will be further evaluated.

The results of the VI evaluation on other parts of campus (i.e., MDS Building [MDS], TPS Building, and Academic Block Buildings) indicate that similar TCE concentrations in groundwater are not impacting indoor air based on predictive modeling or the results of indoor air sampling completed. As a result, further VI evaluation was not required on UW-owned buildings as part of the RI. Furthermore, UW-owned buildings in this area are for commercial and academic use with air exchange rates of at least 0.5 exchanges of outside air per hour and operate on a neutral to slightly positive building pressure that further limits the potential for VI and inhalation by the building occupants. VI evaluation was not completed for non-UW-owned buildings.

The Y Student Center located on the northern portion of Westerly Plume is within an area with elevated concentrations of TCE. This building was constructed with a vapor mitigation system to prevent the potential migration of these contaminants into occupied indoor spaces. Indoor air sampling completed in 2015 (Table 13-9) confirmed that contaminant concentrations resulting from VI are below the indoor air cleanup criteria.

PCE, TCE, and other CVOCs were detected in passive soil vapor samples collected within the 1722 Tacoma Avenue South building and along the sanitary sewer in Tacoma Avenue South. The CVOC results for these samples were quantified as mass. Therefore, the CVOC results cannot be directly compared to the MTCA Method B SLs protective of indoor air. The passive vapor sampling results in this area were used to influence the location of future soil and groundwater samples collected in the area to support the RI as discussed above.

13.7. Contaminant Fate and Transport

The Westerly Plume consists of multiple commingled plumes contained within both the Qvi and Qva aquifers from eight identified source areas. TCE was identified as the primary COC in groundwater due to its widespread nature throughout the Westerly Plume; other COCs including PCE, cis-DCE, DCE, vinyl chloride and DCA are generally located in close proximity to the source area and are limited in extent. Overall, the fate and transport of contaminants are affected by their chemical properties and the physical, chemical, and biological processes that they are exposed to. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed in Section 18.0.

Other factors influencing the transport of CVOCs within the Westerly Plume include the location of contaminant sources, geology and hydrogeology, and the presence of building drains and sanitary and sewer utility networks. In general, CVOCs migrated vertically from the point of release through the soil column to the groundwater table. Concentrations constituting DNAPLs migrated through the water column

before settling in areas of flat-lying silts separating the Qvi and Qva deposits. These contaminants migrated through the silt layers through sorptive and diffusive processes and into the underlying geologic unit. Dissolved phases of CVOCs within the Qvi and/or Qva aquifers then migrated laterally and downgradient of the source areas within preferential flow paths (including but not limited to the Qvi channel deposits) and laterally by dispersion and diffusion.

Soil and groundwater contamination for the Westerly Plume Site is predominantly beneath portions of the UWT Campus that are capped by paved ROWs, parking lots and/or buildings preventing direct exposure (Figures 13-1 and 13-29 through 13-34). CVOCs have the potential to migrate through soil vapor into indoor air. Modeling results based on sub-slab vapor sampling within other UWT Campus buildings indicate that there is a low potential for VI into the occupied spaces at a concentration that would exceed the indoor air cleanup criteria although modeling for indoor air has not been completed in buildings within the Westerly Plume. Furthermore, a vapor mitigation system was installed on the Y Student Center and air sampling indicated VI was not occurring into the building.

The migration of CVOCs in a groundwater plume is limited by the sorption of these contaminants to fine-grained soils as evidenced by the detected concentrations in saturated soil downgradient of the source areas themselves although there is limited chemical degradation of CVOCs based on the results of the RI between 2016 and 2021. Overall, groundwater monitoring, completed as part of the 2016 Agreed Order RI (including groundwater data for the various capital projects and environmental due diligence projects completed since 2016), indicates that the leading edge of the Westerly Plume Site is stable likely due to dilution, sorption and/or natural attenuation and that the further migration of the Westerly Plume east of Jefferson Avenue is not occurring.

Source areas for the Westerly Plume and lines of evidence supporting historical operations as the source(s) are discussed in Section 13.4.3. Geologic and hydrogeologic conditions with the Westerly Plume contributing to the contaminant fate and transport are discussed in Section 13.4.2. The fate and transport of CVOCs associated with the Westerly Plume are described by source area in Sections 13.7.1 through 13.7.4 below.

13.7.1. Northern Portion of Westerly Plume (1701 and 1722 Tacoma Avenue South Source Areas)

TCE releases to soil through spills, drips, and/or discharges to the sanitary sewer entered the soil column where they migrated toward the Qvi aquifer at 1722 Tacoma Avenue South. PCE releases to soil entered the soil column where they migrated toward the Qvi aquifer at 1701 Tacoma Avenue South. These contaminants were transported downgradient of these areas following contact with groundwater. Contaminant transport is shown on cross sections CW-CW' (Figure 13-30) and E-E' (Figure 13-32) and specifically includes:

- PCE and TCE migrated into the Qvi aquifer and flowed downgradient to the east with the prevailing Qvi groundwater gradient (see Figures 13-14 and 13-16 and cross sections E-E' and C-C'). In the area west of Fawcett Avenue, contaminants sourcing from historical operations at 1701 Tacoma Avenue South commingled with contaminants sourcing from historical operations at 1722 Tacoma Avenue South.
- Contaminants detected at concentrations constituting DNAPL released from the 1722 Tacoma Avenue South Source Area likely migrated through the Qvi groundwater column before settling on top of the flat-lying Qvi silt. These contaminants migrated through the silt layers into the underlying Qva aquifer through diffusion as shown on Figures 13-30 and 13-32. However, DNAPL is unlikely to remain at this

location based on the results of chemical analyses[14]. Contaminants entering the Qva aquifer were subject to dispersion and diffusion to the north-south (i.e., cross-gradient) due to the relatively flat Qva groundwater gradient and calculated low groundwater velocities in this area. In the Qva aquifer, these contaminants migrated to the northeast with the prevailing Qva groundwater gradient toward the 1701 Tacoma Avenue South Source Area and entered the overlying Qvi aquifer, near Court E where confining silt layers are absent, commingling with contaminants within the Qvi groundwater sourcing from the 1701 Tacoma Avenue South Source Area (Figure 13-32). Contaminants remaining in the Qva aquifer further migrated downgradient to approximately Market Street.

- Limited degradation of PCE to TCE, cis-DCE, and vinyl chloride was observed directly downgradient of the 1701 South Tacoma Source Area within the Qvi aquifer (Figures 13-18, 13-20, 13-22 and 13-24). PCE and breakdown products were not observed in the underlying Qva aquifer (Figures 13-15, 13-17,13-19, 13-21, and 13-23).

13.7.2. West Central Portion of Westerly Plume (1902–1908 and 1922 Tacoma Avenue South and Tacoma Avenue South Sanitary Sewer Source Areas)

PCE, TCE and potentially TCA releases to soil through spills, drips and/or exfiltration from the sanitary sewer entered the soil column where they migrated toward the Qvi aquifer. These contaminants were transported downgradient of these areas following contact with groundwater. Contaminant transport is shown on cross sections AW-AW', D-D' and GW-GW' (Figures 13-29, 13-31, and 13-34) and specifically includes:

- PCE and TCE (and potentially TCA) spilled/released from the 1902–1908 and 1922 Tacoma Avenue South Source Areas (during prior auto repair operations) and entered the vadose zone where they migrated through the soil column to the Qvi aquifer. Additionally, PCE and TCE (and potentially TCA) were also likely discharged to the potential dry well located in Tacoma Avenue South from the 1922 Tacoma Avenue South Source Area and subsequently released to the soil and migrated to the Qvi aquifer.
- PCE and TCE (and potentially TCA) were released from the City's sanitary sewer pipe located in Tacoma Avenue South through exfiltration processes. Video inspections completed by the City identified multiple grade 4 and 5 cracks/breaks in the sewer pipe (Figure 13-31). Contaminants were released into the soil through these breaks in the pipe where they migrated through the soil column to the Qvi aquifer.
- Contaminants at concentrations constituting DNAPL migrated vertically through the water column before settling on top of the flat-lying Qvi silt in the Tacoma Avenue South area. These contaminants migrated through the silt layers into the underlying Qva aquifer through diffusion and appear to have migrated east on the Qvi silt and settled on the Qva silt in the Market Street area (Figures 13-31 and 13-34). However, DNAPL is unlikely to remain at this location based on the results of chemical analyses as noted above. Contaminant flow in the Qvi and Qva aquifers east of Tacoma Avenue South is summarized below:
    - PCE and TCE in the Qvi aquifer migrated downgradient from Tacoma Avenue South to the east with the prevailing Qvi groundwater gradient to approximately Jefferson Avenue. The Qvi CVOC plume entered the underlying Qva aquifer in the area between Market Street and

[14] CVOC concentrations in groundwater are less than 1% the solubility of the specific CVOC indicating that DNAPL is unlikely to be present.

Jefferson Avenue and flowed downgradient to the east to the location of the Science Building east of Jefferson Avenue where the Westerly Plume terminates (Figures 13-14 and 13-16). A portion of the contaminant plume in the Qvi aquifer entered a perched groundwater zone located within the Qvi deposits near Court C and South 19th Street (wells A11-MW11S and JS-MW7A on Figures 13-16 and 13-). Contamination in this perched groundwater zone is discontinuous and isolated from the underlying Qvi aquifer.

- Contaminants entering the Qva aquifer at Tacoma Avenue South were subject to dispersion and diffusion to the north-south (i.e., cross-gradient) due to the relatively flat Qva groundwater gradient and calculated low groundwater velocities in this area. Contaminants migrated downgradient within the Qva aquifer to the east to approximately Fawcett Avenue where an underlying Qva silt confined and directed contaminant flow into the Qvi aquifer where the Qvi silt is absent (Figure 13-34). Contaminants are not present in the Qva aquifer below this Qva silt in the Fawcett area and Market Street.

13.7.3. East Central Portion of Westerly Plume (1742 Jefferson Avenue and 1755 Fawcett Avenue Source Areas)

TCE releases to soil through leaks drips and/or spills entered the soil column where they migrated toward the Qvi aquifer. These contaminants were transported downgradient of these areas following contact with groundwater. Contaminant transport is shown on cross sections CW-CW' and GW-GW' (Figures 13-30 and 13-34) and specifically includes:

- TCE spilled/released from the 1755 Fawcett Avenue Source Area and 1742 Jefferson Avenue during prior motorcycle and automotive repair operations and entered the vadose zone. TCE migrated vertically down through the vadose zone, particularly in the area of coarse-grained channel deposits, and entered the Qvi aquifer where it commingled with other upgradient contaminants sourcing from other properties on Tacoma Avenue South (Sections 13.7.2. and 13.7.4).

13.7.4. Southern Portion of Westerly Plume (1934-1938 Tacoma Avenue South Source Area)

TCE was spilled/released from the 1934-1938 Tacoma Avenue South Source Area during prior camshaft repair operations and entered the vadose zone. These contaminants were transported downgradient of these areas following contact with groundwater. Contaminant transport is shown on cross sections D-D' and FW-FW' (Figures 13-31 and 13-33) and specifically includes:

- TCE entered the Qvi aquifer and migrated east to approximately Tacoma Avenue South where the Qvi aquifer in this area becomes depleted due to drainage into the underlying Qva aquifer where the Qvi silt is absent.
- Contaminants at concentrations constituting DNAPL migrated vertically through the water column before settling on top of the flat-lying Qvi silt. These contaminants migrated through the silt layers into the underlying Qva aquifer through diffusion (Figure 13-33).
- TCE that entered the Qva aquifer beneath the 1934-1938 Tacoma Avenue South Source Area and in the area of Tacoma Avenue South migrated downgradient to the east to approximately Fawcett Avenue where an underlying Qva silt confined and directed contaminant flow into the Qvi aquifer where the Qvi silt is absent (Figures 13-16 and 13-33). TCE is not present in the Qva aquifer below this Qva silt in the area east of Fawcett Avenue. 1934-1938

13.7.5. Stormwater System and Building Drains

TCE-contaminated groundwater discharges from building drains into the stormwater system and from infiltration into the stormwater system where the pipe is not sealed but beneath the Qvi groundwater level. Additionally, building drains constructed for the Y Student Center discharge TCE-contaminated groundwater to the stormwater line within Market Street drains. The City and Ecology approved this discharge into the stormwater system in 2015 as previously discussed.

13.7.6. Soil Vapor

CVOCs detected at concentrations exceeding the MTCA Method B SL for VI were identified in groundwater samples collected from the Qvi aquifer. However, the results of the VI evaluation on other parts of the UWT Campus (i.e., MDS Building, TPS Building, and Academic Block Buildings) indicate that similar detected TCE concentrations in groundwater do not have the potential to impact indoor air based on the predictive modeling or the results of indoor air sampling completed in the past. As a result, further VI evaluation was not required on UW-owned buildings as part of the RI.

13.8. Summary

The Westerly plume consists of multiple commingled plumes in two aquifers from eight identified source areas. TCE was identified as the primary COC in groundwater due to its widespread nature throughout the Westerly Plume; other COCs including PCE, cis-DCE, DCE, vinyl chloride, and DCA are generally located in close proximity to the source area and are limited in extent. The contaminant distribution of the Westerly Plume is highly influenced by the chemical properties of the contaminants, location of the eight sources of contamination, underlying geology and hydrogeology, and presence of building drains and storm utilities. The greatest concentrations of COCs in soil and groundwater are generally located in the area of Tacoma Avenue South.

Six of the primary sources to the Westerly Plume are located on Tacoma Avenue South between South 17th Street and South 21st Street. One of the primary sources is owned by UW and the other five primary sources are owned by others. Two secondary sources are located downgradient and within the Westerly Plume and are owned by UW. A description of historical uses within the source areas is included in Section 13.8.1.

The spills and leaks of PCE, TCE and other solvents during historical operations within the source properties and subsequent discharge of process water with solvents to the City of Tacoma sanitary sewer and a potential dry well in Tacoma Avenue South led to soil and groundwater CVOC contamination in the Qvi and Qva aquifers. The underlying geology influences the flow of contaminants in and out of the Qvi and Qva aquifers as shown on cross-section AW-AW' (Figure 13-29) and GW-GW' (Figure 13-34). Dissolved phases of CVOCs within the Qvi and/or Qva aquifers then migrated laterally and downgradient of the source areas within preferential flow paths and laterally by dispersion and diffusion. Additionally, the stormwater system (pipe and backfill) in South 19th Street is a preferential pathway for the TCE-impacted groundwater that is entering the system.

13.8.1. Sources of Contamination

Source areas for the Westerly Plume and lines of evidence supporting historical operations as the source(s) of contamination include the following (based on the results of the RI), separated by location relative to the UWT Campus.

- Upgradient of the UWT Campus (Primary Sources):
    - **1722 Tacoma Avenue South Source Area.** Photoengraving by West Coast Engravers historically operating between at least 1958 and 1983 followed by Western Metal Arts to at least 1988.
    - **1904-1908 Tacoma Avenue South Source Area.** Automotive, motorcycle and transmission services historically operated at this location between 1942 and 1963.
    - **1922 Tacoma Avenue South Source Area.** Automotive tire, brake, and alignment services historically operated at this location between 1953 and 1993.
    - **1934-1938 Tacoma Avenue South Source Area.** Delta Camshaft historically operated between 1983 and 2010.
    - **Tacoma Avenue South Sanitary Sewer Source Area.** Exfiltration of process water generated during historical operations at 1722 Tacoma Avenue South from the sanitary sewer line located within Tacoma Avenue South.
- Within the UWT Campus Boundary (Primary and Secondary Sources):
    - **1701 Tacoma Avenue South Source Area (Primary).** Glow Cleaners and Towne Cleaners (former dry cleaner businesses) historically operating from the early 1960s until the early 1970s.
    - **1755 Fawcett Avenue Source Area (Secondary).** Motorcycle sales and services (Potter Clarence Co. and Montgomery Motorcycle) and/or former cleaner (E I Cleaners) historically operated between 1931 and 1965.
    - **1742 Jefferson Avenue Source Area (Secondary).** Automotive service center operations (Standard Oil) between 1932 and 1965.

Contaminants associated with the individual source areas including PCE and TCE (primary COCs) as well as breakdown products cis-DCE, DCE and vinyl chloride, and DCA (secondary COCs) have impacted soil and groundwater generally between Court F and Jefferson Avenue (west-east) and generally between South 17th Street and South 21st Street (north-south) (Figure 13-1).

13.8.2. Distribution, Fate and Transport of Contamination

In soil, the highest detected concentrations are generally within the vicinity of Tacoma Avenue South and near the intersection of South 19th Street and Market Street downgradient of this area. COCs were detected at concentrations exceeding the PCUL in soil range from near the ground surface (within the individual source areas) up to approximately 60 feet bgs. In groundwater, TCE is widespread throughout the Westerly Plume in both the Qvi and Qva aquifers extending east to Jefferson Avenue. The greatest TCE concentrations are in the vicinity of Tacoma Avenue South. Other contaminants including PCE, cis-DCE, DCE and vinyl chloride, and DCA are limited in extent and are generally limited to the Qvi aquifer between Tacoma Avenue South and Fawcett Avenue. This contaminant plume appears to be generally stable due to dilution, sorption, and/or natural attenuation and is not observed to be migrating further downgradient of Jefferson Avenue based on the results of the RI.

Paved surfaces (ROW, sidewalks and/or parking areas) are preventing direct contact with this contaminant and are limiting the infiltration of stormwater that could further contribute to contaminant leaching of COCs in shallow soil in source areas to the groundwater. However, CVOC-contaminated groundwater collected by building drains discharging to the City's stormwater system and/or groundwater infiltration into the City's stormwater pipes (each of which discharges to the Thea Foss Waterway) may be a complete exposure

pathway to surface water. In addition, TCE is present in groundwater at concentrations exceeding the MTCA Method B SL for VI. However, VI evaluation on other parts of the UWT Campus (i.e., MDS Building, TPS Building, and Academic Block Buildings) indicates that similar detected TCE concentrations in groundwater do not have the potential to impact indoor air based on the predictive modeling and the results of indoor air sampling completed to date.

Soil, groundwater, soil vapor, and stormwater data for the Westerly Plume are presented in Tables 13-6 through 13-9, respectively. The nature and extent of primary and secondary COCs in soil and groundwater within the Westerly Plume Site are shown in plan view on Figure 13-1, by chemical/media on Figures 13-7 through 13-28, and in cross section on Figures 13-29 through 13-34.

14.0 REMEDIAL INVESTIGATION—NORTHERLY PLUME

14.1. Introduction

the Northerly Plume is generally located between Jefferson Avenue and Pacific Avenue north of South 21st Street in Tacoma, Washington (Figure 14-1). Environmental data collected during previous and more recent soil, groundwater, and indoor/sub-slab vapor investigations (Section 14.5) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of TPH-G, TPH-D, petroleum-related VOCs and CVOCs in soil and groundwater at concentrations greater than their respective PCULs resulting from spills and/or releases associated with historical operations and land use from two separate source areas. Summary statistics for soil and groundwater identifying COCs for the Northerly Plume are presented in Tables Q-28 and Q-29 (Appendix Q).

Primary source areas to the Northerly Plume include: (1) 1754 Pacific Avenue (GWP Building) and (2) 1735 Jefferson Avenue (TPS Building) located within the UWT Campus (Figure 14-1). Other potential contaminant sources to the Northerly Plume were not identified based on historical operations and land use. PCE and TCE were identified as the primary COCs for soil and groundwater due to their widespread nature throughout the Northerly Plume. Breakdown products including cis-DCE and vinyl chloride were also identified as primary COCs for soil and groundwater given their occurrence beneath Pacific Avenue following in-situ treatment in 2013. Other COCs including TPH-G, TPH-D, BTEX, 1,2,4- TMB, 1,3,5- TMB, naphthalene and/or cPAHs are limited to soil in the vicinity of the former cistern previously removed from the GWP Building (primary source area). However, the other COCs were not detected in groundwater downgradient of this location. The contaminant distribution of the Northerly Plume is highly influenced by the chemical properties of the contaminants, location of the two source areas, underlying geology and hydrogeology, and presence of building drains and storm utilities. The greatest concentrations of COCs in soil and groundwater are generally located east and adjacent to the TPS Building and in close proximity to the former GWP Building cistern. In soil, CVOCs range from near the ground surface (within the individual source areas) up to approximately 40 feet bgs. In groundwater, TCE and PCE are present in both the Qvi and Qva aquifers extending east beneath the Federal Courthouse. Other contaminants including cis-DCE, DCE and vinyl chloride are limited in extent and are generally limited to the Qva aquifer beneath Pacific Avenue. TPH and petroleum-related COCs are limited to the soil in close proximity to the former GWP Building cistern and are not detected in groundwater.

Soil and groundwater contamination at the Northerly Plume Site (as defined by PCE, TCE, TPH-G, TPH-D, BTEX, 1,2,4- TMB, 1,3,5- TMB, naphthalene and cPAH PCUL exceedances; Figure 14-1) is predominantly beneath portions of the UWT Campus that are capped by paved ROWs and parking lots and/or buildings preventing direct exposure. Modeling results based on sub-slab vapor sampling and indoor air sampling indicate that there is a low potential for VI into the occupied spaces at a concentration that would exceed the indoor air cleanup criteria. Furthermore, utility infrastructure that could provide a preferential pathway for contaminant migration is located at an elevation above the groundwater water table. Overall, groundwater monitoring completed as part of the 2016 Agreed Order RI indicates that the leading edge of the Northerly Plume Site is stable and is not continuing to migrate toward the Thea Foss Waterway.

The Northerly Plume is shown relative to the surrounding features on Figure 14-1. Terminology for the Northerly Plume referenced by this RI is described below:

- **Northerly Plume.** The extent of TPH-G, TPH-D, petroleum-related VOCs, and CVOC (PCE, TCE, cis-DCE, and vinyl chloride) contamination associated with historic operations and/or land use within the source area. Source areas to the Northerly Plume include:
  - **1754 Pacific Avenue (GWP Building Source Area).** The source or point of release for petroleum and CVOC contamination associated with historic operations at 1754 Pacific Avenue (Pierce County Parcel No. 2017120090). GWP Building is referenced as the Howe Parcel under the 2016 Agreed Order.
  - **1735 Jefferson Avenue (TPS Building Source Area).** The source or point of release for CVOC contamination associated with operations at 1735 Jefferson Avenue (Pierce County Parcel No. 2018060020). The TPS Building is referenced as the 1806 Jefferson Street Association Parcel under the 2016 Agreed Order.

Specific details regarding the historical property use leading to the release of contaminants, RI activities completed to date, the CSM, and the nature and extent of contamination associated with the Northerly Plume are summarized below.

14.2. Property Conditions

General property conditions for the Northerly Plume area are described in Section 14.2.1. Property conditions specific to the two individual source areas including location, historical land use, current and future land use, and utility infrastructure are described in Sections 14.2.1 through 14.2.5.

14.2.1. Northerly Plume

14.2.1.1. Location and Description

The Northerly Plume is generally located within the northeast portion of the UWT Campus between Jefferson Avenue (western extent), I-705 (eastern extent), South 19th Street Stairs (southern extent), and South 17th Street (northern extent). This area is predominantly occupied by buildings for academic purposes and pedestrian pathways. The ground surface across this area generally slopes east toward the Thea Foss Waterway from approximately elevation 90 feet along Jefferson Avenue to elevation 20 feet east of the Federal Courthouse over an approximate distance of 700 feet.

14.2.1.2. Historical Land Use

General historic land use in the northwestern portion of the UWT Campus is primarily residential with commercial and academic buildings. Historical building footprints associated with commercial uses and/or

features are shown on Figure 14-2. Specific historical land use associated with the GWP and TPS Buildings (source areas) are discussed in Sections 14.2.2.1 and 14.2.2.2 below.

14.2.1.3. Current and Future Land Use

The land encompassing the Northerly Plume currently contains paved City ROWs and pedestrian paths/parks as well as commercial and academic buildings and the Federal Courthouse. UW acquired some of the properties contained within the Northerly Plume in the mid-1990s. However, properties located east of Pacific Avenue are not part of the UWT Master Campus and are not planned to be purchased by UW. The property uses include ROWs for the City of Tacoma (Jefferson Avenue and Pacific Avenue) and UWT Campus buildings to the north and south, a UWT Campus park to the south, and the Federal Courthouse to the east. The UWT Campus buildings to the north and south consist of the BB Building, BHS Building, WCG Building, Dougan Building, Joy Building, and the Science Building. The PLT and Commerce pedestrian corridors are present between the TPS and GWP Buildings.

Future land use is anticipated to remain a mix of commercial and academic with pedestrian paths/parks and City ROWs. Future land uses for properties located beyond the UWT Campus boundary (i.e., east of Pacific Avenue) are unknown but are anticipated to generally be consistent with their current use.

14.2.1.4. Utility Infrastructure

Current utility infrastructure present in the ROW and individual properties include sanitary sewer, storm sewer, drinking water, natural gas, underground electrical, overhead electrical, and communications. Utility infrastructure within and adjacent to the Northerly Plume with the potential to serve as preferential pathways for contaminant migration is shown on Figure 14-3 and includes the following:

- **Sanitary Sewer Utility.** Eight-inch sanitary sewer pipes are located within City ROWs on Jefferson Avenue and Commerce Street. Laterals present on individual properties connect to the 8-inch mainline pipes. The mainline pipes are sloped north toward South 17th Street between 0.5 and 2 percent. The majority of the pipes are constructed of terra cotta and were installed in the early 1900s under a City work order. Portions of the sanitary sewer network have been either replaced with modern PVC piping or have been lined with resin based on a review of the City's resources website. A north-south oriented 14-inch-diameter sanitary sewer line is present within the Pacific Avenue ROW. The mainline pipes at this location are sloped south toward South 19th Street between 0.5 and 2 percent.
- **Stormwater Utility.** The stormwater network within the UWT Campus boundary is comprised of two stormwater sub-basins with discharge to the Thea Foss Waterway (1019). The majority of the stormwater collected from the UWT Campus in the vicinity of the Northerly Plume discharges to the Thea Foss Waterway through an outfall located under State Route 509 (Outfall 235). Stormwater collected within portions of Commerce Street and the PLT pedestrian corridor is directed to the second sub-basin, which discharges to the Thea Foss Waterway near South 15th Street (Outfall 230). The Jefferson and Hood Street Surface Water Interceptor Capital Project (completed in December 2022) transitioned the dividing line between sub-basin Outfall 235 and Outfall 230 from South 17th Street to South 19th Street as described in Section 2.3.2.2. Multiple sections of the stormwater pipe were replaced between the 1990s and 2022. A new 48- to 60-inch-diameter stormwater pipe was recently installed (as of December 2022) within South 19th Street and Jefferson Avenue as part of the City's Jefferson and Hood Street Surface Water Interceptor Capital Project.
- **Utilidor.** The east-west oriented utilidor crosses the PLT pedestrian corridor in the area of the Dougan Building. The utilidor is encased in concrete and approximately 15 feet wide and 15 feet deep.

Multiple utilities are housed in the utilidor with walkable space allowing for maintenance access. One north-south oriented utilidor (10 feet wide and 10 feet deep) is located under the sidewalk west of Shaub-Ellison. The elevation of the floor of the utilidor is approximately 51 to 52 feet.

14.2.2. 1754 Pacific Avenue (GWP Building Source Area)

The GWP Building is a five-story brick building constructed in 1890 (241). Historical addresses include 1750, 1752, 1754, 1834, 1836, 1838, 1840 Pacific Avenue and 1755 Commerce Street and 201 South 19th Street based on Sanborn fire insurance maps. The GWP Building is located at 1754 Pacific Avenue in the northeast side of the UWT Campus (Figure 14-1). The property at 1754 Pacific Avenue (Pierce County Parcel No. 2018040090) is bounded by Commerce Street to the west, Pacific Avenue to the east, South 19th Street to the south, and UWT Campus building "BB Building" to the north. A small building shown adjacent to the railroad line in Commerce Street labeled "Storage" is shown in the 1896 Sanborn map. A fire occurred in 1908 on the top floor based on information obtained from Tacoma Library Northwest Room digital archives.

Operations in the GWP Building varied since 1890 and consisted of an ammunition warehouse, sign company, radio supply, dry goods warehouse, department store, general storage warehouse, furniture company, cigar sales, business forms company, and bank administrative services. The property was purchased by UW and is now referred to as the GWP Building. The GWP Building contains classrooms, offices and retail space (UW Bookstore).

Photo 14-1. 1893 GWP Building (looking northwest).

The building was renovated by UW in the late 1990s. At the time of renovation, a brick cistern was observed containing oil and water (with residual PCE) and was connected to what was believed to be a 3-inch-diameter footing drainpipe beneath the building. The GWP Building historical operations and use of the brick cistern that led to the release of contaminants into soil and groundwater at this source area are unknown. However, chemicals may have been stored in the building as the historical operations consisted of general storage for over 30 years. The GWP Building, former brick cistern and surrounding features are shown on Figure 14-1.

14.2.3. 1735 Jefferson Avenue (TPS Building Source Area)

The TPS Building is located at 1735 Jefferson Avenue on the northeast side of the UWT Campus (Figure 14-1). The property at 1735 Jefferson Avenue (Pierce County Parcel No. 2018060021) is bounded by Jefferson Avenue to the west, the PLT pedestrian corridor to the east, Dougan Building to the north, and the UWT Sciences Building to the south. The TPS Building is a three-story brick building constructed between 1904 and 1905 for use as a candy factory for the Tacoma Biscuit and Candy Company. A portion of the building was used to house boilers and ovens during historical operations while the remaining portion of the building was used as a warehouse, storage room and office space. Two wholesale paper companies operated within the building based on information provided in City directories and Sanborn fire insurance maps as follows.

Photo 14-2. 1943 photo of TPS Building. (looking northeast).

- **1911 and 1942**. Tacoma Paper and Stationery Company. The south end of the building was used as a sign printing shop according to the Sanborn fire insurance map.
- **1942 and 1953**. Blake, Moffit, and Towne.

The Tacoma Paper and Stationery Company and Blake, Moffit, and Towne operations likely included the use of solvents, including PCE, in association with ink printing processes as part of their wholesale paper operations. The building was either vacant after 1953 or used for storage and partially operated as a restaurant until 2016 when UW purchased the building. UW completed remodeling of the building between 2016 and 2017 as part of the Urban Solutions Center (USC) project and was renamed the TPS Building. The TPS Building is currently used as classrooms and offices. The TPS Building and surrounding features are shown on Figure 14-1.

14.3. Field Investigations and Remedial Actions

Multiple environmental investigations have been completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations documenting soil, soil vapor/air, stormwater, and groundwater conditions associated with the Northerly Plume and/or surrounding area are discussed in Sections 14.3.1 through 14.3.5 below. Sampling locations to evaluate soil, groundwater, and soil vapor conditions associated with the Northerly Plume are shown on Figures 14-4 through 14-6. Investigations completed for the Northerly Plume and the surrounding area to support the development of the RI are summarized in Tables 14-1 through 14-4. Construction details for temporary and permanent monitoring wells installed within the Northerly Plume footprint and the surrounding area are presented in Table 14-5. Soil, groundwater, soil vapor/air, and stormwater investigation results are presented in Tables 14-6 through 14-9.

14.3.1. 1997 Agreed Order Investigations

URS, on behalf of UW, completed an RI for the UWT Campus between 1998 and 2002 in accordance with the 1997 Agreed Order. The GWP Building was identified as a location requiring investigation under the 1997 Agreed Order. In general, the focus of the 1997 Agreed Order RI in the vicinity of the GWP Building was to evaluate the nature and extent of previously identified petroleum-related contamination. Investigations included the collection of soil and groundwater samples from soil borings, installation and sampling of permanent groundwater monitoring wells, and collection of indoor air samples and evaluation for vapor intrusion into the GWP Building during the 1998 through 2002 RI. Investigation activities for the GWP Building are further discussed in Sections 14.3.1.1 through 14.3.1.3 below. Investigation locations are shown on Figure 14-4.

14.3.1.1. Soil Investigation Summary

Two hand-auger borings (H-UT-881 and H-UT-882) were completed to depths of approximately 2 to 4 feet bgs at locations within the footprint of the utilidor west and adjacent to the GWP Building in 1998 and 10 soil borings (DMB-5 and DMB-7 through DMB-14) were completed upgradient of the GWP Building in 1999. Results of the soil investigation did not identify CVOCs or TPH in soil samples collected from the borings. Naphthalene and/or cPAHs were detected in two soil samples collected from borings DMB-8 and DMB-13. Other contaminants were not detected in the analyzed soil samples.

14.3.1.2. Groundwater Investigation Summary

Five soil borings (H-GW1, H-GW2, H-GW3, H-MW1, and H-MW2) were completed in 1998 to depths ranging from approximately 12.5 to 36 feet bgs at locations downgradient of the GWP Building and west of Pacific Avenue (Figure 14-4). Two of the borings (H-MW1 and H-MW2) were converted to permanent monitoring wells. Ten additional soil borings (H-GW4 through H-GW11, H-MW3, and H-MW4) were completed to depths between approximately 15 and 43 feet bgs in 1999 and 2000. Four of the borings (H-MW3 through H-MW6) were converted into permanent monitoring wells.

Grab groundwater samples were collected from borings H-GW1 through H-GW11. Groundwater samples were collected from the monitoring wells located downgradient of the GWP Building that included wells H-MW1 and H-MW2 beginning in 1998 and wells H-MW3 through H-MW6 beginning in 1999 and 2000. Groundwater samples from the borings and monitoring wells were submitted for analysis of TPH and/or select VOCs. Results of the groundwater investigation identified CVOCs, TPH, benzene, toluene, ethylbenzene, total xylenes, and 1,2,4-TMB in one or more groundwater samples collected during the 1998 to 2002 RI.

- PCE was detected at concentrations ranging from 5.77 to 311 µg/L in groundwater samples collected from borings H-GW1, H-GW3, H-GW4, and H-GW6, and monitoring wells H-MW2, H-MW3, and H-MW4, located downgradient of the GWP Building. The highest detected PCE concentrations (228 to 311 µg/L) were observed in groundwater from well H-MW4 located on the eastern side of Pacific Avenue.
- TCE was detected in groundwater from temporary monitoring wells H-GW4, H-GW7, and H-GW11 and from monitoring wells H-MW2 and H-MW4 at concentrations ranging from 1.01 to 12 µg/L. Additionally, cis-DCE was detected at concentrations between 2.01 and 8.1 µg/L in groundwater samples collected from temporary wells H-GW7 and H-GW11 and from monitoring wells H-MW3 and H-MW4.
- TPH-G was detected in one or more groundwater samples collected from temporary wells H-GW3 and H-GW6 and from monitoring wells H-MW1, H-MW2, and H-MW4. The detected concentrations ranged

from 51.6 to 79.8 µg/L. TPH-D and TPH-O were detected in groundwater samples collected from temporary wells H-GW5 and H-GW6 and from monitoring well H-MW1 at concentrations ranging from 265 to 963 µg/L.

- Benzene was detected in groundwater samples collected from temporary wells H-GW4, H-GW5, and H-GW6 at concentrations ranging from 1.28 to 3.56 µg/L. Additionally, toluene, ethylbenzene and total xylenes were detected in these groundwater samples and 1,2,4-TMB was detected in groundwater from temporary wells H-GW4 and H-GW10.

14.3.1.3. Indoor Air Investigation Summary

In February 2001, UW conducted an indoor air survey at the GWP Building to assess potential impacts to air quality inside the building resulting from PCE beneath the GWP Building (151). Indoor air samples were collected inside the GWP Building at six locations and at one location on the building rooftop to provide background ambient air data. The samples were submitted for analysis of VOCs by Method TO-15.

Results of the indoor air sampling did not identify CVOCs in the indoor air samples collected inside the GWP Building. Other VOCs detected in indoor air samples were evaluated to be within the normal range for an urban building based on the results of the study.

14.3.2. Supplemental Investigations Under the 1997 Agreed Order

Supplemental investigation activities were completed in accordance with the 1997 Agreed Order to further evaluate soil and groundwater conditions for the GWP Building Source Area. These investigations included additional groundwater and VI investigations to reassess potential remedial actions and potential impacts for vapor intrusion from the identified CVOC groundwater plume in the vicinity of the GWP Building and Federal Courthouse to supplement the RI conducted by URS. Supplemental investigations included the installation and collection of groundwater samples from permanent groundwater monitoring wells, and collection of indoor and outdoor air samples at the UWT Campus between 2008 and 2014. Investigation activities related to the Northerly Plume are summarized in Sections 14.3.2.1 through 14.3.2.3 below. Supplemental soil and groundwater sampling locations are shown on Figure 14-4.

14.3.2.1. 1754 Jefferson Street (GWP Building Source Area) Groundwater Investigation

A supplemental groundwater investigation was conducted between 2008 and 2010 to further evaluate the CVOC plume and to reassess potential remedial actions that were outlined in the Draft FS (225). Monitoring wells H-MW7 through H-MW10 were installed in 2008 followed by the installation of monitoring wells H-MW11 through H-MW15 in 2009 as part of this investigation. Monitoring wells H-MW7 through H-MW10 were installed north of the Federal Courthouse to monitor groundwater levels and evaluate groundwater flow direction in this area. Monitoring wells H-MW11, H-MW12, H-MW13, H-MW14, and H-MW15 were installed on the eastern side of the Federal Courthouse to assess downgradient groundwater conditions. Groundwater samples were collected from monitoring wells H-MW1 through H-MW15 and analyzed for CVOCs.

Results of the groundwater investigation identified PCE at concentrations ranging from 0.47 to 1.86 µg/L in monitoring wells H-MW13 and H-MW15 during each sampling event conducted between 2008 and 2010. PCE was not detected in groundwater samples collected from the remaining monitoring wells sampled as part of this investigation (Table 14-7). It was concluded that the leading edge of the GWP Building Source Area PCE plume in groundwater had migrated east beneath the Federal Courthouse based on the results of the groundwater monitoring activities conducted between 2008 and 2010.

14.3.2.2. 2013 Soil and Groundwater Investigation Summary

An environmental investigation was completed by UW in 2013 to further evaluate potential contaminant sources for groundwater contamination identified within the UWT Campus Master Plan boundary within the area of the Northerly Plume. The investigation also evaluated soil and groundwater conditions in areas identified by UW as potential development areas. The investigation was completed in multiple areas across the UWT Campus and included the completion of 27 sonic borings, 40 DP borings, and 14 TP explorations followed by the installation of 27 new monitoring wells and the collection of groundwater samples from 85 permanent and four temporary monitoring wells (263; see Tables 14-1 and 14-2). Investigation activities completed as part of this investigation are summarized below.

Soil Investigation Summary

Soil investigation activities were completed within and adjacent to the TPS Building between June and October 2013. The investigation consisted of drilling five DP borings (2D-B1 through 2D-B5) ranging in depth from approximately 3 to 12 feet bgs within the building to evaluate soil conditions below the building slab (Figure 14-4). Environmental data for boring JS-MW3S were also evaluated as part of the soil investigation for the Northerly Plume. Boring JS-MW3S, located upgradient of the TPS Building in conjunction with 1742 Jefferson (see Section 8.0), was advanced to a depth of approximately 25 feet bgs and completed as a permanent monitoring well screened within the Qvi aquifer. Soil samples collected from the soil borings were submitted for chemical analysis of TPH, VOCs, PAHs, and RCRA 8 metals.

The results of the soil investigation identified PCE in eight soil samples collected at depths ranging from less than 1 to 12 feet bgs from four of the five direct-push borings (2D-B1 through 2D-B4) completed within the footprint of the building.

- PCE was detected at concentrations ranging from 0.0042 to 0.12 mg/kg in soil samples collected beneath the TPS Building. Soil collected from boring 2D-B2 contained the highest detected PCE concentration in soil (0.12 mg/kg) at a depth of 4 feet below the building slab.
- PCE was not detected in the soil samples collected from boring 2D-B5, located at the western upgradient end of the TPS Building, and boring JS-MW3S, located upgradient of the TPS Building.
- Benzene was detected at a concentration of 0.0078 mg/kg in the soil sample collected from boring 2D-B5 located at the western end of the TPS Building.
- TPH was not detected in the analyzed soil samples.

Other CVOCs were not detected in the remaining analyzed soil samples. The results of other contaminants not associated with the Northerly Plume are summarized in Section 17.0 (Area-Wide Soil).

Groundwater Investigation Summary

Groundwater samples were collected from the Qvi aquifer monitoring well JS-MW3S in September 2013 and January 2014 and the Qva aquifer monitoring well JS-MW3 in June 2013, both located upgradient of the TPS Building. Groundwater samples were analyzed for TPH and VOCs. The results of the groundwater investigation in these wells did not identify CVOCs in the collected groundwater samples. However, TPH-D was detected in the groundwater sample collected from JS-MW3S in September 2013 at a concentration of 310 µg/L and chloroform was detected in the September 2013 and January 2014 groundwater samples collected from JS-MW3S at concentrations of 8.7 and 0.23 µg/L, respectively. The detection of chloroform in JS-MW3S was interpreted to be related to the chlorinated water that was used to develop the well.

14.3.2.3. Indoor/Outdoor Air Investigation Summary

UW evaluated indoor air quality for the presence of PCE and associated breakdown compounds in the Federal Courthouse in December 2010 to assess the potential for VI based on the detected concentrations of PCE in groundwater sourcing from the GWP Building Source Area (232). Six indoor air samples and one outdoor air background sample were collected and analyzed for VOCs. PCE (a maximum concentration of 8.4 micrograms per cubic meter [µg/m^3]) and TCE (a maximum concentration of 0.24 µg/m^3) were detected in indoor air samples collected on the ground floor level of the Federal Courthouse. Vinyl chloride was detected in the outdoor air sample at a concentration of 0.041 µg/m^3.

Supplemental indoor air sampling was conducted inside the GWP Building in May 2011 to supplement indoor air sampling results conducted in 2001 as part of the URS RI (236). Five indoor air samples and one outdoor air background sample were collected and analyzed for PCE and associated breakdown compounds. PCE and other chlorinated VOCs were not detected in the air samples collected from publicly accessible areas in the UW Bookstore. TCE was detected at a concentration of 1.4 µg/m^3 in a sample collected in the southwest portion of a utility tunnel. However, the utility tunnel is not accessible to the public and rarely occupied by UW personnel.

14.3.3. 1997 Agreed Order Remedial Action

UW developed an Interim Action Work Plan (IAWP) based on the cumulative results of the investigations for the GWP Building Source Area. UW implemented the Interim Action (IA) as part of the Agreed Order for the UWT Campus in July 2013 (259). The purpose of the IA was to perform remedial actions to address PCE contamination (and associated breakdown compounds) in groundwater downgradient of the GWP Building that were identified to be migrating beneath the Federal Courthouse.

The IA consisted of injecting EHC® into the PCE groundwater plume located within the Qva aquifer at multiple locations east and west of Pacific Avenue. EHC is an in-situ chemical reduction (ISCR) reagent comprised of zero valent iron (ZVI) and organic substrates. The IA included the installation of monitoring wells H-MW16 through H-MW22, the injection of approximately 30,000 pounds of ISCR reagent at 49 locations (H1 through H25 and H31 through H49) along Pacific Avenue and upgradient (H26 through H30) of the GWP Building (Figure 14-4), and post-injection groundwater monitoring at 17 monitoring wells (H-MW1 through H-MW5 and H-MW11 through H-MW22). Monitoring wells H-MW1 through H-MW5 and H-MW11 through H-MW22 were designated for ongoing monitoring, sampling and chemical analysis as part of the groundwater performance/compliance monitoring conducted between December 2013 and December 2015 (241).

Results of the quarterly groundwater monitoring of PCE, TCE and breakdown products and water quality parameters showed that PCE concentrations decreased in groundwater downgradient of the injection point locations while PCE breakdown compounds, including cis-DCE and vinyl chloride, increased indicating that reductive dechlorination occurred following the IA (214). For example, PCE concentrations decreased by approximately two orders of magnitude from 70 µg/L in July 2013 to 0.17 µg/L in February 2014 in monitoring well H-MW4 located east of Pacific Avenue and downgradient of the injection wells. Conversely, cis-DCE concentrations increased by approximately two orders of magnitude (from 0.60 to 65 µg/L) between these two monitoring events (Table 14-7).

The results of compliance groundwater monitoring determined the IA reduced the size of the plume, which generally stabilized after 2016 (290). PCE and associated daughter products stabilized in most of the

observed wells during the groundwater monitoring. PCE and daughter product concentrations in monitoring well H-MW4 increased up to one order of magnitude after 2014 indicating the effectiveness of the IA likely stalled. However, the PCE and daughter product concentrations did not rebound to those observed in groundwater prior to the IA.

14.3.4. 2016 Agreed Order Remedial Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions were completed in accordance with the RI Work Plan and subsequent addenda (Section 4.0). RI activities within the Northerly Plume and surrounding area included collection of 67 soil samples from nine soil borings, installation of nine groundwater monitoring wells and collection of groundwater samples from 33 groundwater monitoring wells, collection of 11 passive soil vapor samples, 13 indoor air samples, and five outdoor air samples. The 2016 Agreed Order RI soil, groundwater, soil vapor, and air samples were analyzed for VOCs. Specific areas of interest include:

- **Focused GWP and TPS Building Source Areas Soil and Groundwater Investigation.** Eleven borings were advanced to depths ranging between 14 and 70 feet bgs between November 2016 and June 2019. Each boring was converted into a monitoring well. Nine borings/wells (A7-MW1S/M/D, A7-MW2S, A7-MW3S, A7-MW5S, A7-MW6S/D and H-MW18S) were located in the vicinity of the GWP and TPS Buildings. Two wells (A11-MW23S/D) were installed upgradient of the GWP Building. Two additional borings (A7-MW4S and A7-MW4S) were identified in the RI Work Plan but could not be completed due to access constraints.
- **Interim Action Compliance Monitoring.** Groundwater samples were collected during IA compliance groundwater monitoring conducted between March 2016 and March 2018. Samples were submitted for analysis of dissolved gases (methane, ethene, ethane) and select VOCs including PCE and associated breakdown compounds. Groundwater samples were submitted for the full suite of VOC analyses as part of the RI between March 2019 and September 2020 in accordance with the RI Work Plan. Select samples were also submitted for chemical analysis of dissolved gases, total iron and conventional parameters (nitrate, nitrite, total organic carbon, ammonia, and biological oxygen demand) to evaluate natural attenuation parameters in groundwater.

Chemical analytical results for soil and groundwater samples collected as part of the 2016 Agreed Order RI are presented in Tables 14-6 and 14-7, respectively, and discussed in Sections 14.3.4.1 through 14.3.4.3.

14.3.4.1. Soil Investigation Summary

A total of eighty-four soil samples were collected from depths of between 3 and 70 feet bgs during the soil investigation for chemical analysis of select VOCs and petroleum constituents (Table 14-1) to further evaluate the nature and extent of contaminants in soil and groundwater. In addition, select surficial samples within fill material were also analyzed for other COCs as part of a UWT Campus-wide investigation. Fill material sampling and analysis is further discussed in Section 17.0 (Area-Wide Soil). Soil analytical results related to the Northerly Plume are summarized below. Boring locations are shown in Figure 14-5.

- PCE was detected in 20 soil samples collected within the Qvi deposits in borings A7-MW3S, A7MW1M/D, A7-MW5S, and H-MW18S located within and downgradient of the TPS Building. The detected concentrations ranged from 0.0011 to 0.099 mg/kg in soil samples collected between 12 and 30 feet bgs.

- TCE was detected in two soil samples collected within the Qvi deposits in boring A7-MW3S located east adjacent to the TPS Building. TCE was detected at concentrations of 0.0011 mg/kg at 12 feet bgs and 0.0045 mg/kg at 16 feet bgs.
- Other VOCs were not detected in the remaining analyzed soil samples.

14.3.4.2. Groundwater Investigation Summary

Groundwater sampling was performed following the completion of the soil investigation and installation of new monitoring wells to further evaluate groundwater conditions and define the nature and extent of contamination sourcing from the GWP and TPS Building Source Areas. Groundwater samples (summarized in Table 14-2) were collected from the network of new and existing monitoring wells in the vicinity of the GWP and TPS Buildings and the vicinity of Pacific Avenue and the Federal Courthouse in March and September 2016, March 2017, March 2018, March and September 2019, and March and September 2020. Water levels were measured at each of the sampled wells including other wells (H-MW6 to H-MW12 and H-MW14) that were not sampled. Groundwater sampling activities and their results associated with the Northerly Plume are further discussed below. Well locations are shown in Figure 14-5.

Qvi Aquifer Groundwater Monitoring Results

Chemical analytical results are summarized below for groundwater samples collected in monitoring wells screened within the Qvi aquifer during the 2016 Agreed Order RI representing current conditions.

- PCE was detected in each of the groundwater samples collected from monitoring wells A7-MW1M, A7MW3S, A7-MW5S, and USC-MW1S screened within the Qvi deposits. The concentration of PCE remained relatively stable between the 2016 and 2020 Agreed Order RI groundwater monitoring events as observed in wells USC-MW1S (220 to 350 µg/L), A7-MW1M (110 to 170 µg/L) and A7-MW3S (140 to 160 µg/L). PCE was not detected in monitoring well A7-MW1S, which is screened in a perched groundwater zone within the upper Qvi deposits.
- TCE was detected in each of the groundwater samples collected from monitoring wells screened within the Qvi deposits (A7-MW1M, A7-MW3S, and USC-MW1S). TCE concentrations were relatively stable in monitoring wells USC-MW1S (2.2 to 2.8 µg/L), A7-MW1M (1.6 to 3.2 µg/L), and A7-MW3S (5.5 to 5.9 µg/L) between the 2016 and 2020 Agreed Order RI groundwater monitoring events, which are similar to the PCE results discussed above. TCE was not detected in groundwater monitoring well A7-MW1S, which is screened in a perched groundwater zone within the upper Qvi deposits.
- Cis-DCE was detected at concentrations ranging from 0.56 to 2.2 µg/L in each of the groundwater samples collected from monitoring wells A7-MW3S and H-MW18S screened within the Qvi deposits.
- Trans-DCE was detected at concentrations ranging from 0.23 to 0.45 µg/L in one or more of the groundwater samples collected from monitoring well H-MW18S screened within the Qvi deposits.
- Vinyl chloride was detected at concentrations ranging from 0.26 to 0.58 µg/L in each of the groundwater samples collected from monitoring well H-MW18S screened within the Qvi deposits.
- Ethene (final breakdown product of the PCE reductive chlorination process) was not detected in the analyzed groundwater samples.

Groundwater geochemical conditions were also evaluated for the Northerly Plume Qvi aquifer. Groundwater geochemical conditions are generally unfavorable for reductive chlorination directly downgradient of the

TPS Building Source Area and only slightly favorable for reductive dechlorination near Pacific Avenue where the 2013 IA action was performed.

Qva Aquifer Groundwater Monitoring Results

Chemical analytical results are summarized below for groundwater samples collected from monitoring wells screened within the Qva aquifer during the 2016 Agreed Order RI representing current conditions.

- **1754 Jefferson Street (GWP Building Source Area).** Chemical analytical results for groundwater in the vicinity of and downgradient of the GWP Building include the following detections in wells screened within the Qva deposits.
  - PCE was detected in each of the groundwater samples collected from monitoring wells H-MW2 and H-MW16 and in one groundwater sample collected from monitoring well H-MW1. PCE concentrations were relatively consistent in monitoring well H-MW2 (adjacent-downgradient of the GWP Building) during the 2016 to 2020 RI groundwater sampling events with concentrations ranging from 5.6 to 16 µg/L and an average concentration of 10.8 µg/L. PCE concentrations ranged in concentration from 0.53 to 7.6 µg/L in monitoring well H-MW16 during the 2016 to 2020 RI groundwater sampling events with the maximum concentration of 7.6 µg/L detected during the most recent (September 2020) groundwater monitoring event.
  - TCE was detected in each of the groundwater samples collected from monitoring wells H-MW2 and H-MW16. TCE was detected at concentrations ranging from 0.45 to 3.7 µg/L with an average detected concentration of 1.7 µg/L in H-MW2. The detected concentrations in H-MW16 ranged from 2.9 to 11 µg/L with an average detected concentration of 6.8 µg/L.
  - Vinyl chloride was detected in each of the groundwater samples collected from monitoring well H-MW16. The detected concentrations were observed to be relatively stable during each of the sampling events with a concentration ranging from 0.15 to 0.68 µg/L with an average detected concentration of 0.34 µg/L.
  - Vinyl chloride was detected in groundwater samples collected from monitoring well H-MW2 during the 2016 and 2017 sampling events. However, vinyl chloride was not detected during the subsequent sampling events completed between 2018 and 2020.
  - Vinyl chloride was detected in groundwater samples collected from monitoring well H-MW1 during the two 2016 sampling events. However, vinyl chloride was not detected during the subsequent sampling events completed between 2017 and 2020.
  - Cis-DCE was detected in each of the groundwater samples collected from monitoring wells H-MW2 and H-MW16. The detected concentrations in H-MW16 generally decreased over the course of the sampling events between 2016 and 2020 with concentrations ranging from 17 µg/L in March 2016 to 2.0 µg/L in September 2020. The detected concentrations of cis-DCE were relatively consistent ranging from 0.21 to 1.8 µg/L with an average detected concentration of 0.97 µg/L in well H-MW2.
- **1735 Jefferson Street (TPS Building Source Area).** Chemical analytical results in the vicinity of and downgradient of the TPS Building include the following detections in wells screened within the Qva deposits.
  - PCE was detected in each of the groundwater samples collected from monitoring wells A7-MW6D and H-MW18. PCE was also detected in monitoring well A7-MW1D during each event except for the December 2016 sampling event, and at concentrations slightly greater than the laboratory detection limit in three of six sampling events at monitoring well USC-MW1D. PCE concentrations were relatively consistent in monitoring well A7-MW1D between 2016 and 2020 ranging from non-detect to 0.75 µg/L with an average concentration of 0.61 µg/L. The highest detected PCE concentration within the Qva aquifer was from monitoring well H-MW18,

which had a maximum detected concentration of 14 µg/L and an average detected concentration of 8.8 µg/L.

- TCE was detected in each of the groundwater samples collected from monitoring wells USC-MW1D and H-MW18. The detected concentrations ranged from 0.71 to 3.5 µg/L. TCE was detected in monitoring well A7-MW6D during only the March 2020 sampling event.
- Cis-DCE was detected in each of the groundwater samples collected from monitoring well H-MW18. The detected concentrations ranged from 0.32 to 3.1 µg/L. Detected concentrations in monitoring well H-MW17 were highest in 2016 and 2017 (19 to 43 µg/L) and generally decreased during subsequent monitoring events between 2018 and 2020 (2.0 to 13 µg/L).
- Vinyl chloride was detected during the September 2016 sampling event at H-MW18 but was not detected in groundwater in subsequent groundwater sampling events from 2017 to 2020.

- **Pacific Avenue Area.** Chemical analytical results in the vicinity of Pacific Avenue extending from the area immediately west, beneath, and to the east of Pacific Avenue include the following detections in wells screened within the Qva deposits:
  - PCE was detected in each of the groundwater samples collected from monitoring wells H-MW13, H-MW17, H-MW19, H-MW20 and H-MW22. PCE was also detected during each sampling event except for the September 2016 sampling event in monitoring well H-MW4, the December 2015 sampling event in monitoring well H-MW22, and only during the March and September 2020 sampling events in monitoring well H-MW3. The highest detected PCE concentration within the Qva aquifer was from monitoring well H-MW17. Well H-MW17 had a maximum detected concentration of 130 µg/L with an average detected concentration of 71 µg/L.
  - PCE concentrations decreased in monitoring well H-MW19 from a maximum concentration of 7.3 µg/L in 2016 to 2.5 µg/L in September 2020. PCE concentrations also generally decreased in monitoring well H-MW22 located north of the Federal Courthouse during the 2016 and 2020 groundwater monitoring period relative to pre-2016 groundwater sampling events. PCE concentrations in well H-MW22 decreased from an average of approximately 60 µg/L prior to 2016 to an average of 2.8 µg/L between 2016 and 2020. However, PCE concentrations increased from 0.29 to 3.1 µg/L between 2016 and 2020 in monitoring well H-MW13 located east of the Federal Courthouse.
  - TCE was detected in each of the groundwater samples collected from monitoring wells H-MW4, H-MW17, H-MW19 and H-MW20. The highest detected TCE concentrations in this area were in well H-MW4, with an average detected TCE concentration of 11.2 µg/L. TCE concentrations in H-MW17 ranged between 5.7 and 15 µg/L. TCE concentrations in H-MW19 and H-MW20 were relatively stable ranging between 0.88 and 3.5 µg/L with average detected TCE concentrations of 1.3 µg/L in H-MW19 and 1.8 µg/L in H-MW20. TCE was also detected at concentrations ranging from 0.27 to 2.6 µg/L in five of eight groundwater samples collected from monitoring well H-MW22 between 2016 and 2020 with the maximum concentration detected in September 2020.
  - Vinyl chloride was detected in each of the groundwater samples collected from monitoring well H-MW17 located near the western edge of Pacific Avenue. The detected concentrations ranged from 1.2 to 8.6 µg/L with an average detected concentration of 2.6 µg/L. Vinyl chloride was detected in each of the groundwater samples collected from well H-MW4 located east of Pacific Avenue. The detected concentrations ranged from 0.31 to 3.6 µg/L with an average detected concentration of 0.90 µg/L. Vinyl chloride concentrations were generally stable in well H-MW4 ranging from 0.31 to 0.75 µg/L between March 2016 and March 2020 with a maximum concentration of 3.6 µg/L detected in September 2020. Vinyl chloride was also detected in two of eight groundwater samples collected from H-MW19 between 2016 and 2020.

- Cis-DCE was detected in each of the groundwater samples collected from monitoring well H-MW17. The detected concentrations ranged from 2 to 43 µg/L. Detected concentrations in monitoring well H-MW17 were highest in 2016 and 2017 (19 to 43 µg/L) and generally decreased during subsequent monitoring events between 2018 and 2020 (2.0 to 13 µg/L). Cis-DCE was detected in all samples collected in well H-MW4 except for the September 2020 sampling event. The detected concentrations ranged from 8.7 to 45 µg/L with an average concentration of 24 µg/L.
- DCE was detected in each of the 2016 groundwater samples collected from H-MW17 but was not detected in groundwater during subsequent sampling events collected between 2017 and 2020.

Groundwater geochemical conditions were also evaluated in the Qva aquifer for the Northerly Plume in addition to the evaluation of the chemical analytical conditions. Groundwater geochemical conditions are generally unfavorable for reductive chlorination directly downgradient of the TPS Building Source Area and only slightly favorable for reductive dechlorination in the vicinity of Pacific Avenue where the 2013 IA action was performed.

14.3.4.3. Vapor Intrusion Evaluation Summary

A VI evaluation was completed in 2017 and 2018 at the GWP Building, three adjacent buildings (BB, BHS, and WCG buildings; see Figure 14-1), and the Federal Courthouse. The purpose of the VI evaluation was to evaluate if increased TCE and vinyl chloride concentrations in groundwater due to the IA action were impacting indoor air (293). The investigation in 2017 consisted of collection of nine indoor air, two outdoor air, and seven soil vapor samples from the GWP Building and the three adjacent buildings. The 2018 sampling consisted of collection of four indoor air, three outdoor air, and four soil vapor samples within and beneath the Federal Courthouse. The air samples included one indoor air sample collected in the BBB Building and one HVAC intake outdoor sample.

PCE was detected in each of the five sub-slab soil vapor samples collected during the 2017 VI investigation beneath the GWP and three adjacent buildings. However, the detected PCE concentrations were less than the SL in each of the samples. TCE and associated breakdown chemicals were not detected in the analyzed soil vapor samples. PCE was also detected at concentrations less than the indoor air PCUL in each of the indoor air samples. TCE was detected in five indoor air samples with two of the detections exceeding the indoor air PCUL for indoor air of a commercial space for full-time workers. Cis-DCE and trans-DCE were detected in six and seven indoor air samples, respectively. However, the indoor air sample was not identified as an indication of VI because the adjusted indoor air TCE concentration (calculated from the indoor air TCE concentration minus the outdoor air TCE concentration) was less than the indoor air PCUL. Furthermore, TCE was not detected in the sub-slab samples collected at the GWP Building or the BB Building indicating there is no known subsurface source for the detected concentrations of TCE in indoor air.

PCE and TCE were detected in indoor air at concentrations exceeding the indoor air PCUL during the 2018 Federal Courthouse VI evaluation. However, the detected TCE concentrations were less than the indoor air SL for indoor air of a commercial space for full-time workers.

A supplemental VI evaluation was completed at the BB Building in 2020 (305). One indoor air and two outdoor air samples were collected. PCE, TCE, and other PCE breakdown compounds (DCE, trans-DCE, cis-DCE and vinyl chloride) were not detected in each of the three analyzed air samples.

14.3.5. Capital Projects

Investigation and remedial action activities were necessary to implement UW Capital Projects. Capital projects and investigation activities in the vicinity of the Northerly Plume are summarized in Sections 14.3.5.1 through 14.3.5.4. Soil and groundwater sampling locations are shown on Figure 14-6.

14.3.5.1. Garretson Woodruff & Pratt Building Capital Project

A subsurface investigation was completed by AGI Technologies on behalf of UW to assess areas of potential environmental concern discovered at the GWP Building during redevelopment in May 1996. Investigation locations and building features included a brick cistern, USTs, and utility pipes which are shown on Figure 14-6. The specific environmental concerns addressed and associated chemical analytical results are as follows. The results of soil and water chemical analyses are summarized in Tables 14-6 and 14-7, respectively, and discussed below.

- **In Place Abandonment of Two Heating Oil USTs.** Two 1,750-gallon heating oil USTs constructed of single-wall carbon steel were abandoned in place during building renovation activities. One UST was located near the southwest corner of the GWP Building adjacent to the brick cistern, and the other UST was located within the footprint of the nearby BHS Building. The UST located at the GWP Building reportedly contained water indicating a release may have occurred from this UST. No apparent evidence of a release was noted during removal of the UST from the nearby BHS Building. Both USTs were filled with concrete and the excavations were backfilled and covered with concrete. A product sample was collected from the UST in the GWP Building and submitted for chemical analysis of hydrocarbons by TPH-HCID and total halogens. No product sample was collected from the UST located in the BHS Building. The UST fuel product analytical results indicated that total halogens were not present at concentrations that would classify the waste as hazardous, and a review of the sample analytical chromatogram indicated the product was consistent with fuel in the diesel hydrocarbon range (125). The former heating oil USTs located in the southwestern corner of the GWP Building and the western portion of the BHS Building (see Figure 14-6) were abandoned in place by filling the USTs with concrete.
- **Assessment of a Cistern and Footing Drain.** A brick cistern was discovered near the southwest corner of the GWP Building during building renovations in May 1996. The cistern was located approximately 10 feet north of the GWP Building UST. Water was observed flowing from a pipe entering the west side of the cistern, which was believed to be a footing drain for the west wall of the GWP Building. A second pipe was observed to drain from the cistern at the eastern end of the cistern (125). The cistern contained approximately 2 to 3 feet of liquid consisting of water with approximately 3 to 6 inches of floating product. Subsequently, the contents of the cistern and the brick top and sides of the cistern were removed to support the building renovation in November 1996. During removal, approximately 10 cubic yards of soil surrounding the cistern were also removed for off-site disposal based on the presence of an apparent fuel-like odor. Three soil confirmation samples (GWP-Cistern S1, GWP-Cistern S2, and GWP-Cistern SS1) were collected from the margins of the cistern excavation and analyzed for TPH and VOCs. Additionally, two water samples were collected from the footing drain discharge point. Sample results are as follows:
    - TPH-G was detected in the three collected soil samples. The detected concentrations ranged from 37 to 990 mg/kg.
    - TPH-D was detected in the three collected soil samples and TPH-O was detected in one soil sample. The detected concentrations ranged from 270 to 7,500 mg/kg.

- Ethylbenzene and total xylenes were detected in two soil samples at concentrations ranging from 0.09 to 4.4 mg/kg.
- 1,2,4-TMB, 1,3,5-TMB, n-propylbenzene were detected in one or more soil samples. The detected concentrations ranged from 0.71 to 42 mg/kg.
- PCE was detected in the two water samples collected from the footing drain discharge point. The detected concentrations were 9.7 and 5.5 µg/L. TCA was also detected in the two water samples at concentrations of 0.49 and 0.33 µg/L. TPH and associated petroleum-related VOCs were not detected in the two water samples collected from the footing drainpipe.

- **Assessment of Unknown Utility Pipe.** During building renovations, an approximately 4-inch-diameter steel pipe of unknown use was encountered beneath Commerce Street at the western edge of the building. The pipe end had a valve that prevented water from flowing out of the pipe. One water sample was collected and submitted for analysis of VOCs and SVOCs. Sample results are as follows:
  - BTEX and petroleum-related VOCs were detected as follows: Benzene (2,700 µg/L); toluene (3,800 µg/L); ethylbenzene (530 µg/L); total xylenes (4,300 µg/L); 1,2,4-TMB (680 (µg/L); and 1,3,5-TMB (350 µg/L). CVOCs were not detected in the analyzed water sample.
- **Assessment of Elevator Shaft Soil Cuttings.** Soil with a fuel-like odor was encountered during excavation of the elevator shaft. One soil sample was collected and analyzed for TPH and BTEX compounds. TPH-G, TPH-D, TPH-O, ethylbenzene and total xylenes were detected in the soil sample. The sample chromatogram indicated the TPH compounds were in the diesel fuel range.
- **Treatment and Disposal of Elevator Shaft Water.** Water from the elevator shaft excavation was pumped into a holding tank pending characterization for disposal. TPH was detected at a concentration of 2.8 mg/L and BTEX compounds were not detected. The water was discharged to the sanitary sewer during construction.

The footing drainpipe was re-routed to discharge to the City's sanitary sewer system during building renovations.

14.3.5.2. Joy Building Capital Project

A subsurface investigation was completed at the Joy Building property in February 2008 to evaluate soil and groundwater conditions prior to redevelopment of the property by UW. The investigation consisted of completion of two soil borings (Joy-B01 and Joy-B02) and four hand-auger borings (Joy-Bay-A-1, Joy-Bay-A-2, Joy-Bay-B-1 and Joy-Bay-B-2) within the building and completion of a magnetometer survey to estimate the dimensions of a UST located in the western portion of the building (Figure 14-6).

A product sample collected from the UST contained TPH-O, TPH-D, benzene, toluene, ethylbenzene, xylenes, and several other petroleum-related VOCs. The analytical laboratory indicated the liquid within the UST appeared to be predominantly diesel with water based on the chromatogram and a water solubility test. CVOCs were not detected in the product sample. As shown on Figure 14-1, only the southern portion of the Joy Building is located within the Northerly Plume boundary. CVOCs and TPH were not detected in the soil samples collected from this portion of the building. Groundwater was not encountered in the explorations completed. The results of soil samples from other portions of the building are discussed in Section 17.0, Area-Wide Soil.

14.3.5.3. Prairie Line Trail Capital Project

Environmental investigation activities and remedial actions were completed between 2013 and 2014 within the footprint of PLT east of Jet Parking as part of the planning and development of the PLT Capital

Project. The PLT Capital Project consisted of the development of an abandoned railroad ROW into a pedestrian trail. See Section 7.0 for investigation results related to PLT.

14.3.5.4. Tacoma Paper and Stationery Building Capital Project

An investigation was performed at the TPS Building in 2014 to evaluate downgradient groundwater conditions and the potential for vapor intrusion into the building related to the PCE contamination detected in soil beneath the building in 2013 (266). The 2014 investigation, completed during the design phase for the redevelopment of the building, consisted of soil and groundwater sampling on the downgradient edge of the TPS Building and collection of soil vapor samples within the footprint of the TPS Building.

Two borings (USC-MW1S and USC-MW1D) were completed on the downgradient edge of the TPS Building during the 2014 soil investigation for the TPS Building Capital Improvement Project. Boring USC-MW1S was completed to a depth of 25.5 feet bgs and converted into permanent monitoring well screened within the Qvi aquifer. Boring USC-MW1D was completed to a depth of 56 feet bgs and converted into a monitoring well screened within the Qva aquifer. The groundwater investigation consisted of collecting samples from the two new monitoring wells and existing upgradient monitoring wells JS-MW3S and JS-MW3 completed as part of the 1742 Jefferson (see Section 8.0). In addition, five sub-slab soil vapor samples (USC-SV1 through USC-SV5) were collected beneath the TPS Building slab (Figure 14-6). The soil and groundwater samples were analyzed for VOCs. Sub-slab soil vapor samples were analyzed for chlorinated VOCs.

The findings of the 2014 investigation confirmed the presence of PCE in soil and groundwater beneath the TPS Building. Soil, groundwater, and sub-slab soil vapor sample results are as follows:

- **Soil.** PCE was detected in seven of eight samples collected at depths from approximately 10 to 40 feet bgs within the Qvi deposits in boring USC-MW1D (Table 14-6). The detected PCE concentrations ranged from 0.016 to 0.24 mg/kg with the highest detected concentrations in soil samples collected from depths of 11.5 to 13 feet bgs (0.22 mg/kg) and 16.5 to 18 feet bgs (0.24 mg/kg). PCE was not detected in soil samples collected at depths from 51 to 52 feet bgs within the underlying Qva deposits. In addition, TCE was detected in two soil samples collected at depths of approximately 20 feet bgs (0.0013 mg/kg) and 21.5 feet bgs (0.0015 mg/kg). Other CVOC-related compounds were not detected in the analyzed soil samples.
- **Groundwater.** PCE was detected in the samples collected from downgradient monitoring wells USC-MW1S (330 µg/L) and USC-MW1D (1.5 µg/L) screened within the Qvi and Qva aquifers. PCE was not detected in groundwater samples collected from the two upgradient monitoring well locations (JSMW3S and JS-MW3) screened within the Qvi and Qva aquifers. TCE was detected at a concentration of 3.0 µg/L in the groundwater sample collected in well USC-MW1S (Qvi aquifer). Other VOCs were not detected in the remaining analyzed groundwater samples.
- **Sub-slab Soil Vapor.** PCE was detected at concentrations ranging from 670 to 6,000 µg/m^3. PCE breakdown compounds including TCE, DCE, and vinyl chloride were not detected in the analyzed soil vapor samples.

The sub-slab soil vapor results were utilized to complete the Johnson and Ettinger (J&E) model to simulate indoor air conditions post-redevelopment of the building. The Johnson and Ettinger model estimated the PCE concentration for indoor air to range between 0.82 to 7.3 µg/m^3. The modeling results of the study concluded that VI does not appear to be a risk for the TPS Building based on the soil vapor sampling results

and indoor air modeling (266). Vapor mitigation included sealing cracks and penetrations in the concrete floor during construction of the TPS Building as approved by Ecology.

Redevelopment for the TPS Building was completed in 2016 (287). Redevelopment consisted of upgrades to foundations (micropiles), utilities, and interior features. Cracks and penetrations were sealed during construction to meet the requirements of the vapor intrusion evaluation assumptions as approved by Ecology. A potential dry well was encountered in the southwest corner of the building during renovation construction activities. Soil samples were collected at the base and one sidewall of the dry well excavation to evaluate whether the dry well was a potential source of PCE to groundwater at the UWT Campus. PCE was detected in the two collected soil samples at concentrations one to two orders of magnitude less than PCE detected in soil beneath the TPS Building during previous investigations. The dry well was not identified as a source of PCE contamination based on these findings.

14.4. Conceptual Site Model

Development of the CSM for the Northerly Plume is based on the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM supports the evaluation of potential human health and environmental risks presented in Section 14.6.4. The CSM for the Northerly Plume is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. The following sections (Sections 14.4.1 through 14.4.4) describe the specific elements of the Northerly Plume CSM.

14.4.1. Physical Setting

The Northerly Plume extends from the TPS Building at the eastern edge of Jefferson Avenue east across the PLT pedestrian corridor, and from the GWP Building to the northeast to Pacific Avenue, across Pacific Avenue to approximately the eastern edge of the Federal Courthouse (Figure 14-1). Land uses within this portion of the UWT Campus include a variety of commercial and academic buildings and City ROWs. Commercial use of the UWT Campus buildings primarily includes restaurants and retail services.

14.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic setting for the Northerly Plume (described in the following sections) informs the distribution of contaminants in media of potential concern for the Northerly Plume Site. Local geology and hydrogeology for the Northerly Plume and surrounding area are described below in Sections 14.4.2.1 and 14.4.2.2.

14.4.2.1. Local Geology

Geologic units present beneath the Northerly Plume include the Qf, Qvi and Qva deposits. Geologic conditions for the UWT Campus including portions of the Northerly Plume are shown on generalized geologic cross sections on Figures 2-7 through 2-13. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings completed at both buildings and surrounding area consists of locally derived, reworked ice-contact deposits or imported fill. The fill is present across the Northerly Plume ranging in thickness between approximately 3 and 35 feet with a typical thickness of 5 to 10 feet. Fill is generally absent east of the Federal Courthouse.

- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till, subglacial channel deposits, and lacustrine materials typically composed of silt. The consistency of the Qvi is highly variable across the UWT Campus and not easily predictable due to the wide variety of depositional environments of this geologic unit. The Qvi is present across most of the Northerly Plume but is absent at locations generally east of Pacific Avenue (Figure 2-9). Where present, the Qvi deposits range in thickness from approximately 5 to 40 feet and consist of Qvi till-like deposits, Qvi channel deposits and Qvi silt. Qvi till-like deposits in this area vary in thickness from approximately 10 to 20 feet. Qvi channel deposits are generally oriented in an east-west direction and range in thickness from a few feet near the TPS Building up to approximately 15 feet east of PLT before thinning and terminating near Pacific Avenue. Qvi silt deposits beneath the Northerly Plume are approximately 5 feet thick near the eastern edge of Jefferson Avenue, becoming up to 20 feet thick east of the TPS Building before terminating east of PLT. The Qvi silt is absent from approximately PLT to Pacific Avenue where drainage channel deposits cut through the silt deposit.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** The Qva beneath the Northerly Plume consists of alternating layers of sand, silt, and gravel. A generally flat-lying Qva silt layer up to 25 feet thick is present west of the TPS Building Source Area. The Qva silt acts as an aquitard to vertical groundwater flow between the Qvi and Qva aquifers in this area. The Qva silt layer terminates east of Jefferson Avenue.

14.4.2.2. Local Hydrogeology

Groundwater within the Northerly Plume occurs within both the Qvi (shallow) and Qva (deep) aquifers (see Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Beneath and to the east of Pacific Avenue, the Qvi unit is absent altogether and the Qva aquifer is unconfined. Specific areas where the Qvi and Qva aquifers are interpreted to be hydraulically connected and flow into each other are shown on Figure 2-14 to 2-19 and include the following as they relate to groundwater flow for the Northerly Plume and the surrounding area:

- **GWP Building**. Incision of the valley walls during the last glacier retreat (approximately 10,000 to 13,000 years ago) and/or construction activities for the GWP Building and buildings to the north have locally resulted in the absence of the confining layer separating the Qvi and Qva aquifers (i.e., Qvi and/or Qva silt) in this vicinity. As a result, the Qvi and Qva aquifers are locally hydraulically connected. In this vicinity, groundwater within the Qvi aquifer is interpreted to drain into and mix with groundwater from the underlying Qva aquifer (see Figure 2-9).
- **Pacific Avenue and Federal Courthouse.** The Qvi Unit terminates at Pacific Avenue (Figure 2-9). As a result, groundwater only occurs within the Qva aquifer.
- **North of the TPS Building.** The Qvi aquifer is absent north of the TPS Building along the northern portion of PLT within the vicinity of monitoring wells A7-MW2s and A11-MW10S (Figures 2-14 through 2-16). The absence of the Qvi aquifer in this area may be related to erosion or absence of low permeable Qvi silt and Qva silt layers in this area or absence of higher permeable deposits within the Qvi unit in this area with the ability to transmit groundwater. As a result, the Qvi aquifer in this area is absent (i.e., dry wells observed north of the TPS Building).

Local groundwater occurrence and flow for the Qvi and Qva aquifers are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer is unconfined where present and occurs at depths ranging between approximately 7 and 26 feet bgs (Table 14-7). With the exception of the TPS Building and the area to the east of the TPS Building, the Qvi aquifer is absent. Groundwater within the Qvi aquifer at this location generally flows downgradient east to east-northeast beneath the TPS Building toward Pacific Avenue (see Figure 2-9) and is hydraulically separated from the Qva aquifer by the Qvi silt layer.

The estimated Qvi average linear groundwater velocity is approximately 8.12 ft/day with a hydraulic gradient of 0.083 ft/ft. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

Qva Groundwater Occurrence and Flow

The Qvi/Qva aquifers are hydraulically connected beneath the GWP Building where the Qvi/Qva silt layers are absent. The Qvi aquifer is absent north of the GWP and TPS Buildings. Additionally, the occurrence of groundwater is within the Qva aquifer only beneath Pacific Avenue and to the east. The groundwater flow direction within the Qva aquifer is generally east-northeasterly based on the UWT Campus-wide Qva flow direction (Figures 2-17 and 2-19).

The estimated Qva average linear groundwater velocity ranges from 2.27 to 4.89 ft/day with a hydraulic gradient of 0.08 to 0.10 ft/ft based on the April 2021 monitoring data. Determination of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

14.4.3. Sources of Contamination

Source areas for the Northerly Plume and lines of evidence supporting historical operations as the source(s) of contamination include the following, based on the results of the RI (see Section 14.3):

- **1754 Pacific Avenue (GWP Building Source Area).** TPH, BTEX and other petroleum-related VOCs, as well as CVOCs including PCE, TCE, and vinyl chloride have been identified in soil, groundwater, and soil vapor associated with GWP Building Source Area. The source of TPH contamination in soil and groundwater beneath and downgradient of the GWP Building is likely the result of UST releases and releases from the cistern formerly located within the footprint of the GWP Building. CVOC contamination in groundwater associated with the GWP Building Source Area is attributed to releases to the cistern and/or breakdown of PCE. It is possible that CVOC contamination collected within the utilidor where it was transferred to the cistern and ultimately was released to soil and groundwater beneath the GWP Building, given the configuration of the utilidor which likely collected seepage water along Commerce Street (downgradient of the TPS Building Source Area).

  Details related to historical operations and use of the brick cistern at the GWP Building are not known. However, historical operations at the GWP Building included general storage for over 30 years and chemicals including PCE may have been stored and used during this time. Additionally, the detection of PCE in water draining from the footing drainpipe into the cistern may be an indication of CVOCs coming into this system from an upgradient source (i.e., TPS Building Source Area). The following lines of evidence supporting the brick cistern and potentially the footing drain as sources of petroleum and CVOC contamination are based on the results of utility drain samples collected during GWP Building

renovations, soil vapor sampling conducted within the footprint of the GWP and adjacent/downgradient buildings, and groundwater sampling conducted immediately adjacent and downgradient of the GWP Building, as follows:

- Detection of PCE in a water sample collected from the footing drain connected to the brick cistern located in the southwest corner of the GWP Building during the 1997 assessment (125; Table 14-8). The footing drain is associated with the west-adjacent utilidor, which runs north along Commerce Street, west beneath the Dougan Building, and south along Jefferson Avenue adjacent to the TPS Building (see Figure 14-4). The groundwater elevation in monitoring well A7-MW5S, located in the vicinity of the GWP Building, was observed to be at an elevation of 51.82 and 52.90 feet during the RI groundwater monitoring events. These observed groundwater elevations are above the elevation of the adjacent utilidor footing drain of 48.6 feet, indicating the footing drain likely intersects Qvi groundwater originating from west-upgradient locations including the TPS Building Source Area.
- Detection of PCE in each of the sub-slab soil vapor samples collected beneath the GWP Building and the north-adjacent BB and BHS Buildings during the 2018 vapor intrusion investigation at locations interpreted to be hydraulically downgradient of the former cistern or the TPS Building Source Area (293; Table 14-10). Soil vapor samples H-BHS-SS1 and H-UT-SS2, collected from the BHS and WCG Buildings, respectively, are located in the western portion of these two buildings in proximity to the utilidor and cross-gradient of the former GWP Building cistern location. PCE detected in soil vapor at these two locations is attributed to the CVOC Qvi groundwater plume originating from the TPS Building Source Area (Figure 14-4).
- Absence of PCE in upgradient groundwater monitoring wells A11-MW23S, A11-MW23D, and PS-MW9 during RI groundwater monitoring (Table 14-7). Note the TCE detected in these monitoring wells is attributed to other sources located south and west of the GWP Building as discussed in Section 7.0.
- Documentation of water inside the heating oil UST located within the GWP Building at the time of abandonment and analytical characterization of UST liquid as a mix of water and diesel fuel. The presence of water inside the UST indicates the UST was structurally damaged and groundwater had entered the UST. Structural damage of this magnitude would also allow the UST contents to leak to surrounding soil and groundwater beneath the GWP Building Source Area.

The TPH plume in groundwater is limited in extent to the immediate area downgradient and adjacent to the GWP Building (see Figure 14-17). The TCE plume (and other breakdown compounds) in groundwater at the GWP Building Source Area is interpreted to be the result of degradation of PCE resulting from both natural attenuation and enhanced degradation following the 2013 IA that consisted of injections of an ISCR reagent into groundwater upgradient and downgradient of the GWP Building along the western and eastern sides of Pacific Avenue. TCE concentrations in Qva groundwater are higher downgradient of the IA injection wells at monitoring well H-MW16 relative to concentrations upgradient at monitoring well H-MW2 (Table 14-7).

- **1735 Jefferson Avenue (TPS Building Source Area).** The source of CVOC contamination including PCE, TCE, cis-DCE, and vinyl chloride in soil, groundwater and soil vapor for the TPS Building Source Area is associated with releases/spills within the footprint of the TPS Building and migration through cracks in the slab and/or discharges to building plumbing and leaks in sub-grade pipes. Lines of evidence supporting historical operations as the source of PCE contamination include the following based on the results of soil and soil vapor sampling conducted within the footprint of the TPS Building and groundwater sampling conducted immediately adjacent and downgradient of the building:

- Use of solvents, including PCE, in association with ink printing processes as part of historical wholesale paper operations between 1911 and 1953.
- Detection of PCE in four of the five shallow soil samples collected from depths between 0- and 1-foot bgs and in three soil samples collected from depths ranging from 4 to 12 feet bgs beneath the building slab.
- Detection of PCE in six soil samples collected in boring A7-MW3S and in seven of eight soil samples collected in boring USC-MW1D, both located immediately adjacent and downgradient of the TPS Building. The PCE detections in USC-MW1D soil extended from a depth of 9 to 40 feet bgs at the top of the Qva aquifer. PCE was detected in four of eight groundwater samples collected from Qva monitoring well USC-MW1D at concentrations ranging between 0.25 and 1.5 µg/L.
- Detection of PCE in the Qvi groundwater samples collected from monitoring wells A7-MW3S and USCMW1S located immediately downgradient of the TPS Building. PCE was detected in monitoring well A7-MW3S during three RI groundwater monitoring events and in USC-MW1S during seven groundwater sampling events conducted between 2014 and 2020. The detected PCE concentrations in both monitoring wells were relatively consistent varying between 140 and 160 µg/L in A7-MW3S and between 220 and 350 µg/L in USC-MW1S (Table 14-7). This trend suggests an on-going source area in Qvi soil beneath the TPS Building.
- Detection of PCE in four of the five sub-slab soil vapor samples collected beneath and adjacent to the TPS Building.
- Detection of PCE soil vapor samples (H-BHS-SS1 and H-UT-SS2) collected from the BHS and WCG Buildings at locations cross-gradient of the former GWP Building cistern location but hydraulically downgradient of the TPS Building Source Area (Figure 14-4).
- Absence of PCE in soil samples collected from upgradient borings JS-MW3S and A7-MW2S. Sample depths in these two borings ranged between 8 and 23 feet bgs in the 11 soil samples that were collected.

The TCE plume (and other breakdown compounds) in groundwater within the TPS Building Source Area is interpreted to be the result of degradation of PCE and conversion to TCE and associated breakdown chemicals resulting from natural attenuation.

14.4.4. Potential Receptors and Exposure Pathways

Current and future land use are considered when evaluating potential receptors and exposure pathways. The current and planned future land use is commercial and academic. The Northerly Plume includes the GWP and TPS Buildings and associated paved parking. The surrounding area includes buildings, roads, sidewalks, and stairways. It is assumed that future land use will be similar to current use for purposes of this CSM. The following exposure pathways and receptors have been identified based on the current and anticipated future land use:

- **Direct Contact.** The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil and/or groundwater during excavation activities.
- **Drinking Water.** Groundwater within the Qvi and Qva aquifers beneath the Northerly Plume and surrounding area is not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.

- **Surface Water.** Stormwater utilities are located within and west of GWP and TPS Building Source Areas and in Pacific Avenue at an elevation above the groundwater table limiting the potential for groundwater to enter the stormwater network and be transported/discharged to surface water. However, protection of surface water is still being considered a potential exposure pathway given the areal extent of the Northerly Plume and its proximity to the Thea Foss Waterway for CVOC-related contaminants. The groundwater to surface water pathway is considered to be incomplete given the limited extent of the petroleum-related contamination in close proximity to the former brick cistern as verified by the groundwater data downgradient of this location.
- **Indoor Air**. Multiple buildings (Figure 14-1) are located within the Northerly Plume footprint. Petroleum-related contaminants in soil and/or CVOCs in groundwater have the potential to volatize and migrate through the vadose zone into enclosed building spaces in this area. As a result, the vapor intrusion into indoor air pathway is considered a potential exposure pathway. The potential for VI and impacts to indoor air is further discussed below in Section 14.6.4.

14.5. Proposed Cleanup Levels

PCULs were developed for the Northerly Plume for the protection of human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (Chapter 173-340 WAC), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water uses, potential exposure pathways, and the potential receptors to the Northerly Plume. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for the Northerly Plume is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels.** PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b) and numerical criteria protective of marine surface water cleanup levels. Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels.** Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

Screening levels for the protection of vapor intrusion were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SL are referenced from Ecology's VI Guidance (1064). The groundwater SL are referenced to the standard MTCA Method B SL from Ecology's CLARC Table dated January 2023.

14.6. Nature and Extent of Contamination

14.6.1. Contaminants and Media of Concern

Characterization data for the Northerly Plume are summarized in Tables 14-6 through 14-10 and were evaluated to determine contaminants and media of concern for the Northerly Plume Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions (i.e., post-remedial excavation confirmation samples and samples from soil explorations collected beyond the final remedial excavation limit) is presented in Table Q-28 (Appendix Q). An evaluation of groundwater sample results representing current conditions is presented in Table Q-29 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-30, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-28 through Q-30) include the following:

- **Soil.** PCE and TCE are considered the primary soil COCs for the Northerly Plume given their widespread occurrence in soil at concentrations greater than the PCUL. In addition, TPH-G, TPH-D, ethylbenzene and xylenes are considered primary COCs for the Northerly Plume given the magnitude of exceedance (although localized) and source. Other contaminants including 1,2,4-TMB, 1,3,5-TMB, and naphthalene were identified as secondary soil COCs for the Northerly Plume because these contaminants infrequently exceed the PCULs (i.e., less than 10 percent) and are not impacting groundwater. The nature and extent of soil COCs (both primary and secondary) are further discussed in Section 14.6.2.
- **Groundwater.** PCE and TCE were identified as primary groundwater COCs for the Northerly Plume Site based on results of the 2016 Agreed Order groundwater investigation in which PCE and TCE results exceeded the groundwater PCUL during one or more monitoring events between 2016 and 2020. Breakdown products including cis-DCE and vinyl chloride are also considered primary COCs given their occurrence in groundwater within Pacific Avenue following in-situ treatment. In addition, TPH-D was identified as secondary groundwater COCs for the Northerly Plume because these contaminants were identified downgradient of the GWP Building Source Area during previous investigations. Groundwater samples collected from the vicinity of the GWP Building Source Area in 1998 and 1999 were analyzed for TPH and BTEX compounds and these results were used to evaluate the nature and extent of these compounds in groundwater in the absence of more recent data. The nature and extent of groundwater COCs are further discussed in Section 14.6.3.
- **Soil Vapor.** Based on screening of soil data, TPH-G and TPH-D were identified as COCs with the potential to migrate into enclosed spaces at concentrations that could exceed the Method B indoor air PCULs and/or the SL for the protection of commercial workers. In addition, PCE and TCE were identified as COCs based on the groundwater data and sub-slab soil vapor samples collected within the footprint of the Northerly Plume. An evaluation for VI potential is further discussed in Section 14.6.4.

Other contaminants including benzene and/or cPAHs were detected in boring 2D-B2 located near the western edge of the TPS Building and within borings DMB-8 and DMB-13 located within Commerce Street at concentrations greater than the PCUL. However, contaminants at these locations are considered to be associated with imported fill to these areas and/or off-site releases. The nature and extent of benzene and cPAH exceedances are further discussed in Section 17.0 (Area-Wide Soil).

COCs (TPH-G, TPH-D, BTEX, PCE, TCE, cis-DCE, and vinyl chloride) for soil and groundwater are shown in plan view on Figures 14-7 through 14-27 and in cross section on Figure 14-28. The nature and extent of COCs in media of concern are further discussed below.

14.6.2. Soil

The nature and extent of COCs in soil for the Northerly Plume are further discussed in Sections 14.6.2.1 through 14.6.2.9 below as they relate to each individual source area. The results for TPH-G, TPH-D, BTEX, PCE, TCE (primary soil COCs) as well as cis-DCE and vinyl chloride (primary groundwater COCs) in soil are shown on Figures 14-7 through 14-13.

14.6.2.1. 1754 Pacific Avenue (GWP Building Source Area)

The extent of COC contamination in soil remaining within the GWP Building Source Area is likely limited due to the removal of the brick top and sides of the cistern and approximately 10 cubic yards of soil from the GWP Building in May 1996 (125). However, two of three soil confirmation samples (GWP-Cistern S1 and GWP-Cistern S2) contained several COCs, and soil represented by these samples remained in place in the north excavation sidewall following removal of the cistern. The detected COC concentrations for the two soil confirmation samples were as follows:

- TPH-G was detected in the two soil confirmation samples at concentrations of 37 and 990 mg/kg, which exceed the PCUL of 30 mg/kg.
- TPH-D was detected in one of the soil confirmation samples at a concentration of 7,500 mg/kg, which exceeds the PCUL of 2,000 mg/kg.
- 1,2,4-TMB, 1,3,5-TMB, and naphthalene were detected in both soil confirmation samples at concentrations ranging from 0.27 to 42 mg/kg, which exceed the respective PCULs for each compound.
- Ethylbenzene and total xylenes were detected in one of the soil confirmation samples at concentrations of 0.92 and 4.4 mg/kg, respectively, which exceed the respective PCULs for each compound.

Soil samples have not been collected beneath or downgradient of the GWP Building with the exception of the three soil confirmation samples collected from the cistern excavation in 1996. PCE and TCE are anticipated to be present beneath the GWP Building due to sorption of the chemicals onto soil from the PCE and TCE groundwater plumes although there are no additional soil samples that have been collected beneath the GWP Building.

14.6.2.2. 1735 Jefferson Avenue (TPS Building Source Area)

The results of soil sampling completed within the footprint of the TPS Building in 2013 and 2014 identified PCE in soil at concentrations exceeding the PCUL beneath the building and downgradient of the building along the western edge of Pacific Avenue. Additionally, TCE was identified in soil immediately downgradient of the TPS Building and benzene was identified in soil at one location beneath the TPS Building. Borings completed during this RI identified PCE contamination in Qvi and Qva soil adjacent to the east and downgradient of the TPS Building. Soil results are summarized below:

- PCE was detected in nine soil samples collected beneath the southern and eastern portions of the TPS Building slab. The soil samples ranged in depth from 1 to 11 feet bgs (Table 14-6; Figure 14-10). The detected concentrations that exceed the PCUL of 0.0016 mg/kg in the nine analyzed soil samples ranged from 0.0024 to 0.12 mg/kg. The maximum concentration detected in the soil beneath the TPS Building was 0.12 mg/kg collected from boring 2D-B2 at a depth of 4 feet bgs. As discussed above, benzene was detected in one soil sample collected beneath the western edge of the TPS Building and is attributed to other sources as discussed in Section 17.0. Other VOCs were not detected in the soil beneath the TPS Building.

- PCE was detected at concentrations exceeding the PCUL in 24 of the 39 soil samples collected from borings A7-MW1M, A7-MW1D, A7-MW3S, A7-MW5S, and USCMW1D located directly downgradient of the TPS Building. The soil samples that extended through the Qvi silty gravel, channel deposits and the Qvi silt down to the top of the Qva unit ranged in depth from 10 to 40 feet bgs (Table 14-6). The detected concentrations that exceed the PCUL of 0.0016 mg/kg in the analyzed soil samples ranged from 0.0021 to 0.24 mg/kg. The maximum concentration of 0.24 mg/kg was collected in boring USC-MW1D located directly downgradient of the TPS Building.
- TCE was detected at concentrations exceeding the PCUL in four of the 16 soil samples collected from borings A7-MW3S and USCMW1D located directly downgradient of the TPS Building. The soil samples that extended through the Qvi silty gravel and into the channel deposits ranged in depth from 12 to 20 feet bgs. The detected concentrations ranged from 0.0011 to 0.0045 mg/kg, which exceeded the PCUL of 0.001 mg/kg in the analyzed soil samples. The maximum concentration was 0.0045 mg/kg in a sample collected at a depth of 15 feet bgs in boring A7-MW3S located downgradient of the TPS Building.
- PCE was detected at a concentration of 0.0026 mg/kg, which exceeds the PCUL of 0.0016 mg/kg in one soil sample collected from a depth of 14 feet bgs in boring H-MW18S located near the western edge of Pacific Avenue (Table 14-6). PCE was also detected at a concentration less than the PCUL in the soil sample collected from a depth of 19 feet from boring H-MW18S.

14.6.2.3. Pacific Avenue and Downgradient

Soil data are not available for the area downgradient of Pacific Avenue. PCE and TCE are anticipated to be present in soil within the groundwater plume due to the sorption of the chemicals onto soil from the PCE and TCE groundwater plumes.

14.6.3. Groundwater

The nature and extent of the Northerly Plume COCs in groundwater are based on analytical data from groundwater samples collected during the 2016 Agreed Order RI and other investigations completed after 2016 with the exception of petroleum-related contaminants in groundwater data collected in 1999 downgradient of the GWP Building Source Area, which is used in the absence of more recent groundwater data from this area. These groundwater results are considered to be representative of current conditions. Therefore, investigation results prior to 2016 were not used to evaluate contaminant nature and extent. The nature and extent of primary COCs associated with the Northerly Plume based on groundwater data from the individual and/or semi-annual monitoring events, completed between 2016 and March 2021, as well as primary soil COCs for comparison to the groundwater results are shown on Figures 14-13 through 14-24, in cross section Figure 14-25.

14.6.3.1. Qvi Aquifer

The nature and extent of primary and secondary COCs associated with the Northerly Plume in the Qvi aquifer are discussed below relative to identified individual source areas. In general, PCE and TCE contamination within the Qvi aquifer extends from the TPS Building east toward Pacific Avenue. Other COCs including petroleum-related contaminants and PCE/TCE breakdown products are not observed in the Qvi aquifer.

- **1754 Pacific Avenue (GWP Building Source Area).** The Qvi aquifer is not present in the vicinity of the GWP Building Source Area (see Section 14.4.2.2). The nature and extent of COCs in the Qva aquifer are discussed in Section 14.6.3.2.

- **1735 Jefferson Avenue (TPS Building Source Area).** PCE and TCE were detected in groundwater at concentrations greater than the PCUL within and/or downgradient of the TPS Building Source Area. At this location, the PCE concentration (primary COC) ranges between 3.8 and 360 µg/L with the highest concentration detected in well USC-MW1S (220 to 350 µg/L) located east and adjacent to the TPS Building. TCE in groundwater (primary COC) ranges from 1.3 to 5.9 µg/L with the highest concentration detected in well A7-MW3S (USC-MW1S (5.5 to 5.9 µg/L) located east and adjacent to the TPS Building. Vinyl chloride (breakdown product of PCE and TCE) was detected well H-MW18S at a range of 0.26 to 0.58 µg/L.
- **Pacific Avenue and Federal Courthouse.** The Qvi aquifer is absent in this area (see Section 14.4.2.2). Contaminants within the Qva aquifer in this area are further discussed in Section 14.6.3.2.

14.6.3.2. Qva Aquifer

The nature and extent of primary and secondary COCs associated with the Northerly Plume in the Qva aquifer are discussed below relative to identified individual source areas. In general, PCE, TCE, and breakdown products including cis-DCE and vinyl chloride in the Qva aquifer extend from the GWP Building northeast toward Pacific Avenue where they commingle with PCE, TCE, and vinyl chloride contamination sourcing from the TPS Building before migrating beneath Pacific Avenue and portions of the Federal Courthouse. The nature and extent of COCs (primary and secondary) within the Qva aquifer are as follows:

- **1754 Pacific Avenue (GWP Building Source Area).** TCE and PCE were detected in groundwater at concentrations greater than the PCUL downgradient of the GWP Building Source Area. PCE exceedances of the PCUL range between 3.6 and 130 µg/L with the highest concentration at H-MW7. TCE exceedances of the PCUL range between 1.01 and 15 µg/L with the highest concentration at H-MW17. Cis-DCE exceedances of the PCUL range between 17 and 43 µg/L and vinyl chloride between 0.22 and 10 µg/L with the highest concentrations at H-MW17. In addition, TPH and BTEX compounds were detected in groundwater samples collected in 1998 and 1999 from temporary and permanent Qva aquifer monitoring wells located downgradient of the GWP Building. The results of these analyses are used to define the nature and extent of these contaminants in groundwater for the GWP Building Source Area because more recent data for these analytes are not available.
    - TPH-G was detected in grab groundwater samples collected from temporary monitoring wells H-GW3 and H-GW6 located east of the GWP Building Source Area and in groundwater samples collected from permanent monitoring wells H-MW1, H-MW2 and H-MW4. The detected concentrations ranged from 51.6 to 79.8 µg/L, which are less than the PCUL of 800 µg/L.
    - TPH-D were detected in grab groundwater samples collected from permanent monitoring well H-MW1 at concentrations ranging from up to 594 µg/L, which exceeded the PCUL of 500 µg/L during the April 1996 sampling event. The results of subsequent samples at this location were less than the PCUL. TPH-D in groundwater is no longer considered a COC given the age of this sample result and the result of the duplicate sample at this location.
- **1735 Jefferson Avenue (TPS Building Source Area).** Beneath and east of the TPS Building Source Area, COCs exceeding the PCUL were not detected in the Qva aquifer due to the Qvi/Qva silt layer.
- **Pacific Avenue and Federal Courthouse.** Contaminant concentrations of PCE and TCE in groundwater have been reduced following the implementation of the IA remedy along Pacific Avenue. After 2016, the IA effects appeared to be decreasing with PCE concentrations rebounding in one or more monitoring wells in this vicinity. Other indications of decreasing effectiveness of the IA include limited concentrations of PCE breakdown compounds cis-DCE and vinyl chloride in groundwater, elevated

redox values, and limited dissolved iron. Currently, PCE, TCE, and breakdown products cis-DCE and vinyl chloride remain above the PCUL in the Qva aquifer as follows:

- The greatest PCE and associated breakdown component concentrations within the Qva aquifer were detected in well H-MW17 located at the convergence of the GWP and TPS Building Source Area contaminants plumes. PCE concentrations in Qva aquifer monitoring well H-MW17 exceeded the PCUL during the RI groundwater monitoring events conducted between 2013 and 2020 with detected concentrations ranging from 20 to 130 µg/L. TCE concentrations in the same groundwater samples exceeded the PCUL of 0.7 µg/L with concentrations ranging from 3.5 to 16 µg/L. TCE breakdown product cis-DCE was detected in the groundwater samples collected from H-MW17 and H-MW18 between 2016 and 2020, with the detected concentrations exceeding the PCUL of 16 µg/L during 10 of 17 groundwater monitoring events with decreasing concentrations since March 2017. Related PCE breakdown product DCE was detected in nine of the groundwater samples collected from H-MW17 at concentrations less than the PCUL and not detected since March 2017. Vinyl chloride was detected in groundwater samples collected between March 2015 and September 2020 at concentrations (1.3 to 10 µg/L) greater than the PCUL. The vinyl chloride concentrations have decreased since March 2017.
- In the central portion of the plume (H-MW4, H-MW19, H-MW20, H-MW22), analytical results for PCE ranged from non-detect to 88 µg/L, TCE from non-detect to 20 µg/L, cis-DCE from 8.7 to 65 µg/L, trans-DCE from non-detect to 0.73 µg/L, and vinyl chloride from non-detect to 3.6 µg/L.

Overall, the northern edge of the plume is defined by H-MW5 and H-MW21 where PCE and associated breakdown compounds either were not detected or were detected at concentrations less than the PCUL. The southern edge of the plume is defined by H-MW3 and H-MW15, where PCE associated breakdown compounds either were not detected or were detected at concentrations less than the PCUL. The eastern limit of the groundwater plume is defined by PCE and TCE concentrations that are less than the PCUL except for the September 2020 groundwater sample collected from monitoring well H-MW13 where PCE was detected at a concentration exceeding the PCUL. A statistical analysis was completed using H-MW13 groundwater data to further evaluate the exceedance. The statistical analysis indicates that the 95 percent confidence interval concentration is 2.2 µg/L, which is less than the PCUL (see Appendix R).

14.6.4. Soil Vapor and Indoor Air

Based on the soil, groundwater and sub-slab soil vapor sampling results representing current conditions, TPH-G, TPH-D, PCE, TCE and vinyl chloride were identified as COCs with the potential to migrate into enclosed spaces at concentrations exceeding MTCA Method B indoor air PCULs and/or SL for the protection of commercial workers. The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination**. Petroleum-related contaminants in soil were evaluated for potential VI based on Ecology's 2022 VI Guidance. Ecology's guidance states buildings located within the inclusion area (30 feet horizontal and 15 feet vertical separation distance) of soil with TPH-D concentrations greater than 250 mg/kg and TPH-G concentrations greater than 100 mg/kg may be at risk of VI into indoor air (1064). An evaluation of the potential for VI based on current conditions at Snoqualmie Library and the surrounding area is discussed below:
  - Residual TPH-D and TPH-G contamination at locations GWP-Cistern S1 and GWP-Cistern S2 were collected from the former cistern located in the southwest portion of the GWP Building,

which is within the recommended 30 feet horizontal and 15 feet vertical separation distance recommended by Ecology under the VI guidance from any enclosed space. The results of the VI evaluation on other parts of the UWT Campus (i.e., MDS Building, TPS Building, and Academic Block Buildings) indicate CVOC concentrations in groundwater are not impacting indoor air based on predictive modeling or the results of indoor air sampling completed. Although TPH-G and TPH-D were not included in this evaluation, it can be surmised that if CVOCs (i.e., highly volatile contaminants) are not impacting indoor air, then TPH-G and TPH-D (i.e., less volatile contaminants) are also unlikely to impact indoor air. Furthermore, UW-owned buildings in this area are for commercial and academic use with air exchange rates of at least 0.5 exchanges of outside air per hour and operate on a neutral to slightly positive building pressure that further limits the potential for VI and inhalation by the building occupants.

- **Petroleum-Related Groundwater Contamination**. Petroleum-related contaminants either were not detected or were detected at concentrations less than the SL for groundwater VI. Therefore, petroleum-related contaminants are not considered a potential threat.
- **Other Contaminants.** PCE, TCE and vinyl chloride at concentrations exceeding the MTCA Method B SL for VI were identified in groundwater samples collected from the Qvi aquifer within at least 100 feet of the footprint of one or more UW-owned and non-UW-owned buildings based on the results of the 2016 Agreed Order RI. However, CVOCs in sub-slab soil vapor have not resulted in indoor air concentrations greater than the indoor air PCUL for unrestricted use in UW buildings, or greater than the indoor air PCUL for commercial use in the Federal Courthouse based on analytical results for indoor air samples and the Johnson and Ettinger Model (Tables 14-9 and 14-10). UWT Campus buildings and the Federal Courthouse are considered commercial buildings with an air exchange rate of at least 0.5 exchanges of outside air per hour and operate on a neutral to slightly positive building pressure except for select locations like laboratories. The air exchange and positive pressure help to reduce the potential for vapor intrusion. Soil vapor sampling results for the TPS Building, GWP and adjacent buildings and Federal Courthouse are summarized below.
    - **TPS Building.** PCE was detected in the sub-slab soil vapor samples submitted for analysis at concentrations ranging from 670 to 6,000 µg/m^3, which are greater than the soil vapor PCULs for unrestricted use (320 µg/m^3) and commercial use (1,700 µg/m^3). TCE, DCE, cis-DCE, and trans-DCE and vinyl chloride were not detected in the analyzed soil gas samples. The soil vapor results were utilized to complete the Johnson and Ettinger model to simulate indoor air conditions of the building. The estimated PCE concentrations in indoor air ranged from 0.82 to 7.3 µg/m^3, which are less than the indoor air PCULs for unrestricted use (9.6 µg/m^3) and commercial use (51 µg/m^3). The results of the study concluded that vapor intrusion does not appear to be a risk at the TPS Building based on the soil vapor sampling results and indoor air model (215). The vapor mitigation of the TPS Building that was approved by Ecology in 2015 and implemented by UW included sealing cracks and penetrations in the concrete floor during construction.
    - **UWT Campus Buildings (WCG, BB, BHS, and GWP).** PCE was detected at concentrations less than the soil vapor PCUL for unrestricted use in seven soil vapor samples collected in 2017 from the UWT Campus buildings located west of Pacific Avenue. TCE, DCE, cis-DCE, and trans-DCE and vinyl chloride were not detected in the analyzed samples. In addition, PCE was detected at concentrations less than the indoor air PCUL for unrestricted use in the nine indoor air and two outdoor air samples collected in 2017. DCE, cis-DCE, and trans-DCE were detected in various indoor and outdoor air samples in the 2017 sampling event. However, TCE was detected at concentrations greater than the indoor air PCULs for unrestricted use and commercial use in two air samples collected during the 2017 event. The air samples included one indoor air sample (H-BB-IA1) collected in the BB Building and one outdoor air sample (H-BB, BHS, WCG-OA1) collected on the Joy Building roof. The indoor air sample H-BB-IA1 was not

an indication of vapor intrusion because the adjusted indoor air TCE concentration (calculated from the indoor air TCE concentration of sample H-BB-IA1 minus the outdoor air TCE concentration of sample H-BB, BHS, WCG-OA1) was less than the indoor air PCUL for unrestricted use. Furthermore, TCE was not detected in the sub-slab samples in the area. PCE, TCE and associated breakdown compounds were not detected in the one indoor air sample collected in the BB Building and two outdoor samples collected on the building roofs in 2020.

- **Federal Courthouse.** PCE was detected at a concentration greater than the soil vapor PCUL (320 µg/m^3) in soil vapor sample H-CH-SS2 (1,030 µg/m^3). PCE was detected at concentrations less than the soil vapor PCUL in the remaining analyzed soil vapor samples. PCE was detected at concentrations less than the indoor air PCUL (9.6 µg/m^3) at the four indoor air and three outdoor air sample locations. TCE was detected at concentrations greater than the soil vapor PCUL (12 µg/m^3) in two soil vapor samples (H-CH-SS1 and H-CH-SS4). TCE was detected at concentrations less than the soil vapor PCUL in the remaining analyzed soil vapor samples. TCE was detected at concentrations greater than the indoor air PCUL for unrestricted use (0.37 µg/m^3) in the four indoor air samples (H-CH-IA1 through H-CH-IA4) ranging from 0.495 to 0.596 µg/m^3. It is not clear if vapor intrusion was occurring based on the ratios of PCE and TCE between the indoor air and sub-slab, and TCE concentrations between the sub-slab and indoor air. However, the detected concentrations are less than indoor air PCULs for commercial use and therefore not a calculated risk to the occupants. Other PCE breakdown compounds (DCE, trans-DCE, cis-DCE and vinyl chloride) were either not detected or were detected at concentrations less than the respective soil vapor PCULs and indoor air PCULs.

14.7. Contaminant Fate and Transport

The Northerly Plume consists of commingled plumes contained within both the Qvi and Qva aquifers from two identified source areas (GWP and TPS Building Source Areas). PCE and TCE were identified as the primary COCs in groundwater due to their widespread nature throughout the Northerly Plume. Other COCs including PCE/TCE breakdown products cis-DCE and vinyl chloride, as well as TPH, BTEX, and petroleum-related VOCs (1,2,4-TMB, and 1,3,5-TMB) are generally located in close proximity to the individual source areas and are limited in extent. The chemical properties of contaminants and the physical, chemical, and biological processes to which they are exposed affect the fate and transport of contaminants. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed in Section 18.0. Other factors influencing the transport of contaminants within the Northerly Plume include the geology and hydrogeology and the presence of building drains and utility networks.

In general, CVOCs migrated vertically from the individual points of release (TPS and GWP Building Source Areas) through the vadose zone to groundwater. In groundwater, these contaminants migrated downgradient toward Pacific Avenue, commingled together, and continued to migrate beneath the Federal Courthouse. The 2013 IA resulted in a significant reduction in the overall contaminant mass within Pacific Avenue, although recent groundwater monitoring in this area has indicated a rebound in PCE and TCE concentrations. TPH and petroleum-related contaminants exceeded the PCULs in proximity to the brick cistern formerly located beneath the GWP Building. However, groundwater monitoring results following removal of the cistern indicate that the PCUL exceedance in soil is limited in extent.

Soil and groundwater contamination for the Northerly Plume Site is predominantly situated beneath portions of the UWT Campus that are capped by paved ROWs and/or buildings preventing direct exposure (Figures 14-1 and 14-28). CVOCs have the potential to migrate through soil vapor into indoor air. Modeling results based on sub-slab vapor sampling within UWT Campus buildings indicate that there is a low potential

for vapor intrusion into the occupied spaces at a concentration that would exceed the indoor air cleanup criteria.

The migration of CVOCs in a groundwater plume is limited by the sorption of these contaminants to fine-grained soils as evidenced by the detected concentrations in saturated soil downgradient of the source areas themselves. Overall, groundwater monitoring completed as part of the 2016 Agreed Order RI (including groundwater data for the various capital projects and environmental due diligence projects completed since 2016) indicates that chemical degradation of CVOCs is occurring based on the results of the RI between 2016 and 2021 although PCE concentrations have rebounded in the area east of Pacific Avenue likely resulting from decreasing effectiveness of the IA performed in 2013.

Source areas for the Northerly Plume and lines of evidence supporting historical operations as the source(s) are discussed in Section 14.4.3. Geologic and hydrogeologic conditions with the Northerly Plume contributing to the contaminant fate and transport are discussed in Section 14.4.2. The fate and transport for CVOCs associated with the Northerly Plume are described by source area in Sections 14.7.1 through 14.7.4 below.

14.7.1. 1754 Pacific Avenue (GWP Building Source Area)

PCE and TPH were released through spills, drips, and/or discharges to the former brick cistern and TPH was released from the former UST and entered the soil column. The contaminants migrated through the soil column toward the Qva aquifer. These contaminants were transported downgradient of these areas following contact with groundwater. Contaminant fate and transport processes associated with the GWP Building Source Area include the following:

- PCE and TPH were released/discharged to the former brick cistern during prior operations at the GWP Building and/or through discharge of contaminated water redirected from the TPS Building Source Area plume via the building footing drain and into the cistern (see Section 14.3.5.1), which was observed to be cracked and porous at the time of removal (125). TPH was also released from the former UST located in the GWP Building, as indicated by the apparent structural damage (i.e., the presence of water observed inside the UST) at the time of abandonment. The cistern/UST leaked over time allowing PCE and TPH to enter the underlying Qva soil and migrate downward to groundwater in the Qva aquifer.
- PCE-contaminated groundwater in the Qva aquifer then migrated from the GWP Building downgradient toward the Federal Courthouse to the northeast. This is evident by the southwest-northeast orientation of the PCE plume originating from the GWP Building, which aligns with the prevailing northeast groundwater flow direction in the Qva aquifer in this area (Figures 2-17 through 2-19). TPH transport in groundwater was limited in extent to areas immediately downgradient and adjacent to the GWP Building.

14.7.2. 1735 Jefferson Avenue (TPS Building Source Area)

PCE releases through spills, drips and/or discharges to building plumbing entered the soil column where they migrated through the vadose zone into the Qvi aquifer. These contaminants were transported downgradient of these areas following contact with groundwater. Contaminant fate and transport processes associated with the TPS Building Source Area include the following:

- PCE and TCE released inside the TPS Building migrated through building slab cracks or leaks in building plumbing down to Qvi soil beneath the building, entered the Qvi aquifer, and migrated downgradient toward the east (Figure 14-28).
- PCE and TCE migrating downgradient of the TPS Source Area within the Qvi aquifer may have in part been intercepted by the footing drain of the utilidor located along Commerce Street and routed south to the GWP Building footing drain, where PCE/TCE-contaminated water may have discharged to the brick cistern and released to the underlying soil and the Qva aquifer (Figure 14-28).
- PCE and TCE migrated from the TPS Building downgradient toward the Federal Courthouse to the northeast. This is evident by the southwest-northeast orientation of the PCE plume originating from the GWP Building, which aligns with the prevailing northeast groundwater flow direction in the Qva aquifer in this area (Figures 2-17 through 2-19).

14.7.3. Pacific Avenue and Federal Courthouse

PCE- and TCE-contaminated groundwater (including breakdown products cis-DCE and vinyl chloride) originating from the GWP and TPS Building Source Areas commingled in the area near and immediately west-southwest of H-MW17 extending beneath Pacific Avenue. PCE concentrations in the Qva aquifer increase near the western edge of Pacific Avenue where PCE plumes originating from the GWP Building to the southwest and TPS Building to the west converge. PCE- and TCE-contaminated groundwater in the Qva aquifer flows generally northeast across Pacific Avenue, then flows east to the eastern boundary of the Federal Courthouse where the leading edge of the plume is delineated by groundwater samples collected from monitoring wells H-MW5, H-MW13, H-MW15, and H-MW21. The TCE plume is anticipated to increase in concentration and lateral extent relative to the PCE groundwater plume over time as natural attenuation processes continue converting the PCE into TCE and other breakdown chemicals.

PCE breakdown resulting from the 2013 IA has resulted in increased concentrations of TCE beneath and downgradient of Pacific Avenue. The breakdown of PCE to TCE in this area was accelerated by the installation and use of injection wells located along Pacific Avenue. The presence of TCE, DCE, and vinyl chloride in groundwater east of Pacific Avenue indicates PCE is breaking down to daughter products as evidenced by higher TCE concentrations in Qva groundwater at locations downgradient of the IA injection wells (monitoring wells H-MW4 and H-MW17) relative to concentrations at monitoring well H-MW19 located slightly upgradient of IA injection wells (Figure 14-23; Table 14-7). However, PCE concentrations appear to be rebounding in three monitoring wells (H-MW13, H-MW15, and H-MW17). Rebounding PCE concentrations in monitoring well H-MW17 are likely related to ongoing PCE migration from the TPS Building Source Area upgradient to the west outside the 2013 IA area.

Overall, groundwater monitoring completed as part of the 2016 Agreed Order RI indicates that the leading edge of the Northerly Plume Site is stable and is not continuing to migrate toward the Thea Foss Waterway. The northern edge of the plume is defined by H-MW5 and H-MW21 where PCE and associated breakdown compounds either were not detected or were detected at concentrations less than the PCUL. The southern edge of the plume is defined by H-MW3 and H-MW15 where PCE-associated breakdown compounds either were not detected or were detected at concentrations less than the PCUL. The eastern margin of the groundwater plume is defined by PCE and TCE concentrations that are less than the PCUL except for the September 2020 groundwater sample collected from monitoring well H-MW13 where PCE was detected at a concentration exceeding the PCUL. However, a statistical analysis was completed using H-MW13

groundwater data to further evaluate the exceedance. The statistical analysis indicates that the 95 percent confidence interval concentration was less than PCUL.

14.7.4. Soil Vapor

CVOCs detected at concentrations exceeding the MTCA Method B SL for vapor intrusion were identified in groundwater samples collected from the Qvi aquifer. However, the results of the vapor intrusion evaluation completed for the UWT Campus buildings in this vicinity indicate that similar detected PCE concentrations in groundwater do not have the potential to impact indoor air-based predictive modeling or the results of indoor air sampling completed. As a result, further vapor intrusion evaluation was not required on UW-owned buildings as part of the RI. However, CVOCs in sub-slab soil vapor have not resulted in indoor air concentrations greater than indoor air PCULs for unrestricted use in UWT Campus buildings, or greater than the indoor air PCUL for commercial use in the Federal Courthouse based on analytical results for indoor air samples and J&E modeling.

14.8. Summary

The results of the RI indicate that historical land use and operations at the GWP and TPS Building Source Areas have resulted in the release of petroleum-related and CVOC contaminants to soil, which has migrated vertically through the soil column to groundwater (Qvi and Qva aquifers). PCE, TCE, and breakdown products (cis-DCE and vinyl chloride) have further migrated downgradient from the initial source areas beneath portions of Pacific Avenue and the Federal Courthouse, although the extent of petroleum-related contamination is limited to the GWP Building Source Area (Figure 14-1). The volatilization of PCE, TCE, and associated breakdown compounds in soil and/or groundwater is migrating upward through the vadose zone based on sub-slab monitoring results. However, indoor air sampling and VI modeling indicate that building occupants are not being exposed to contaminant concentrations greater than the indoor air PCULs for unrestricted use in UWT Campus buildings, or greater than the indoor air SL for commercial use in the Federal Courthouse. Paved surfaces (ROW, sidewalks, and/or parking areas) are preventing direct contact with these contaminants and are limiting the infiltration of stormwater that could further contribute to contaminant leaching of COCs in shallow soil in source areas to the groundwater. Overall, groundwater monitoring completed as part of the 2016 Agreed Order RI indicates that the leading edge of the Northerly Plume Site is stable and is not continuing to migrate toward the Thea Foss Waterway.

Soil, groundwater, soil vapor and stormwater data for the Northerly Plume are presented in Tables 14-6 through 14-9, respectively. The nature and extent of primary COCs in soil and groundwater constituting the Northerly Plume Site are shown in plan view on Figure 14-1, by chemical/media on Figures 14-7 through 14-27, and in cross section on Figure 14-28.

15.0 REMEDIAL INVESTIGATION—EASTERLY PLUME

15.1. Introduction

The Easterly Plume is generally located from the area west of Market Street to the area east of Pacific Avenue (west-east), and South 21st Street and South 19th Street (south-north) in Tacoma, Washington (Figure 15-1). Environmental data collected during previous and more recent soil, soil vapor and/or groundwater environmental studies (further discussed in Section 15.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of CVOCs in soil

and/or groundwater at concentrations greater than their respective PCULs resulting from spills and/or releases associated with historical operations and land use from three separate source areas located on the UWT Campus. Summary statistics for soil and groundwater identifying COCs for the Easterly Plume are presented in Tables Q-31 and Q-32 (Appendix Q).

Primary source areas to the Easterly Plume include 1934-1938 Market Street, and portions of South C Street and Commerce Street, as shown on Figure 15-1. The results of the RI confirm that other areas including Cragle (Section 5.0), Prairie Line Trail (Section 7.0), Shaub-Ellison (Section 11.0), Snoqualmie Library Building (Section 12.0) and the Southerly Plume (Section 16.0) are not contributing to the Easterly Plume and are not considered sources of petroleum-related contaminants. The Easterly Plume is discussed separately based on the location of sources and types of contaminants even where the Easterly Plume is collocated with petroleum-related groundwater plumes (Southerly Plume, Cragle, Snoqualmie Library, Shaub-Ellison). TCE, cis-DCE, vinyl chloride, and chlorobenzene were identified as the primary COCs in soil and/or groundwater due to their widespread nature throughout the Easterly Plume. Other COCs including trans-DCE and DCE are considered secondary COCs and are generally located in close proximity to the source areas and are limited in extent. The contaminant distribution of the Easterly Plume is highly influenced by the chemical properties of contaminants, location of the three sources of contamination, underlying geology and hydrogeology and presence of storm utilities.

The greatest concentrations of COCs in soil and groundwater are located in the area of Market Street. In soil, the highest detected concentrations are generally near the intersection of Market Street and Jefferson Avenue. COCs detected at concentrations exceeding the PCULs in soil range from near the ground surface (within the individual source areas) up to approximately 60 feet bgs. In groundwater, TCE, cis-DCE and vinyl chloride are widespread throughout the Easterly Plume in both the Qvi and Qva aquifers extending east toward Pacific Avenue; other contaminants including chlorobenzene and DCE are generally limited in extent and area generally limited to the Qvi aquifer between Market Street and Commerce Street. The highest detected concentrations in groundwater are located immediately downgradient of 1934-1938 Market Street and in the vicinity of Jefferson Avenue and Jet Parking.

Soil and groundwater contamination for the Easterly Plume Site (as defined by TCE, cis-DCE, vinyl chloride, chlorobenzene, trans-DCE and DCE PCUL exceedances; Figure 15-1) is predominantly beneath portions of the UWT Campus that are capped by paved ROWs, parking lots and/or buildings preventing direct exposure. Modeling results based on sub-slab vapor sampling and indoor air sampling indicate that there is a low potential for VI into the occupied spaces at a concentration that would exceed the indoor air cleanup criteria. Furthermore, utility infrastructure that could provide a preferential pathway for contaminant migration is located at an elevation above the groundwater water table. Overall, groundwater monitoring completed as part of the 2016 Agreed Order RI indicates that the leading edge of the Easterly Plume Site is stable and is not continuing to migrate toward the Thea Foss Waterway.

The Easterly Plume is shown relative to the surrounding features on Figure 15-1. Terminology for the Easterly Plume referenced by this RI is described below:

- **Easterly Plume.** The extent of CVOC (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) contamination associated with historic operations and/or land use. Sources to the Easterly Plume include:

- **1934-1938 Market Street (1934-1938 Market Street Source Area)**. The primary source area located at 1934-1938 Market Street in which historical operations resulted in the release of CVOC contaminants to the environment. In the 1950s, an addition (1938 Market Street) was completed at the southern end of the original building location at 1934 Market Street. The buildings located at 1934 and 1938 Market Street are contained within Pierce County Parcel No. 2019080040 (0.41-acre parcel) and are collectively referred to as the Market Street Building.
- **Commerce Street Source Area.** Minor source area located near the intersection of South C Street and Commerce Street (formally Dolly Roberson Lane). Historical operations and land use in this area resulted in the release of CVOCs to soil and groundwater. The actual point source for this release area is unknown.
- **South C Street Source Area.** Minor source area centrally located within South C Street between South 21st Street and Commerce Street. Historical operations and land use in this area (possibly related to Cragle) resulted in the release of CVOCs to soil and groundwater. The actual point source for this release area is unknown.

- **Cragle.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019050027, which is further discussed in Section 5.0.
- **PLT.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 0320043155, which is further discussed in Section 7.0.
- **Shaub-Ellison**. The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019040010, which is further discussed in Section 11.0.
- **Snoqualmie Library.** The source property or point of release for contamination associated with historic operations on Pierce County Parcel No. 2019050026, which is further discussed in Section 12.0.
- **Westerly Plume.** The extent of CVOC (PCE, TCE, DCE, cis-DCE, vinyl chloride, and DCA) contamination associated with historic operations and/or land use at 1701 Tacoma Avenue South, 1722 Tacoma Avenue South, 1904-1908 Tacoma Avenue South, 1922 Tacoma Avenue South, 1934-1938 Tacoma Avenue South, Tacoma Avenue South Sanitary Sewer, 1755 Fawcett Avenue, and 1742 Jefferson Avenue, which is further discussed in Section 13.0.
- **Southerly Plume**. The extent of BTEX and TPH contamination associated with historic operations at 1956 Jefferson Avenue, 1934-1938 Market Street, and Jet Parking, which is further discussed in Section 16.0.

Specific details regarding the historical property use leading to the release of contaminants, RI activities completed to date, the CSM and the nature and extent of contamination associated with the Easterly Plume are summarized below.

15.2. Property Conditions

General property conditions for the Easterly Plume area are described in Section 15.2.1. Property conditions specific to the three individual source areas including location, historical land use, current and future land use, and utility infrastructure are described in Sections 15.2.2 through 15.2.4.

15.2.1. Easterly Plume

15.2.1.1. Location and Description

The Easterly Plume is located in the southeast quadrant of the UWT Campus generally between Court D (western extent), I-705 (eastern extent), South 21st Street (southern extent) and South 19th Street (northern extent). The southwest portion of the UWT Campus is used for a variety of retail, commercial, and academic purposes. This area is predominantly occupied with buildings for mixed commercial, retail, and academic use, paved sidewalks, streets, and/or parking lots. The ground surface across this area slopes east toward the Thea Foss Waterway from approximately elevation 140 feet (Court D) to elevation 47 feet (Pacific Avenue).

15.2.1.2. Historical Land Use

General historical land use in the southeast quadrant of the UWT Campus has included a variety of commercial, retail, residential, and railroad uses and includes the Warehouse Historic District of Tacoma Washington. The Warehouse Historic District was initially developed in the late 1880s and early 1900s surrounding the Prairie Line railway historically operated by Northern Pacific/BNSF. The properties along and in the vicinity of Prairie Line were generally utilized to house import products and organize export products for shipping. Side streets included stores like grocery, stoves companies, paper companies, dry goods, etc. Historical building footprints associated with commercial uses and/or features are shown on Figure 15-2.

15.2.1.3. Current and Future Land Use

The southeast quadrant of the UWT Campus is currently occupied by a variety of commercial and academic buildings, surface parking lots and City ROWs. Commercial use of the UWT Campus buildings primarily includes restaurants and retail services. Current features including UWT Campus and commercial buildings along with associated stormwater and sewer utility infrastructure (further described in Section 15.2.1.4) are shown on Figure 15.3. Anticipated future land use in this area will remain predominantly academic, streets, and parking with miscellaneous commercial/retail services.

15.2.1.4. Utility Infrastructure

Current utility infrastructure present in the ROW and individual properties include sanitary sewer, storm sewer, drinking water, natural gas, underground electrical, overhead electrical, and communications. Utility infrastructure within and adjacent to the Easterly Plume with the potential to serve as preferential pathways for contaminant migration is shown on Figure 15-3 and includes the following:

- **Market Street Utilities**. The current utility infrastructure in the vicinity of Market Street is shown on Figure 15-3 and includes the following:
    - A north-south oriented 8-inch-diameter sanitary sewer line is located within the western edge of the Market Street ROW at elevations between approximately 109 to 113 feet. This sanitary sewer line was originally constructed in the early 1900s using approximately 2-foot sections of terra cotta pipe with grouted joints and joins the east-west oriented sanitary sewer line located within South 21st Street, described below. A portion of the sanitary sewer line within the intersection of Market Street and South 21st Street collapsed sometime prior to the fall of 2005 and was subsequently replaced with 8-inch-diameter PVC piping in late 2005 (192). The remaining terra cotta piping between Market Street and South 21st Street was replaced with 8-inch-diameter PVC piping by the City in 2012. Five unknown utilities were noted east of the Market Street Building during trenching for the sanitary sewer replacement project within Market Street (245). Currently, two of the laterals provide service to the buildings located at

1914 and the Market Street Building and one lateral provides service to the building located at 1956 Jefferson Avenue to the south.

- A 24-inch-diameter stormwater line is located within the Market Street ROW at elevations between approximately 107 to 115 feet. This stormwater line was constructed in 1906 with terra cotta pipe that joins the east-west oriented stormwater line located within South 21st Street, described below. A portion of this stormwater line collapsed between the intersection of Market Street and Jefferson (at manhole 6767332) and the intersection of Jefferson Avenue and South 21st Street sometime prior to the fall of 2005 and was replaced with 24-inch-diameter PVC piping in late 2005 (192, 193) along a new alignment east of the 1906 stormwater alignment (Figure 15-3). The former stormwater line was filled with concrete following replacement.
- Two stormwater line laterals were identified along Market Street during video surveillance conducted by UW in 2019. One stormwater lateral provides service for a series of roof drains, catch basins and indoor sumps located at the Market Street Building. The other lateral appears to provide service to a catch basin (CB: 6512234) located in the sidewalk on the west side of Jefferson Avenue north of the intersection of Jefferson Avenue and South 21st Street.

- **Jefferson Avenue Utilities**. Current utility infrastructure in the vicinity of Jefferson Avenue is shown on Figure 15-3 and includes the following:
  - A north-south oriented 8-inch-diameter sanitary sewer line is located within the western portion of the Jefferson Avenue ROW at elevations between approximately 88 and 98 feet. This sanitary sewer line was constructed in the early 1900s using approximately 2-foot sections of terra cotta pipe with grouted joints. Video surveillance was not conducted in this sanitary sewer line and no laterals are recorded in the City's database. However, laterals likely exist within the sanitary sewer line to provide service to the adjacent buildings located within the triangle area that is bounded by Market Street, Jefferson Avenue and South 19th Street.
  - A north-south oriented 8- to 12-inch-diameter stormwater line is located within the eastern portion of the Jefferson Avenue ROW at elevations between approximately 91 and 103 feet. This stormwater line was constructed between 2011 and 2012 and joins the east-flowing stormwater line at manhole 6767248 located northwest of the TLB.

- **South 21st Street Utilities.** Current utility infrastructure in the vicinity of South 21st Street is shown on Figure 15-3 and includes the following:
  - An east-west oriented 10-inch-diameter sanitary sewer line is located within the South 21st Street ROW at elevations between approximately 127 and 148 feet. This sanitary sewer line was constructed in the early 1900s using unreinforced concrete and terra cotta piping. The City is currently planning to replace this line between Tacoma Avenue and Jefferson Avenue with a new 12-inch-diameter PVC pipe. Construction for replacement is occurring concurrently with the RI.
  - An east-west oriented 18- to 24-inch-diameter stormwater line is located within the South 21st Street ROW at elevations between approximately 78 and 119 feet. This stormwater line was constructed in the early 1900s using terra cotta pipe sections. Portions of this stormwater line were replaced in 1940, 1971, 2002, and 2005 using various materials.

- **PLT Utilities**. Current utility infrastructure in the vicinity of the PLT pedestrian corridor is shown on Figure 15-3 and includes the following:
  - A north-south oriented 8-inch-diameter sanitary sewer line is located within the PLT pedestrian corridor and was constructed in the early 1900s. The materials used to construct this sanitary sewer line are not reported in the City database. However, it is likely that this line was constructed using terra cotta pipe sections based on the construction time period.

- A north-south oriented 6- to 18-inch-diameter stormwater line located within the PLT pedestrian corridor was constructed in 2014 using PVC piping at elevations between approximately 81 and 83 feet. This stormwater line joins the east-flowing stormwater line located near the centerline of South 21st Street.
- A stormwater treatment facility was installed in 2014 at the southern end of the PLT pedestrian corridor adjacent to South 21st Street. A review of plan drawings indicates that stormwater is conveyed to the treatment facility through a series of 12- to 18-inch-diameter PVC pipes at elevations between approximately 81 and 96 feet. Stormwater is conveyed through a flow splitter and vault designed to allow entrained sediment to settle out of the flow and control the volume of water before entering the treatment facility. This vault receives stormwater collected from various catch basins and connection points along Market Street (including South 19th Street). The treatment facility consists of a series of 6-inch-diameter PVC tightline pipes that convey stormwater to six cells of 6-inch-diameter perforated PVC pipes that push the stormwater though an approximately 1.5-foot-thick layer of filter material used to treat the water for possible contaminants. Treated stormwater is then conveyed to the above described north-south oriented stormwater line connected to the east-flowing stormwater line near the centerline of South 21st Street.

- **Jet Parking Utilities.** Current utility infrastructure in the vicinity of Jet Parking is shown on Figure 15-3 and includes an east-west oriented 12-inch-diameter stormwater line constructed in 2014 using PVC piping at elevations between approximately 92 and 105 feet. This stormwater line is connected to the stormwater treatment facility located within PLT as described above. Additional discussion on the utility infrastructure for Jet Parking is presented in Section 16.0.

15.2.2. 1934-1938 Market Street (1934-1938 Market Street Source Area)

The 1934 Market Street Source Area property and surrounding area were initially developed for residential use from the 1880s to the early 1900s. Residential buildings on the property included several small houses and an apartment building (295). The property was redeveloped in 1925 to include a single-story warehouse building (1934 Market Street) for commercial use. Sanborn maps, city directories, and available permits indicate the following land uses:

- **1925–1940**. 76™ Gasoline fuel supply and auto repair (Rowland-Hulscher Adams Brake Service [1925 to 1940] Eisemann Magneto Station [at least 1925]).
- **1947–1958**. Oxygen sales and service (Oxygen Sales and Service Company).
- **1963–1965**. Vacant.
- **1969–1970**. Auto repair/transmission service (Transmission Sales and Service).
- **1974**. Restaurant equipment sales (Bargreen Ellingson Inc.).
- **1978**. Fireplace sales (Fireplaces of Tacoma).
- **1983–1993**. Diaper service and laundry (Fresh and Ready Diaper Service).

Photo 15-1. Circa 1940 photo of the 1934 Market Street buildings (looking west).

- **2000s to present**. Apparel embroidery/screen printing (T-Town Apparel/All American Screen Print).

A building addition to the 1934 Market Street building was completed on the southern portion of the building in the 1950s (1938 Market Street). Historical uses for this building addition included:

- **1950–1969**. Auto parts/machine shop/truck services (Mayberry Motor Parts).
- **1974**. Auto repair (T&R German Auto Repair).
- **1978–1988**. Refrigeration parts sales and services (Thermal Supply Company).
- **1993**. Antique sales (Tillmon and Sons).
- **2004**. Upholsterers' workshop (Decorators Workshop).
- **2010**. Trophy store with sales and services. (Lazer Trends LLC).
- **2014–2022**. FabLab.
- **2022 to present**. South Sound Scooters.

Photo 15-2. Circa 1950 photo of the 1934 and 1938 Market Street Buildings (looking west).

The original building (1934 Market Street) and the southern building (1938 Market Street) addition are collectively referenced as the Market Street Building. Historical land use for Market Street and surrounding area is shown on Figure 15-2. UW purchased the property in 2018 and currently leases the space to a tenant. Future anticipated use of this property will be commercial/retail and potentially residential under the UWT Campus Master Plan although specific plans for this property have not been identified at this time.

Utility infrastructure within the 1934-1938 Market Street Source Area includes floor drains, and bathrooms and sinks within the buidling. A screen print rinsing sink is present in the northeast portion of the building. Two sumps are present on the western portion of the building to collect groundwater that enters the building. The orientation of utilities within the building is not known. A sanitary sewer connection to the sanitary sewer in Market Street is located north of the building as shown on Figure 15-3.

A building drain is located on the western portion of the property adjacent to the slope. A stormwater system is located west and north of the building with a series of drains. The connection between the building drain and the stormwater system is not known. The stormwater system connection to the main stormwater system in Market Street is located north of the building as shown on Figure 15-3.

15.2.3. South C Street Source Area

The South C Street Source Area (location of monitoring well CR-MW15) is contained within South C Street between South 21st Street and South 19th Street (approximate historical address of 1940 South C Street). Historically, South C Street was used as an ROW providing access to the adjacent buildings and laydown areas to support historical operations in this general vicinity. It is suspected that the historical operations related to Cragle likely contributed to this source area given the proximity of this source area and the contaminants observed (vinyl chloride). However, a direct connection to Cragle could not be established. Therefore, the South C Street Source Area is included with the Easterly Plume due to the vinyl chloride contamination in this area commingling with the Easterly Plume and no direct evidence that Cragle is the source to CVOC contamination to soil or groundwater. Specific details for the historical land uses of Cragle are described in Section 5.0. Historical land use and features in the vicinity of the South C Street Source area are shown on Figure 15-2.

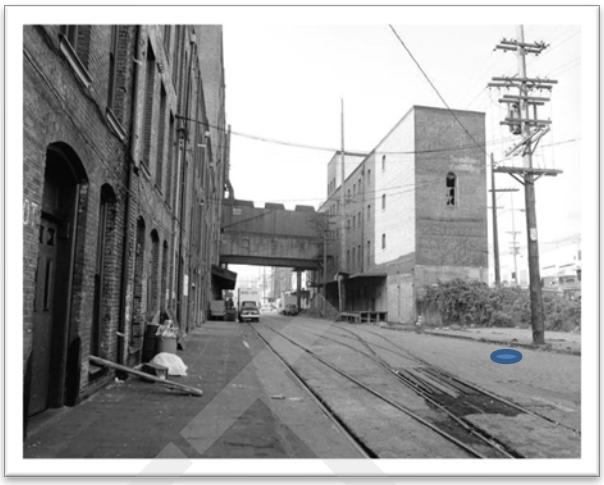


Photo 15-3. Circa 1979 photo of Commerce Street in the area of monitoring well CR-MW16 (looking south).

A north-south oriented 12- to 36-inch-diameter sanitary sewer line was located within the South C Street ROW with an inlet elevation of approximately 73 feet. This sanitary sewer line was abandoned by the City in 1995. Other utility infrastructure in this vicinity is associated with the Milgard Hall Capital Project located within Cragle and includes a north-south oriented 18-inch-diameter stormwater line and various water utilities. Additional discussion on the utility infrastructure for Cragle is presented in Section 5.0.

15.2.4. Commerce Street Source Area

A review of Sanborn maps identified a small outbuilding of unknown use historically located adjacent to the former railroad near the location of monitoring well CR-MW16 in which localized CVOC contamination was identified in soil and groundwater (further discussed in Section 15.3). Historical operations at this location are the likely source for the observed CVOC contamination in well CR-MW16 based on the relative proximity to this building. Other historical land uses for the buildings in the vicinity of the former outbuilding include a railroad, cabinet manufacturing and varnishing, a log warehouse, a coal bunker, a machine shop, and furniture upholstering. It is suspected that the outbuilding was likely associated with one or more of these adjacent historical operations. Historical land use and features in the vicinity of the Commerce Street Source Area are shown on Figure 15-2.

A utilidor Is present in Commerce Street adjacent to the buildings and as shown on Figure 15-3.

15.3. Field Investigations and Remedial Actions

Multiple environmental investigations have been completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations documenting soil, groundwater, soil vapor, and indoor air conditions for the Easterly Plume are discussed in Sections 15.3.1 through 15.3.7 below. Sampling locations to evaluate soil, groundwater and soil vapor conditions associated with the

Easterly Plume are shown on Figures 15-4 through 15-6. Investigations completed for the Easterly Plume and the surrounding area to support the development of the RI are summarized in Tables 15-1 through 15-4. Construction details for temporary and permanent monitoring wells installed within the Easterly Plume footprint and the surrounding area are presented in Table 15-5. Soil, groundwater, soil vapor and modeling results, and stormwater investigation results are presented in Tables 15-6 through 15-9.

Investigation activities specific to Cragle, PLT, Shaub-Ellison, Snoqualmie Library, and the Southerly Plume are described in other portions of this report as referenced above (Section 5.1).

15.3.1. Pre-1997 Agreed Order Remedial Investigations

Environmental investigations were completed prior to implementation of the 1997 Agreed Order in the vicinity of Cragle, Snoqualmie Library, and Shaub-Ellison to evaluate soil and groundwater conditions. Investigation activities for portions of the Cragle, Snoqualmie Library, and Shaub-Ellison properties to evaluate soil and/or groundwater conditions are further discussed below as they relate to the Easterly Plume. Soil and groundwater sampling locations are shown relative to the Easterly Plume and the Market Street, Commerce Street and South C Street Source Areas on Figure 15-4.

15.3.1.1. Cragle Soil and Groundwater Investigation Summary

Investigation activities were performed to evaluate soil and groundwater conditions within Cragle including the completion of soil borings and collection of confirmation soil samples following remedial excavation activities performed after the removal of multiple USTs within the property boundary. Select soil and groundwater samples were analyzed for CVOCs and select VOCs as part of these investigations. Soil and groundwater sampling activities in which one or more samples were submitted for CVOC analysis are summarized below. Details regarding the investigation, UST removal, and remedial investigation activities for Cragle are further discussed in Section 5.0.

- Completion of two DP soil borings (CR-B8 and CR-B9) to an approximate depth of 18 feet bgs and submittal of soil samples collected from approximately 12.5 to 17.5 feet bgs for analyses of PCE, TCE, vinyl chloride, and select VOCs. Contaminants associated with historical releases from the 1934-1938 Market Street Source Area (upgradient location) were not detected in the analyzed samples. Other contaminants analyzed and their results are summarized in Section 5.0.
- Completion of nine borings (BL-MW1, CR-MW1, CR-MW3 through CR-MW9[15]) to approximate depths ranging between 17 and 22.5 feet bgs. These borings were completed as permanent monitoring wells. Shallow soil samples collected in borings CR-MW5 and CR-MW6 from approximately 7.5 feet bgs were submitted for analysis of PCE, TCE, vinyl chloride and select VOCs. Contaminants associated from historical releases from the 1934-1938 Market Street Source Area (upgradient) and South C Street and Commerce Street Source Areas (downgradient) were not detected in the analyzed samples. Groundwater samples collected from monitoring wells CR-MW1 and CR-MW3 through CR-MW7 were analyzed for select CVOCs. TCE, DCE, vinyl chloride and DCA were detected in one or more of these wells except CR-MW3. Other contaminants analyzed and their results are summarized in Section 5.0.

[15] Boring CR-MW9 was initially completed in December 1994 and completed as a permanent monitoring well. However, soil samples were never analyzed at this location. To further evaluate soil conditions at this location, URS completed a supplemental boring at this location to collect soil samples for chemical analysis in March 1999 as part of the 1997 Agreed Order RI. Soil samples from this subsequent boring were also labeled as CR-MW9 for consistence with the original boring location.

- Six confirmation soil samples were collected from the UST removal/remedial excavation areas (further discussed in Section 5.0) for chemical analyses of PCE, TCE, vinyl chloride, and select VOCs. Contaminants associated with historical releases from the 1934-1938 Market Street Source Area (upgradient location) were not detected in the analyzed samples. Other contaminants analyzed and their results are summarized in Section 5.0.

15.3.1.2. Snoqualmie Library Soil and Groundwater Investigations Summary

An environmental assessment was conducted in 1993 to evaluate soil and groundwater conditions associated with historical operations at Snoqualmie Library, including the completion of five soil borings (PS-MW1 through PS-MW5) that were completed as monitoring wells in the central portion of the property. Select soil and groundwater samples were analyzed for CVOCs as part of these investigations. Soil and groundwater sampling activities in which one or more samples were submitted for CVOC analysis are summarized below. Detailed information regarding investigation activities for Snoqualmie Library is further discussed in Section 12.0.

- Two soil samples collected in boring PS-MW1 collected from approximately 7.5 and 12.5 feet bgs were submitted for analyses of PCE, TCE, vinyl chloride and select VOCs. Contaminants associated with historical releases from the 1934-1938 Market Street Source Area (upgradient location) were not detected in the analyzed samples. Other contaminants were analyzed, and their results are summarized in Section 12.0.
- Groundwater samples collected in monitoring wells PS-MW1, PS-MW2, PS-MW3, and PS-MW5 were analyzed for CVOCs. TCE and mixed DCEs were detected in monitoring wells PS-MW1, PS-MW3, and PS-MW5. DCA was also detected in the groundwater sample collected from well PS-MW1. Other contaminants associated with historical releases from the 1934-1938 Market Street Source Area were not detected in these samples. Other contaminants analyzed and their results are summarized in Section 12.0.

15.3.1.3. Shaub-Ellison Soil and Groundwater Investigation and Results Summary

Investigation activities were performed to evaluate soil and groundwater conditions within Shaub-Ellison including the completion of soil borings and collection of confirmation soil samples following remedial excavation activities performed after removal and closure of multiple USTs within the property boundary. Select soil and groundwater samples were analyzed for CVOCs as part of these investigations. Soil and groundwater sampling activities in which one or more samples were submitted for CVOC analyses are summarized below. Detailed information regarding investigation activities for Shaub-Ellison is further discussed in Section 11.0.

- Five borings (SH-MW1 through SH-MW5) were advanced to depths ranging from approximately 20 to 29 feet bgs and completed as groundwater monitoring wells. Soil samples collected from boring SH-MW1 through SH-MW5 were not analyzed for CVOCs.
- Groundwater samples collected in monitoring wells SH-MW1 through SH-MW4 were analyzed for a combination of PCE, TCE, vinyl chloride and select VOCs. TCE was detected in monitoring well SH-MW4 and mixed DCEs were detected in wells SH-MW3 and SH-MW4. Other contaminants associated with historical releases from the 1934-1938 Market Street Source Area were not detected in these samples. Other contaminants that were analyzed and their results are summarized in Section 11.0.

15.3.2. 1997 Agreed Order Remedial Investigation

URS, on behalf of UW, completed an RI for the UWT Campus between 1998 and 2002 in accordance with the 1997 Agreed Order. The Easterly Plume was not specifically identified as an area requiring investigation under the 1997 Agreed Order. However, investigation activities completed in this vicinity included the collection of soil and groundwater samples from Cragle, Jet Parking, Snoqualmie Library, Shaub-Ellison, and GWP Building as well as other UWT Campus-wide investigations under the 1997 Agreed Order RI.

In general, the focus of the 1998 through 2002 RI work completed in the vicinity of the Easterly Plume was to evaluate the nature and extent of previously identified petroleum-related contamination at the Cragle, Jet Parking, Snoqualmie Library, and Shaub-Ellison properties. The investigation was also completed for CVOC and petroleum-related contamination at the GWP Building. RI work completed in this area included the collection of soil and grab groundwater samples from soil borings as well as the installation and sampling of permanent groundwater monitoring wells. RI sampling and chemical analysis identified TCE, chlorobenzene, and associated breakdown products in soil and groundwater in portions of these properties not related to specific historical land uses for Cragle, Jet Parking, Snoqualmie Library, and Shaub-Ellison properties. Investigation activities for portions of Cragle, Snoqualmie Library, Shaub-Ellison, GWP Building, and UWT Campus-wide areas to evaluate soil, groundwater, and/or indoor air conditions are further discussed below as they relate to the Easterly Plume (i.e., CVOCs). Soil and groundwater sampling locations are shown relative to the Easterly Plume and the Market Street, Commerce Street, and South C Street Source Areas on Figure 15-4.

15.3.2.1. Soil Investigation Summary

A total of nine borings were completed in the vicinity of the Easterly Plume to varying depths up to approximately 45 feet bgs with a total of eight soil samples submitted for CVOC contaminants. Additional borings were completed and finished as monitoring wells although soil samples were either not collected or not analyzed for CVOCs. CVOCs were detected in soil samples collected from two borings completed in Market Street (UG-MW5 and UG-MW6). CVOCs were not detected in wells located within Cragle and Shaub-Ellison.

- **UG-MW5**. TCE (0.049 mg/kg), cis-DCE (0.0068 mg/kg), and chlorobenzene (0.10 mg/kg) were detected in the soil sample collected from a depth of approximately 20 feet bgs at UG-MW5 located southeast of the 1934 Market Street Source Area.
- **UG-MW6**. TCE (0.33 mg/kg), cis-DCE (0.010 mg/kg), and chlorobenzene (0.049 mg/kg) were detected in the soil sample collected from a depth of approximately 5 feet bgs located east of the 1934-1938 Market Street Source Area.

15.3.2.2. Groundwater Investigation Summary

A total of 139 groundwater samples collected from 64 temporary (i.e., grab) and permanent monitoring wells were submitted for analysis of CVOCs and select VOC contaminants associated with historical operations and land use at the Market Street, South C Street, and/or Commerce Street Source Areas as part of the 1997 Agreed Order RI. Contaminants detected in groundwater included PCE, TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, DCA, and chlorobenzene; the highest concentrations of contaminants were generally observed in wells BL-MW5, JP-MW2, and UG-MW6 generally located east of the 1934-1938 Market Street Source Area. Other VOCs detected in groundwater not attributed to TCE, chlorobenzene, and parent/breakdown products are summarized in other sections of this RI as referenced above.

15.3.2.3. Indoor Air Investigation

UW conducted an indoor air survey at the GWP Building in February 2001 to assess potential impacts to the air quality inside the building resulting from PCE beneath the GWP Building (151). Indoor air samples were collected inside the GWP Building at five locations and at one location on the building rooftop to provide background ambient air data. The samples were submitted for analysis of VOCs by Method TO-15. The results of the indoor air sampling did not identify CVOCs in the indoor air samples collected inside the GWP Building.

15.3.3. Supplemental Investigations Under the 1997 Agreed Order

UW completed multiple supplemental rounds of investigation between 2005 and 2013 to further evaluate the source and extent of the CVOC contamination identified in soil and groundwater in Market Street during the 1997 Agreed Order RI. Supplemental investigation activities included collection of additional soil and groundwater samples within and downgradient of Market Street to further define CVOC contamination associated with the Easterly Plume.

Investigation activities included the completion of 16 borings with the installation of 12 permanent wells and collection of grab samples from four temporary wells and four indoor air samples in the southeast portion of the UWT Campus. Soil borings were completed to depths ranging between 25 and 55 feet bgs with permanent monitoring wells screened across both the Qvi and Qva aquifers. A total of 71 soil samples collected from the soil borings were analyzed for a combination of TPH, VOCs, PAHs, and metals (see Tables 15-1 and 15-6) to further evaluate soil conditions in this area. In addition, a total of 60 groundwater samples collected from the temporary and permanent wells were also analyzed for a combination of TPH, VOCs, PAHs, and metals (see Tables 15-2 and 15-7) to further evaluate groundwater conditions in this area.

Investigation activities specific to the Easterly Plume completed as part of the supplemental investigation under the 1997 Agreed Order are summarized in Sections 15.3.3.1 through 15.3.3.4 below.

15.3.3.1. 2005 Targeted Brownfields Assessment

UW obtained a Targeted Brownfields Assessment grant in 2005 from EPA to further investigate soil and groundwater conditions at the UWT Campus. EPA contracted Weston Solutions to complete the investigation that included the installation and collection of soil and/or groundwater samples from monitoring well BA-MW1 located in Market Street and downgradient of the Market Street Building (Figure 15-4). TCE, chlorobenzene and parent/breakdown products were not detected in the analyzed soil samples collected in this well. TCE was detected at a concentration of 0.1 µg/L in groundwater samples collected at BA-MW1. Other CVOCs were not detected in the analyzed samples. Chemical analytical results are summarized for the soil and groundwater samples in Tables 15-6 and 15-7, respectively.

15.3.3.2. 2007 TCE Groundwater Investigation Summary

URS conducted a supplemental investigation in 2007 within the Market Street area to further evaluate potential source areas for CVOC-related contaminants in groundwater previously identified as part of the 1997 Agreed Order RI and subsequent investigations. The 2007 investigation focused on areas in Market Street to evaluate groundwater conditions and identify potential sources of TCE contamination similar to the 2005 Targeted Brownfields Assessment. Potential upgradient sources for TCE in groundwater evaluated include historical releases from the sanitary sewer and/or stormwater lines within the Market Street ROW and/or other unidentified historic releases from properties west of Market Street (205). The sanitary sewer and stormwater lines located in the Market Street ROW were identified as a potential source of contamination based on a review of City stormwater video surveys that identified cracks and

broken joints to the pipes adjacent to and south of the Market Street Building. The damaged segment of the stormwater line within the Market Street ROW located immediately east of the Market Street Building and extending south to South 21st Street was abandoned and re-routed by the City in 2007 as further described in Section 15.2.1 and shown on Figure 15-4.

The investigation was conducted in three phases. Phase 1 of the investigation consisted of completing borings MS-SB04, MS-SB05, and MS-SB06 located directly downgradient of the sanitary sewer line in the Market Street ROW and the collection of soil and grab groundwater samples from the shallow groundwater (i.e., Qvi aquifer further discussed in Section 15.4.2). Phase 2 consisted of the installation of monitoring wells UG-MW10 and UG-MW11 immediately west and upgradient of the stormwater and sanitary sewer lines. Additionally, groundwater samples were collected from monitoring wells BA-MW1, JP-MW2, UG-MW1, UG-MW2, UG-MW5, and UG-MW6. Phase 3 consisted of completing and installing monitoring well UG-MW12 east and downgradient of the stormwater and sanitary sewer lines.

Soil and groundwater samples collected from these borings and monitoring wells were submitted for chemical analysis of CVOCs and select VOCs. TCE, cis-DCE, chlorobenzene and 1,4-dichlorobenzene (1,4-DCB) were identified in soil at depths ranging between approximately 5 and 15 feet bgs at this location. TCE and associated breakdown products as well as chlorobenzene were identified in groundwater samples with the highest detected concentrations observed at JP-MW2. Chemical analytical results are summarized for the soil and groundwater samples in Tables 15-6 and 15-7, respectively. Sample locations are shown on Figure 15-4.

15.3.3.3. 2008 Market Street Groundwater Investigation

URS conducted a supplemental investigation in 2008 within the Market Street area to further evaluate potential source areas for CVOC-related contaminants in groundwater previously identified as part of the 1997 Agreed Order RI and subsequent investigations. One monitoring well (UG-MW15) was installed in the Easterly Plume area. TCE was identified in groundwater at this location. Soil samples were not analyzed.

Chemical analytical results for the groundwater sample are summarized in Table 15-7. UG-MW15 is shown on Figure 15-4.

15.3.3.4. 2013 Soil and Groundwater Investigation Summary

An environmental investigation was completed by UW in 2013 to further evaluate potential contaminant sources for groundwater contamination identified within the UWT Campus Master Plan boundary within the area of the Easterly Plume. The investigation within the Easterly Plume included completion of six borings converted into new monitoring wells (CR-MW15, CR-MW16, CR-MW17, JS-MW5, JS-MW6S, and JS-MW6D) and the collection of groundwater samples from 38 monitoring wells (263, Tables 15-1 and 15-2).

Soil Investigation Summary

A total of 58 soil samples collected from the soil boring explorations were analyzed for a combination of petroleum hydrocarbons, VOCs, PAHs, and metals (see Table 15-1). Detected concentrations of CVOCs included TCE, cis-DCE, trans-DCE, vinyl chloride and chlorobenzene in multiple samples analyzed as part of this investigation at depths ranging between 9 and 40 feet bgs (Table 15-6). TCE was the most frequent (i.e., 17 of the 58 samples analyzed) of the detected CVOCs with the greatest concentrations generally observed in the vicinity of the Commerce Street Source Area.

Groundwater Investigation Summary

Groundwater investigation activities associated with the Easterly Plume included the collection of 40 groundwater samples (including duplicates) from 38 new and existing monitoring wells for a combination of petroleum-hydrocarbon, VOC, PAH, and metal analyses (see Table 15-2). Detected concentrations of CVOCs included TCE, cis-DCE, trans-DCE, DCE, vinyl chloride and chlorobenzene (Table 15-7). In addition, benzene was also detected and further discussed in Section 16.0 (Southerly Plume). Similar to the soil results, TCE was the most frequently detected CVOC (i.e., 31 of the 49 samples analyzed) in groundwater. The highest concentrations of contaminants were observed at BL-MW5 and JP-MW2 generally located east of the 1934-1938 Market Street Source Area. Other VOCs detected in groundwater that are not attributed to TCE, chlorobenzene and parent/breakdown products are summarized in other sections of this RI as they pertain to other AOCs.

15.3.4. 1997 Agreed Order Remedial Action

UW implemented an IA for the Northerly Plume to address the GWP Building Source Area as part of the Agreed Order for the UWT Campus in July 2013. The purpose of the IA was to perform remedial actions to address PCE contamination (and associated breakdown compounds) in groundwater downgradient of the GWP Building that was identified to be migrating beneath the Federal Courthouse. The remedial action is further described in Section 14.0. Well H-MW1 was sampled during the IA until 2017 and is relevant to define the downgradient extent of the Easterly Plume.

PCE, cis-DCE and vinyl chloride were detected between 2013 and 2017 in well H-MW13. CVOCs were detected during the 2018 groundwater sampling event.

15.3.5. 2016 Agreed Order Remedial Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions were completed in accordance with the RI Work Plan and subsequent addenda (Section 4.0). RI activities within the Easterly Plume and surrounding area included collection of soil samples from 61 soil borings, groundwater samples from existing and new temporary and permanent groundwater monitoring wells, and collection of sediment and water samples from three drains and two catch basins (see Tables 15-1 through 15-5). In addition to the Easterly Plume, one or more of these monitoring wells were also used to evaluate groundwater conditions associated with Cragle, Jet Parking, Snoqualmie Library, Shaub-Ellison and GWP Building.

Investigation locations for the 2016 Agreed Order Remedial Investigation are shown on Figure 15-5. Well construction details are summarized on Figure 15-5. Soil and groundwater analytical results are summarized in Tables 15-6 and 15-7. Water sample results collected from the Market Street Building and the City's stormwater system at select manhole locations are summarized in Table 15-8; sub-slab soil vapor sample results are summarized in Table 15-9. Investigations completed between 2016 and 2020 as part of the 2016 Agreed Order RI are summarized in Sections 15.3.3.1 through 15.3.3.4. The well locations are shown on Figure 15-5.

15.3.5.1. Soil Investigation Summary

The soil investigation was implemented throughout the Easterly Plume. However, the majority of the soil investigation was completed within Market Street and the Jet Parking Lot. A total of 553 soil samples were collected from 56 borings completed within the Easterly Plume and surrounding area between 2016 and 2020 to further evaluate soil conditions and define the nature and extent of CVOC contamination sourcing

from the Market Street, Commerce Street and South C Street Source Areas. The soil samples were also used to evaluate the spread of CVOC contamination along Market Street resulting from potential releases from the 1934-1938 Market Street Source Area and City of Tacoma stormwater utility. In general, the highest detected concentrations in soil are in the vicinity of the 1934-1938 Market Street Source Areas and downgradient of these areas. Soil sampling results associated with the Easterly Plume are further discussed below.

TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, chlorobenzene and 1,4-DCB were identified in soil interpreted to be Qvi deposits (upper 50 feet). The highest detected concentrations of contaminants were identified in Qvi borings A10-MW3S, A10-MW5D, A10-B10, A10-B8, A10-B17 generally located downgradient of the 1934-1938 Market Street Source Area and the Market Street stormwater line where breaks have been observed as part of City video inspections (205). TCE, cis-DCE, trans-DCE DCE, vinyl chloride and chlorobenzene were detected in samples collected from what is interpreted to be Qva deposits during the 2016 Agreed Order RI. The highest detected concentrations of contaminants in the Qva deposits were identified at boring locations A10-B13 and A10-MW30D generally located downgradient of the 1934-1938 Market Street Source Area.

15.3.5.2. Sediment Investigation Summary

Three sediment samples (PS14-DS1, PS14-DS2, and PS14-DS3) were collected from the three stormwater catch basins/drains located in the parking lot of the 1934-1938 Market Street Source Area. Chemical analytical results for three sediment samples identified TCE, chlorobenzene, 1,2,4-trichlorobenzene (1,2,4-TCB) and 1,4-DCB.

15.3.5.3. Groundwater Chemical Analytical Results

A total of 356 groundwater samples were collected between 2016 and 2021 for the 2016 Agreed Order RI from the network of new and existing monitoring wells, to further evaluate groundwater conditions and define the nature and extent of CVOC contamination resulting from releases during historical operations along Tacoma Avenue South and on UW-owned source properties. Groundwater sampling activities and their results associated with the Easterly Plume are further discussed below. Well locations are shown in Figures 15-5.

- A total of 217 groundwater samples were collected from 63 permanent or temporary monitoring wells screened within the Qvi aquifer during the RI. TCE, chlorobenzene, and vinyl chloride were identified as the primary contaminants in the Qvi aquifer based on the results of this investigation. The greatest TCE, chlorobenzene and vinyl chloride concentrations were detected in groundwater downgradient of the 1934-1938 Market Street Source Area. Chlorobenzene was limited to the Market Street/Jet Parking area. Other CVOCs in the Qvi aquifer are as follows:
    - Other TCE breakdown products (trans-, cis-DCE, and DCE) were detected in numerous samples collected within the Easterly Plume.
    - PCE was detected in a limited number of samples collected within Market Street.
- During the 2016 Agreed Order RI, a total of 27 groundwater samples were collected from six permanent monitoring wells screened within both the Qvi and Qva aquifers where the Qvi/Qva confining layers are typically absent (A11-MW23S, A11-MW26S, BL-MW4, BL-MW6, CR-MW12 and SH-MW8) generally located between PLT and the eastern portion of Pacific Avenue as shown on Figure 15-5. TCE, cis-DCE, DCE and vinyl chloride were detected at least once in the monitoring wells. The greatest concentrations

were detected in monitoring well BL-MW6 located at the intersection of Commerce Street and South C Street.

- A total of 91 groundwater samples were collected from 20 permanent monitoring wells screened within the Qva aquifer during the 2016 Agreed Order RI. TCE, cis-DCE, and vinyl chloride were identified as the primary contaminants in the Qva aquifer. The highest TCE, cis-DCE and vinyl chloride concentrations were detected in the northern portion of Cragle (A11-MW30D and BL-MW5). Other CVOCs in the Qva aquifer are as follows:
    - TCE breakdown products (trans-DCE and DCE) were detected in a limited number of groundwater samples within the Easterly Plume.
    - Chlorobenzene was detected in groundwater samples collected from wells A11-MW30D and BL-MW5.

15.3.5.4. Stormwater Investigation Summary

Twelve stormwater manholes and two catch basins were checked during a period of dry weather to evaluate base flow while performing groundwater sampling within and upgradient of the Easterly Plume between 2016 and 2020 as part of the 2016 Agreed Order RI. Water was observed in six of the manholes and both catch basins and 30 water samples were collected. Additionally, water samples were collected from three drains located on the western portion of the 1934-1938 Market Street Source Area. CVOCs were detected in the stormwater system as follows:

- **South 19th Street.** TCE was consistently detected in water samples collected from manholes MH:6751942, MH:6767230, and MH:6767239 located within South 19th Street between Tacoma Avenue South and Market Street at concentrations ranging between 0.38 and 15 µg/L (Figure 15-5). PCE was also detected in the water samples collected from these manholes. Chloroform was detected in select manholes as well.
- **Market Street Catch Basins.** TCE was detected in one water sample collected in March 2019 from catch basin CB:6512234 (0.40 µg/L). Other CVOCs were not detected in the analyzed samples.
- **Market Street Building Drains.** PCE, TCE, cis-DCE, and other CVOCs were detected in water samples collected from three drains located west of the Market Street Building (PS14-DS1, PS14-DS2, and PS14-DS3). The CVOC concentrations were variable during each sampling event but ranged between 0.30 to 220 µg/L. Vinyl chloride and chlorobenzene were detected in two drains (PS14-DS1 and PS14-DS2). Other CVOCs were not detected in the analyzed samples.

15.3.6. Environmental Due Diligence

Environmental due diligence activities completed to evaluate soil and/or groundwater conditions in connection with property acquisitions by UW within the Easterly Plume and surrounding area are summarized in Sections 15.3.6.1 through 15.3.6.6. Soil and groundwater sampling locations are shown on Figure 15-6.

15.3.6.1. Market Street Building Underground Storage Tank Removal and Closure

Four USTs were removed from the Market Street Building property in July 2000 in connection with the purchase of the property by others. The USTs consisted of two approximately 500-gallon gasoline USTs located beneath the City's sidewalk east of the building, and one 675-gallon waste oil/gasoline UST, and one 550-gallon heating oil UST located in the parking area behind the building (149,see Figure 15-6). The contents of the waste oil UST were found to contain PCE, TCE, and chlorobenzene based on the results of

the Phase II ESA described above. Holes and signs of steel failure were observed on the two gasoline USTs and petroleum-contaminated soil was observed within the UST excavation at the time of removal.

The USTs were reportedly associated with the former service station that operated on the property starting in 1929. No information is available regarding the installation dates of the four USTs. The results of product characterization and soil confirmation sampling for each removed UST are summarized below. One soil sample was analyzed for CVOCs (MS-UST-15) and included in the Easterly Plume tables and figures.

- **Two Gasoline USTs**. Both gasoline USTs contained residual product prior to removal. One residual product/water sample collected from one of the gasoline USTs contained benzene (1,330,000 µg/L), ethylbenzene (2,490,000 µg/L), and toluene (16,000,000 µg/L). The two gasoline USTs were observed to have damage to the outside at the time of removal including numerous holes and evidence of steel failure. Soil surrounding the USTs had visual and olfactory indications of contamination at the time of UST removal. A total of 11 composite and discrete soil samples were collected from the gasoline UST excavation bottom, sidewalls and stockpiled excavated soil. One composite stockpile soil sample and one excavation base soil sample contained gasoline, ethylbenzene, xylenes, and/or lead at concentrations less than applicable MTCA cleanup levels. These analytes were not detected in the remaining collected confirmation soil samples at concentrations greater than the laboratory reporting limits, and lead was not detected at concentrations exceeding the MTCA cleanup level.
- **Waste Oil UST**. The waste oil contained approximately 1,500 gallons of residual product at the time of removal. TCE, PCE, and chlorobenzene were detected in the waste oil product sample collected from the waste oil UST at the following concentrations: TCE (979 mg/kg); PCE (26 mg/kg); and chlorobenzene (684 mg/kg). Olfactory indications of petroleum were noted in the soil in the waste oil UST excavation. Four excavation soil sidewall samples and one excavation base soil sample were collected for chemical analysis of TPH, BTEX and metals. One soil sample (MS-UST-15) was analyzed for CVOCs and PCBs. Analytes were not detected in the collected soil samples at concentrations greater than laboratory reporting limits with the exception of lead.
- **Heating Oil UST.** The heating oil tank was full of residual product at the time of removal. One soil sample was collected from the heating oil UST excavation base and submitted for analysis of TPH-D and TPH-O. TPH-D and TPH-O were not detected in the soil sample at concentrations greater than laboratory reporting limits.

The approximate location of the four USTs is shown on Figure 15-6. Contaminated soil identified during UST excavation activities was removed and transported off-site for disposal. Soil confirmation samples were collected at the margins of the UST excavations. Following removal of the gasoline USTs, 44.95 tons of contaminated soil were removed for off-site thermal treatment and disposal.

15.3.6.2. Merlino Environmental Due Diligence

A Phase II ESA was conducted downgradient of the Merlino property in connection with purchase of the properties by UW in 2002 (Figure 15-6). The Merlino property is located at 1945 and 1953 Fawcett Avenue (Pierce County Parcel Nos. 2019090153 and 2019090154). One well (DD-MW2) east and one well downgradient of the property were installed within Court D. One groundwater sample was collected and analyzed for VOCs. VOCs were not detected in the analyzed groundwater sample from DD-MW2. Soil samples were not collected for chemical analysis.

15.3.6.3. Ecology Stormwater System Environmental Due Diligence

Ecology collected seven water samples from six manholes in 2002 and 2003 located within South 21st Street and Pacific Avenue as shown on Figure 15-6. The water samples were analyzed for TPH-G and VOCs (Table 15-3). TCE was detected in each water sample at concentrations ranging between 0.25 and 17 µg/L. PCE, cis-DCE, and other non-CVOCs were detected in select water samples. TPH-G and other VOCs were not detected in the analyzed water samples. Sampling locations where CVOC and select VOC samples were collected are shown on Figure 15-6. Chemical analytical results for these samples are presented in Table 15-8.

15.3.6.4. McDonald Smith Building Environmental Due Diligence

Phase I and Phase II ESAs were conducted at the MDS Building in June 2006 in connection with purchase of the property by UW. The Phase II ESA consisted of the completion of eight soil borings (MDS-SB-1 through MDS-SB-8) from inside to depths between approximately 3 and 7 feet bgs. Soil and groundwater samples were collected from each boring and analyzed for a combination of TPH and VOCs. CVOC and select VOCs were not detected in the analyzed soil samples collected from borings MDS-SB-1, MDS-SB-3, and MDS-SB-4 associated with the Easterly Plume. TCE, cis-DCE, trans-DCE, DCE, and/or vinyl chloride were detected in groundwater samples from these locations.

The results of other contaminants not associated with the Easterly Plume are summarized in Section 17.0 (Area-Wide Soil). Sampling locations where CVOC and select VOC samples were collected are summarized in Tables 15-1 and 15-2 and are shown on Figure 15-6. Chemical analytical results for these samples are presented in Tables 15-6 and 15-7.

15.3.6.5. Frederick Wilds Environmental Due Diligence

Phase I and Phase II ESAs were conducted at the Frederick Wilds Building (Swiss Complex) located between 1910 and 1916 Jefferson Avenue (Pierce County Parcel No. 2019070020) in July 2013 in connection with purchase of the property by UW. The Phase II ESA consisted of a GPR survey, to investigate the potential presence of USTs on the property, and completion of nine soil borings (FW-B01 through FW-B08 and FW-B10), and collection of one sediment sample (FW-B09) from a manhole of unidentified use located on the west side of the property. Soil and groundwater samples collected from the nine borings and the manhole were analyzed for a combination of TPH, VOCs, metals, and PAHs. CVOCs and select VOCs associated with the Easterly Plume were not detected in the analyzed soil samples from borings FW-B03 and FW-B04.

The results for other contaminants not associated with the Easterly Plume are summarized in Section 17.0 (Area-Wide Soil). Sampling locations where CVOC and select VOC samples were collected are summarized in Tables 15-1 and 15-2 and are shown on Figure 15-6. Chemical analytical results for these samples are presented in Tables 15-6 and 15-7.

15.3.6.6. Market Street Building Phase II Environmental Site Assessment

A Phase II ESA was conducted at 1934 and 1938 Market Street in December 2018 to evaluate soil and groundwater conditions at the properties prior to purchase by UW (296). The Phase II ESA was focused to evaluate the following recognized environmental conditions (RECs) identified in a 2018 Phase I ESA (295):

- **Potential Historic Use of Residential Heating Oil.** The Market Street parcel was initially developed with several residential structures in the early 1900s based on the results of the 2018 Phase I ESA. Historic property use may have included the use of residential heating oil and associated USTs.

- **UST and Hazardous Material Use.** The Phase I ESA identified commercial and light industrial uses at the properties that may have included the use of hazardous substances. Product containers labeled as PCE and TCA were observed at the property during the Phase I ESA. In addition, TCE, PCE and chlorobenzene were detected in a product sample collected from the waste oil UST located adjacent to the Market Street Building.

The Phase II ESA consisted of a GPR survey/utility locate and video inspection in subsurface building utility pipes, stormwater catch basins, and drain lines in the building parking lot (to identify and map underground utilities near the proposed exploration locations), collection of water and sediment samples from building sumps and stormwater drains, completion of 17 DP soil borings (MS-DP1 to MS-DP6 and MS-DP8 to MS-DP18) and one soil boring completed as a permanent monitoring well (MS-MW1). The locations of the borings and well are as follows:

- Borings MS-DP1 through MS-DP4 were completed within the footprint of the Market Street Building space.
- Borings MS-DP5, MS-DP6, and MS-DP8 through MS-DP10 were completed within the footprint of the Market Street Building space.
- Borings MS-DP11 through MS-DP14 and well MS-MW1 were completed in the parking lot west of the building.
- Borings MS-DP15 through MSD-P18 were completed within the vacant land south of the building.

The borings were advanced to depths between 4 and 16.5 feet bgs. A total of 42 soil samples were collected from the borings and one sediment sample was collected from a sump. The samples were analyzed for a combination of TPH and VOCs. In addition, eight groundwater samples were collected from temporary wells at locations MS-DP8, MS-DP12, MS-DP13, and MS-DP15 through MS-DP18 and one groundwater sample was collected from monitoring well MS-MW1 and analyzed for a combination of TPH and VOCs. Lastly, two water samples were collected from sumps inside the Market Street Building and one water sample was collected from a drainpipe located in the parking area and analyzed for a combination of TPH and VOCs.

Results of the GPR survey and utility inspection, and soil and groundwater results associated with the Easterly Plume, are summarized below. Sampling locations where CVOC and select VOC samples were collected are summarized in Tables 15-1 and 15-2 and shown on Figure 15-6. Chemical analytical results for these samples are presented in Tables 15-6 and 15-7. The results of other contaminants not associated with the Easterly Plume are summarized in Section 17.0 (Area-Wide Soil).

GPR Survey Utility Locate and Subsurface Utility Video Inspection Observations

The video inspection was conducted within the footprint of the Market Street Building and in the parking lot area west of the building. The interior survey was generally unsuccessful due to obstructions within the sewer cleanout located near the north wall of the building, a floor drain in the building bathroom, and a utility sink drain. Video inspection of the outdoor catch basins and associated drain lines identified the following:

- Three drain lines were observed to extend from the catch basin located in the central portion of the parking lot as follows:

- One subsurface pipe extended approximately 42 feet to the north, where video refusal was met due to an unknown obstruction.
- One pipe extended approximately 20 feet southeast from the catch basin to an approximately 8-inch-diameter drain near boring DP12 (see Figure 15-6).
- One subsurface pipe extended approximately 38 feet to the south where a "Y" was observed in the pipe, with one line extending to the southwest toward the former heating oil UST and the other line extending approximately 10 feet from the "Y" with an open cap on the end and water intruding from the subsurface into the pipe and open cap. It is unknown if the line extending toward the former heating oil UST was the same pipe observed during removal of this UST in 2000.

- A 5-inch-diameter pipe was observed north of the building trending in an east-west direction. The video inspection met refusal due to obstructions/debris inside the pipe and the extent of the pipe was not confirmed. However, it is likely this pipe is the stormwater lateral connected to the catch basins in the parking area and possibly the building drains due to the configuration and position of this pipe relative to other pipes inspected.

Two sumps were observed within the western portion of the Market Street Building. The sumps are identified as Sump 1 and Sump 2 and are shown on Figure 15-6.

Soil Analytical Results

Soil analytical results for samples collected as part of the Phase II ESA are presented in Table 15-6 and summarized below:

- TCE and chlorobenzene were detected at concentrations of 0.0029 mg/kg and 0.0034 mg/kg, respectively, in the soil sample collected from a depth of 0 to 1 feet bgs in boring MS-DP1.
- PCE was detected at a concentration of 0.0013 mg/kg in the soil sample collected from a depth of 2 to 2.5 feet bgs from boring MS-DP6 located within the footprint of the Market Street Building.
- Cis-DCE was detected at a concentration of 0.0013 mg/kg in the soil sample collected from a depth of 2 to 2.5 feet bgs in boring MS-DP9 located within the footprint of the Market Street Building.

Groundwater and Drain Water Analytical Results

Chemical analytical results for groundwater and drain/sump samples collected as part of the Phase II ESA are presented in Table 15-8 and summarized below.

- TCE (2.7 µg/L), PCE (17 µg/L), cis-DCE (1.6 µg/L), chlorobenzene (1.3 µg/L), and vinyl chloride (0.82 µg/L) were detected in the water sample collected from the drain located in the parking lot.

Other CVOCs and select VOCs were not detected in the remaining analyzed groundwater samples or in the sump water samples.

15.3.7. Capital Projects

Investigation and remedial action activities were necessary to implement UW Capital Projects. Similar investigations were conducted by the City to support planning and design for various ROW utility projects. Capital projects and investigation activities in the vicinity of the Easterly Plume are summarized in Sections 15.3.7.1 through 15.3.7.11 below. Soil and groundwater sampling locations are shown on Figure 15-6.

15.3.7.1. Phase IIB Utility Capital Project

Environmental investigations were completed between 2001 and 2002 as part of the planning and design for landscaping and utility installation activities to be completed within Commerce Street and South C Street (155). Several borings (borings Phase II B-2 through Phase II B-33 and wells MF-MW1, BL-MW7, and CR-MW13) were completed to depths up to 25 feet bgs to evaluate soil in this area as part of this investigation. A total of 52 soil samples collected from the borings at varying depths were analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, select VOCs and metals. CVOCs were not detected in the analyzed soil samples. Petroleum-related COCs were detected and are discussed further in Section 5.0 (Cragle) and Section 17.0 (Area-Wide Soil).

One groundwater sample was collected from well BL-MW7 and analyzed for CVOCs. TCE, trans-DCE and cis-DCE were detected in the analyzed groundwater sample.

The wells were subsequently decommissioned. Soil represented by the analyzed samples was subsequently excavated and removed from this area as part of the completed landscaping and utility work.

15.3.7.2. Cherry Parkes Building Capital Project

Five soil borings (CP-B1 through CP-B4B) were completed in April 2002 at the Cherry Parkes Building Capital Project to characterize property soil and shallow groundwater in preparation for construction. The borings were completed to depths ranging between approximately 3 and 40 feet bgs. In addition, one groundwater sample was collected from a temporary well at CP-B4A. Soil and groundwater samples collected from the borings were analyzed for a combination of TPH and VOCs.

CVOCs associated with the Easterly Plume from CP-B1 through CP-B4B were not detected in the analyzed soil samples with the following exception.

- TCE and cis-DCE were detected in soil collected at a depth of approximately 3 feet bgs in boring CP-B1 located west of the building footprint.

CVOCs associated with the Easterly Plume were not detected in the groundwater samples. Sampling locations where CVOC samples were collected are summarized in Tables 15-1 and 15-2 and are shown on Figure 15-6. Chemical analytical results for these samples are presented in Tables 15-6 and 15-7. The results of other contaminants not associated with the Easterly Plume are summarized in Section 17.0 (Area-Wide Soil).

15.3.7.3. Assembly Hall Capital Project

Six soil borings (AH-B01 through AH-B06) were completed at the William W. Philip Building (formally Assembly Hall), located at 1912 Pacific Avenue, between 2004 and 2006 to characterize property soils in preparation for construction of the William W. Philip Hall Building. The borings were completed to depths ranging from approximately 5 to 15 feet bgs. In addition, two borings (AH-BOX-01 and AH-BOX-02) were completed to depths between approximately 3 and 5.5 feet bgs to characterize material used to infill a former concrete vault in the southern portion of this property. Soil samples collected from the borings were analyzed for TPH, metals, VOCs and PAHs.

CVOCs associated with the Easterly Plume were not detected in the analyzed soil samples collected from AH-B01, AH-B03, AH-B05, AH-B06, AH-BOX-01, and AH-BOX-02. Sampling locations where CVOC samples were collected are summarized in Table 15-1 and are shown on Figure 15-6. Chemical analytical results

for these samples are presented in Table 15-6. The results of other contaminants not associated with the Easterly Plume are summarized in Section 17.0 (Area-Wide Soil).

15.3.7.4. City of Tacoma 2005 Utilities Capital Project

The City of Tacoma rerouted the stormwater system between the Market Street Building and South 21st Street in 2005 due to damage to the utility. The City collected three samples of soil in the location of the new utility as shown on Figure 15-6 (MS-1934 Market Street, MS-20th & Jefferson, MS-21st and Jefferson). Two of the locations were adjacent to the connection of the new stormwater line with the abandoned line. The soil samples were collected at a depth of 6 feet bgs and were analyzed for VOCs. VOCs were not detected in the analyzed soil samples.

15.3.7.5. Tioga Library Building Capital Project

The TLB Capital Project completed in 2012 included building demolition and construction of a new four-story library with a sky bridge spanning PLT providing access to the Snoqualmie Library Building (Figure 15-6). Investigation activities were performed in conjunction with the TLB Capital Project to evaluate soil conditions within and adjacent to the footprint of the construction area to ensure proper soil management and disposal. The investigation activities for the TLB Capital Project included the completion of multiple TPs and DP borings to evaluate soil conditions to depths ranging from 5 to 40 feet bgs. Additionally, soil samples were collected at the base of three construction piles to characterize soil.

Selected samples from these sample locations were submitted for VOC analysis. These sample results are being used to inform regarding the nature and extent of contamination associated with the Easterly Plume. Sampling locations where CVOC samples were collected are summarized in Table 15-1 and are shown on Figure 15-6. Chemical analytical results for soil samples collected as part of this investigation did not identify CVOC or VOC contamination in soil, except for the following:

- TCE, trans-DCE cis-DCE, vinyl chloride, and chlorobenzene as well as other select VOCs were detected in soil collected between 10 and 25 feet bgs at TLB-B05. Boring TLB-B05 was located south of the TLB Building in the Jet Parking Lot.
- PCE was detected in two test pit samples (TLB-TP2 and TLB-TP27) collected from the ground surface to 3 feet bgs.

Chemical analytical results for soil samples collected as part of this investigation associated with the Easterly Plume are presented in Table 15-6.

15.3.7.6. Market Street Utilities 2013 Capital Project

UW completed environmental monitoring and soil sampling in September and October 2012 during City replacement work for the sanitary sewer and water lines located in Market Street between South 21st Street and South 17th Streets (245). The purpose of the work was to collect soil samples during utility replacement work in areas where contaminants had been previously identified in soil and groundwater. Twenty soil samples were collected within the utility alignment from depths ranging between approximately 4 and 9.5 feet bgs for chemical analysis of TPH and VOCs. CVOCs associated with the Easterly Plume in the vicinity of the Market Street Building were not detected in the analyzed soil samples with the following exceptions:

- TCE was detected at a concentration of 0.0010 mg/kg in soil sample MS-104+00-5.
- Chlorobenzene was detected at concentrations of 0.0015 and 0.0027 mg/kg in soil samples MS-101+75-8WL and MS-103+40-9.7WL, respectively.

The results of other contaminants not associated with the Easterly Plume are summarized in Section 17.0 (Area-Wide Soil). Sampling locations where CVOC samples were collected are summarized in Table 15-1 and are shown on Figure 15-6. Chemical analytical results for these samples are presented in Table 15-6.

15.3.7.7. Prairie Line Trail Capital Project

Environmental investigation activities followed by remedial actions were completed between 2013 and 2014 within the footprint of PLT as part of the planning and development of the PLT Capital Project. A detailed discussion of these activities is presented in Section 7.0. Select soil and groundwater samples were analyzed for CVOCs within the groundwater in the area for the Easterly Plume including six DP soil borings (PLT-B7 through PLT-B10, PLT-B12, and PLT-B29) and three sonic borings completed as monitoring wells (JP-MW1R, PL-MW1, and PL-MW2) were completed in March and April 2013 to evaluate soil conditions within PLT (252, 258). Monitoring well JP-MW1 was also decommissioned during this project. Sampling locations where CVOC samples were collected are summarized in Tables 15-1 and 15-2 and are shown on Figure 15-6. Chemical analytical results for soil samples collected as part of this investigation did not identify CVOC contamination in soil or groundwater, except for the following:

- TCE and cis-DCE were detected in soil ranging in depths from approximately 10 to 27 feet bgs at PL-MW1 and PLT-B12 located in the southern portion of PLT east of the 1934-1938 Market Street Source Area.
- TCE, trans-DCE, cis-DCE, DCE, vinyl chloride, and chlorobenzene were detected in Qvi groundwater at PL-MW1 and PLT-B12 located in the southern portion of PLT east of the 1934-1938 Market Street Source Area.

Chemical analytical results for soil and groundwater samples collected as part of this investigation associated with the Easterly Plume are presented in Tables 15-6 and 15-7, respectively. A detailed discussion of historical land use and investigation activities completed for PLT is presented in Section 7.0.

15.3.7.8. McDonald Smith Building Capital Project

Soil, groundwater and sub-slab soil vapor investigations were completed in 2014 at the MDS Building (Figure 15-6). The purpose of the investigation was to provide additional information for UW in preparation for planned structural upgrades to the building, and to: (1) assess soil adjacent to and beneath the building that may be disturbed during the upgrades, (2) evaluate the depth of the Qva aquifer and presence of TCE in the Qva aquifer at the building location to assess if planned building upgrades could potentially impact Qva aquifer conditions, and (3) evaluate the potential for vapor intrusion into the existing building (267).

One HSA boring (MDS-MW1D) was completed west of the building as a permanent monitoring well to evaluate soil and groundwater conditions and three micro-core borings (MDS-DP2, MDS-DP3 and MDS-DP5) were completed within the footprint of the building to evaluate shallow soil conditions beneath the building. Selected samples from these locations were submitted for VOC analysis. These sample results were used to inform regarding the nature and extent of contamination associated with the Easterly Plume. In soil, TCE, cis-DCE, trans-DCE and vinyl chloride were detected at depths between approximately 1 and 56 feet bgs from borings MDS-DP5 and MDS-MW1D. Other VOCs were not detected in the analyzed soil samples. Groundwater samples collected from new monitoring well MDS-MW1D and from existing monitoring wells CR-MW16 and CR-MW17 identified TCE, cis-DCE, trans-DCE, DCE and vinyl chloride in one or more of these monitoring wells. The highest detected concentrations were identified in the groundwater sample collected from monitoring well MDS-MW1D.

The vapor intrusion evaluation investigation consisted of collecting four sub-slab soil vapor samples (MDS-SV1 through MDS-SV4) from the west side of the MDS Building (Figure 15-6). This area of the building was targeted due to the presence of shallow groundwater in that area relative to the eastern portion of the building. Indoor and outdoor air samples were not collected as part of the evaluation. Results of this investigation identified TCE, PCE and/or cis-DCE in each of the four sub-slab soil vapor samples collected beneath the MDS Building. The detected concentrations of TCE, PCE and DCE were compared to the MTCA Method B Shallow Soil Gas Screening levels, which were calculated using attenuation factors of both 0.1 per Ecology guidance and 0.03 per EPA guidance. The results of the evaluation indicated that the TCE concentrations in each of the soil vapor samples were greater than the MTCA Method B Shallow Soil Gas Screening Level using Ecology's attenuation factor, and in three of the soil vapor samples using EPA's attenuation factor. Other CVOCs were either not detected or were detected at concentrations less than the MTCA Method B Shallow Soil Gas Screening Levels. The soil vapor results were utilized to complete a J&E model to predict indoor air conditions. The results of the J&E modeling indicated that the predicted indoor air concentrations are less than the MTCA Method B air cleanup level and further vapor intrusion assessment was not required.

Sampling locations where CVOC and select VOC samples were collected are summarized in Tables 15-1 and 15-2 and are shown on Figure 15-6. Chemical analytical results for soil, groundwater, and sub-slab soil vapor samples collected as part of this investigation are presented in Tables 15-6, 15-7, and 15-9.

15.3.7.9. City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project

Three soil borings (COT-MW1 through COT-MW3) were completed in December 2017 near the intersection of Market Street and Jefferson Avenue in the vicinity of a planned stormwater replacement project based on previous investigation results in this area. The borings were advanced to depths of approximately 32 feet bgs and completed as permanent monitoring wells. Soil and groundwater samples collected from the borings/monitoring wells were analyzed for TPH, VOCs and SVOCs.

TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, chlorobenzene, and 1,4-DCB were detected in the analyzed soil samples collected from between approximately 5 and 25 feet bgs. TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene were detected in groundwater samples collected in wells COT-MW1 and COT-MW2. Sampling locations in which CVOCs and select VOCs associated with the Easterly Plume are shown on Figure 15-6. Chemical analytical results for these samples are presented in Tables 15-6 and 15-7. The results of other contaminants not associated with the Easterly Plume are summarized in Section 17.0 (Area-Wide Soil).

15.3.7.10. Fawcett Utility Replacement Capital Project

Three soil borings (FAW-SB09 through FAW-SB11) were completed in October 2020 near the intersection of Market Street and Jefferson Avenue to evaluate soil conditions in the vicinity of a planned utility replacement project based on previous investigation results in this area. The borings were advanced to depths between approximately 15 and 16 feet bgs. Soil samples collected from the borings were analyzed for TPH, VOCs and SVOCs.

CVOCs associated with the Easterly Plume were not detected in the analyzed soil samples collected from FAW-SB09, FAW-SB10 and FAW-SB11. Sampling locations where CVOC samples were collected are summarized in Table 15-1 and are shown on Figure 15-6. Chemical analytical results for these samples are presented in Table 15-6. The results of other contaminants not associated with the Easterly Plume are summarized in Section 17.0 (Area-Wide Soil).

15.3.7.11. Milgard Hall Capital Project

Environmental investigation activities followed by remedial actions were completed between 2020 and 2021 as part of the planning and development of the Milgard Hall Capital Project. Investigation activities were performed in conjunction with the Milgard Hall Capital Project to evaluate soil conditions within and adjacent to the footprint of the construction area to ensure proper soil management and disposal. The investigation activities included the completion of 14 DP soil borings (MIL-B1 through MIL-B14) to depths ranging between 10 and 32 feet bgs to further evaluate soil conditions for material management during construction. Following soil excavation activities for the new building subgrade, confirmation soil samples MIL-A1-CONF-1 through MIL-A1-CONF-7, MIL-A2-CONF-1 through MIL-A2-CONF-4, MIL-A3-CONF-B through MIL-A3-CONF-WSW, MIL-GL13/F-3 through MIL-GL16/H-WSW and storm drain sample MIL-STORMDRAIN were collected to document soil conditions at the final construction excavation limit.

Selected samples from these locations were submitted for VOC analysis. These sample results are being used to inform regarding the nature and extent of contamination associated with the Easterly Plume. Sampling locations where CVOC and select VOC samples were collected are summarized in Table 15-1 and are shown on Figure 15-6. Chemical analytical results for soil samples collected as part of this investigation did not identify CVOC or VOC contamination in soil, except for the following:

- 1,4-DCB was detected at a concentration of 0.0045 mg/kg in sample MIL-GL13/F-3 obtained at a depth of approximately 3 feet bgs.

Chemical analytical results for soil samples collected as part of this investigation are presented in Table 15-6. Additionally, soil vapor and air samples were collected following construction of the Milgard Hall building in December 2022. The purpose of the sampling was to evaluate the effectiveness of the vapor mitigation system. The sampling consisted of one sub-slab sample, two indoor air samples, and two outdoor air samples (Table 15-4). TPH, BTEX, naphthalene and TCE were detected in soil vapor, indoor air, and outdoor air samples. Cis-DCE, DCE, trans-DCE, vinyl chloride, and chlorobenzene were not detected in the analyzed soil samples.

A detailed discussion of historical land use and investigation activities completed on Cragle, located within the Milgard Hall Capital Project, is presented in Section 5.0.

15.4. Conceptual Site Model

Development of the CSM for the Easterly Plume is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for the Easterly Plume is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 15.4.1 through 15.4.4 describe the specific elements of the Easterly Plume CSM.

15.4.1. Physical Setting

The Easterly Plume encompasses Market Street, South C Street, and Commerce Street Source Areas and extends east beneath the Market Street Building, Jefferson Avenue, and Commerce Street and ends just beyond Pacific Avenue in the vicinity of the Washington State History Museum (Figure 15-1). Land uses within this portion of the UWT Campus include a variety of commercial and academic buildings, surface

parking lots and City ROWs. Commercial use of the UWT Campus buildings primarily includes restaurants and retail services.

15.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic setting for the Easterly Plume (described in the following sections) informs the distribution of contaminants in media of potential concern for the Easterly Plume Site. Local geology and hydrogeology for the Easterly Plume and surrounding area are described below in Sections 15.4.2.1 and 15.4.2.2.

15.4.2.1. Local Geology

Geologic units present beneath the Easterly Plume include the Qf, Qvi, and Qva deposits. Geologic conditions for the UWT Campus including portions of the Easterly Plume are shown on generalized geologic cross section F-F' on Figure 2-12. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings completed within the Easterly Plume and the surrounding area consists of locally derived, reworked ice-contact deposits and/or imported fill. The fill ranges in thickness between approximately 3 and 20 feet with an average thickness of approximately 8 to 10 feet.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till, subglacial channel deposits, and lacustrine materials. The consistency of the Qvi is highly variable across the UWT Campus due to the wide variety of geologic depositional environments of this geologic unit. Qvi till-like deposits in this area vary in thickness from approximately 5 to 50 feet. Qvi channel deposits in this area are generally oriented in an east-west direction and range in thickness from approximately 10 feet beneath the Market Street Building area to greater than 25 feet thick east of Jefferson Avenue, thinning to approximately 5 feet east of Commerce Street. The Qvi silt deposits are not present where the Qvi channel eroded the unit or human activities removed the unit as shown on Figure 2-6.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva silt).** Flat-lying Qva silt is present beneath Market Street extending to the west and upgradient of the Easterly Plume. The Qva silts were not observed in borings completed between approximately Jefferson Avenue and Prairie Line Trail and may be absent in this area. In general, the contact between the Qva and the overlying Qvi deposits generally dips to the east following the surface topography.

15.4.2.2. Local Hydrogeology

Groundwater within the Easterly Plume occurs within both the Qvi (shallow) and Qva (deep) aquifers (see Figures 2-14 through 2-19). Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Specific areas where the Qvi and Qva aquifers are interpreted to be hydraulically connected and flow into each other are shown on Figures 2-14 to 2-19 and include the following as they relate to groundwater flow for the Easterly Plume and surrounding area:

- **Easterly Plume—West.** Qvi groundwater is present along the western portion of Easterly Plume. However, groundwater within the Qvi aquifer is interpreted to flow into the underlying Qva aquifer in the vicinity of monitoring wells A10-MW1S/D and A10-MW5S/D. Geologic and hydrogeologic conditions in this vicinity are shown on cross section F-F' (Figure 2-12).

- **Easterly Plume—North Central.** The Qvi aquifer is absent in the area beneath and immediately surrounding the Snoqualmie Library Building. Additional information regarding construction for the Snoqualmie Library Building is presented in Section 12.0. Geologic and hydrogeologic conditions in this vicinity are shown on cross section A-A' (Figure 2-7).
- **Easterly Plume—South Central.** Qvi groundwater is present along the southern portion of Easterly Plume. However, groundwater within the Qvi aquifer is interpreted to flow into the underlying Qva aquifer in the vicinity of monitoring wells UG-MW1 and JP-MW2. Geologic and hydrogeologic conditions in this vicinity are shown on cross section F-F' (Figure 2-12).
- **Easterly Plume—East.** The Qvi aquifer is generally absent east of Pacific Avenue. Upgradient groundwater from the Qvi aquifer mixes with groundwater from the Qva aquifer at this location. Geologic and hydrogeologic conditions in this vicinity are shown on cross section F-F' (Figure 2-12).

Local groundwater occurrence and flow for the Qvi and Qva aquifers are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer is generally confined in the western part of the Easterly Plume and unconfined in the eastern portion of the Easterly Plume. The Qvi aquifer occurs and flows primarily within the channel deposits and sand and gravel seams within the Qvi deposits at depths between approximately 1 and 32 feet bgs (Table 15-7) with an average depth of approximately 12 to 13 feet bgs. Perched groundwater is present at some locations within the Qvi as observed in monitoring wells A11-MW1S and A11-MW5S but is not considered representative of groundwater levels in the Qvi aquifer. In addition, groundwater is confined and under artesian conditions at monitoring wells MS-MW1 and UG-MW10. Well MS-MW1 is located west of the Market Street Building Source Area and at the foot of a steep 15-foot embankment where Qvi aquifer seepage was observed.

Well UG-MW10 is located within Market Street and screened within drainage channel material overlain by Qvi till-like deposits. The water levels have been observed between approximately 0.4 and 4 feet above the ground surface. The inferred groundwater flow direction in the Qvi aquifer within the Easterly Plume is generally northeasterly (Figures 2-14 to 2-16) and is consistent with the UWT Campus-wide Qvi groundwater flow direction. The Qvi aquifer is interpreted to be absent east of Pacific Avenue as discussed above.

The estimated Qvi aquifer average linear groundwater velocity ranges from approximately 1.89 to 2.94 ft/day with hydraulic gradients between 0.086 and 0.10 ft/ft based on the April 2021 groundwater monitoring event. Groundwater flow calculations are presented in Appendix L.

Qva Groundwater Occurrence and Flow

The Qva aquifer underlies the Qvi aquifer (where present) at depths between approximately 4 and 23 feet bgs (Table 15-7) with an inferred groundwater flow direction that is generally east to northeasterly (Figures 2-17 to 2-19). The Qva aquifer is generally under confined conditions except where hydraulically connected with the Qvi aquifer as described above. The Qva aquifer becomes unconfined downgradient of this location where the Qvi and Qva aquifers become hydraulically connected near monitoring well A10-MW1D as discussed above.

The estimated Qva average linear groundwater velocity ranges from approximately 1.5 and 2 ft/day with hydraulic gradients of 0.053 and 0.11 ft/ft based on the April 2021 groundwater monitoring data. Groundwater flow calculations are presented in Appendix L.

15.4.3. Sources of Contamination

Source areas for the Easterly Plume and lines of evidence supporting historical operations as the source(s) of contamination include the following, based on the results of the RI:

- **1934-1938 Market Street (1934-1938 Market Street Source Area—Primary Source).** The primary source of the contamination to the Easterly Plume is associated with historical use for the Market Street Building operations, which likely included illicit discharges of solvents including TCE and chlorobenzene to the stormwater drains located in the west-adjacent paved parking area to the Market Street Building, based on the presence of CVOCs in sediment and water samples collected in the drains. Additionally, containers of chlorinated solvent were observed in the attic of the building in 2018. CVOC contaminants dumped in the drains were likely released from the drains to the surrounding soil/groundwater through cracks/breaks in the private stormwater lateral piping and/or the City's stormwater conveyance piping within Market Street to the east. Once released to the stormwater system, the stormwater pipes would have provided a preferential flow pathway for CVOCs released/dumped from the Market Street Building and would have contributed to the lateral spread of contaminants released from the 1934-1938 Market Street Source Area prior to replacement in 2005. The illicit discharges of solvents likely occurred during historical operations of automobile repair (1925 to 1940 and 1969 to 1974), machine shops (1950 to 1969), oxygen sales and service (1947 to 1958), and diaper cleaning (1983 to 1993) as described in Section 15.2.2. Additional sources of contamination to the Easterly Plume from the Market Street Building include the following:
    - Drips, leaks and/or spills from within the Market Street Building and the migration of contaminants through cracks in the building floor slab and/or discharged to building sanitary plumbing where the contaminants were released to the surrounding environment through breaks in the pipes within Market Street. The sanitary sewer may have provided a preferential flow pathway for CVOCs released/dumped from the Market Street Building. As described in Section 15.2, the sewer was constructed in the early 1900s using approximately 2-foot sections of terra cotta pipe with grouted joints. These pipes were replaced by the City between 2005 and 2012 following the pipe collapse. Prior to replacement, the cracks and/or breaks in the sewer piping may have been a preferential pathway for CVOC contamination into portions of Market Street and contributed to the lateral spread of contaminants released from the 1934-1938 Market Street Source Area.
    - Releases from a former waste oil UST previously located in the west-adjacent parking area of the Market Street Building.
- **South C Street Source Area (approximate 1940 South C Street).** Vinyl chloride was detected at concentrations greater than the surrounding area in well CR-MW15 indicating a source of vinyl chloride to groundwater in the area. It is suspected that the historical operations related to Cragle likely contributed to this source area given the proximity of this source area and the contaminants observed (vinyl chloride). However, a direct connection to Cragle could not be established. Therefore, the South C Street Source Area is included with the Easterly Plume.
- **Commerce Street Source Area (approximately 1930 Commerce).** TCE was detected in soil above the groundwater table in well CR-MW16. Additionally, TCE groundwater concentrations in the Qvi aquifer increase in the area indicating a source of TCE in the area. A review of Sanborn maps identified a small outbuilding of unknown use historically located adjacent to the former railroad near the location of well CR-MW16. Historical operations at this location are the likely source for the observed CVOC contamination in well CR-MW16 based on the relative proximity to this building. Other historical land uses for the buildings in the vicinity of the former outbuilding include a railroad, cabinet manufacturing

and varnishing, a log warehouse, coal bunker, machine shop, and furniture upholstering. It is suspected that the outbuilding was likely associated with one or more of these adjacent historical operations and CVOC contamination is due to releases from historical operations and/or land use in the vicinity of the Commerce Street Source Area.

In other portions of the UWT Campus, localized releases of petroleum-related contaminants, cPAHs and metals to shallow soil have been identified and are further discussed in Section 5.0 (Cragle), Section 11.0 (Shaub-Ellison), Section 12.0 (Snoqualmie Library), Section 16.0 (Southerly Plume) and Section 17.0 (Area-Wide Soil).

15.4.4. Potential Receptors and Exposure Pathways

Current and future land use are considered when evaluating potential receptors and exposure pathways. The current and planned future land use is for commercial and academic purposes. The Easterly Plume and surrounding area include multiple commercial and academic buildings, paved parking lots, ROWs, sidewalks/staircases, and limited areas of landscaping. Precipitation falling to the ground surface either infiltrates into the ground (unpaved areas) or is captured by catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway. It is assumed that future land use will be similar to its current use.

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

- **Direct Contact.** The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil and/or groundwater during excavation activities.
- **Drinking Water.** Groundwater within the Qvi and Qva aquifers beneath the Easterly Plume and surrounding area is not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, protection of drinking water is still being considered as a potential exposure pathway as required by Ecology.
- **Surface Water.** Stormwater utilities at the Market Street Building contain sediment and water with elevated CVOCs concentrations. The Market Street Building stormwater system is connected to the City stormwater system which discharges to Outfall 235 in the Thea Foss Waterway. Additionally, the stormwater system within the Westerly Plume contains water with elevated TCE and is connected to the Easterly Plume stormwater system. However, actual stormwater utilities located within the Easterly Plume are at an elevation above the groundwater table limiting the potential for groundwater to enter the stormwater network and be transported/discharged to surface water. Protection of surface water is considered a potential exposure pathway given the areal extent of the Easterly Plume, presence of CVOCs in the stormwater system and its proximity to the Thea Foss Waterway.
- **Indoor Air**. Multiple buildings (Figure 15-3) are located within the Easterly Plume footprint. TCE and associated breakdown compounds in groundwater (further discussed in Section 15.6.5) have the potential to volatize and migrate through the vadose zone into enclosed building spaces in this area. As a result, the vapor intrusion into indoor air pathway is considered a potential exposure pathway.

15.5. Proposed Cleanup Levels

PCULs were developed for the Easterly Plume to protect human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (Chapter 173-340 WAC), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water use, potential exposure pathways, and the potential receptors to the Easterly Plume area. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for the Easterly Plume is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels.** PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b) and numerical criteria protective of marine surface water cleanup levels. Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels**. Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

15.6. Nature and Extent of Contamination

15.6.1. Contaminants and Media of Concern

Characterization data for the Easterly Plume are summarized in Tables 15-6 through 15-9 and were evaluated to determine contaminants and media of concern for the Easterly Plume Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions is presented in Table Q-31 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2020) is presented in Table Q-32 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-33, Appendix Q). Soil vapor and indoor air results were also used to evaluate the potential for VI. Contaminants in media of concern based on this evaluation (Tables Q-31 through Q-33) include the following:

- **Soil.** TCE, cis-DCE, vinyl chloride and chlorobenzene were identified as primary soil COCs for the Easterly Plume based on the source of contamination to soil and the characterization results. In addition, TCE breakdown products including (trans-DCE and DCE) were identified as secondary soil COCs for the Easterly Plume. Trans-DCE and DCE are considered secondary COCs because these contaminants either are collocated with one or more primary soil COC, infrequently exceed the PCULs (i.e., less than 10 percent) or were not detected in groundwater exceeding the PCULs. The nature and extent of soil COCs (both primary and secondary) are further discussed in Section 15.6.2.
- **Groundwater.** TCE, cis-DCE, vinyl chloride and chlorobenzene were identified as primary groundwater COCs for the Easterly Plume based on results of the 2016 Agreed Order groundwater investigation in which TCE, cis-DCE, vinyl chloride and chlorobenzene exceeded the groundwater PCUL during one or more monitoring events results between 2016 and 2020. TCE and vinyl chloride exceeding the PCUL were also observed in the drains located in the western portion of the 1934-1938 Market Street Source Area. In addition, TCE breakdown products including DCE were identified as secondary groundwater COCs for the Easterly Plume because these contaminants either are collocated with one or more primary groundwater COCs or infrequently exceed the PCULs (i.e., less than 10 percent). The nature and extent of groundwater COCs are further discussed in Section 15.6.3.
- **Soil Vapor.** Based on screening of soil and groundwater data, TCE, cis-DCE, vinyl chloride and chlorobenzene were identified as COCs with the potential to migrate into enclosed spaces at concentrations that could exceed the Method B indoor air PCULs and/or the SL for the protection of commercial workers. An evaluation for VI potential is further discussed in Section 15.6.4.

Petroleum-related contaminants including TPH, BTEX, 1,2,4-TMB, 1,3,5-TMB, as well as naphthalenes, cPAHs and lead associated with Cragle, PLT, Shaub-Ellison, Snoqualmie Library, Northerly Plume or Area-Wide Soil are discussed in Sections 5.0, 7.0, 11.0, 12.0, 14.0 and 17.0, respectively.

COCs (TCE, cis-DCE, vinyl chloride, and chlorobenzene) for soil and groundwater are shown in plan view on Figures 15-7 through 15-18. COCs (PCE and TCE) for the stormwater system are shown in plan view on Figures 15-19 and 15-20. COCs are shown in cross section on Figure 15-21. The nature and extent of COCs in media of concern are further discussed below.

15.6.2.Soil

The nature and extent of COCs for the Easterly Plume are discussed in Sections 15.6.2.1 through 15.6.2.4 below as they relate to each individual source area. The results for TCE, cis-DCE, vinyl chloride, and chlorobenzene (primary COCs) are shown on Figures 15-7 through 15-10.

15.6.2.1. 1934-1938 Market Street (1934-1938 Market Street Source Area)

Soil contamination directly associated with the 1934-1938 Market Street Source Area is located within the area of various historical operations that used or likely used solvents between 1925 and 1993. The results of the soil sampling completed in the vicinity of the 1934-1938 Market Street Source Area identified the following:

- Primary COCs, including TCE and chlorobenzene, were detected in sediment samples collected from storm drain catch basins at PS14-DS1 and PS14-DS2 located in the parking area west of the Market Street Building at concentrations exceeding the PCULs. In addition, 1,2,4-TCB and 1,4-DCB were detected in one or more of these sediment samples at concentrations less than the PCULs. TCE

was also detected in soil at concentrations greater than the PCUL in soil samples collected from ground surface to 1-foot bgs in boring MS-DP12 and 3 to 3.5 feet bgs in boring A10-MW2S. The borings were located adjacent to the storm system piping.

- Primary COCs, including TCE, cis-DCE, vinyl chloride and chlorobenzene, were detected at depths ranging between approximately 3 and 60 feet bgs in multiple soil samples collected within the Market Street ROW and area to the east. In general, contaminant concentrations increased with depth with increased distance east of the Market Street Building. PCUL exceedances in soil near the former City storm drain line and downgradient of the 1934-1938 Market Street Source Area ranged between approximately 2 to 10 feet bgs (MS-SB06, A10-B3, A10-B4, A10-B5, and A10-B6). COC exceedance in soil increased in depth to 9 to 30 feet in the central portion of Market Street (multiple borings), and up to an approximate depth of 60 feet bgs east of Jefferson where the Qvi/Qva silt layer is absent. The greatest TCE concentrations were detected in boring A10-MW3S, located directly downgradient of the Market Street Building stormwater lateral, at a depth of 18 to 25 feet bgs (1.4 and 2.2 mg/kg).
- Secondary COCs (including trans-DCE and DCE) were detected greater than the PCULs at concentrations up to 0.29 mg/kg and up to 0.0035 mg/kg, respectively, at locations A10-B10, COT-MW2, A10-MW1D and/or A10-MW3D within Market Street and Jefferson Avenue east of the 1934-1938 Market Street Source Area. Secondary COCs at these locations are collocated with TCE, cis-DCE, vinyl chloride and/or chlorobenzene as described above.

15.6.2.2. South C Street Source Area

Primary COCs were not detected in soil within the vicinity of the South C Street Source Area. However, elevated concentrations of vinyl chloride were detected in CR-MW15 at this location as discussed in Section 15.6.3.1.

15.6.2.3.Commerce Street Source Area

TCE concentrations exceeded the PCUL in the soil above and below the local water table within boring CR-MW16. While historical operations for this area are not known, adjacent areas included a railroad, cabinet manufacturing and varnishing, a log warehouse, a coal bunker, a machine shop, and furniture upholstering. Soil results in the vicinity of the Commerce Street Source Area are summarized below:

- TCE (primary COC) was detected at concentrations greater than the PCUL in soil from 9 to 31 feet (bottom of boring) in well CR-MW16. The depth to groundwater is 16 feet bgs in CR-MW16. Cis-DCE was also detected at concentrations greater than the PCUL at depths ranging between 18 to 31 feet bgs. Vinyl chloride was detected at concentrations greater than the PCUL in one soil sample at a depth of 28 to 29 feet bgs.
- TCE, cis-DCE and vinyl chloride were also detected at concentrations greater than the PCUL in soil samples collected below the groundwater table to depths up to 60 feet bgs in borings CP-B1, CR-MW17, MDS-MW1D and MDS-DP5 located east and downgradient of the Commerce Street Source Area.

15.6.2.4.Other Areas

Other locations with PCUL exceedances include location A11-MW26S located east of Snoqualmie Library and A11-MW12D located east of Pacific Avenue near the Washington State History Museum. Isolated exceedances of TCE are observed at each of the locations at depths ranging between approximately 22 and 30 feet bgs. TCE is not a COC based on the results of the RI for Snoqualmie Library. However, the PCUL exceedance at this location may be the result of residual saturation of soil from the upgradient 1934-1938 Market Street Source Area based on the nature and extent of TCE in groundwater as further discussed

below (Section 15.6.3). There is no indication that residual soil saturation from the groundwater contaminant plume occurred at location A11-MW12D based on the groundwater monitoring results at this location. As a result, the PCUL soil exceedance is likely the result of an undocumented off-site source related to other historical land use in this vicinity.

15.6.3. Groundwater

The nature and extent of groundwater COCs for the Easterly Plume are based on the results of the 2016 Agreed Order RI, which are representative of current conditions. As noted above, TCE, cis-DCE, vinyl chloride, and chlorobenzene were identified as primary COCs based on PCUL exceedances during one or more monitoring events during the 2016 Agreed Order groundwater investigation. TCE breakdown products, including trans-DCE and DCE, are considered secondary COCs for the Easterly Plume Site because they infrequently exceed the PCULs and are limited in extent where they do exceed.

As discussed in Section 15.4.2.2, the groundwater in the Qvi and Qva aquifers are hydraulically connected in various portions of the Easterly Plume area. As a result, contaminant distribution in Qvi and Qva aquifers varies based on the geologic and hydrogeologic conditions in this area (i.e., glacial incision of the confining Qvi/Qva silt layers and/or preferential flow pathways through the Qvi till-like and channel deposits). This section describes where COCs are present in the Qvi and Qva aquifer. The contaminant fate and transport are further described in Section 15.7. The nature and extent of primary COCs associated with the Easterly Plume, based on groundwater data from the individual and/or semi-annual monitoring events completed between 2016 and September 2020, are shown on Figures 15-11 through 15-18 and in cross section on Figure 15-21. The nature and extent of contamination within the Qvi and Qva aquifers are further discussed in Sections 15.6.3.1 and 15.6.3.2 below.

15.6.3.1. Qvi Aquifer

The nature extent of primary and secondary COCs associated with the Easterly Plume in the Qvi aquifer are discussed below relative to identified individual source areas. In general, TCE and vinyl chloride are the most widespread contaminants throughout the Easterly Plume, which extends from the 1934-1938 Market Street Source Area to slightly east of Pacific Avenue as shown on Figures 15-11 and 15-15. Cis-DCE-contaminated groundwater within the Qvi aquifer is generally limited to the areas with higher TCE and vinyl chloride concentrations in the central portion of the Easterly Plume (Figure 15-13). Chlorobenzene is generally limited to the area of Market Street and the Jet Parking Lot as shown on Figure 15-17. Other COCs including trans-DCE and DCE are limited in extent to the area immediately downgradient of their respective source areas. Other CVOCs were either not detected or detected at concentrations less than the respective PCULs in groundwater samples collected in the Qvi aquifer.

Easterly Plume Site COCs within the Qvi aquifer generally follow the orientation of the Qvi channel deposits, which extend from the 1934-1938 Market Street Source Area beneath portions of Jet Parking, PLT, and Cragle. Easterly Plume Site COCs within the Qvi aquifer in the vicinity of Commerce Street spread laterally (north to south) where the groundwater gradients become less pronounced and where the Qvi and Qva aquifers come together to form one single unconfined aquifer unit.

TCE either was not detected or was detected at a concentration less than the PCUL in well JP-MW1R prior to 2016, which indicates that recent utility work (i.e., Market Street stormwater replacement in 2005 and/or construction of the Regional Treatment System within PLT in 2013) may have created a preferential

pathway for contaminant migration and led to the release of contaminants to groundwater from an upgradient area (i.e., 1934-1938 Market Street Source Area and/or Westerly Plume).

The nature and extent of COCs in the Qvi aquifer are as follows:

- **1934-1938 Market Street (1934**-1938 **Market Street Source Area).** TCE, cis-DCE, vinyl chloride, and chlorobenzene were detected in groundwater at concentrations greater than the PCUL within and/or downgradient of the 1934-1938 Market Street Source Area. The highest observed groundwater concentrations of TCE in the Easterly Plume Site are observed in the Qvi aquifer in well A10-MW3S located within Market Street, immediately downgradient of the 1934-1938 Market Street Source Area side stormwater lateral. The 1934-1938 Market Street Source Area side stormwater laterals are identified as a primary source to soil and groundwater because CVOCs were identified in sediment and water in the drains. The range of exceedances for primary COCs in the 1934-1938 Market Street Source Area, and the area downgradient (Jet Parking Lot and Cragle) in the Qvi aquifer, are as follows:
    - TCE: 0.74 to 3,700 µg/L
    - Cis-DCE: 17 to 680 µg/L
    - Vinyl Chloride: 0.23 to 160 µg/L
    - Chlorobenzene: 130 to 340 µg/L.

  Additionally, the TCE concentration in well JP-MW1R has increased from non-detect to 4.0 µg/L since the well and a new stormwater system to the PLT Regional Treatment System were installed in the area. The new stormwater system connection includes CVOC-contaminated water from drains at the Market Street Building and CVOC-contaminated water in the stormwater system located in the Westerly Plume (groundwater infiltration and building drains). The occurrence of TCE in the stormwater system from one or more of these locations may be contributing to the observed groundwater PCUL exceedances in monitoring well JP-MW1R.

  Secondary COC (DCE) PCUL exceedances in groundwater were only observed in wells BL-MW6 and JP-MW2 and collocated with other primary COCs.

- **South C Street Source Area.** Vinyl chloride was detected at concentrations greater than the PCUL in groundwater within this source area in well CR-MW15. These vinyl chloride detections in conjunction with no vinyl chloride exceedances upgradient of the area for 240 feet indicate that there is an additional source in the area. PCUL exceedances of vinyl chloride range between 0.89 to 1.8 µg/L at this location.

- **Commerce Street Source Area.** TCE, cis-DCE, and vinyl chloride were detected at concentrations greater than the PCULs within and downgradient of the Commerce Street Source Area. While the TCE, cis-DCE, and vinyl chloride are commingled with upgradient contaminant sources, TCE was also detected in shallow soil above the groundwater table and TCE, cis-DCE, and vinyl chloride groundwater concentrations are greater than upgradient concentrations indicating historical operations within and near the Commerce Street Source Area contributed to the larger TCE plume. The range of exceedances for the primary COCs in the Commerce Street Source Area and the area downgradient of this location in the Qvi aquifer are as follows:
    - TCE: 47 to 500 µg/L
    - Cis-DCE: 67 to 310 µg/L
    - Vinyl Chloride: 6.0 to 32 µg/L.

15.6.3.2.Qva Aquifer

The nature and extent of TCE, cis-DCE, and vinyl chloride in the Qva aquifer within the Westerly Plume are discussed below relative to the individual source areas identified. In general, TCE and vinyl chloride are the most widespread contaminants throughout the Easterly Plume (Figures 15-12 and 15-16). Cis-DCE-contaminated groundwater within the Qva aquifer is generally limited to the areas with higher TCE and vinyl chloride concentrations in the central portion of the Easterly Plume (Figure 15-14). Other CVOCs were either not detected or detected at concentrations less than the respective PCULs in groundwater samples collected in the Qva aquifer.

- **1934-1938 Market Street (1934-1938 Market Street Source Area).** Chemical analytical data are not available for the Qva aquifer within and directly downgradient of the 1934-1938 Market Street Source Area. However, CVOCs are anticipated to be present in the Qva aquifer on the eastern portion of Jefferson Avenue based on the geology observed and soil chemical analytical data as shown on cross section FE-FE' (Figure 15-21). TCE, cis-DCE, and vinyl chloride were detected at concentrations greater than the PCULs in the Qva aquifer, at least 360 feet downgradient of the 1934-1938 Market Street Source Area, in wells located on Cragle (A11-MW30D and BL-MW5) and the Commerce Street area as shown on Figures 15-12, 15-14 and 15-16. The highest CVOC concentrations in the Qva aquifer were detected in well A11-MW30D located downgradient of Qvi aquifer well A10-MW3S and the Market Street Source, and are as follows:
  - TCE: 0.9 to 1,600 µg/L
  - Cis-DCE: 21 to 550 µg/L
  - Vinyl Chloride: 0.69 to 97 µg/L.
- **South C Street Source Area**. Chemical analytical data are not available for the Qva aquifer within the South C Street Source Area. TCE was detected slightly greater than the PCUL in downgradient well A11-MW28D at concentrations ranging from 0.74 to 0.88 µg/L.
- **Commerce Street Source Area.** TCE, cis-DCE, and vinyl chloride were detected at concentrations greater than the PCULs within and downgradient of the Commerce Street Source Area. While TCE, cis-DCE, and vinyl chloride are commingled with upgradient contaminant sources, TCE was also detected in shallow soil above the groundwater table and TCE, cis-DCE, and vinyl chloride groundwater concentrations are greater than upgradient concentrations, indicating historical operations within and near the Commerce Street Source Area contributed to the larger TCE plume. The ranges of PCUL exceedances for primary COCs within the Qva aquifer are as follows:
  - TCE: 47 to 500 µg/L
  - Cis-DCE: 67 to 310 µg/L
  - Vinyl Chloride: 6.0 to 32 µg/L.

15.6.4. Stormwater System and Building Drains

CVOCs including PCE and TCE as well as breakdown products were detected in water samples collected within the stormwater system at concentrations greater than the PCUL within: (1) drains located west of the Market Street Building, (2) Y Student Center building drains, and (3) stormwater system manholes on South 19th Street. PCE and TCE results within the stormwater system and building drains (primary COCs) are shown on Figures 15-19 and 15-20. CVOC contamination in these areas is discussed below.

- **1934-1938 Market Street (1934-1938 Market Street Source Area).** PCE, TCE, cis-DCE and other CVOCs were detected in water samples collected from three drains located west of the Market Street Building (PS14-DS1, PS14-DS2, PS14-DS3). The drains are connected to the City stormwater system in Market Steet, which are subsequently directed to the Regional Stormwater Treatment Facility located within PLT, before discharging through Outfall 235. PCE up to 220 µg/L, TCE up to 17 µg/L and vinyl chloride up to 12 µg/L exceeded the PCULs for protection of surface water.
- **Y Student Center Building (Westerly Plume).** TCE was detected in the Y Student Center building drains between 2014 and 2015 at concentrations ranging from 18.6 to 22.2 µg/L. The Y Student Center building drain is directed south and connects with the Market Street Building drains and subsequent Outfall 235.
- **South 19th Street (Westerly Plume).** TCE was detected at concentrations greater than the PCUL in base flow water samples, collected between 2016 and 2020, from the stormwater system manholes on South 19th Street. The stormwater system on South 19th Street was directed south and connected to the Market Street Building drains during the 2016 to 2020 RI sampling. TCE exceedance of the PCUL in the base flow samples ranges between 0.78 and 15 µg/L, with the highest TCE concentration detected in manhole MH:6767230 located at the intersection of Fawcett Avenue and South 19th Street.

The recently completed Jefferson and Hood Street Surface Water Interceptor Capital Project, completed in December 2022, redirects the South 19th stormwater system to Outfall 230, and future stormwater flow toward the Easterly Plume from these areas has been eliminated. As discussed in Section 13.3.5, Ecology and the City determined that TCE discharges to the stormwater system at concentrations up to 30 µg/L (i.e., less than the 2014 Washington State Water Quality Standards for marine water) were acceptable.

15.6.5. Soil Vapor and Indoor Air

Based on the soil and/or groundwater sampling results representing current conditions, TCE, cis-DCE, vinyl chloride and chlorobenzene were identified as COCs with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SL for the protection of commercial workers. The potential for VI from soil and groundwater contaminants is further discussed below.

- **Petroleum-Related Soil Contamination**. TPH-G and TPH-D exceeded the SL for soil VI. The potential for VI resulting from TPH-G and TPH-G associated with the Cragle, Shaub-Ellison, and Snoqualmie Library is further discussed in Sections 5.0, 11.0, and 12.0, respectively.
- **Petroleum-Related Groundwater Contamination**. Benzene exceeded the SL for groundwater VI within the Southerly Plume, which is collocated with the Easterly Plume in Market Street. The potential for VI resulting from benzene associated with the Southerly Plume is further discussed in Section 16.0. Additionally, LNAPL is present downgradient of Snoqualmie Library. The potential for VI resulting from LNAPL associated with the Snoqualmie Library is further discussed in Section 12.0.
- **Other Contaminants.** TCE, cis-DCE, vinyl chloride and chlorobenzene at concentrations exceeding the MTCA Method B SL for VI were identified in groundwater samples collected from the Qvi or Qva aquifer when the Qvi aquifer is not present within at least 100 feet of the footprint of one or more UW-owned and non-UW-owned buildings based on the results of the 2016 Agreed Order RI.

  TCE was detected in the sub-slab, indoor air, and outdoor air samples at concentrations less than the respective soil vapor SL and indoor air PCULs for unrestricted use in samples collected following completion of the Milgard Hall. Trans-DCE, cis-DCE, DCE, vinyl chloride and chlorobenzene were not

detected in the sub-slab and air samples. The Milgard Hall is located in the vicinity of the center of the Easterly Plume and was constructed with a vapor mitigation system (see Section 5.0). Additionally, the results of the VI evaluation within the Easterly Plume (i.e., MDS Building, GWP Building) and in other parts of the UWT Campus (TPS Building and other Academic Block Buildings) indicate that similar TCE concentrations in groundwater are not impacting indoor air based on predictive modeling or the results of the indoor air sampling. As a result, further VI evaluation was not required on UW-owned buildings as part of the RI. Furthermore, UW-owned buildings in this area are for commercial and academic use, with air exchange rates of at least 0.5 exchanges of outside air per hour and operate on a neutral to slightly positive building pressure that further limits the potential for VI and inhalation by the building occupants. VI evaluation was not completed for non-UW-owned buildings.

15.7. Contaminant Fate and Transport

The Easterly Plume consists of multiple commingled plumes contained within both the Qvi and Qva aquifers from three identified source areas. TCE, cis-DCE, vinyl chloride, and chlorobenzene were identified as the primary COCs in groundwater due to their widespread nature throughout the Easterly Plume. Other COCs including DCE and trans-DCE were identified as secondary COCs because they are generally located in close proximity to the source area and are limited in extent. PCE was detected in the stormwater drains, however, PCE was not detected in soil or groundwater at concentrations greater than the PCUL.

Overall, the chemical properties of contaminants, and the physical, chemical, and biological processes that they are exposed to, affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed in Section 18.0. Other factors influencing the transport of CVOCs within the Easterly Plume include the location of contaminant sources, geology and hydrogeology, and storm sewer utility networks. In general, CVOCs migrated vertically from the point of release through the soil column to the groundwater table. Dissolved phases of CVOCs within the Qvi and/or Qva aquifer then migrated horizontally and vertically downgradient of the source areas within preferential flow paths (including but not limited to the Qvi channel deposits) and laterally by dispersion and diffusion as shown on cross section FE-FE' (Figure 15-21).

Soil and groundwater contamination for the Easterly Plume Site is predominantly beneath portions of the UWT Campus that are capped by paved ROWs, parking lots and/or buildings preventing direct exposure (Figure 15-1). CVOCs have the potential to migrate through soil vapor into indoor air. Modeling results indicate that there is a low potential for VI into the occupied spaces at a concentration that would exceed the indoor air cleanup criteria based on sub-slab vapor sampling results within Campus buildings. Furthermore, a vapor mitigation system was installed at Milgard Hall further limiting VI into enclosed spaces at this location.

The migration of CVOCs in a groundwater plume is limited by the sorption of these contaminants to fine-grained soils as evidenced by the detected concentrations in saturated soil downgradient of the source areas themselves although there is substantial chemical degradation of CVOCs, based on the results of the RI between 2016 and 2020. Degradation of CVOCs is evidenced by cis-DCE, trans-DCE, DCE, and vinyl chloride and other geochemical parameters. The degradation of CVOCs is attributed to the degradation of TCE while migrating through the subsurface, particularly in areas with elevated petroleum hydrocarbons and benzene (Cragle, Southerly Plume, Snoqualmie Library, and Shaub-Ellison).

Overall, groundwater monitoring completed as part of the 2016 Agreed Order RI (including groundwater data for the various capital projects and environmental due diligence projects completed since 2016) indicate that the leading edge of the Easterly Plume Site is stable likely due to dilution, sorption and/or natural attenuation and that the further migration of the Easterly Plume east of Pacific Avenue is not occurring.

Source areas for the Easterly Plume and lines of evidence supporting historical operations as the source(s) are discussed in Section 15.4.3. Geologic and hydrogeologic conditions with the Easterly Plume contributing to the contaminant fate and transport are discussed in Section 15.4.2. The fate and transport for CVOCs associated with the Easterly Plume are described by source area in Sections 15.7.1 through 15.7.5.

15.7.1. 1934-1938 Market Street (1934-1938 Market Street Source Area)

PCE, TCE, and chlorobenzene releases to soil through spills, drips and/or exfiltration from the illicit discharges to the stormwater system entered the soil column where they migrated toward the Qvi aquifer. These contaminants were transported downgradient of these areas following contact with groundwater. Contaminant transport is shown on cross section FE-FE' (Figure 15-21). CVOCs in the Qvi aquifer entered the Qva aquifer where the Qvi silt was not present. The presence of cis-DCE, trans-DCE, DCE and vinyl chloride is attributed to degradation of PCE and TCE while migrating through the subsurface, particularly in areas with elevated petroleum hydrocarbons and benzene (Southerly Plume). Degradation of PCE and TCE is evidenced by the limited amount of PCE in the soil and groundwater and the presence of cis-DCE, trans-DCE, DCE, and vinyl chloride.

15.7.2. South C Street Source Area

Vinyl chloride (or potentially TCE that degraded) released to the soil through spills, drips, and/or exfiltration from the former sanitary sewer in the area entered the soil column and migrated into the Qvi aquifer.

15.7.3. Commerce Street Source Area

TCE released to the soil through spills and drips entered the soil column and migrated into the Qvi aquifer. The presence of cis-DCE, trans-DCE, DCE, and vinyl chloride is attributed to the degradation of TCE.

15.7.4. Stormwater System and Building Drains

Historical CVOC illicit discharges to the Market Street Building storm drains and current sediment within the drains contribute to CVOC contaminated water in the storm system. Additionally, building drains constructed for the Y Student Center discharge Westerly Plume TCE-contaminated groundwater to the stormwater line within the Market Street drains. The City and Ecology approved this discharge into the stormwater system in 2015, as previously discussed. This discharge is directed to Outfall 235. Prior to December 2022, the stormwater system impacts in the Easterly Plume were also attributed to the South 19th Street stormwater system within the Westerly Plume, where TCE-contaminated groundwater discharged from building drains into the stormwater system and groundwater entered the stormwater system where the pipe is not sealed but beneath the Qvi aquifer groundwater level. Stormwater collected from within the Westerly Plume footprint and in the South 19th Street pipe is now directed to Outfall 230 following completion of the Jefferson and Hood Street Surface Water Interceptor Capital Project. The Y Student Center building drain (within the Westerly Plume) is still connected to Outfall 235.

15.7.5. Soil Vapor

CVOCs detected at concentrations exceeding the MTCA Method B SL for VI were identified in groundwater samples collected from the Qvi and Qva aquifers. However, the results of the VI evaluation within and adjacent to the Easterly Plume (i.e., MDS Building and GWP Building) and other parts of UWT Campus (TPS Building and Academic Block Buildings) indicate that similar detected TCE and vinyl chloride concentrations in groundwater do not have the potential to impact indoor air based on the predictive modeling or the results of indoor air sampling completed in the past. As a result, further VI evaluation was not required on UW-owned buildings as part of the RI.

15.8. Summary

CVOC contaminations greater than the PCULs were detected in soil between approximately 10 and 25 feet bgs near the intersection of Market Street and Jefferson Avenue (east adjacent to the 1934-1938 Market Street Source Area) and extend to a maximum depth of 60 feet bgs in the vicinity of boring A11-MW5S/D (located within Jet Parking) where glacial erosion of the Qva/Qvi silt confining layer has occurred.

CVOC contamination in groundwater are contained within both the Qvi and Qva aquifers that extend beneath portions of Market Street, Jefferson Avenue, and further to the east beneath Pacific Avenue and the Washington State History Museum. CVOC contamination sources primarily include illicit discharges to the Market Street Building storm drains system during historical operations of automobile repair (1925 to 1940 and 1969 to 1974), machine shops (1950 to 1969), oxygen sales and service (1947 to 1958) and diaper cleaning (1983 to 1993). Secondary release mechanisms include discharges to the drains, where the contaminants migrated to surrounding soil/groundwater through cracks/breaks in the private stormwater lateral piping and/or the City's stormwater conveyance piping within Market Street to the east. The pipes provided a preferential flow pathway for CVOC migration to the south and along Market Street prior to discharging to the surrounding soil through cracks/breaks in the early 1900s-era terra cotta pipes when released to the stormwater/sewer system. The migration in the stormwater/sewer pipes and subsequent discharge likely contributed to the lateral spread of contaminants released from the 1934-1938 Market Street Source Area. Secondary sources to the Easterly Plume include the South C Street and Commerce Street Source Areas resulting from historical land uses in these areas.

Overall, the leading edge of the Easterly Plume Site (Figure 15-1) is stable likely due to dilution, sorption and/or natural attenuation and that the further migration of the Easterly Plume east of Pacific Avenue is not occurring. Paved surfaces (ROW, sidewalks and/or parking areas) are preventing direct contact with the CVOC contamination and are limiting the infiltration of stormwater that could further contribute to contaminant leaching of COCs in shallow soil in source areas to the groundwater. However, residual CVOC contamination contained within the Market Street Building catch basins may be entering the City's stormwater system (which discharges to the Thea Foss Waterway) and may be a complete exposure pathway to surface water. In addition, CVOCs are present in groundwater at concentrations exceeding the MTCA Method B SL for VI. However, VI evaluation of other parts of UWT Campus (i.e., MDS Building, TPS Building, and Academic Block Buildings) indicates that similar detected TCE concentrations in groundwater do not have the potential to impact indoor air based on the predictive modeling and the results of indoor air sampling completed to date. Furthermore, the vapor mitigation system installed as part of the Milgard Hall Capital Project further limits the potential for VI into Milgard Hall, which is centrally located in the Easterly Plume footprint.

Soil, groundwater, soil vapor and stormwater data for the Easterly Plume are presented in Tables 15-6 through 15-9, respectively. The nature and extent of primary COCs in soil and groundwater constituting the Easterly Plume Site are shown in plan view on Figure 15-1, by chemical/media on Figures 15-7 through 15-20, and in cross section on Figure 15-21.

16.0 REMEDIAL INVESTIGATION—SOUTHERLY PLUME

16.1. Introduction

The Southerly Plume (formerly known as Jet Parking Lot) is generally located between Market Street and the PLT pedestrian corridor (west-east), and South 21st Street and South 19th Street (south-north) in Tacoma, Washington (Figure 16-1). Environmental data collected during previous and more recent soil and groundwater investigations define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. These data indicate the presence of primary COCs benzene and TPH-G and secondary COCs TPH-D, toluene, ethylbenzene, and total xylenes in soil and/or groundwater at concentrations greater than the respective PCULs resulting from spills and/or releases associated with historical operations and land use for the Southerly Plume. Summary statistics for soil and groundwater identifying COCs for the Southerly Plume are presented in Tables Q-34 and Q-35 (Appendix Q).

While a specific point-source could not be identified for the Southerly Plume historical operations at 1934-1938 Market Street, 1947 Jefferson Avenue (Jet Parking), 1956 Jefferson Avenue and spills/releases in portions of Market Street and Jefferson Avenue likely resulted in the release of benzene (and to a lesser degree, TPH-G and TPH-D) in the soil and groundwater. Historical operations at 1956 Jefferson Avenue may have used benzene as a solvent during electrical repair services between 1947 and 1978 resulting in discharges of benzene to the stormwater and/or sanitary sewer and releases through identified breaks/cracks in the terra cotta pipes located in the Market Street ROW. Releases from petroleum USTs associated with the 1934-1938 Market Street may have migrated through the soil column to the Qvi aquifer within portions of the Market Street and Jefferson Avenue ROWs. Releases of benzene to soil at Jet Parking migrated to groundwater in the Qvi aquifer and are likely related to operations at the former City Fuel Company, as indicated by the soil benzene hot spot adjacent to the location of the former City Fuel Company office. Localized releases of benzene in the Market Street and Jefferson Avenue ROWs are indicated by the results of soil sampling in this area and may be related to operations at the former City Fuel Company or unknown spills that were transported along the former trolley tracks.

The greatest concentrations of COCs (predominantly benzene) in soil and groundwater are located in the area of Market Street, Jefferson Avenue, and the western portion of Jet Parking. In soil, the highest detected concentrations are generally near the location of Grade 5 cracks within Market Street east of 1956 Jefferson Avenue. COCs detected at concentrations exceeding the PCUL in soil range from near the ground surface (within and/or adjacent to the individual source areas) up to approximately 30 feet bgs. In groundwater, the highest detected concentration is within the Qvi aquifer west of former historical City Fuel Company operations at Jet Parking. Soil and groundwater contamination for the Southerly Plume Site (as defined by BTEX, TPH-G and TPH-D PCUL exceedances; Figure 16-1) is predominantly beneath portions of the UWT Campus that are capped by paved ROWs and parking lots, preventing direct exposure. The stormwater collection systems for Market Street, Jefferson Avenue, and the Jet Parking area prevent the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater.

Additionally, there is a significant separation distance between the residual benzene contamination and the surrounding buildings to limit the migration of contaminant vapors from entering occupied indoor spaces. Residual contamination for the Southerly Plume Site (as defined by the residual soil and groundwater contamination) based on current conditions is generally stable and not migrating further downgradient of this area, based on the monitoring data presented for the Southerly Plume RI.

In addition, environmental data collected as part of the RI indicate the presence of CVOC (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) contamination associated with the Easterly Plume that extends beneath the Southerly Plume. Groundwater contamination associated with the Easterly Plume is further discussed in Section 15.0.

The Southerly Plume is shown relative to surrounding features on Figure 16-1. Terminology for the Southerly Plume RI referenced in the subsections below are as follows.

- **Southerly Plume.** The extent of BTEX and TPH contamination associated with historic operations and/or land use on three potential source areas. Potential sources to the identified soil and groundwater contamination for the Southerly Plume include:
    - **1934-1938 Market Street (1934-1938 Market Street Source Area)**. Suspected source area located at 1934-1938 Market Street in which historical operations included the use of petroleum-related contaminants from fuel supply and auto repair operations between 1925 and 1940 and potentially auto repair/transmission services between 1969 and 1970. In the 1950s, an addition (1938 Market Street) was completed at the southern end of the original building location at 1934 Market Street. The buildings located at 1934 and 1938 Market Street are contained within Pierce County Parcel No. 2019080040 (0.41-acre parcel) and are collectively referred to as the Market Street Building.
    - **1956 Jefferson Avenue (Jefferson Avenue Source Area)**. Suspected source area located at 1956 Jefferson Avenue (Pierce County Parcel Nos. 2019080070 and 2019080080) in which historical electric motor services and repair services were in operations between the late-1940s and late 1970s and discharge COCs to the sanitary sewer.
    - **Jet Parking Source Area**. Source area associated with historical operations at Jet Parking (Pierce County Parcel No. 2019060031) that included the City Fuel Company between 1926 and 1949.
    - **Other Potential Sources**. Historical use within Jefferson Avenue, including trolley services and/or other unknown spills/releases which may have occurred within the Jefferson Avenue ROW vicinity and/or potentially imported fill from unknown sources in the early 1900s.
- **Jet Parking**. The source or point of release associated with historic operations on Pierce County Parcel No. 2019060040. AOC defined by the 2016 Agreed Order for Cragle with residual petroleum contamination and benzene in soil and groundwater.
- **PLT.** The source or point of release for contamination associated with historic operations on Pierce County Parcel No. 0320043155, which is further discussed in Section 7.0.
- **Easterly Plume.** The extent of CVOC (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) contamination associated with historic operations at 1934 Market Street and within Commerce Street and South C Street, which is further discussed in Section 15.0.

Specific details regarding the historical property uses potentially leading to the release of contaminants, RI activities completed to date, the CSM and the nature and extent of contamination associated with the Southerly Plume are summarized below.

16.2. Property Conditions

16.2.1. Southerly Plume

16.2.1.1. Location and Description

The Southerly Plume is located in the south-central portion of the UWT Campus within portions of Market Street and Jefferson Avenue north of South 21st Street and includes the southern and central portions of Jet Parking. The south-central portion of the UWT Campus is used for a variety of retail, commercial and academic purposes. This area is predominantly occupied with arterial streets and UWT Campus parking with adjacent buildings for mixed commercial, retail and academic use. The ground surface across this area slopes east-northeast toward the Thea Foss Waterway from approximate elevation 118 feet (intersection of Jefferson Avenue and South 21st Street) to elevation 95 feet within the PLT pedestrian corridor and has remained largely unchanged since the late 1960s. Redevelopment of the PLT pedestrian corridor as part of the PLT Capital Project is discussed in Section 7.0.

Following ex-situ petroleum-related contaminant treatment in the mid-1990s, Jet Parking was re-graded using a combination of imported fill and soil treated at the property. The southern half of the property was approximately 4 feet higher in elevation relative to the northern half with a steep transitional slope joining the two areas prior to fill placement. Fill placement and grading activities were focused on the northern portion of the property to bring both halves flush with one another prior to asphalt paving.

The current parking lot occupying the eastern portion of the Southerly Plume Site ranges between approximately 98 to 106 feet in elevation with a north sloping gradient based on lidar-derived topography. Elevation differences between a 1994 elevation survey of the property and the current lidar-derived elevations indicate that between approximately 2 and 4 feet of fill material was placed in the northern portion of the property and little to no fill was placed in the southern portion. Current access to the UWT Campus parking lot is from Jefferson Avenue at the northwest corner of the property.

16.2.1.2. Historical Land Use

General historical land use in the south-central portion of the UWT Campus has included a variety of commercial, retail, residential, and transit (i.e., trolley and ROW) uses located west adjacent to the PLT pedestrian corridor in which the BNSF Railway Company historically operated the rail line known as “Prairie Line” from 1888 and late 1990s. Prairie Line is located within the Warehouse Historic District of Tacoma Washington. The Warehouse Historic District was initially developed in the late 1880s and early 1900s. The properties along and in the vicinity of Prairie Line were generally utilized to house import products and organize export products for shipping. Side streets included stores like grocery, stoves companies, paper companies, dry goods, etc. Historical building footprints associated with commercial uses and/or features are shown on Figure 16-2.

Historical land use specific to PLT is summarized in Section 7.0. Specific details regarding historical operations and land use at the Market Street Building are described in Section 15.0. Historical land use specific to the 1956 Jefferson Avenue and Jet Parking as well as transit services within Jefferson Avenue located within and/or adjacent to the Southerly Plume are discussed below.

16.2.1.3. Current and Future Land Use

The land encompassing the Southerly Plume currently contains paved City ROWs and Jet Parking (UWT Campus parking lot), as well as commercial and retail buildings to the west. Although specific plans for Jet Parking's future and the properties to the west of Market Street have not been identified, future anticipated use of these properties will remain mixed use for commercial/retail and academic under the UWT Campus Master Plan. Market Street and Jefferson Avenue will continue to serve as City ROWs. Current features for the Southerly Plume Site are shown on Figure 16-3.

16.2.1.4. Utility Infrastructure

Current utility infrastructure present in the ROW and individual properties includes sanitary sewer, storm sewer, drinking water, natural gas, underground electrical, overhead electrical, and communications. Utility infrastructure within and adjacent to the Southerly Plume, with the potential to serve as preferential pathways for contaminant migration, is shown on Figure 15-3 and includes the following:

- **Market Street Utilities.** The current utility infrastructure in the vicinity of Market Street is shown on Figure 16-3 and includes the following:
  - A north-south oriented 8-inch-diameter sanitary sewer line is located within the western edge of the Market Street ROW at elevations between approximately 109 to 113 feet. This sanitary sewer line was originally constructed in the early 1900s using approximately 2-foot sections of terra cotta pipe with grouted joints and joins the east-west oriented sanitary sewer line located within South 21st Street described below. A portion of the sanitary sewer line within the intersection of Market Street and South 21st Street collapsed sometime prior to the fall of 2005 and was subsequently replaced with 8-inch-diameter PVC piping in late 2005 (192). The remaining terra cotta piping between Market Street and South 21st Street was replaced with 8-inch-diameter PVC piping by the City in 2012. Five unknown utilities were noted east of the 1934 Market Street building during trenching for the sanitary sewer replacement project within Market Street (245). Currently, two of the laterals provide service to the buildings located at 1914 and 1934 Market Street and one lateral provides service to the building located at 1956 Jefferson Avenue to the south.
  - A 24-inch-diameter stormwater line is located within the Market Street ROW at elevations between approximately 107 to 115 feet. This stormwater line was constructed in 1906 with terra cotta pipe that joins the east-west oriented stormwater line located within South 21st Street described below. A portion of this stormwater line collapsed between the intersection of Market Street and Jefferson (at manhole 6767332) and the intersection of Jefferson Avenue and South 21st Street sometime prior to the fall of 2005 and was replaced with 24-inch-diameter PVC piping in late 2005 (192) along a new alignment east of the 1906 stormwater alignment (Figure 16-3). The former stormwater line was filled with concrete following replacement.
  - Two stormwater line laterals were identified along Market Street during video surveillance conducted by UW in 2019. One stormwater lateral provides service for a series of roof drains, catch basins and indoor sumps located at 1934 Market Street. The other lateral appears to provide service to a catch basin (CB: 6512234) located in the sidewalk on the west side of Jefferson Avenue north of the intersection of Jefferson Avenue and South 21st Street.
- **Jefferson Avenue Utilities.** Current utility infrastructure in the vicinity of Jefferson Avenue is shown on Figure 16-3 and includes the following:
  - A north-south oriented 8-inch-diameter sanitary sewer line is located within the western portion of the Jefferson Avenue ROW at elevations between approximately 88 and 98 feet. This sanitary sewer line was constructed in the early 1900s using approximately 2-foot sections of terra cotta pipe with grouted joints. Video surveillance was not conducted in this sanitary sewer

line and no laterals are recorded in the City's database. However, laterals likely exist within the sanitary sewer line to provide service to the adjacent buildings located within the triangle area that is bounded by Market Street, Jefferson Avenue, and South 19th Street.

- A north-south oriented 8- to 12-inch-diameter stormwater line is located within the eastern portion of the Jefferson Avenue ROW at elevations between approximately 91 and 103 feet. This stormwater line was constructed between 2011 and 2012 and joins the east-flowing stormwater line at manhole 6767248 located northwest of the TLB.

- **South 21st Street Utilities.** Current utility infrastructure in the vicinity of South 21st Street is shown on Figure 16-3 and includes the following:
  - An east-west oriented 10-inch-diameter sanitary sewer line is located within the South 21st Street ROW at elevations between approximately 127 and 148 feet. This sewer line was constructed in the early 1900s using unreinforced concrete and terra cotta piping. The City is currently planning to replace this line between Tacoma Avenue and Jefferson Avenue with a new 12-inch-diameter PVC pipe. Construction for replacement is occurring concurrently with the RI.
  - An east-west oriented 18- to 24-inch-diameter stormwater line is located within the South 21st Street ROW at elevations between approximately 78 and 119 feet. This stormwater line was constructed in the early 1900s using terra cotta pipe sections. Portions of this stormwater line were replaced in 1940, 1971, 2002, and 2005 using various materials.

Jet Parking Utilities. A network of catch basis is contained within the eastern portion of the Jet Parking Lot for collecting stormwater runoff. This stormwater network directs flow to the south toward South 21st Street.

16.2.2. 1934-1938 Market Street (1934-1938 Market Street Source Area)

The property at 1934-1938 Market Street and the surrounding area was initially developed for residential use from the 1880s to the early 1900s. Residential buildings on the property included several small houses and an apartment building (295). The property was redeveloped in 1925 to include a single-story warehouse building (1934-1938 Market Street) for commercial use. An addition to the 1934 Market Street building was completed on the southern portion of the building in the 1950s (1938 Market Street).

Photo 16-1. Circa 1951 photo from South 21st Street looking north. 1956 Jefferson Avenue is the white building on left and City Fuel/Jet Parking Lot is on the right.

The original building (1934 Market Street) and the southern building (1938 Market Street) addition are collectively referenced as the Market Street Building. Historical land use for Market Street and the surrounding area is shown on Figure 16-2. UW purchased the property in 2018 and currently leases the space to a tenant. Future anticipated use of this property will be commercial/retail and potentially residential under the UWT Campus Master Plan although specific plans for this property have not been identified at this time.

Additional details related to the historical land use of the 1934-1938 Market Street Building are discussed in Section 15.2.

16.2.3. 1956 Jefferson Avenue (1956 Jefferson Avenue Source Area)

The property at 1956 Jefferson Avenue was initially developed with a hotel by 1896. Surrounding properties were initially developed for residential use from the 1880s to the early 1900s. Sanborn maps, City directories, and available permits indicate the following land uses:

- **1896**. Grand Hotel and apartments.
- **1947–1953**. Electrical repair and machinery(Stone and Trobridge).
- **1958–1978**. Electrical motors repair (Gustafson Nemish Electric Motors).
- **1970 to present**. Machine shop, tools and equipment (American Equipment and Tool).

Photo 16-2. Circa 1949 photo of the Southern portion of Jet Parking (looking southwest). South 21st Street is located to the left and Prairie Line Trail at bottom of photo.

Currently, the American Equipment and Tool Company operates at 1956 Jefferson Avenue. Historical land use for Jefferson Avenue and surrounding area is shown on Figure 16-2.

16.2.4. Transit (Trolley) Services

The Tacoma Trolley was operated by Tacoma Railway & Power Company throughout Tacoma as a mode of transportation from the late 1800s until 1938 (see Photo 16-3). The street cars operated on rail tracks and were powered by electricity and comprised the first interurban streetcar system in the world.

Rail Line Route 40 operated in the vicinity of the Southerly Plume with a north-south service within Jefferson Avenue.

Photo 16-3. Circa 1920 Tacoma Railway & Power Company trolley tracks on Jefferson Avenue (right) and Market Street (left) looking north.

16.2.5. Jet Parking

The Jet Parking parcel was initially developed in the 1890s with residential homes and vacant lots. Residential use continued for the northern half of the parcel through the early and mid-1900s. Sanborn maps, City directories, and available permits indicate the following land uses for the southern half of the parcel for the historic address 1947 Jefferson Avenue:

- **1896**. Single family residential.
- **1926–1942**. City Fuel Company, Rogers Construction, City Garage, and Walker Stone Cutting operated from a building situated in the southern portion of the Jet Parking parcel.

- **1942–1949**. City Fuel Company (see Photo 16-2).
- **1969 to present**. Predominantly used as a parking lot. Soil treatment activities for various UWT Campus projects were completed at the property in the mid-1990s (further discussed below).

Historical land use for the Jet Parking parcel and surrounding area is shown on Figure 16-2. Additional information related to soil treatment activities completed at the Jet Parking parcel is discussed below.

Jet Parking Soil Treatment Activities

The parking lot at Jet Parking was used to treat contaminated soil during remediation work conducted at the UWT Campus in the mid-1990s (see Photo 16-4). During these activities, approximately 4,675 cubic yards of contaminated soil removed from various locations across the UWT Campus were transferred to Jet Parking for treatment. Contaminated soil treated at Jet Parking included 740 cubic yards removed as part of a remedial action for Jet Parking (see Section 16.3.1.3 below), approximately 1,580 cubic yards removed as part of a remedial action for Snoqualmie Library (see Section 12.0), approximately 30 cubic yards removed as part of a remedial action for the Bleckert parcel (contained within Snoqualmie Library), and approximately 2,325 cubic yards removed from Shaub-Ellison as part of a 1995 remedial action.

Photo 16-4. Circa 1997 photo of the southern portion of Jet Parking used as a treatment cell for petroleum-contaminated soil (looking north).

Contaminated soil was treated at Jet Parking within treatment cells constructed on top of the gravel-paved parking lot over 10- to 20-mil plastic sheeting. Straw bales wrapped with plastic sheeting lined the perimeter of the treatment cells. Soil placed into the treatment cell was mechanically screened to remove oversized material, mixed with reagents and land farmed on Jet Parking to promote enhanced ex-situ biological degradation of petroleum-related compounds sourcing from on- and off-property locations (described above). The soil was periodically aerated using angle dozing or tilling methods. Confirmatory soil samples collected from the treated soil verified that this material was suitable for reuse as fill material at Jet Parking and for other locations including Shaub-Ellison and Snoqualmie Library and during various redevelopment activities along Pacific Avenue.

16.3. Field Investigations and Remedial Actions

Multiple environmental investigations have been completed to evaluate subsurface conditions for the UWT Campus as described in Section 4.0. Environmental investigations documenting soil, groundwater and stormwater conditions for the Southerly Plume are discussed in Sections 16.3.1 through 16.3.6 below. Sampling locations to evaluate soil, groundwater and stormwater conditions associated with the Southerly Plume are shown on Figures 16-4 through 16-6. Investigations completed for the Southerly Plume and the surrounding area to support the development of the RI are summarized in Tables 16-1 through 16-3. Construction details for temporary and permanent monitoring wells installed within the Easterly Plume footprint and the surrounding area are presented in Table 16-4. Soil, groundwater, soil vapor and modeling results, and stormwater investigation results are presented in Tables 16-5 through 16-7.

Investigation activities specific to PLT and the Easterly Plume are described in other portions of this report as referenced above (Section 6.1).

16.3.1. Pre-1997 Agreed Order Investigations and Remedial Actions

Environmental investigations were completed prior to implementation of the 1997 Agreed Order within portions of Jet Parking to evaluate soil conditions based on historical land use and to verify the removal of petroleum-contaminated soil during remedial excavation activities. Investigation and remedial activities completed for Jet Parking as it relates to the Southerly Plume are further discussed below. Soil and groundwater sampling locations are shown on Figure 16-4.

16.3.1.1. Jet Parking Phase II Environmental Site Assessment Summary

A geotechnical investigation completed at the Jet Parking parcel by GeoEngineers in 1993 identified field screening evidence of petroleum in soil within the southern portion of the Jet Parking Lot. Based on these findings, a subsequent Phase II ESA was completed by AGI in October 1993 and March 1994 to evaluate petroleum contamination in soil (126). Investigation activities included the completion of eight TPs (JP-TP1-1993 through JP-TP3-1993 and JP-TP5-1994 through JP-TP9-1994; Figure 16-4). Each TP was completed to depths of approximately 6 to 10 feet bgs and groundwater was reportedly not encountered. One UST was encountered at location JP-TP6-1994 during the exploration activities. No groundwater was observed in the test pit explorations.

Select soil samples from each test pit exploration were submitted for a combination of chemical analyses including TPH-HCID, TPH-G, TPH-D, TPH-O and BTEX. TPH-G, TPH-D, toluene, ethylbenzene, and xylenes were detected in samples collected from JP-TP1-1993, JP-TP2-1993, and JP-TP6-1993. Other contaminants were not detected in the analyzed samples.

16.3.1.2. Jet Parking UST Removal and Remedial Excavation Summary

Remedial excavation and subsequent confirmation soil sampling activities were completed in the southern portion of Jet Parking in August 1996 following the removal and closure of two USTs from the property (Figure 16-4). Remedial excavation activities resulted in the removal of approximately 740 cubic yards of petroleum-contaminated soil based on the initial soil characterization (described above) from two separate areas (described below). Results of the confirmation soil samples collected at the final remedial excavation limits verified the removal of the petroleum-contaminated soil with the exception of sample JP-S7, where an elevated concentration of TPH-G was detected at a depth of approximately 9 feet bgs along the western excavation limit.

Details of the UST removal areas, including confirmation sampling completed and the remedial excavation activities completed to address the observed petroleum contamination, are summarized below. USTs, remedial excavation areas and confirmation soil samples are shown on Figure 16-4.

- **Area 1 Excavation.** A former 110-gallon gasoline UST contained within the Area 1 Excavation was removed in August 1996 during the remedial excavation completed to remove the petroleum-contaminated soil previously identified in this area. The final limits of the remedial excavation at this location measured approximately 35 feet wide by 55 feet long by 11 feet deep. Confirmation soil samples JP-S1 through JP-S12 collected from the base and sidewalls of the remedial excavation were analyzed for TPH-G, TPH-D, TPH-O and BTEX. TPH-G were detected in sample JP-S7 collected along the eastern sidewall at a depth of 9 feet bgs. Other contaminants either were not detected or detected at concentrations less than the MTCA Method A cleanup level for unrestricted land use in the remaining

analyzed samples. Remedial excavation activities to address soil represented by sample JP-S7 are further discussed in Section 7.0.

- **Area 2 Excavation.** A former 350-gallon heating oil UST contained within the Area 2 Excavation was removed in August 1996 during the remedial excavation completed to remove the petroleum-contaminated soil previously identified in this area. The final limits of the remedial excavation at this location measured approximately 20 feet wide by 40 feet long by 10 feet deep. Confirmation soil samples JP-S13 through JP-S19 collected from the base and sidewalls of the remedial excavation were analyzed for TPH-G, TPH-D, TPH-O and BTEX. Contaminants either were not detected or detected at concentrations less than the MTCA Method A cleanup level for unrestricted land use in the confirmation soil samples.

Each of the remedial excavations was backfilled with imported material to meet the surrounding grade. Soil generated from the remedial excavations was placed within the treatment cell and mixed with petroleum-contaminated soil generated from other UWT Campus projects for enhanced ex-situ treatment of the petroleum constituents as described in Section 16.2.1.2. Subsequent investigations and remedial actions completed within PLT to address soil represented by sample JP-S7 as part of the Prairie Line Trail Capital Project are further discussed in Section 16.3.6.4.

16.3.2. 1997 Agreed Order Investigations

URS, on behalf of UW, completed an RI for the eastern portion of the UWT Campus between 1997 and 2002 in accordance with the 1997 Agreed Order. Investigation activities completed in the vicinity of the Southerly Plume included the collection of soil and groundwater samples from Jet Parking. Investigation activities for portions of Jet Parking to evaluate soil and/or groundwater conditions are further discussed below as it relates to the Southerly Plume. CVOCs associated with the Easterly Plume are further discussed in Section 15.0. Soil and groundwater sampling locations are shown on Figure 16-4.

16.3.2.1. Petroleum-Contaminated Soil Treatment and Backfill Area Investigation Summary

Four TPs (JP-TP1-1997 through JP-TP4-1997) were completed by URS in June 1997. The investigation targeted areas where petroleum-contaminated soil, generated during the 1996 Jet Parking Remedial Action and from other various locations across the UWT Campus (totaling approximately 4,675 cubic yards), was stockpiled for ex-situ enhanced biological attenuation. The investigation also targeted the portion of Jet Parking in which treated soil was used as fill to level the surface grade across the parcel. Investigation activities were completed to evaluate whether TPH leached from the treated soil into the underlying soil.

As part of this investigation, eight discrete soil samples collected from depths ranging from 0.5 to 6 feet bgs within the TP explorations were analyzed for a combination of TPH-G, TPH-D, and TPH-O. In addition, one sample from JP-TP4-1997 was also analyzed for BTEX. TPH-G, TPH-D, and TPH-O were detected in seven of the eight samples analyzed at concentrations less than the PCUL. BTEX was not detected in the analyzed sample.

16.3.2.2. Jet Parking Soil and Groundwater Investigation and Results Summary

Two phases of investigation were completed to further evaluate the subsurface conditions associated with historical land use at Jet Parking. The initial phase of the investigation was completed near the southeast corner of Jet Parking near soil sample JP-S7 to further evaluate whether the concentrations of TPH-G detected at this location extended east of the previous remedial excavation area (126). Investigation activities completed for this area included the collection of soil samples from DP soil borings and the

collection of groundwater samples from both permanent and temporary monitoring wells (161). These investigations included the following:

- Completion of two DP soil borings (JP-B1 and JP-GW1) to approximate depths of 14 and 23 feet bgs, respectively, in August 1998 to evaluate soil and groundwater conditions. Soil samples collected at approximately 4 and 10 feet bgs in boring JP-B1 were submitted for chemical analysis of TPH-G. TPH-G was not detected in each of these samples. A grab water sample was also collected in boring JP-GW1 for chemical analysis of TPH-G, TPH-D and TPH-O and select VOCs to evaluate groundwater conditions. These contaminants were not detected in the analyzed groundwater sample.
- Completion of one soil boring (JP-MW1) to an approximate depth of approximately 30 feet bgs in September 1998 to evaluate groundwater conditions. Boring JP-MW1 was completed as a permanent monitoring well and sampled on a quarterly basis between October 1998 and September 1999. Groundwater samples collected from well JP-MW1 were submitted for chemical analyses of TPH-G, TPH-D and TPH-O and select VOCs during the quarterly sampling events. Contaminants were not detected in the analyzed groundwater samples during each of the four quarterly monitoring events.
- Completion of two soil borings (UG-MW1 and UG-MW2) to approximate depths of approximately 39 and 34 feet, respectively, in September 1998 to evaluate soil and groundwater conditions. Both of these borings were completed as permanent monitoring wells. Soil samples collected between the ground surface and 15 feet bgs in these borings were submitted for a combination of chemical analyses including TPHG, TPH-D and TPH-O and select VOCs. Methylene chloride was detected in the surface samples collected from UG-MW1. Other contaminants were not detected in the analyzed samples. Semi-annual groundwater monitoring at UG-MW1 and UG-MW2 was completed in October 1998 and April 1999. Groundwater samples collected from wells UG-MW1 and UG-MW2 were submitted for chemical analyses of TPH-G, TPH-D and TPH-O, BTEX and CVOCs during each sampling event. TPH-G, TPH-D, benzene and CVOCs (cis-DCE, DCE, and vinyl chloride) were detected at UG-MW1 during one or more sampling events. Contaminants were not detected at UG-MW2 in the analyzed samples.

The second phase of the investigation was completed across the Jet Parking parcel and within portions of Market Street to further evaluate petroleum-related contamination and CVOC contamination in soil and groundwater identified during the initial phase of investigation. Investigation activities completed as part of this phase included the collection of soil samples from soil borings and the collection of groundwater samples from both permanent and temporary monitoring wells. These investigations included:

- Completion of one soil boring (JP-MW2) to an approximate depth of 27 feet bgs in March 2001 to further evaluate groundwater conditions. Boring JP-MW2 was completed as a permanent monitoring well and sampled in April 2001. The groundwater sample collected from well JP-MW2 was submitted for chemical analyses of BTEX and CVOCs. Benzene, toluene and CVOCs (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) were detected in the analyzed groundwater sample. Other contaminants were not detected in the groundwater sample.
- Completion of two DP soil borings (JP-GW3 and JP-GW5) to depths ranging between approximately 24 and 25 feet bgs in March 2001 to further evaluate groundwater conditions. Grab groundwater samples collected from borings JP-GW3 and JP-GW5 were analyzed for BTEX, petroleum-related VOCs and CVOCs. Benzene, toluene and CVOCs (trans-DCE, cis-DCE, vinyl chloride and chlorobenzene) were detected in the analyzed groundwater samples. Other contaminants were not detected in the groundwater samples.

- Completion of two soil borings (UG-MW5 and UG-MW6) to depths of approximately 43 and 35 feet bgs, respectively, in March 2002 to further evaluate groundwater conditions. Each of the borings were completed as permanent monitoring wells and sampled in April 2002 for BTEX and CVOC analysis. Contaminants were not detected in the analyzed groundwater sample from UG-MW5. Benzene and CVOCs (TCE, cis-DCE, vinyl chloride, and chlorobenzene) were detected in the analyzed groundwater sample from UG-MW6.

16.3.3. Supplemental Investigations Under the 1997 Agreed Order

Supplemental investigation activities were completed in accordance with the 1997 Agreed Order to further evaluate soil and/or groundwater conditions within the Southerly Plume and surrounding area. Investigation activities related to the Southerly Plume are summarized in Sections 16.3.3.1 through 16.3.3.4 below. Soil and groundwater sampling locations are shown on Figure 16-4. CVOCs associated with the Easterly Plume are further discussed in Section 15.0.

16.3.3.1. 2005 Targeted Brownfields Assessment Summary

UW obtained a Targeted Brownfields Assessment grant in 2005 from EPA to further investigate soil and groundwater conditions at the UWT Campus. EPA contracted Weston Solutions to complete the investigation that included the installation and collection of soil and/or groundwater samples from monitoring well BA-MW1 (Figure 16-5). Soil and groundwater samples were analyzed for a combination of petroleum-related VOCs including BTEX, CVOCs and other select VOCs. Contaminants were not detected in the soil. Low level concentrations of benzene and toluene as well as other VOCs were detected in groundwater. Chemical analytical results are summarized for the soil and groundwater samples in Tables 16-5 and 16-6, respectively.

16.3.3.2. 2007 Market Street Groundwater Investigation Summary

URS conducted a supplemental investigation in 2007 within the Market Street area to further evaluate potential source areas for contaminants in groundwater previously identified as part of the 1997 Agreed Order RI and subsequent investigations. The 2007 investigation focused on areas hydraulically upgradient of Jet Parking to evaluate groundwater conditions and identify potential sources of the CVOC contamination identified during the 2005 Targeted Brownfields Assessment. Groundwater samples from select borings were analyzed for petroleum-related VOCs including BTEX as part of this investigation. Potential upgradient sources identified during the assessment included properties located west of Market Street (see Section 16.2.2) that may have released contaminants to soil, groundwater, and/or the sanitary and stormwater sewer systems. As indicated in Section 16.2.4, the sanitary sewer and stormwater lines located in the Market Street ROW were identified as potential points of release for contamination based on a review of City stormwater video surveys that identified cracks and broken joints to the pipes adjacent to and south of these properties. The damaged segment of the stormwater line in the Market Street ROW located immediately east of the Market Street Building and extending south to South 21st Street was abandoned and re-routed by the City in 2005 (205) as further described in Section 16.2.4 and shown on Figure 16-3.

The investigation in this area was conducted in three phases. The first phase of the investigation consisted of completing borings MS-SB04, MS-SB05, and MS-SB06 located directly downgradient of the sewer line in the Market Street ROW and the collection of soil and grab groundwater samples from the shallow groundwater (i.e., Qvi aquifer further discussed in Section 16.4). The second phase consisted of the installation of monitoring wells UG-MW10 and UG-MW11 immediately west and upgradient of the stormwater and sanitary sewer lines. Additionally, groundwater samples were collected from monitoring

wells BA-MW1, JP-MW2, UG-MW1, UG-MW2, UG-MW5, and UG-MW6. The third phase consisted of completing and installing monitoring well UG-MW12 east and downgradient of the stormwater and sanitary sewer lines.

Soil and groundwater samples collected from these borings and monitoring wells were analyzed for a combination of TPH-G, TPH-D, TPH-O, petroleum-related VOCs including BTEX and CVOCs. In soil, one or more of these contaminants were detected at depths ranging between approximately 5 and 15 feet bgs in these samples. In groundwater, benzene, toluene, ethylbenzene, and CVOCs (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) were detected in one or more samples. Elevated concentrations of benzene were observed in soil at an approximate depth of 5 feet bgs at location MS-SB04 situated downgradient of 1956 Jefferson Avenue near one of the observed breaks in the stormwater line. Elevated concentrations of benzene were also observed in groundwater at locations UG-MW1 and JP-MW2 located along the western Jet Parking property boundary. Chemical analytical results for soil and groundwater samples are summarized in Tables 16-5 and 16-6, respectively. Sample locations are shown on Figure 16-4. Investigation activities completed to evaluate CVOC contamination in groundwater are further discussed in Section 15.0.

16.3.3.3. 2008 Market Street Groundwater Investigation Summary

URS conducted a supplemental investigation in 2008 within the Market Street area to further evaluate potential source areas previously identified as part of the 1997 Agreed Order RI and subsequent investigations. One monitoring well (UG-MW15) was installed downgradient of 1956 Jefferson Avenue west of Market Street as part of this 2008 investigation. Petroleum-related contaminants were not identified in groundwater at this location. Soil samples were not analyzed during this investigation.

Chemical analytical results for the groundwater sample are summarized in Table 16-6. UG-MW15 is shown on Figure 16-4.

16.3.3.4. 2013 Investigation Summary

An environmental investigation was completed by UW in 2013 to further evaluate potential contaminant sources for groundwater contamination identified within the UWT Campus Master Plan boundary (263).

Soil investigation activities associated with the Southerly Plume included the completion of soil borings JS-MW5, JS-MW6S, and JS-MW6D. Thirty-two soil samples were collected from these borings and submitted for TPH-HCID, petroleum-related VOCs including BTEX, CVOCs and other select VOC analyses. TPH and related VOCs were not detected in these samples. CVOCs (further discussed in Section 15.0) were identified in soil at depths ranging between approximately 18 to 47 feet bgs with the highest concentration observed at JS-MW5.

Groundwater investigation activities associated with the Southerly Plume included the collection of water samples from 13 new and existing monitoring wells (see Table 16-2) for TPH-G, TPH-D, TPH-O, petroleum-related VOCs including BTEX, CVOCs, other select VOCs, PAHs, and metals analyses. TPH-G, benzene, CVOCs, and metals were identified in one or more of the groundwater samples analyzed with elevated concentrations of TPH-G and/or benzene observed at locations JP-MW2, UG-MW1, UG-MW6, and UG-MW12. CVOCs associated with the Easterly Plume are further discussed in Section 15.0

Soil and groundwater sampling activities related to the Southerly Plume are presented in Tables 16-1 and 16-2, respectively. Investigation locations are shown on Figure 16-4. Chemical analytical results are summarized in Tables 16-5 and 16-6.

16.3.4. 2016 Agreed Order Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions were completed in accordance with the RI Work Plan and subsequent addenda (Section 4.0). RI activities within the Southerly Plume and surrounding area included collection of soil samples from 41 soil borings, collection of groundwater samples from 75 temporary and permanent groundwater monitoring wells and collection of samples from the five separate catch basins (see Tables 16-1 and 16-2). Exploration locations for the 2016 Agreed Order RI are shown on Figure 16-5.

16.3.4.1. Soil Investigation Summary

A total of 424 soil samples (including duplicate samples) were collected from 41 borings and three sediment samples were collected from three stormwater catch basins in the Southerly Plume vicinity between 2016 and 2020 to further evaluate soil conditions and define the nature and extent of contamination resulting from historical operations at Jet Parking and historical operations and land use west (upgradient) of Jet Parking including portions of Market Street and Jefferson Avenue. Benzene and to a lesser degree TPH-O, petroleum-related VOCs and CVOCs were identified in soil interpreted to be Qvi deposits. CVOCs associated with the Easterly Plume are further discussed in Section 15.0. Soil sampling results associated with the Southerly Plume are further discussed below.

- Benzene was detected in 105 of 414 soil samples collected at depths ranging between approximately 5 and 20 feet bgs. The detected concentrations ranged from 0.87 to 0.00089 mg/kg. The highest detected concentrations were identified in soil samples collected from borings A10-B10 and A10-B16 located in Jefferson Avenue west of Jet Parking and in boring A10-B26 located within Jet Parking in the vicinity of the historical City Fuel Company, which operated at this location between 1926 and 1949.
- Other petroleum-related VOCs detected in soil included ethylbenzene, toluene, xylenes, 1,2,4-TMB, 1,3,5-TMB, 4-isopropyltoluene, carbon disulfide, isopropylbenzene, MEK, methyl isobutyl ketone, and sec-butylbenzene. These contaminants are collocated with benzene in soil.

16.3.4.2. Groundwater Investigation Summary

A total of 161 groundwater samples (including duplicates) were collected between 2016 and 2020 for the 2016 Agreed Order RI from the network of new and existing monitoring wells and temporary wells to further evaluate groundwater conditions and define the nature and extent of contamination resulting from historical operations at Jet Parking and the area to the west of Jet Parking. Groundwater samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, petroleum-related VOCs (including BTEX, CVOCs, and other select VOCs), and PCBs at well locations screened within the Qvi aquifer (geologic and hydrogeologic conditions in the vicinity of the Southerly Plume are further discussed in Section 16.4.2). CVOCs associated with the Easterly Plume are further discussed in Section 15.0. Groundwater monitoring results associated with the Southerly Plume are discussed below.

- A total of 18 grab groundwater samples were collected from 18 temporary well locations screened within the Qvi aquifer located within Jet Parking and upgradient of Jet Parking within portions of Market Street and Jefferson Avenue during the RI (see Table 13-2). Results of groundwater samples collected within the Qvi aquifer identified TPH-G, TPH-D, TPH-O, and benzene were the greatest in the

west central portion of Jet Parking and to the west of this area in Jefferson Avenue. High turbidity was noted during sample collection of each of the grab samples.

- A total of 131 groundwater samples (including duplicate samples) were collected from 57 permanent monitoring wells screened within the Qvi aquifer located within Jet Parking and upgradient of Jet Parking within portions of Market Street and Jefferson Avenue during the RI (see Table 16-2). Results of groundwater samples collected within the Qvi aquifer identified TPH-G and benzene as well as 1,2,4-TMB, acetone, carbon disulfide and chloroform with the highest detected concentrations in the west central portion of Jet Parking. A review of the laboratory data indicated that the positive detections of TPH-G were due to a single peak of chlorobenzene detected in these samples which are associated with the Easterly Plume.

16.3.4.3. Catch Basin Investigation Summary

Water and sediment samples were collected from catch basins and from within City manholes connected to utilities servicing 1934 Market Street and 1956 Jefferson Avenue in 2018 and 2019 to evaluate the potential release of contaminants from these utilities. Samples were collected from catch basins PS14-DS1, PS14-DS2, and PS14-DS3 located in the parking lot at 1934 Market Street and within City manholes CB:6512234 and CB:6522217 located east of 1934-1938 Market Street and 1956 Jefferson Avenue. Chemical analytical results for sediment and water samples collected from the catch basins are summarized in Table 16-7.

TPH-G, TPH-D and TPH-O were detected in sediment and/or drain water samples collected within each of these catch basins with the exception of CB:6512234. One or more petroleum-related VOCs including ethylbenzene and total xylenes were also detected at low concentrations in the sediment samples from PS14-DS1, PS14-DS2, and PS14-DS3. In addition, CVOCs were detected in samples PS14-DS1, PS14-DS2, PS14-DS3, and CB-6512234 (further discussed in Section 15.0).

16.3.5. Environmental Due Diligence

Environmental due diligence activities completed to further evaluate soil and/or groundwater conditions in connection with property acquisitions by UW within the Southerly Plume and surrounding area are summarized in Sections 16.3.5.1 through 16.3.5.3. Soil and groundwater sampling locations are shown on Figure 16-6.

16.3.5.1. 1934 Market Street Phase II Environmental Site Assessment

A Phase II ESA was conducted at 1934- 1938 Market Street in December 2018 and January 2019 to evaluate soil and groundwater conditions at the properties prior to purchase by the UW (296). The Phase II ESA was focused on evaluating the potential historic use of a residential heating oil UST and hazardous materials use, which were identified as recognized environmental conditions (RECs) in a 2018 Phase I ESA (295). The Phase II ESA consisted of a GPR survey/utility locate and video inspection in subsurface building utility pipes, stormwater catch basins and drain lines in the building parking lot to identify and map underground utilities near the proposed exploration locations, collection of water and sediment samples from building sumps and stormwater drains, completion of 17 DP soil borings (MS-DP1 to MS-DP6 and MS-DP8 to MS-DP18) and one HSA soil boring completed as a permanent monitoring well (MS-MW1). Details related to this investigation as well as chemical analytical results for CVOCs are summarized in Section 15.3.6.6 (Easterly Plume). Chemical analytical results for petroleum-related chemicals are summarized below.

Soil Analytical Results

Analytical results for soil samples collected as part of the Phase II ESA are presented in Table 16-5 and summarized below:

- TPH-G was detected at concentrations of 36 mg/kg and 9.8 mg/kg in the soil samples collected at a depth of 0- to 1-foot bgs in borings MS-DP12 and MS-DP16, respectively.
- TPH-D and TPH-O were detected in soil samples collected from borings MS-DP6, MS-DP12, MS-DP13, and MS-DP16 at depths between 0.5 to 6 feet bgs. The detected concentrations ranged from 120 to 790 mg/kg.

Groundwater Analytical Results

Chemical analytical results for groundwater samples collected as part of the Phase II ESA are presented in Table 16-6 and summarized below.

- TPH-D was detected in the groundwater sample collected from monitoring well MS-MW1 at a concentration of 1,500 µg/L.

Other petroleum-related VOCs were not detected in the remaining analyzed groundwater samples.

Utility Water Analytical Results

Water samples were collected from two sumps (MS-SUMP1 and MS-SUMP2) located inside the 1934 Market Street Building and one catch basin (MS-DRAIN) located in the building parking lot as part of the Phase II ESA. Additionally, one sediment sample was collected from the catch basin. Chemical analytical results are presented in Table 16-7 and summarized below.

- TPH-D and/or TPH-O were detected in the water samples collected from the two sumps and the catch basin. The detected concentration ranged from 810 to1,400 µg/L.
- TPH-D and TPH-O were detected in the catch basin sediment sample at concentrations of 550 mg/kg and 380 mg/kg, respectively.

Petroleum-related VOCs were not detected in the analyzed utility samples.

16.3.5.2. Market Street Building Underground Storage Tank Removal and Closure Summary

Four USTs were removed from the 1934-1938 Market Street Building property in July 2000 in connection with the purchase of the property by others. The USTs consisted of two approximately 500-gallon gasoline USTs, located beneath the City of Tacoma sidewalk east of the building, and one 675-gallon waste oil/gasoline UST and one 550-gallon heating oil UST, located in the parking area behind the building (147, see Figure 16-2). The contents of the waste oil UST were found to contain PCE, TCE and chlorobenzene based on the results of a product sample collected from the tank (further discussed in Section 15.0). Additionally, holes and signs of steel failure (i.e., corrosion) were observed on the two gasoline USTs and petroleum-contaminated soil was observed within the UST excavation at the time of removal. CVOCs associated with the Easterly Plume are further discussed in Section 15.0.

The two gasoline USTs were reportedly associated with the former service station that operated on the property between the late 1920s and early 1930s. No information regarding the installation dates for the

four USTs is available. The results of product characterization and soil confirmation sampling for each removed UST are summarized below.

- **Two Gasoline USTs (Southerly Plume Source).** Both gasoline USTs contained residual product prior to removal. One residual product/water sample collected from one of the gasoline USTs contained benzene (1,330,000 µg/L), ethylbenzene (2,490,000 µg/L), and toluene (16,000,000 µg/L). The two gasoline USTs were observed to have damage at the time of removal including numerous holes and evidence of steel failure (corrosion). Soil surrounding the USTs had visual and olfactory indications of contamination at the time of UST removal. Soil samples MS-UST-1 through MS-UST-11 (Figure 16-6) were collected from the gasoline UST excavation base and sidewalls. In addition, one composite soil sample was collected from the stockpiled excavated soil. The composite stockpile soil sample and the excavation base soil sample contained gasoline, ethylbenzene, xylenes, and/or lead at concentrations less than applicable MTCA Method A cleanup levels at the time of removal. Contaminants were not detected in the other confirmation soil samples, with the exception of lead. Lead was not detected at concentrations exceeding the MTCA Method A cleanup level.
- **Waste Oil UST (Easterly Plume Source).** The waste oil tank contained approximately 1,500 gallons of residual product at the time of removal. TCE, PCE and chlorobenzene were detected in the waste oil product sample collected from the waste oil UST at the following concentrations: TCE (979 mg/kg); PCE (26 mg/kg); and chlorobenzene (684 mg/kg). Olfactory indications of petroleum were noted in soil within the waste oil UST excavation. Two composite soil stockpile samples as well as four excavation soil sidewall samples (MS-UST-12, MS-UST-14 through MS-UST-17) and one excavation base soil sample (MSUST18) were collected for chemical analyses for TPH, BTEX, chlorinated solvents, PCBs and RCRA metals. Analytes were not detected in the collected soil samples at concentrations greater than laboratory reporting limits, with the exception of lead, which was detected at a concentration less than the applicable MTCA Method A cleanup level.
- **Heating Oil UST.** The heating oil tank was full of residual product at the time of removal. One soil sample (MS-UST-13) was collected from the heating oil UST excavation base and submitted for analysis of TPH-D and TPH-O. TPH-D and TPH-O were not detected in the soil sample at concentrations greater than laboratory reporting limits.

The approximate locations of the four USTs are shown on Figure 16-6. Contaminated soil identified during UST excavation activities (44.95 tons) was removed and transported off-site for disposal. Chemical analytical results for confirmation soil samples collected at the limits of the UST removal excavations are summarized in Table 16-5.

16.3.5.3. Merlino Environmental Due Diligence

A Phase II ESA was conducted downgradient of the Merlino property located at 1945 and 1953 Fawcett Avenue (West of 1954 Jefferson and 1934-1938 Market Street) in June 2002 in connection with purchase of the property by UW. The Phase II ESA consisted of installation and sampling of one monitoring well (DD-MW2) upgradient of the Southerly Plume area. Soil samples were not collected for chemical analysis. One groundwater sample was collected and analyzed for BTEX and CVOCs. Contaminants were not detected at this location. CVOCs associated with the Easterly Plume are further discussed in Section 15.0. Monitoring well DD-MW2 is shown on Figure 16-6.

16.3.5.4. Frederick Wilds Environmental Due Diligence

Phase I and Phase II ESAs were conducted at the Frederick Wilds Building (Swiss Complex) located between 1910 and 1916 Jefferson Avenue in July 2013 in connection with purchase of the property by UW. The Phase II ESA consisted of a GPR survey to investigate the potential presence of USTs on the property, completion of nine soil borings (FW-B01 through FW-B08 and FW-B10) and collection of one sediment sample (FW-B09) from a manhole of unidentified use located on the west side of the property. Soil and groundwater samples collected from the nine borings and the manhole were analyzed for a combination of TPH-HCID, petroleum-related VOCs including BTEX, CVOCs, other select VOCs, PAHs and metals. One or more of these contaminants were detected in the samples submitted for chemical analyses with an elevated concentration of lead detected in shallow soil (approximately 0- to 1-foot bgs) at location FW-B10.

Sampling locations are shown on Figure 16-6. Soil analytical results are summarized in Table 16-5. CVOCs associated with the Easterly Plume are further discussed in Section 15.0.

16.3.6. Capital Projects

Investigation and remedial action activities were necessary to implement UW Capital Projects. Similar investigations were conducted by the City to support planning and design for various ROW utility projects. Capital projects and investigation activities in the vicinity of the Southerly Plume are summarized in Sections 16.3.6.1 through 16.3.6.6. Soil and groundwater sampling locations are shown on Figure 16-6.

16.3.6.1. Market Street 2005 Stormwater Replacement Capital Project

The City collected soil samples between October and November 2005 to evaluate soil conditions in preparation for the planned replacement work for the sanitary sewer and water lines located in Market Street between South 21st Street and South 17th Street. Three grab samples (MS-21ST & JEFFERSON, MS-20TH & JEFFERSON, and MS-1934 MARKET ST) were collected for analyses of petroleum-related VOCs including BTEX, CVOCs, and other select VOCs as part of this project. Low levels of methylene chloride were detected in samples MS-21ST & JEFFERSON and MS-20TH & JEFFERSON. Other contaminants were not detected in the analyzed samples.

Sampling locations are shown on Figure 16-6. Soil analytical results are summarized in Table 16-5.

16.3.6.2. Tioga Library Building Capital Project

The TLB Capital Project completed in 2012 included building demolition and construction of a new four-story library with a sky bridge spanning the PLT pedestrian corridor providing access to the Snoqualmie Library Building (Figure 16-3). Investigation activities were performed in conjunction with the TLB Capital Project to evaluate soil conditions within and adjacent to the footprint of the construction area to ensure proper soil management and disposal, considering its proximity to contamination on neighboring properties previously identified (Figures 16-1). The environmental activities for the TLB Capital Project included the completion of multiple test pits and direct-push borings to evaluate soil conditions to depths ranging from 5 to 40 feet bgs and the collection of groundwater samples from monitoring well UG-MW2 and replacement well UG-MW2R prior to and after completion of the TLB Capital Project.

Soil and groundwater samples collected as part of this project (Tables 16-1 and 16-2) were analyzed for a combination of TPH-G, TPH-D, TPH-O, petroleum-related VOCs including BTEX, CVOCs, other select VOCs, PAHs and metals. Chemical analytical results for soil samples identified one or more of these contaminants in soil. However, soil represented by most of these samples was subsequently excavated and removed from the property for permitted disposal during construction. Contaminants were not detected in the analyzed groundwater samples.

Investigation activities are summarized in Tables 16-1 and 16-2. Sampling locations are shown on Figure 16-6. Chemical analytical results for soil samples and groundwater samples collected as part of this investigation are summarized in Tables 16-5 and 16-6, respectively.

16.3.6.3. Market Street Utilities Capital Project

UW completed environmental monitoring and soil sampling in September and October 2012 during City replacement work for the sanitary sewer and water lines located in Market Street between South 21st Street and South 17th Streets (245). The purpose of the work was to collect soil samples during utility replacement work in areas where contaminants had been previously identified in soil and groundwater. Twenty soil samples (Table 16-1) were collected from the utility alignment project from depths ranging between approximately 4 to 9.5 feet bgs for chemical analyses of TPH-G, TPH-D, TPH-O, petroleum-related VOCs, CVOCs and other select VOCs. One or more contaminants were detected in these samples. CVOCs associated with the Easterly Plume are further discussed in Section 15.0.

Sampling locations are shown on Figure 16-6. Soil analytical results are summarized in Table 16-5.

16.3.6.4. Prairie Line Trail Capital Project

Environmental investigation activities followed by remedial actions were completed between 2013 and 2014 within the footprint of PLT as part of the planning and development of the PLT Capital Project. A detailed discussion of these activities is presented in Section 7.0. As part of this capital project, 52 direct-push soil borings (PLT-B1 through PLT-B39, PLT-BA2-1 through PLT-BA2-5, and PLT-BA6-1 through PLT-BA6-8), three sonic borings completed as permanent wells (PL-MW1, JP-MW1R, PL-MW2), and 11 test pit explorations (PLT-TP1 through PLT-TP11) were completed in March and April 2013 to evaluate soil conditions within PLT (252, 258). Soil and groundwater samples collected as part of this project in the vicinity of the Southerly Plume (Tables 16-1 and 16-2) were analyzed for a combination of TPH-G, TPH-D, TPH-O, petroleum-related VOCs including BTEX, CVOCs, other select VOCs, PAHs and metals. Chemical analytical results for soil samples identified one or more of these contaminants in soil. However, soil represented by most of these samples was subsequently excavated and removed from the property during construction for permitted disposal. In groundwater, benzene, naphthalene and CVOCs were detected in one or more monitoring well. CVOCs associated with the Easterly Plume are further discussed in Section 15.0.

Investigation activities are summarized in Tables 16-1 and 16-2. Sampling locations are shown on Figure 16-6. Chemical analytical results for soil samples and groundwater samples collected as part of this investigation are summarized in Tables 16-5 and 16-6, respectively.

16.3.6.5. City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project

Three soil borings (COT-MW1 through COT-MW3) were completed in December 2017 near the intersection of Market Street and Jefferson Avenue in the vicinity of a planned stormwater replacement project based on previous investigation results in this area. The borings were advanced to depths of approximately 32 feet bgs and completed as permanent monitoring wells. Soil and groundwater samples collected as part of this project in the vicinity of the Southerly Plume (Tables 16-1 and 16-2) were analyzed for a combination of TPH-G, TPH-D, TPH-O, petroleum-related VOCs including BTEX, CVOCs, other select VOCs, PAHs and metals. Chemical analytical results for soil samples identified one or more of these contaminants in soil between approximately 2 and 25 feet bgs. Only benzene and CVOCs were detected in groundwater. CVOCs associated with the Easterly Plume are further discussed in Section 15.0.

Investigation activities are summarized in Tables 16-1 and 16-2. Sampling locations are shown on Figure 16-6. Chemical analytical results for soil samples and groundwater samples collected as part of this investigation are summarized in Tables 16-5 and 16-6, respectively.

16.3.6.6. Fawcett Utility Replacement Capital Project

Three soil borings (FAW-SB09 through FAW-SB11) were completed in October 2020 near the intersection of Market Street and Jefferson Avenue to evaluate soil conditions in the vicinity of a planned utility replacement project based on previous investigation results in this area. The borings were advanced to depths between approximately 15 and 16 feet bgs. Soil samples collected as part of this project in the vicinity of the Southerly Plume (Tables 16-1 and 16-2) were analyzed for a combination of TPH-G, TPH-D, TPH-O, petroleum-related VOCs including BTEX, CVOCs, other select VOCs, PAHs and metals. Chemical analytical results for soil samples identified one or more of these contaminants in soil. However, soil represented by these samples was subsequently excavated and removed during construction of the new utility. CVOCs associated with the Easterly Plume are further discussed in Section 15.0.

Investigation activities are summarized in Tables 16-1 and 16-2. Sampling locations are shown on Figure 16-6. Chemical analytical results for soil samples and groundwater samples collected as part of this investigation are summarized in Tables 16-5 and 16-6, respectively.

16.4. Conceptual Site Model

Development of the CSM for the Southerly Plume is based on the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for the Southerly Plume is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 16.4.1 through 16.4.4 describe the specific elements of the Southerly Plume CSM.

16.4.1. Physical Setting

The Southerly Plume encompasses portions of Market Street and Jefferson Avenue north of South 21st Street and extends east toward the western edge of the PLT pedestrian corridor (Figure 16-1). Land uses within this portion of the UWT Campus include a variety of commercial and academic buildings, surface parking lots and City ROWs. Commercial use of the UWT Campus buildings primarily includes retail services (see Section 16.2).

16.4.2. Geologic and Hydrogeologic Setting

The geologic and hydrogeologic setting for the Southerly Plume (described in the following sections) informs the distribution of contaminants in media of potential concern for the Southerly Plume. Local geology and hydrogeology for the Southerly Plume and surrounding area are described below in Sections 16.4.2.1 and 16.4.2.2.

16.4.2.1. Local Geology

Geologic units present within the Southerly Plume include the Qf, Qvi, and Qva deposits. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill that was encountered in the borings completed within the Southerly Plume and surrounding area consists of locally derived, reworked ice-contact deposits or imported fill. The fill ranges in thickness between approximately 8 to 12 feet bgs.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi in the vicinity of the Southerly Plume consists of till and subglacial channel deposits. Qvi till-like deposits vary in thickness from approximately 5 to 20 feet. Qvi channel deposits in this area are generally oriented in an east-west direction and range in thickness from approximately 10 feet beneath Market Street area to greater than 20 feet thick east of Jefferson Avenue.
- **Glacial Outwash Deposits (Qva Sands/Gravels and Qva Silt).** Flat-lying Qva silt is present beneath Market Street extending to the west and upgradient of the Southerly Plume. The Qva silt was not observed in borings completed between approximately Jefferson Avenue and PLT and may be absent in this area. In general, the contact between the Qva and the overlying Qvi deposits generally dips to the east following the surface topography.

Geologic conditions in the vicinity of the Southerly Plume are shown on Figure 2-12.

16.4.2.2. Local Hydrogeology

Groundwater in the south-central portion of the UWT Campus occurs within both the Qvi (shallow) and Qva (deep) aquifers. Across the UWT Campus, the Qvi aquifer is predominately unconfined while the Qva aquifer is predominantly confined due to the presence of the Qvi silt and Qva silt deposits inhibiting vertical groundwater movement between the Qvi and Qva aquifers. However, the Qvi and Qva aquifers may be hydraulically connected due to local glacial incision of the silt layers separating the two aquifers or the result of property redevelopment. Specific areas where the Qvi and Qva aquifers are interpreted to be hydraulically connected and flow into each other are shown on Figures 2-14 to 2-19 and include the following, as they relate to groundwater flow for the Southerly Plume and surrounding:

- **Southerly Plume—East.** The Qvi aquifer is interpreted to flow into the underlying Qva aquifer near the eastern edge of the Southerly Plume in the vicinity of UG-MW1 and JP-MW2, and A10-MW1S/D and A10-MW5S/D where the Qvi silt and Qva silt are both absent. At this location. incision of the valley walls during the last glacier retreat (approximately 10,000 to 13,000 years ago) has locally resulted in the absence of the confining layer separating the Qvi and Qva aquifer (i.e., Qvi and/or Qva silt) in this vicinity. As a result, the Qvi and Qva aquifers are locally hydraulically connected. In this vicinity, groundwater within the Qvi aquifer is interpreted to drain into and mix with groundwater from the underlying Qva aquifer (see Figure 2-12).

Local groundwater occurrence and flow for the Qvi and Qva aquifers are summarized below.

Qvi Groundwater Occurrence and Flow

The Qvi aquifer is generally unconfined and occurs and flows primarily within the channel deposits and sand and gravel seams within the Qvi deposits at depths between approximately 1 and 32 feet bgs (Table 16-6) with an average depth of approximately 14 to 15 feet bgs. Locally, the Qvi aquifer may be semi-confined beneath the Qvi till-like deposits. Qvi groundwater is under artesian conditions at monitoring wells MS-MW1 and UG-MW10 with observed water levels at elevations ranging between approximately 0.4 and 4 feet above ground surface. Confined groundwater conditions within the Qvi aquifer appear to occur where groundwater within channel deposits is confined above and below by the Qvi till-like deposits as observed at monitoring well UG-MW10, or where shallow groundwater perched on the silty gravel deposits

exits the Qvi aquifer on a hillside as observed upgradient of monitoring well MS-MW1. The inferred groundwater flow direction in the Qvi aquifer within the Southerly Plume is generally easterly toward the Thea Foss Waterway and is consistent with the Campus-wide Qvi groundwater flow direction.

The local estimated Qvi average linear groundwater velocity is approximately 3.99 ft/day with a hydraulic gradient of 0.028 ft/ft based on the April 2021 groundwater monitoring event. Evaluation of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

Qva Groundwater Occurrence and Flow

The presence of the Qva aquifer beneath the Southerly Plume is inferred based on information from the Easterly Plume presented in Section 15.0, whereas most borings completed for the Southerly Plume were focused within the Qvi Unit (location of observed contamination). The Qva aquifer underlies the Qvi aquifer at depths greater than approximately 30 to 40 feet bgs with an inferred groundwater flow direction that is generally easterly based on the results of other borings in the surrounding area. The Qva aquifer beneath the Southerly Plume is inferred to be generally under confined conditions. The Qva aquifer becomes unconfined downgradient of the Southerly Plume near Pacific Avenue (Qva groundwater conditions in the southeast portion of the UWT Campus are further discussed in Section 15.0).

The estimated Qva average linear groundwater velocity is approximately 2 ft/day with a hydraulic gradient of 0.11 ft/ft across the Southerly Plume, based on groundwater data collected for the Easterly Plume (see Section 15.0). Evaluation of the groundwater flow velocity based on hydrogeologic testing of the Qvi and Qva aquifers during the 2016 Agreed Order investigation is further discussed in Appendix L.

16.4.3. Sources of Contamination

A specific point-source for the Southerly Plume could not be identified as previously discussed. However, historical operations at 1956 Jefferson Avenue (i.e., electrical repair services between 1947 and 1978), 1934-1938 Market Street (i.e., gas and oil services between the late 1920s and early 1930s) and Jet Parking (i.e., City Fuel Company between 1926 and 1949) and/or other unknown spills/releases (including within the Market Street and Jefferson ROW) may have led to the release of petroleum-related contaminants to soil and groundwater within the Southerly Plume. Lines of evidence supporting these historical operations as the source(s) of contamination include the following, based on the results of the RI (see Section 16.3).

- **1934-1938 Market Street (1934-1938 Market Street Source Area).** Two gasoline USTs east of the 1934-1938 Market Street property were historically in operation during the late 1920s and early 1930s. The results of a residual product/water sample representing the contents of these tanks contained benzene, ethylbenzene and toluene. At the time of removal in July 2000, the two gasoline USTs were observed to have numerous holes and evidence of steel failure (i.e., corrosion), and soil surrounding the USTs had visual and olfactory indications of contamination. However, TPH and BTEX contamination either were not detected or detected at concentrations less than the MTCA Method A cleanup level at the final UST removal excavation limits. In addition to the USTs, sediment and water samples from the catch basins at the 1934-1938 Market Street Property contained TPH likely resulting from drips, spills and/or releases during historical land use. Within the catch basin system, these contaminants may have migrated through the lateral stormwater lines and may have been released to

soil in the vicinity of the observed breaks/cracks in the stormwater line within Market Street during the 2005 City inspection (see Section 16.2.4).

- **1956 Jefferson Avenue (Jefferson Avenue Source Area).** Elevated concentrations of benzene were detected in soil samples collected along the sanitary sewer line located east of 1956 Jefferson Avenue and at locations inferred to be downgradient of utility lateral lines leading from this property. The elevations of these detected concentrations are consistent with the elevations of the utilities at this location. In addition, elevated concentrations of benzene were also observed near the location of two identified cracks/breaks identified in the stormwater line during the 2005 City inspection (see Section 16.2.4). Solvents and/or cleaners used as part of the historical electrical repair services from 1956 Jefferson Avenue and discharged to the stormwater system between 1947 and 1978 may be a potential source of contamination for the Southerly Plume based on the proximity of these detections relative to the utility and identified cracks/breaks.
- **Spills/Releases in City ROW.** Elevated concentrations of benzene were detected in soil and groundwater within Market Street and Jefferson Avenue. The detected concentrations in soil were as shallow as 2 feet bgs indicating a localized source (i.e., spills and/or releases within these areas that infiltrated into the ground). These contaminants are aligned with the historical trolly line. The rail track within the ROW may be a preferred migration pathway for contaminants released to the surface to migrate into the ground (i.e., joints between the pavement and tracks), although the trolly itself is not believed to be a source. Contaminants in groundwater are predominantly contained within the ROW.
- **Jet Parking Source Area**. Elevated concentrations of benzene are detected in soil and groundwater in the vicinity of the City Fuel Company, which historically operated in the southern portion of Jet Parking between 1926 and 1949. Elevated concentrations of benzene are observed below a depth of approximately 5 to 10 feet bgs (original ground surface prior to infilling during the mid-1990s) in the northern portion of Jet Parking. Contaminant concentrations in this vicinity may be associated with drips, spills, or releases. However, land use in this area was largely residential or vacant and used for parking/storage.

16.4.4. Potential Receptors and Exposure Pathways

Current and future land uses are considered when evaluating potential receptors and exposure pathways. The current and planned future land uses are commercial and academic. The Southerly Plume and surrounding area include the central and southern portions of Jet Parking and portions of Market Street and Jefferson Avenue each of which are paved with asphalt and/or concrete surfaces with limited areas of landscaping. Precipitation falling to the ground surface either infiltrates into the ground (unpaved areas) or is captured by catch basins and transported by the City's stormwater infrastructure to the Thea Foss Waterway. It is assumed that future land use will be similar to its current use.

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

- **Direct Contact.** The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil and/or groundwater during excavation activities.

- **Drinking Water.** Groundwater within the Qvi/Qva aquifers beneath the Southerly Plume and surrounding area is not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.
- **Surface Water.** Stormwater utilities at the Market Street Building contain sediment and water with elevated petroleum-related concentrations (and CVOC concentrations associated with the Easterly Plume as discussed in Section 15.0). The Market Street Building stormwater system is connected to the City stormwater system, which discharges to Outfall 235 in the Thea Foss Waterway. However, actual stormwater utilities located within the Southerly Plume are at an elevation above the groundwater table limiting the potential for groundwater to enter the stormwater network and be transported/discharged to surface water. Surface water is not considered an exposure pathway because the catch basin system is designed to capture TPH from spills and drips and/or releases typical of any parking lot catch basin system.
- **Indoor Air.** Ground surface conditions within and surrounding the Southerly Plume are comprised of paved UWT Campus parking and ROWs. The vapor intrusion into the indoor air pathway is considered an incomplete exposure pathway due to the lack of enclosed building spaces in this area. However, further development of Jet Parking with building structures may create a scenario in which vapor intrusion could enter indoor spaces. Future development of this parcel should consider the potential for vapor intrusion.

16.5. Proposed Cleanup Levels

PCULs were developed for the Southerly Plume for the protection of human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (Chapter 173-340 WAC), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water use, potential exposure pathways, and the potential receptors of these contaminants to the Southerly Plume. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for the Southerly Plume Site is as follows:

- **Proposed Soil Cleanup Levels.** PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Groundwater Cleanup Levels.** PCULs for groundwater were developed using standard MTCA Method B groundwater cleanup levels for potable (drinking) water prescribed in WAC 173-340-720(4)(b). Numerical criteria (state or federal) that are not sufficiently protective (i.e., that exceeded an excess cancer risk of 1×10^{-5} or a hazard quotient of 1) were adjusted to a cancer risk of 1×10^{-5} or a hazard quotient of 1. MTCA Method A groundwater cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels.** Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064). The groundwater SLs are referenced to the standard MTCA Method B SLs from Ecology's CLARC Table dated January 2023.

16.6. Nature and Extent of Contamination

16.6.1. Contaminants and Media of Concern

Characterization data for the Southerly Plume are summarized in Tables 16-5, 16-6, and 16-7 and were evaluated to determine contaminants and media of concern the for the Southerly Plume Site (as defined by soil and groundwater PCUL exceedances). An evaluation of soil sample results representing current conditions (i.e., post-remedial excavation confirmation samples and samples from soil explorations collected beyond the final remedial excavation limit) is presented in Table Q-34 (Appendix Q). An evaluation of groundwater sample results representing current conditions (i.e., groundwater samples collected between 2016 and 2020) is presented in Table Q-35 (Appendix Q). In addition, soil and groundwater sample results representing current conditions were screened to evaluate the potential for VI (Table Q-36, Appendix Q). Contaminants in media of concern based on this evaluation (Tables Q-34 through Q-36) include the following:

- **Soil.** TPH-G and benzene were identified as primary soil COCs for the Southerly Plume Site, based on the widespread occurrence in soil at concentrations greater than the PCUL, and potential sources (i.e., historical gasoline USTs located along the western edge of Market Street adjacent to the Market Street Building). TPH-D, toluene, ethylbenzene, total xylenes. 1,2,4-TMB, and 1,3,5-TMB were identified as secondary soil COCs for the Southerly Plume Site because they infrequently exceeded the PCUL (i.e., less than 10 percent) and/or were found contained within stormwater catch basin systems, which are not considered to be representative of soil.
- **Groundwater.** Benzene was identified as a primary groundwater COC for the Southerly Plume Site due to the widespread occurrence in groundwater at concentrations greater than the PCUL. TPH-G and TPH-D were identified as secondary groundwater COCs for the Southerly Plume Site because they infrequently exceeded the PCUL (i.e., less than 10 percent), were found contained within stormwater catch basin systems that are not considered to be representative of groundwater, were collected as grab samples in which field observations noted elevated turbidity biasing the results high, are the result of matrix interferences due to the presence of chlorobenzene associated with the Easterly Plume (Section 15.0), and/or are the result of overlap between the gasoline and diesel/heavy oil ranges resulting in a concentration that is biased high.
- **Soil Vapor.** Based on screening of soil and groundwater data, benzene was identified as a COC with the potential to migrate into enclosed spaces at concentrations that could exceed the Method B indoor air PCULs and/or the SL for the protection of commercial workers. An evaluation for VI potential is further discussed in Section 16.6.4.

Other contaminants including cPAHs, naphthalenes, and lead are not considered to be soil COCs because these contaminants were removed from the property during previous remedial actions or are located in areas beyond the footprint of the Southerly Plume. Additionally, empirical evidence from the 2016 Agreed Order RI groundwater investigation indicates cPAHs, naphthalenes, and lead detected in soil are not adversely impacting groundwater (i.e., incomplete exposure pathway). TPH-O was detected greater than the PCUL in one or more storm drain samples. However, TPH-O is not considered a COC given limited occurrence

and that the catch basin system is designed to capture TPH from spills/drips and or releases typical of any parking lot catch basin system. CVOCs (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) observed in soil and groundwater within the footprint of the Southerly Plume resulting from releases during historical operations at 1934-1938 Market Street are associated with the Easterly Plume and are further discussed in Section 15.0. Other COCs in soil not associated with Southerly Plume sources (e.g., PAHs and metals) are discussed in Section 17.0.

Primary COCs (TPH-G and benzene) for soil and groundwater are shown in plan view on Figures 16-7 through 16-10 and in cross section on Figure 16-11. The nature and extent of COCs in media of concern are further discussed below.

16.6.2.Soil

Remedial excavation activities completed between approximately 1996 and 2013 resulted in the removal of petroleum contamination in the southeast portion of Jet Parking associated with former gasoline and heating oil USTs (see Section 16.3). Additionally, the results of the RI confirmed that petroleum-contaminated soil generated from these remedial activities, in addition to other petroleum-contaminated soil imported to Jet Parking for ex-situ enhanced biological remediation, has not adversely impacted soil and groundwater. However, TPH-G and benzene (primary COCs), and TPH-D, toluene, ethylbenzene and total xylenes (secondary COCs) were detected in soil and/or groundwater at concentrations greater than the PCUL within the Southerly Plume boundary. The nature and extent of Southerly Plume COCs are summarized below. Primary COCs in soil including TPH-G and benzene are shown on Figures 16-9 and 16-10. CVOCs (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) associated with the Easterly Plume are discussed in Section 15.0. Other COCs not associated with Southerly Plume sources are discussed in Section 17.0 (Area-Wide Soil).

- **East of 1956 Jefferson Avenue (1956 Jefferson Source Area).** Benzene exceeding the PCUL is present in soil in this area at depths ranging between approximately 3 to 8 feet bgs as indicated by soil samples collected during drilling in 2007 and during utility replacement work completed in the Jefferson Avenue ROW in 2012. Benzene was detected at concentrations exceeding the PCUL in soil samples MS-101+75-8WL (4.6 mg/kg), MS-101+10-3 (0.052 mg/kg), and one sample collected from boring MS-SB04 (0.699 mg/kg).
- **East of 1934-1938 Market Street (1934-1938 Market Street Source Area).** Benzene exceeding the PCUL is present in soil in this area at a depth of approximately 5 feet bgs as indicated by soil samples collected during the supplemental investigation under the 1997 Agreed Order in 2007. TPH-G was detected exceeding the PCUL in soil at a concentration of 479 mg/kg at location MS-SB06. In addition to TPH-G, secondary COCs including 1,2,4-TMB (9.77 mg/kg) and 1,3,5-TMB (0.0744 mg/kg) were also detected at location MS-SB06 exceeding the PCUL. TPH-G (36 mg/kg) slightly exceeded the PCUL of 30 mg/kg in the parking area west of the 1934-1938 Market Street Building.
- **Market Street and Jefferson Avenue.** Benzene (primary COC) exceeding the PCUL is present in soil within the Market Street and Jefferson Avenue ROWs east (downgradient) of 1956 Jefferson Avenue and 1934-1938 Market Street at depths ranging between 2 to 30 feet bgs. Shallow benzene contamination (i.e., depths between 0 to 5 feet bgs) is present at borings A10-B16, A10-B29, A10-B31, A10-MW6, and COT-MW2 with detected concentrations greater than the PCUL ranging from 0.0061 to 1.3 mg/kg. Benzene soil contamination extends to depths up to 30 feet bgs in this area in soil samples collected in borings UG-MW5, A10-B7, A10-B9, A10-B10, A10-B11, A10-B16, A10-B29, A10-B31, A10-

MW3S, A10-MW6S, UG-MW12, COT-MW1, and COT-MW2 with concentrations greater than the PCUL ranging from 0.0020 to 0.43 mg/kg. **Jet Parking.** Benzene (primary COC) exceeding the PCUL is present across the central and southern portions of Jet Parking at depths between approximately 5 and 25 feet bgs. The highest detected concentrations are located in the southwestern portion of the property on and adjacent to the historic footprint of the City Fuel Company, as indicated by soil samples collected from borings A10-MW4S, A10-MW4D, A10-B12, A10-B13 and A10-B26. The detected concentrations were reported up to 0.40 mg/kg at depths between approximately 5 to 21 feet bgs. However, benzene was also detected at concentrations greater than the PCUL in soil samples collected in the southern and central portions of the Jet Parking lot as shown on Figure 16-8. The detected concentrations greater than the PCUL ranged between 0.0018 and 0.29 mg/kg at depths between 4 and 25.5 feet bgs.

16.6.3. Groundwater

The nature and extent of COCs in groundwater are based on analytical data from groundwater samples collected during the 2016 Agreed Order RI and capital projects completed after 2016, which are representative of current conditions. Benzene was identified as the primary COC for groundwater at the Southerly Plume Site based on PCUL exceedances during one or more groundwater monitoring events. TPH-G, TPH-D, and TPH-O were identified as secondary COCs for groundwater at the Southerly Plume Site based on PCUL exceedances during one or more groundwater monitoring events. The extent of COC contamination in Qvi groundwater at the Site is east of 1956 Jefferson Avenue and 1934-1938 Market Street within the Market Street and Jefferson Avenue ROW and includes the western portion of the Jet Parking parcel. COC contamination was not observed in the Qva aquifer downgradient of the Southerly Plume Site based on the 2016 Agreed Order groundwater monitoring (groundwater results for A11-MW30D, Section 5.0). The nature and extent of COCs associated with the Southerly Plume are discussed below. The nature and extent of benzene (and TPH-G for comparison to the soil results) are shown in plan view on Figures 16-9 and 16-10 and in geologic cross section on Figure 16-11.

- **Market Street and Jefferson Avenue ROW.** Benzene contamination was detected within the Qvi groundwater in monitoring wells COT-MW1, COT-MW2, UG-MW6 and UG-MW12 in one or more monitoring events completed during the 2016 Agreed Order and/or City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project within portions of Market Street and Jefferson Avenue. The detected concentration of benzene at these locations ranged between 1.8 and 33 µg/L. Benzene was also detected at concentrations exceeding the PCUL in two grab groundwater samples collected from A10-B10 at depths between approximately 30 to 34 feet bgs (20 µg/L) and approximately 50 to 58 feet bgs (2.2 µg/L) within the Qvi aquifer. Benzene extends into the western portion of Jet Parking downgradient of this location as discussed below. Additionally, TPH-G was detected in the five 2016 Agreed Order groundwater samples collected from monitoring wells A10-MW3S and UG-MW6 located downgradient of the 1934 Market Street UST area at concentrations ranging from 650 to 1,500 µg/L. TPH-D and/or TPH-O were also detected in groundwater samples collected from borings A10-B7, A10-B9, and A10-B10 at concentrations exceeding the PCUL. Benzene and TPH groundwater contamination extends east and downgradient of this area as discussed below.
- **Jet Parking.** Benzene contamination was detected in Qvi groundwater during multiple monitoring events completed during the 2016 Agreed Order along the western portion of Jet Parking and represents the highest concentrations within the Southerly Plume. The highest concentrations of benzene in groundwater were detected in well A10-MW4S between 1,600 to 3,800 µg/L near the former location of City Fuel Company, which historically operated in this area. Other benzene

concentrations in groundwater along the western edge of Jet Parking ranged between 2.3 to 85 µg/L in groundwater samples collected from borings A10-B12, A10-B13, and A10-B14 and from monitoring wells A10-MW1S, UGMW1, and JP-MW2. In addition, TPH-G was detected in two groundwater samples collected from A10-MW1S (1,200 µg/L, each), and in one groundwater sample collected from A10-MW5S (960 µg/L) located east and downgradient of TPH-G groundwater contamination identified in Market Street and Jefferson Avenue. TPH-D groundwater contamination is limited in extent in this area and was detected in three groundwater samples collected from borings A10-B12, A10-B14, and monitoring well A10-MW1S at concentrations ranging from 560 to 860 µg/L.

Benzene and TPH-D groundwater contamination is bounded to the east and downgradient by monitoring wells JP-MW1R, PL-MW1, and A10-MW5S. TPH-G was detected at a concentration exceeding the PCUL in only the September 2019 groundwater sample collected from monitoring well A10-MW5D (960 µg/L) and was less than the PCUL in the two subsequent events (670 and 730 µg/L) indicating this location is near the edge of the TPH-G groundwater contamination plume. CVOC (TCE, cis-DCE, trans-DCE, DCE, vinyl chloride, and chlorobenzene) groundwater contamination within the Southerly Plume originates from sources associated with the Easterly Plume and is discussed further in Section 15.0.

16.6.4. Stormwater System and Building Drains

Petroleum-related contaminants were detected in sediment and water samples collected within the stormwater system at concentrations greater than the PCUL as follows.

- TPH-G and TPH-D were detected in sediment samples collected from two stormwater catch basins located west of the Market Street Building (PS14-DS1 and PS14-DS2) and a sump located inside the Market Street Building (MS-SUMP1). TPH-G and TPH-D were also detected in water samples collected from catch basins PS14-DS1 and PS14-DS2. The drains are connected to the City stormwater system in Market Steet and subsequently directed to the Regional Stormwater Treatment Facility in PLT and Outfall 235. However, the detected concentrations at this location do not suggest a widespread release but are more in line with what would be typically observed in a stormwater collection system for a parking lot and/or light industrial facility.

16.6.5. Soil Vapor and Indoor Air

Based on the results of the soil and groundwater representing current conditions, TPH-G, TPH-D and benzene were identified as COCs with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SL for the protection of commercial workers. The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination**. Petroleum-related contaminants in soil were evaluated for potential VI based on Ecology's 2022 VI Guidance. Ecology's guidance states buildings located within the inclusion area (30 feet horizontal and 15 feet vertical separation distance) of soil with TPH-D concentrations greater than 250 mg/kg, TPH-G concentrations greater than 100 mg/kg, and benzene concentrations greater than 10 mg/kg, may be at risk of VI into indoor air (1064). An evaluation of the potential for VI based on current conditions at the Southerly Plume and the surrounding area is discussed below:

- Residual TPH-G contamination at boring MS-DP12 located adjacent to the Market Street Building is within the recommended 30 feet separation distance but the detected concentration was less than the 100 mg/kg VI risk threshold for TPH-G.
- Residual TPH-G contamination at boring MS-SB06 is located at a distance greater than the recommended 30 feet separation distance recommended by Ecology under the VI guidance from any enclosed space. The base of the sanitary sewer line servicing the 1934 Market Street Building is located within 15 vertical feet of the TPH-G contaminated soil at boring MS-SB06 and the utility trenches associated with the sanitary sewer may serve as a preferential pathway for soil vapor. However, the horizontal distance along the utility trench to the Market Street Building is greater than 100 feet bgs, which is likely a sufficient distance to allow for the biodegradation of vapors based on the distance. Therefore, the residual TPH-D and TPH-G contamination is not a potential threat for VI in this area.
- Petroleum-related contamination in stormwater catch basin/drain sediment and water samples collected from the Market Street Building is not considered to be representative of current conditions and not a potential threat for VI.

- **Petroleum-Related Groundwater Contamination**. TPH-G, TPH-D and benzene either were not detected in groundwater, were detected at concentrations less than the SL for groundwater VI, or the detections were located at a distance greater than the recommended 30 feet separation distance recommended by Ecology under the VI guidance from any enclosed space. Therefore, petroleum-related groundwater contamination in the area is not considered a potential VI threat.
- **Other Contaminants**. CVOCs including TCE, cis-DCE, DCE, chlorobenzene and vinyl chloride exceeded the SL for groundwater VI. The potential for VI resulting from CVOCs associated with the Easterly Plume that extends beneath the Southerly Plume is further discussed in Section 15.0.

16.7. Contaminant Fate and Transport

The Southerly Plume primarily consists of benzene contamination within the Qvi soil and groundwater aquifer likely sourcing from historical City Fuel Company operations at Jet Parking and potentially from historical automotive and electrical repair operations at 1934-1938 Market Street (1934-1938 Market Street Source Area) and 1954 Jefferson Avenue (Jefferson Avenue Source Area). Additionally, TPH-G contamination released to soil and groundwater from former gasoline USTs (historically in use at 1934-1938 Market Street) is present within the Market Street and Jefferson Street ROWs. Other petroleum-related COCs, including TPH-D, TPH-O, toluene, ethylbenzene, and total xylenes were identified as secondary COCs because they are generally located in close proximity to the source area and are limited in extent and generally collocated with TPH-G and benzene. TPH-D and TPH-O are not widespread within the Southerly Plume although TPH-D and TPH-O were detected in the stormwater drains west of the Market Street Building. Additionally, the detected concentrations are generally consistent with the expected concentrations of a stormwater catch basis system for a light industrial/commercial parking lot.

Overall, the chemical properties of contaminants and the physical, chemical, and biological processes that they are exposed to affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed in Section 18.0. Other factors influencing the transport of TPH-G, benzene, and other petroleum-related COCs within the Southerly Plume include the location of contaminant sources, geology and hydrogeology, and storm sewer utility networks. In general, COCs migrated vertically from the point of release through the soil column to the groundwater table.

Dissolved phases COCs within the Qvi aquifer then migrated horizontally downgradient within preferential flow paths (including but not limited to the Qvi channel deposits) and laterally by dispersion and diffusion as shown on cross section FZ-FZ' (Figure 16-11).

Soil and groundwater contamination for the Southerly Plume Site is predominantly beneath portions of the UWT Campus that are capped by paved ROWs and parking lots preventing direct exposure (Figures 16-1 and 16-11). TPH-G and benzene have the potential to migrate through soil vapor into indoor air. However, buildings with enclosed spaces are located a sufficient distance from the COCs to make the potential for VI low. Overall, groundwater monitoring completed as part of the 2016 Agreed Order RI indicates that the leading edge of the Southerly Plume Site is stable likely due to dilution, sorption and/or natural attenuation and that the further migration of the Southerly Plume east onto PLT is not occurring.

Source areas for the Southerly Plume and lines of evidence supporting historical operations as the source(s) are discussed in Section 16.4.3. Geologic and hydrogeologic conditions with the Southerly Plume contributing to the contaminant fate and transport are discussed in Section 16.4.2. The fate and transport for TPH and benzene associated with the Southerly Plume are described by source area in the following sections (Sections 16.7.1 through 16.7.5).

16.7.1. 1934-1938 Market Street (1934-1938 Market Street Source Area)

Releases from the gasoline UST located east of 1934-1938 Market Street migrated through the soil column to the Qvi aquifer before migrating beneath portions of the Market Street and Jefferson Avenue ROWs to the east. Gasoline USTs were historically in operation during the 76 Gasoline fuel supply and auto repair time period between 1925 and 1940.

16.7.2. 1956 Jefferson Avenue (Jefferson Avenue Source Area)

Historical operations at 1956 Jefferson Avenue may have used benzene as a solvent during electrical repair services between 1947 and 1978. As a result, releases and or discharges of benzene to the stormwater and/or sanitary sewer may have been transported from the property through side laterals to Market Street where they may have been released through identified breaks/cracks in the terra cotta pipes used to construct these utilities (see Figure 16-11). Benzene released to the surrounding soil from this location migrated through the soil column to the Qvi aquifer. Benzene migrated downgradient within the Qvi aquifer beneath portions of Market Street and Jefferson Avenue before commingling with the benzene released within these ROWs and/or Jet Parking as a result of historical land use. Analytical results for soil samples collected within Market Street and Jefferson Avenue indicated localized releases of benzene (as shallow as 2 feet bgs). Benzene migrated through the soil column to the Qvi aquifer where it then migrated downgradient toward Jet Parking.

16.7.3. Jet Parking Source Area

The highest concentrations of benzene are observed in the vicinity of the former City Fuel Company, which historically operated between 1926 and 1949 in the southern portion of Jet Parking. Historically, benzene was commonly used as an antiknock agent for gasoline in cars from the 1920s to the 1950s. It is possible that the City Fuel Company sold bottles of benzene for this purpose or stored drums of benzene for retail and was released to soil through dumping or poor housekeeping in the vicinity of the former office (i.e., benzene hot spot). Benzene migrated through the soil column at this location to the Qvi aquifer. Groundwater data indicated that the benzene plume is relatively stable and/or is slowly shrinking through

natural attenuation processes and is not migrating to the east of Jet Parking or impacting the Qva aquifer (see results for A11-MW30D, Section 5.0).

16.7.4. Other Potential Sources.

Historical use within Jefferson Avenue, including trolley services and/or other unknown spills/releases which may have occurred within the Jefferson Avenue ROW vicinity and/or potentially imported fill from unknown sources in the early 1900s.

16.8. Summary

Remedial excavation activities completed between approximately 1996 and 2013 resulted in the removal of petroleum contamination in the southeast portion of Jet Parking associated with former gasoline and heating oil USTs. Additionally, the results of the RI confirmed that petroleum-contaminated soil generated from these remedial activities, in addition to other petroleum-contaminated soil imported to Jet Parking for ex-situ enhanced biological remediation (which was later used to infill portions of the property), has not adversely impacted soil and groundwater.

However, the results of the RI indicate that historical land use and operations at 1934-1938 Market Street, 1947 Jefferson Avenue (Jet Parking), and 1956 Jefferson Avenue and spills/releases in portions of Market Street and Jefferson Avenue, resulted in the release of benzene (and to a lesser degree, toluene, ethylbenzene, xylenes, TPH-G, TPH-D and TPH-O; Figure 16-1) to soil which has migrated vertically through the soil column to impact groundwater (Qvi aquifer). While a specific point-source could not be identified for the Southerly Plume, likely historical activities include the potential use of solvents (i.e., benzene) during electrical repair services at 1956 Jefferson Avenue between 1947 and 1978, historical operations at Jet Parking (1947 Jefferson Avenue) by the City Fuel Company between 1926 and 1949, as well as other unknown spills and/or releases to soil within portions of Market Street and Jefferson Avenue. Additionally, gas and oil services at 1934-1938 Market Street during the late 1920s and early 1940s as well as releases from drips, spills and/or imported soil used to grade portions of Market Street and Jefferson Avenue, have resulted in the presence of these contaminants.

Currently, benzene in soil exceeding the PCUL typically ranges from approximately 5 to 25 feet bgs but can be as shallow as 2 feet bgs within portions of Jefferson Avenue. In groundwater, benzene, TPH-G, TPH-D and TPH-O exceedances of the PCULs are located within portions Market Street and Jefferson Avenue and in the western/central portions of Jet Parking. The contaminant plume in groundwater appears to be stable and/or is slowly shrinking through natural attenuation processes and is not observed migrating downgradient to the east based on the results of the 2016 RI. Paved surfaces (ROW, sidewalks and/or parking areas) are preventing direct contact with this contaminant and are limiting the infiltration of stormwater that could further contribute to contaminant leaching from soil to groundwater and the downgradient migration of benzene to the east.

Soil, groundwater and stormwater data for the Southerly Plume are presented in Tables 16-5 through 16-7, respectively. The nature and extent of primary COCs in soil and groundwater are shown in plan view on Figure 16-1, by chemical/media on Figures 16-7 through 16-10, and in cross section on Figure 16-11.

17.0 REMEDIAL INVESTIGATION—AREA-WIDE SOIL

17.1. Introduction

Area-Wide Soil includes the UWT Campus encompassing the area north of South 21st Street, south of South 17th Street, west of Pacific Avenue, and east of Tacoma Avenue South in Tacoma, Washington (Figure 17-1). Environmental data collected during previous and more recent soil studies (Section 17.3) provide the information needed to define the nature and extent of contamination in media of concern and to complete an evaluation of cleanup actions to address the identified contamination. The purpose of this section is to summarize soil contamination on the UWT Campus that is not related to a previously identified Property-Specific or Area-Wide AOCs discussed in Sections 5.0 through 16.0. Locations and chemical analytical data presented in this RI section include:

- Areas of contaminated soil that were not previously discussed in Sections 5.0 through 16.0.
- Soil within 30 feet of the ground surface.
- Soil that is still present (i.e., has not been removed or treated during previous remedial actions or capital projects).
- Soil samples with TPH, petroleum-related VOCs, PAHs, and metals analyses.

An evaluation of soil sample results representing current conditions and locations not addressed in other RI sections is presented in Table Q-37 (Appendix Q). In addition, soil sample results representing current conditions were screened to evaluate the potential for VI (Table Q-38, Appendix Q). Groundwater was not evaluated as part of the Area-Wide Soil impacts. Furthermore, 37 USTs were removed or closed in place since the 1990s, as discussed in Section 4.0. Seven of the 37 USTs removed or closed within the UWT Campus not previously discussed in Sections 5.0 through 16.0 are presented below.

These data indicate the presence of TPH-G, TPH-D, and TPH-O, petroleum-related VOCs including BTEX and 1,2,4-TMB, PAHs (including naphthalene and cPAHs) and metals (including arsenic, cadmium, and lead) within the UWT Campus at concentrations greater than the PCULs resulting from placement of contaminated fill material from unknown sources, grading material used at the property prior to development, atmospheric deposition from historical combustion (vehicle emissions, burning, etc.) and/or lead-based paint on historic buildings (Figure 17-1). Existing buildings, hardscapes (sidewalks, pedestrian pathway, streets) and/or landscaped areas predominantly prevent direct contact with the residual contamination identified within the UWT Campus. However, the results of the RI have identified select areas within the western portion of UWT Campus in which cPAHs and/or metal-contaminated soil is present at the local ground surface. Where TPH and/or petroleum-related VOC contamination is present, the surrounding buildings are located at a sufficient distance to prevent the migration of contaminant vapors from entering the occupied indoor spaces and/or the impacted soil is unlikely to cause a VI issue based on previous soil vapor/indoor sampling and the presence of commercial HVAC systems (discussed in previous sections). Currently, the stormwater collection system for the UWT Campus prevents the infiltration of precipitation that could contribute to contaminant leaching from soil to groundwater on the majority of the UWT Campus. Areas where stormwater infiltrates into unpaved portions of the UWT Campus (i.e., western portion) generally contain less soluble and less mobile COCs, as discussed in Section 18.0. Residual soil contamination within the Area-Wide Soil is stable based on the groundwater sampling results and is not migrating off property.

Specific details regarding the property conditions for the UWT Campus including location and description, historical property use, current and future property use, and utility infrastructure are presented in Section 2.0 and summarized below. RI activities completed to date supporting the development of the CSM to define the nature and extent of contamination associated with Area-Wide Soil are also summarized below.

17.2. Property Conditions

17.2.1. Location and Description

UWT Campus includes approximately 46 acres encompassing the area north of 21st Street, south of South 17th Street, west of Pacific Avenue, and east of Tacoma Avenue South for the Campus (Figure 17-1). The core area of the Campus is composed of parcels of land acquired by UW from a variety of commercial and industrial property owners. As previously discussed, UW does not own several parcels west of Jefferson Avenue and along Pacific Avenue, however, it is the overall goal of UW to acquire these properties as they become available for purchase.

17.2.2. Historical Land Use

The eastern portion of the UWT Campus is located within the Union Station/Warehouse Historic District of Tacoma Washington. The Union Station/Warehouse Historic district was initially developed (typically with warehouses) in the late 1880s and early 1900s following development of the first transcontinental railroad (now PLT). The buildings along this corridor generally had two access points—street side and rail side. The street side included stores like grocery, stoves companies, paper companies, dry goods, etc. Loading and unloading of import and export products occurred on the rail side of the buildings.

The western portion of the UWT Campus and the area west of Market Street consisted of housing (apartments and single family), hotels, corner stores and unions/societies halls since the early 1900s. Commercial historic buildings and land uses are shown on Figure 17-2, however, historic residences in this area are not included. Currently, the majority of the historic buildings/residences have been demolished as shown on Figure 17-3 pending redevelopment by UW.

During historical operations, heating oil USTs were commonly used for historic buildings and/or residences. A total of 37 USTs were removed and/or closed in place by UW or previous owners within the UWT Campus Master Plan boundary based on a review of historical documents. The former South 19th Street ROW and portions of the Commerce Street ROW were also vacated and redeveloped as the pedestrian corridors following acquisition by UW to support the UWT Campus in the 1990s. Additionally, the former Northern Pacific/BNSF rail corridor was gifted to UW in 2013 and the area was redeveloped as a pedestrian corridor (PLT).

Additional details about the historical land use are further described in Section 2.1.2.

17.2.3.Current and Future Land Use

In 1993, the first UWT Campus Master Plan was completed and set the initial vision for a new higher education campus located in the Union Station/Warehouse District of downtown Tacoma and development/redevelopment of buildings east of Jefferson Avenue. The Master Plan was revised in 2008 to include development plans between Pacific Avenue and Tacoma Avenue South. Anticipated future land use in this area will remain academic to support the UWT Campus with academic, commercial and

residential buildings, surface streets and pedestrian access. Additional details about the current and future land use are described in Section 2.1.3. The footprint of the current buildings along with associated subsurface utilities and adjacent properties is shown on Figure 17-3.

17.2.4. Utility Infrastructure

Current utility infrastructure within the UWT Campus is generally described in Section 2.0 with specific details provided in Sections 5.0 through 16.0 as they relate to preferential pathways for contaminant migration. Utility infrastructure within the UWT Campus does not pose a significant threat to the potential contaminant migration given the nature and extent of contamination for the Area-Wide Site (i.e., shallow soil contamination above the water table; see Section 17.6) and is therefore not considered a preferential pathway for Area-Wide Soil.

17.3. Field Investigations and Remedial Actions

Multiple environmental investigations have been completed to evaluate subsurface conditions throughout the UWT Campus since the early 1990s as described in Section 4.0. Environmental investigations documenting soil conditions and remedial actions completed since this time supporting the characterization for Area-Wide Soil are discussed in Sections 17.3.1 through 17.3.6 below. Locations and associated environmental data for the UWT Campus as a whole were evaluated and screened to only include environmental data representing soil conditions in areas located beyond/outside of the previously identified contamination Sites described in Sections 5.0 through 16.0.

Sampling locations used to evaluate soil conditions for Area-Wide Soil are shown on Figures 17-4 through 17-7. Investigations supporting the characterization for Area-Wide Soil are summarized in Table 17-1. Soil results for the subsurface investigations completed are presented in Table 17-2. Groundwater evaluations are discussed in other RI sections and are not included in this section.

17.3.1. Pre-1997 Agreed Order Investigation and Remedial Action

Multiple environmental investigations and remedial action were completed prior to implementation of the 1997 Agreed Order in the eastern portion of the UWT Campus either initiated by UW or others to evaluate subsurface conditions. Soil sampling locations for the UWT Campus not previously discussed in Sections 5.0 through 16.0 and/or located beyond the limit of the previously identified contamination Sites (as defined by soil and/or groundwater PCUL exceedances) are shown on Figure 17-4. As part of these investigations, a total of 122 soil samples from 113 locations (Table 17-1) were analyzed for a combination of TPH, BTEX, select VOCs, PAHs, select metals and PCBs. Contaminants including TPH-G, TPH-D, TPH-O, arsenic and/or lead were detected in multiple samples collected from the ground surface to a depth of approximately 20 feet bgs. Soil sampling results are summarized in Table 17-2.

17.3.2. 1997 Agreed Order Investigation

URS, on behalf of UW, completed an RI for the UWT Campus between 1998 and 2002 in accordance with the 1997 Agreed Order. Area-Wide Soil was not specifically identified as an area requiring investigation under the 1997 Agreed Order. However, investigation activities completed under the 1997 Agreed Order RI provide additional subsurface characterization data for the eastern portion of the UWT Campus. In general, the focus of the 1998 through 2002 RI work completed in this portion of the UWT Campus was to evaluate the nature and extent of previously identified petroleum-related contamination at the Cragle, Jet

Parking, Snoqualmie Library, and Shaub-Ellison properties. Investigation activities were also completed to evaluate CVOC and petroleum-related contamination at the GWP Building (former Howe).

The investigation activities and associated results completed under the 1997 Agreed Order RI are discussed in detail in the previous sections as they relate to the individual areas being evaluated (see Table 2-1). Soil sampling locations supporting the Area-Wide Soil characterization are shown on Figure 17-4. The schedule of analyses and chemical analytical results are summarized in Tables 17-1 and 17-2, respectively. As indicated above, areas/locations in which COCs associated with historical operations and land use for the properties are not being included for the Area-Wide Soil evaluation and are further discussed in previous sections of this report as referenced above. AOC boundaries associated with Cragle, Jet Parking, Snoqualmie Library, and Shaub-Ellison properties are shown on Figure 17-1.

Investigation activities under the 1997 Agreed Order resulted in the collection and analysis of 109 soil samples from 72 locations to support the Area-Wide Soil characterization (Table 17-1). Soil samples were analyzed for a combination of TPH, BTEX, select VOCs, PAHs, and select metals. TPH-G, TPH-D, TPH-O, BTEX, cPAHs, naphthalene, arsenic and lead were detected in multiple samples and locations at depths ranging between the ground surface and approximately 20 feet bgs. Chemical analytical results are presented in Table 17-2.

One 300-gallon heating oil UST was also closed in place in the northeast portion of the current Keystone Building in September 2000 during the 1997 Agreed Order RI. Visual inspection of the UST and surrounding soil showed no sign of leakage. Two soil samples (Key-HA-2 and Key-HA-3) were collected in the vicinity of the UST for chemical analysis for TPH. Low level concentrations of TPH-D and TPH-O (46 mg/kg or less) were detected in these samples. Additional investigation in this vicinity was not completed based on the soil sample results.

17.3.3. Supplemental Remedial Action and Investigations Under the 1997 Agreed Order

Supplemental investigation activities were completed in accordance with the 1997 Agreed Order to further evaluate soil conditions between 2005 and 2013. In general, the purpose of the investigations was to further evaluate the extent of contaminants associated with Cragle and the Westerly, Northerly, Easterly and Southerly Plumes and included the western portion of the UWT Campus. The details of the investigations are summarized in other RI sections as referenced in Table 2-1. The supplemental investigations also evaluated soil conditions in areas identified by the UW as potential development areas in 2013, which included an evaluation of TPH, PAHs and metals in surficial soil as well as EM/GPR survey to evaluate the presence of potential abandoned USTs within the identified development areas. Furthermore, based on the results of the 1997 Agreed Order RI, a remedial action was completed for 1742 Jefferson and Shaub-Ellison as further described in Sections 8.0 and 11.0, respectively. Supplemental soil sampling locations beyond the previous AOC boundaries supporting the Area-Wide Soil characterization are shown on Figure 17-4 and summarized in Table 17-1. Investigation activities supporting the Area-Wide Soil characterization are summarized in Sections 17.3.3.1 and 17.3.3.2 below.

17.3.3.1. Soil Investigation Summary

A total of 390 soil samples from 125 locations (see Table 17-1) are being utilized to characterize subsurface conditions associated with Area-Wide Soil. Soil samples were analyzed for a combination of TPH, BTEX, select VOCs, PAHs, select metals and PCBs. Metals including arsenic, cadmium, and lead were frequently detected in shallow soil (0 to approximately 5 feet bgs) in the western portion of the UWT Campus. TPH-G,

TPH-D, TPH-O, BTEX, 1,2,4-TMB, cPAHs, and naphthalene were also detected, however, were less frequent. Soil sample results are summarized in Table 17-2. CVOCs identified in soil are associated with either the Westerly, Northerly, or Easterly Plumes as discussed in sections referenced by Table 2-1.

17.3.3.2. UST Evaluation

An EM and GPR survey were completed in 2013 on 11 UW-owned properties (1A through 1H and 2A through 2C; Figure 17-5) to evaluate the potential presence of USTs. In general, the EM survey was completed for the entire parcel while the GPR survey was used to focus on areas where the EM survey indicated the presence of a potential magnetic anomaly. A total of 22 anomalies were identified during the EM/GPR survey. Of the 22 anomalies, 13 were further investigated in areas of former commercial buildings or apartments using exploratory TPs in June 2013. The remaining nine anomalies were not investigated due to access limitations. In general, metal debris (buckets, pipes, chicken wire, construction debris, and fencing) was observed in the TP explorations. At locations 1B-A2, 1B-A3, 1B-A4, 1B-A5, 1C-A1, 1C-A2, 1D-A3, and 1D-A4, the TP explorations identified piping that was indicative of a former UST. However, USTs at these locations were not identified.

17.3.4. 2016 Agreed Order Investigation

RI activities conducted under the 2016 Agreed Order between 2016 and 2020 to further evaluate soil and groundwater conditions were completed in accordance with the RI Work Plan and subsequent addenda (Section 4.0). RI activities related to Area-Wide Soil included collection of soil samples from 178 soil borings for chemical analysis of TPH, VOCs, metals, and PAHs (see Tables 17-1). The investigation findings completed to evaluate the nature and extent of petroleum- and/or CVOC-contamination associated with other Property-Specific and Area-Wide AOCs (Table 2-1) are discussed in previous RI sections of this report. Soil sampling locations utilized to support the Area-Wide Soil characterization are shown on Figure 17-6 and summarized in Table 17-1. Chemical analytical results are summarized in Table 17-2.

A total of 404 soil samples from 90 locations from the 2016 Agreed Order RI are being used to characterize conditions for Area-Wide Soil (Tables 17-1 and 17-2). Soil samples were analyzed for a combination of TPH, BTEX, VOCs, PAHs, and select metals. TPH-G, TPH-D, TPH-O, toluene, total xylene, cPAHs, naphthalene, arsenic, cadmium and lead were detected in multiple soil samples as summarized in Table 17-2. CVOCs detections are discussed in other RI section as referenced in Table 2-1.

17.3.5. Environmental Due Diligence

Investigations activities were completed to evaluate soil conditions in connection with property acquisitions by UW and others and provide information that is being used to support the Area-Wide Soil characterization. These investigations are summarized in Sections 17.3.5.1 through 17.3.5.8 below. Soil sampling locations are shown on Figures 17-6.

17.3.5.1. 1934-1938 Market Street Underground Storage Tank Removal and Closure

Four USTs were removed from the 1934-1938 Market Street Building property in July 2000 in connection with the purchase of the property by others. The USTs consisted of two 500-gallon gasoline USTs located beneath the City of Tacoma sidewalk east of the building, and one 675-gallon waste oil/gasoline UST, and one 550-gallon heating oil UST located in the parking area behind the building. The UST removal activities are further discussed in Section 15.3.6.1.

A total of 15 confirmation samples were collected on the limits of the excavation relevant to Area-Wide Soil (Table 17-1). The samples were analyzed for a combination of chemical analyses for TPH-G, TPH-D, TPH-O, BTEX, and lead. One sample was analyzed for select VOCs and PCBs. TPH-G and total xylenes were detected in one soil sample (MS-UST-1). Lead was detected in three soil samples analyzed.

17.3.5.2. Kosin Environmental Due Diligence Summary

Phase I and Phase II ESAs were conducted at the Kosin property located at 1902, 1908 and 1914 Market Street (Pierce County Parcel Nos. 2019080010, 2019080020 and 2019080030) in 2003 in connection with the purchase of the properties by UW (Figure 17-7). The Phase II ESA consisted of nine soil borings (KS-KB-1 through KS-KB-6 and KS-KHA1 through KS-KHA3). Soil samples were analyzed for a combination of TPH-D, TPH-O and VOCs. TPH-D, TPH-O, toluene, and total xylenes were detected in select soil samples as summarized in Table 17-2.

17.3.5.3. Strom Environmental Due Diligence and Remedial Action Summary

Phase I and Phase II ESAs followed by a remedial action were completed at the Strom Building located between 1727, 1733, 1735, and 1737 Fawcett Avenue (Pierce County Parcel Nos. 2017090060 and 2017090070, 2017090080, 2017090090) in 2003 and 2004 in connection with purchase of the property by UW (Figure 13-6B). The Phase II ESA consisted of the completion of four shallow borings (SO-SB001 through SO-SB004) and four surface samples (SB-SS001 through SB-SS004). Soil samples collected from these borings were analyzed for a combination of TPH, select VOCs, select metals, PAHs, SVOCs, and PCBs.

TPH-D, TPH-O, and lead-impacted soil were encountered near the ground surface during the Phase II ESA. Subsequently, the former property owner excavated one area to a depth up to 3 feet bgs to remove the TPH-impacted soil and collected confirmation samples on the base and sidewalls. The soil sample locations and chemical analytical data representing soil remaining in place are shown on Figure 17-6 and summarized in Table 17-2.

17.3.5.4. McDonald Smith Building Environmental Due Diligence

Phase I and Phase II ESAs were conducted at the MDS Building in June 2006 in connection with purchase of the property by UW. The Phase II ESA consisted of the completion of eight soil borings (MDS-SB-1 through MDS-SB-8) within the footprint of the building. Soil samples were analyzed for a combination of TPH-G, TPH-D, TPH-O and select VOCs. The sample locations and chemical analytical data are shown on Figure 17-6 and summarized in Table 17-2.

17.3.5.5. Merlino Environmental Due Diligence Summary

Phase I and Phase II ESAs were conducted at the Merlino property located at 1920 Fawcett Avenue (Pierce County Parcel No. 2019010040) in 2008 in connection with the attempted purchase of the property by UW (Figure 17-6). The Phase II ESA consisted of the completion of 25 soil borings (MER-KSB-1 through MER-KSB-25). As part of this investigation, a total of 55 soil samples from 22 locations were analyzed for a combination of TPH-G, TPH-D, TPH-O, select VOCs, and select metals. The sample locations and chemical analytical data are shown on Figure 17-6 and summarized in Table 17-2. CVOCs detected in soil are further discussed in Section 13.0 (Westerly Plume). Ultimately, UW elected not to purchase the property and it is currently owned by a private entity.

17.3.5.6. Lam Environmental Due Diligence Summary

Phase I and Phase II ESAs were conducted at the Lam property located at 1726 Market Street (Pierce County Parcel No. 2017080040) in 2013 in connection with the purchase of the property by UW (Figure 17-6). The Phase II ESA consisted of a GPR survey to investigate the potential presence of USTs on the property and the completion of three TPs and the collection of soil samples. The results of the GPR survey did not identify USTs at the property. Soil samples collected during this investigation were analyzed for a combination of TPH-D, TPH-O, select VOCs, and select metals. Arsenic and lead were detected in select soil samples as summarized in Table 17-2. Other contaminants were not detected in the analyzed samples. UW elected to purchase the property based on the results of the investigations.

17.3.5.7. Frederick Wilds Environmental Due Diligence Summary

Phase I and Phase II ESAs were conducted at the Frederick Wilds Building located between 1910 and 1916 Jefferson Avenue (Pierce County Parcel No. 2019070020) in July 2013 in connection with purchase of the property by UW (Figure 17-6). The Phase II ESA consisted of a GPR survey to investigate the potential presence of USTs on the property and completion of nine soil borings (FW-B01 through FW-B08 and FW-B10) and collection of one sediment sample (FW-B09) from a manhole of unknown use located on the west side of the property.

A total of 16 soil samples from nine locations were collected and submitted for chemical analysis as part of this investigation (Table 17-1). Soil samples were analyzed for a combination of TPH-HCID, VOCs, PAHs and metals. Ethylbenzene, total xylenes, 1,2,4-TMB, naphthalene, cPAHs, and lead were detected in select soil samples as summarized in Table 17-2. Other contaminants were not detected in the analyzed samples. UW elected to purchase the property based on the results of the Phase I and II ESAs.

17.3.5.8. 1934 Market Street Phase II Environmental Site Assessment

Phase I and Phase II ESAs were conducted at 1934-1938 Market Street in December 2018 to evaluate soil conditions at the properties prior to purchase by UW (296). The Phase II ESA consisted of completion of 18 borings (Figure 17-6).

A total of 39 soil samples were collected from the borings and submitted for chemical analysis as part of this investigation (Table 17-1). Soil samples were analyzed for a combination of TPH-HCID, TPH-G, TPH-D, TPH-O, VOCs, PAHs, select metals and PCBs. TPH-G, TPH-D, TPH-O, naphthalene, cPAHs, lead and PCBs were detected in select soil samples as summarized in Table 17-2. CVOCs and other petroleum-related detections are further discussed in Sections 15.0 and 16.0 (Easterly and Southerly Plumes). UW elected to purchase the property based on the results of the Phase I and II ESAs.

17.3.6. Capital Projects

Investigation and remedial action activities were necessary to implement UW Capital Projects. Similar investigations were conducted by the City to support planning and design for various ROW utility projects. Capital projects and investigation activities supporting the Area-Wide Soil characterization are summarized in Sections 17.3.6.1 through 17.3.6.20 below. Soil sampling locations are shown on Figure 17-6.

17.3.6.1. Walsh Gardner Capital Project

One 575-gallon heating oil UST was removed from within the Walsh Gardner Building located at 1908 Pacific Avenue in April 1996. Visual inspection of the UST indicated slight corrosion and pitting, but no visible corrosion holes. Approximately 5 cubic yards of soil were excavated during UST removal activities and transported to Jet Parking for treatment (see Section 16.0). A total of five soil samples were collected

at the final limit of the UST removal excavation and analyzed for TPH-G, TPH-D, TPH-O, and BTEX. TPH-O was detected in two soil samples as summarized in Table 17-2. Other contaminants were not detected.

17.3.6.2. Science Building Capital Project

Buried piping associated with the former heating oil UST and soil with field indication (staining, sheen, odor, etc.) of petroleum contamination was encountered in May 2000 underneath the former WOF building slab during demolition (148). Subsequent investigation and remedial action were completed in 2000 and are discussed in Section 6.0.

A total of 20 soil samples from 20 discrete locations representing current conditions are shown on Figure 17-7 and summarized in Tables 17-1 and 17-2.

17.3.6.3. Former Sound Care Capital Project

One 300-gallon diesel UST was removed during the demolition of the former Sound Care building located at 1748 Jefferson Avenue in May 2000. Visual inspection of the UST indicated corrosion and petroleum-impacted soil surrounding the UST. Visually impacted soil was removed in May and additional excavation was completed in October 2000. A total of 72.26 tons of soil were excavated and transported off-site for disposal.

A total of seven soil samples were collected within the UST removal excavation and analyzed for a combination of TPH-D and TPH-O. One soil sample (SS-04) was over-excavated and not included in Table 17-2. TPH-D and TPH-O were not detected in the remaining analyzed soil samples (Table 17-2).

17.3.6.4. Mattress Factory Capital Project

One 2,000-gallon and one 500-gallon heating oil USTs were closed in place during redevelopment of the Mattress Factory Building located at 1953 South C Street in September 2000. Ten borings were completed to further evaluate soil conditions in the vicinity of and within the USTs removal excavation area located within Commerce Street (Figure 17-7).

A total of 11 soil samples from these borings were analyzed for a combination of TPH-D, TPH-O and/or BTEX. TPH-D and TPH-O were detected in select soil samples at this location (Table 17-2).

17.3.6.5. Phase IIB Utility Capital Project

Environmental investigations were completed between 2001 and 2002 as part of the planning and design for landscaping and utility installation activities to be completed between the Cherry Parkes and Mattress Factory buildings (155). Soil within the majority of the investigation and sample locations was excavated and removed as part of the landscaping and utility work completed following the investigations. Details of the investigation are discussed in Section 5.0.

Two soil samples from location MF-MW1 that represented current soil conditions were analyzed for a combination of TPH-G, TPH-D, TPH-O and select VOCs. Contaminants were not detected in these two samples (Table 17-2).

17.3.6.6. Cherry Parkes Capital Project

Environmental investigations were completed in April 2002 at the Cherry Parkes Building Capital Project. The purpose of the investigation was to characterize property subsurface conditions in preparation for construction. As part of this investigation, 11 soil samples from five locations (Table 17-1) were analyzed for a combination of TPH-G, TPH-D, TPH-O, select VOCs, and select metals. TPH-D, TPH-O, arsenic and lead

were detected in select analyzed soil samples (Table 17-2). CVOCs detected are discussed in Section 15.0 (Easterly Plume).

17.3.6.7. Assembly Hall Capital Project

Environmental investigations were completed at the William W. Philip Building (formally Assembly Hall) located at 1912 Pacific Avenue between 2004 and 2006 to characterize property soils in preparation for the construction of the William W. Philip Hall Building. As part of this investigation, a total of 12 soil samples from five locations were analyzed for a combination of TPH-HCID, TPH-G, TPH-D, TPH-O, VOCs, PAHs, and select metals. TPH-D, TPH-O, cPAHs, lead, and arsenic were detected in select soil samples as summarized in Table 17-2.

17.3.6.8. City of Tacoma 2005 Utilities Capital Project

The City of Tacoma rerouted the stormwater system between 1934-1938 Market Street and South 21st Street in 2005 due to damage to the utility during this capital project. The City collected three soil samples in the location of the new proposed utility (MS-1934 Market Street, MS-20th & Jefferson, MS-21st and Jefferson) to evaluate soil conditions. Contaminants were not detected in the analyzed soil samples.

17.3.6.9. Former Longshoreman Building Capital Project

One 1,000-gallon heating oil UST was removed during demolition at the former Longshoreman Building located at 1710 Market Street in October 2006. Visual inspection of the UST showed no sign of pinholes or failures. A total of two soil samples were collected at the final limit of the UST removal excavation and analyzed for TPH-D and TPH-O. TPH-D and TPH-O were not detected in the analyzed soil samples (see Table 17-2).

17.3.6.10. Stoneway Building Capital Project

One 2,000-gallon heating oil UST was removed during the redevelopment of the Stoneway Building located at 1914 Market Street in February 2007. Visual inspection of the UST showed no sign of pinholes or failures. A total of five soil samples were collected at the final limit of the UST removal excavation and analyzed for TPH-D and TPH-O. Low-level concentrations of TPH-D were detected in the two analyzed soil samples (Table 17-2).

17.3.6.11. Tioga Library Building Capital Project

Environmental investigations were completed for the TLB Capital Project located at 1907 Jefferson Avenue between February 2008 and 2012 to characterize property soils in preparation for the construction of the TLB. The majority of the soil at the analyzed sample locations was excavated during construction. However, additional confirmation samples were collected following building excavation to characterize soil left in place.

Eight soil samples from six locations representing current conditions are shown on Figure 17-7. Soil samples were analyzed for a combination of TPH-G, TPH-D, TPH-O, VOCs, PAHs, and select metals. TPH-D, TPH-O, benzene, naphthalene, cPAHs, arsenic, cadmium and lead were detected in select soil samples as summarized in Table 17-2.

17.3.6.12. Joy Building Capital Project

Environmental investigations were completed during the redevelopment of the Joy Building located at 1718 Pacific Avenue between February 2008 and 2009 to characterize property soils in preparation for redevelopment. One 700-gallon heating oil UST was removed during construction. Corrosion holes were observed in the UST and petroleum-impacted soil was observed around the UST at the time of removal.

Subsequently, approximately 55 cubic yards of petroleum-impacted soil were excavated and disposed of off-site.

In addition, an underground vault of unknown use was removed during construction, and petroleum-impacted soil was observed in the vicinity of the vault in December 2009. Petroleum-impacted soil was excavated in the vicinity of the vault and disposed off-site. The volume of petroleum-contaminated soil was not reported.

A total of 39 soil samples from 29 locations were analyzed for a combination of TPH-G, TPH-D, TPH-O, VOCs, PAHs, and select metals to verify soil conditions at the limit of the UST and vault removal excavation as well as evaluate soil conditions in other portions of the Joy Building. TPH-D, TPH-O, ethylbenzene, total xylenes, cPAHs, arsenic, cadmium and lead were detected in select soil samples as summarized in Table 17-2.

17.3.6.13. Market Street Utilities Capital Project

UW completed environmental monitoring and soil sampling in September and October 2012 during City replacement work for the sanitary sewer and water lines located in Market Street between South 21st Street and South 17th Streets (245). The purpose of the work was to collect soil samples during utility replacement work in areas where contaminants had been previously identified in soil and groundwater. Confirmation samples were also collected following excavation to confirm the conditions of the soil left in place.

A total of 29 soil samples from 29 locations as part of this investigation were analyzed for a combination of TPH-G, TPH-D, TPH-O and VOCs. TPH-G, TPH-D, TPH-O, BTEX, 1,2,4-TMB, and naphthalene were detected in select soil samples as summarized in Table 17-2. CVOCs detected are further discussed in Section 15.0 (Easterly Plume).

17.3.6.14. Prairie Line Trail Capital Project

Environmental investigations were completed during the redevelopment of the PLT pedestrian corridor located along the former Hood Rail corridor between March 2013 and March 2014 to characterize property soils in preparation for redevelopment. The details of investigations and remedial actions completed are discussed further in Section 7.0 (PLT).

A total of 69 soil samples from 56 locations representing current conditions were analyzed for a combination of TPH-HCID, TPH-G, TPH-D, TPH-O, VOCs, PAHs and select metals at the final limit of construction. Soil conditions associated with PLT are further discussed in Section 7.0.

17.3.6.15. Y Student Center Capital Project

Environmental investigations were completed during development of the Y Student Center (former Longshoreman and Lam properties) in September 2013 to characterize property soils in preparation for redevelopment and to evaluate impacts from the Westerly Plume. The details of investigations and remedial actions are further discussed in Section 13.0 (Westerly Plume).

A total of 28 soil samples from three locations representing current conditions were analyzed for a combination of TPH-HCID and VOCs as part of this investigation. Contaminants were not detected in the analyzed soil samples, with the exception of CVOCs. CVOCs detections are further discussed in Section 13.0 (Westerly Plume).

17.3.6.16. Tacoma Paper and Stationery Building Capital Project

Environmental investigations were completed during redevelopment of the TPS Building in October 2014 to characterize property soils in preparation for redevelopment and to evaluate impacts from the Northerly Plume. The details of investigations and remedial actions for the TPS Building are further discussed in Section 14.0 (Northerly Plume).

Investigation results unrelated to the Northerly Plume include six soil samples from location USC-MW1D for VOC analysis. VOCs (other than CVOCs) were not detected in the analyzed soil samples.

17.3.6.17. McDonald Smith Building Capital Project

Environmental investigations were completed during the redevelopment of the MDS Building in October 2014 to evaluate impacts from the Easterly Plume. The details of investigations and remedial actions are discussed in Section 15.0.

Investigation results unrelated to the Easterly Plume include four soil samples from location MDS-MW1D for VOC analysis. Ethylbenzene, total xylenes, 1,2,4-TMB, 1,3,5-TMB, n-propylbenzene and naphthalene were detected in select soil samples as summarized in Table 17-2. CVOCs detections are discussed further in Section 15.0 (Easterly Plume).

17.3.6.18. City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project

Environmental investigations were completed during planning for the City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project in December 2017 to characterize property soils in preparation for redevelopment and to evaluate potential impacts from the Westerly, Easterly and Southerly Plumes (see Sections 13.0, 15.0 and 16.0, respectively).

Investigation results unrelated to the Westerly, Easterly and Southerly Plumes include 15 soil samples from locations COT-MW3 through COT-MW5 collected within Jefferson Avenue which were analyzed for a combination of TPH-HCID, TPH-G, TPH-D, TPH-O, VOCs, PAHs, select metals and PCBs. TPH-O, BTEX, 1,2,4-TMB, 1,3,5-TMB, n-propylbenzene, naphthalene, cPAHs and lead were detected in select soil samples as summarized in Table 17-2. The City revised the planned orientation of the interceptor pipe, and it was moved to South 19th Street based on the results of the investigation.

17.3.6.19. South 19th Street and Fawcett Parking Lot Capital Project

UW expanded the existing parking lot at South 19th Street and Fawcett Avenue to the north in 2020. The project involved regrading and removal of soil in the area. Three confirmation soil samples were collected at subgrade to characterize soil present following construction activities. Soil samples were analyzed for a combination of PAHs and select metals. Naphthalene, cPAHs, cadmium and lead were detected in select soil samples as summarized in Table 17-2.

17.3.6.20. Milgard Hall Capital Project

Environmental investigation activities followed by remedial actions were completed between 2020 and 2021 as part of the planning and development of the Milgard Hall Capital Project. Investigation activities were performed in conjunction with the Milgard Hall Capital Project to evaluate soil conditions within and adjacent to the footprint of the construction area to ensure proper soil management and disposal. Details of the investigation are discussed in Section 5.0 (Cragle).

A total of 57 soil samples from 44 locations representing current conditions beyond the footprint of the Cragle Site are being used to support the Area-Wide Soil characterization (Table 17-1). Soil samples were

analyzed for a combination of TPH-G, TPH-D, TPH-O, BTEX, VOCs, PAHs, and select metals. Low level concentrations of TPH-D, TPH-O, toluene, 1,2,4-TMB, n-propylbenzene, naphthalene, cPAHs, and lead were detected in select soil samples as summarized in Table 17-2.

17.4. Conceptual Site Model

Development of the CSM for Area-Wide Soil is informed by the physical setting, local geologic and hydrogeologic setting, potential contaminant source and release mechanisms, transport processes, and exposure routes by which receptors may be affected. The CSM for Area-Wide Soil is based on the historical land use, results of the investigation activities performed, and current and anticipated future land use, and forms the basis for the PCULs used to evaluate contaminant nature and extent in media of potential concern. Sections 17.4.1 through 17.4.4 describe the specific elements of the Area-Wide Soil CSM.

17.4.1. Physical Setting

Area-Wide Soil encompasses the UWT Campus Master Plan. Demolition of former structures, remedial excavation, redevelopment of existing structures, development of new structures, utility infrastructure and pedestrian corridors were completed following property acquisition by UW since the early 1990s to support the UWT Campus Master Plan for higher education and learning.

17.4.2. Geologic and Hydrogeologic Setting

The geologic settings for Area-Wide Soil (described in the following sections) inform the distribution of contaminants in media of potential concern. Hydrogeologic conditions for the UWT Campus are discussed in Section 2.3.2. Local hydrogeologic conditions associated with other Property-Specific and Area-Wide petroleum and CVOC contamination Sites are further discussed in Sections 5.0 through 16.0.

17.4.2.1. Local Geology

Geologic units relevant to Area-Wide soil include the Qf and Qvi deposits. Key geologic features associated with these units are described below.

- **Fill (Qf).** Fill encountered in the borings within the UWT Campus consists of locally derived, reworked ice-contact deposits or imported fill material used within the former remedial excavations or as part of the Science Building Capital Project. Fill material extends up to 30 feet bgs and is primarily composed of silty sand with varying amounts of gravel and silt.
- **Vashon Ice-Contact Deposits (Qvi).** Qvi consists of till, subglacial channel materials and lacustrine materials deposited beneath the glacial ice along the ice margin during the last glacial period.

17.4.3. Sources of Contamination

The primary source of contamination for Area-Wide Soil is likely the result of contaminated fill placement from unknown sources, localized drips, spills and/or releases from unidentified sources, atmospheric deposition from historical combustion (vehicle emissions, burning, etc.) and/or use of lead-based paint on historic buildings.

17.4.4. Potential Receptors and Exposure Pathways

Current and future land uses were considered when evaluating potential receptors and exposure pathways for Area-Wide Soil. The current and planned future land use in this area will remain academic to support

the UWT Campus with academic, commercial and residential buildings, surface streets and pedestrian access. Existing buildings and hardscapes (sidewalks, pedestrian pathways, and streets) and landscaped areas prevent direct contact with the residual contamination in portions of the UWT Campus. However, cPAH- and metal-contaminated soil is present at the ground surface in limited portions of the UWT Campus in areas awaiting redevelopment by UW (i.e., western portion of the UWT Campus). It is assumed that future land use will be similar to its current use.

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

- **Direct Contact**. The UWT Campus is unlikely to pose risks to terrestrial ecological receptors based on the simplified TEE completed pursuant to WAC 173-340-7490 (see Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities.
- **Drinking Water.** Groundwater within the Qvi aquifer beneath the UWT Campus as a whole is not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.
- **Surface Water.** Surface water for Area-Wide Soil is not considered to be a current exposure pathway because the majority of ground surface is capped with hardscapes, stormwater is directed to stormwater utilities, and the Thea Foss Waterway is more than 1,000 feet east of the UWT Campus.
- **Indoor Air**. Multiple buildings are located within the UWT Campus. The potential for VI into these buildings from residual TPH-G and TPH-D impacted soil is further discussed in Section 17.6.4.

Potential receptors and exposure pathways for Property-Specific and Area-Wide petroleum and CVOC contamination Sites are further discussed in other RI sections as referenced by Table 2-1.

17.5. Proposed Cleanup Levels

PCULs were developed for Area-Wide Soil for the protection of human health and the environment for both soil and groundwater based on the CSM. Consistent with Ecology's MTCA Cleanup Regulation (WAC 173-340), the PCULs for soil and groundwater were developed based on the highest beneficial current and future land and water uses, potential exposure pathways, and the potential receptors specific to Area-Wide Soil. The general process for developing the PCULs on a UWT Campus-wide basis is described in Section 3.0. The basis for PCULs for Area-Wide Soil is as follows:

- **Proposed Soil Cleanup Levels**. PCULs for soil were developed using the standard MTCA Method B approach based on protection of human health for direct contact with soil and for protection of groundwater as drinking water calculated using the MTCA-fixed parameter three-phase partitioning model (WAC 173-340-747[4]). MTCA Method A soil cleanup levels are being applied where Method B cleanup levels are not established. Cleanup levels were adjusted for natural background and PQL as appropriate pursuant to WAC 173-340-705(6).
- **Proposed Indoor Air Cleanup Levels.** Indoor air PCULs are based on the MTCA standard Method B indoor air cleanup levels protective of human health for unrestricted land use (WAC 173340-750[3][b]) as well as indoor air SLs protective of human health for commercial worker exposure.

SLs for the protection of VI were also developed to evaluate whether contaminants detected in soil and/or groundwater have the potential to migrate into enclosed spaces at concentrations exceeding indoor air cleanup levels. The soil SLs are referenced from Ecology's VI Guidance (1064).

17.6. Nature and Extent of Contamination

17.6.1. Contaminants and Media of Concern

Characterization data for Area-Wide Soil are summarized in Table 17-2 and were evaluated to determine contaminants and media of concern for the Area-Wide Soil (as defined by soil PCUL exceedances). An evaluation of soil sample results representing current conditions (i.e., post-remedial excavation confirmation samples and samples from soil explorations collected beyond the final remedial excavation limit and identified as contaminated in other RI sections) is presented in Table Q-37 (Appendix Q). In addition, soil sample results representing current conditions were screened to evaluate the potential for VI (Table Q-38, Appendix Q). Contaminants in media of concern based on this evaluation include the following:

- **Soil.** TPH-G, TPH-D, TPH-O, petroleum-related VOCs including benzene, ethylbenzene, total xylenes and 1,2,4-TMB, naphthalene, cPAHs and metals including arsenic, cadmium and lead were identified as COCs. The nature and extent of soil COCs are further discussed 17.6.2.
- **Groundwater.** COCs were not detected in groundwater at a concentration greater than the PCULs that are not discussed in other RI sections. Therefore, groundwater is not considered a medium of concern.
- **Soil Vapor.** Based on screening of soil and groundwater data, TPH-G and TPH-D were identified as COCs with the potential to migrate into enclosed spaces at a concentration that could exceed the Method B indoor air PCUL and/or the SL for the protection of commercial workers. An evaluation for VI potential is further discussed in Section 16.6.3.

COCs (TPH, petroleum-related VOCs, naphthalene, cPAHs and metals) for soil and groundwater are shown in plan view on Figures 17-8 through 17-12. The nature and extent of COCs in media of concern are further discussed below.

17.6.2.Soil

The nature and extent of COCs for Area-Wide Soil are discussed in Sections 17.6.2.1 through 17.6.2.3 and are shown on Figures 17-8 through 17-12.

17.6.2.1. Areas Without Hardscape (Undeveloped and Landscaped Areas—Western UWT Campus)

Area-Wide Soil COCs were detected at concentrations greater than respective PCULs in the following locations.

- **TPH and Petroleum-Related VOCs.** TPH-G (up to 190 mg/kg), TPH-D (up to 1,300 mg/kg), TPH-O (up to 4,300 mg/kg) and total xylenes (8.2 mg/kg) were detected at concentrations greater than the PCUL in shallow soil (less than 4 bgs) within the northwest portion of the UWT Campus in boring UG-MW36D between Fawcett Avenue and Court E and north of South 19th Street (Figures 17-8 and 17-9). Soil contamination at this area is limited by surrounding borings and TPs UG-MW37 and A12-TP1 through A12-TP4. Boring UG-MW36D was located in the area of an EM/GPR anomaly identified in 2013, however, evidence of a UST was not identified. Soil contamination at this location may be related to a previously unidentified UST, or potentially related to spills during historical land use. Other petroleum-related contaminants were not detected.

- **PAHs and Metals.** Total cPAH TEQ, naphthalene, arsenic, and/or lead were detected at concentrations greater than the PCUL at 37 locations where hardscaping was not present on the western portion of the UWT Campus (Figures 17-10 through 17-12). The soil samples were collected from the ground surface to an approximate depth of 5 feet bgs west of Jefferson Avenue. The range of PCUL exceedance includes:
    - Total cPAH TEQ concentrations exceeding the PCUL were detected in eight samples with concentrations ranging from 0.23 to 24 mg/kg.
    - Naphthalene was collocated with cPAHs in four locations with concentrations exceeding the PCUL from 0.36 to 1.7 mg/kg.
    - Lead concentrations exceeding the PCUL were detected in 38 samples with concentrations ranging from 260 to 3,100 mg/kg.
    - Arsenic was collocated with lead in two locations with concentrations exceeding the PCUL at 24 and 32 mg/kg.

17.6.2.2. Areas with Hardscape (Streets and Pedestrians Corridors—Eastern UWT Campus)

Area-Wide Soil COCs were detected at concentrations greater than respective PCUL in the following locations.

- **TPH and Petroleum-Related VOCs.** TPH-D and TPH-O were detected at concentrations greater than the PCUL in soil samples collected from 1 to 2 feet bgs in boring A6-MW8S located near Court C and South 17th Street. TPH was not detected in the underlying sample collected at 4 feet bgs. The soil contamination is limited by surrounding borings (A12-DP1 through A12-DP4). The source of TPH-contaminated soil is likely related to uncontrolled fill placed in the area. Additionally, benzene (up to 0.046 mg/kg), ethylbenzene (up to 0.08 mg/kg) and/or total xylenes (up to 0.165 mg/kg) were detected in soil samples collected from locations COT-MW4 and COT-MW5 within Jefferson Avenue to depths of 25 feet bgs. The sources of the deeper benzene impacts within Jefferson Avenue are not known. Benzene (up to 0.685 mg/kg), toluene (up to 0.61 mg/kg), ethylbenzene (up to 0.326), total xylenes (up to 0.734 mg/kg) and 1,2,4-TMB (up to 0.135 mg/kg) were detected in shallow soil at depths between approximately 6 to 9 feet bgs within the Commerce Street corridor.
- **PAHs and Metals.** Total cPAH TEQ, naphthalene, and/or lead were detected at concentrations greater than the PCUL in soil from the ground surface to 12 feet bgs in multiple locations throughout the UWT Campus, specifically, Commerce Street and 1701 Tacoma Avenue South (Upton) as shown on Figures 17-10 through 17-12. The range of PCUL exceedance includes:
    - Total cPAH TEQ concentrations exceeding the PCUL were detected in four samples with concentrations ranging from 0.417 to 8.28 mg/kg.
    - Naphthalene concentrations exceeding the PCUL were detected in four samples with concentrations ranging from 0.64 to 1.4 mg/kg.
    - 1,2,4-TMB was collocated with cPAHs in one boring (DMB-18) with of concentration of 0.135 mg/kg.
    - Lead concentrations exceeding the PCUL were detected in four samples with concentrations ranging from 400 to 1,300 mg/kg.

The sources of contaminated soil in these areas are attributed to uncontrolled fill.

17.6.2.3. Beneath Existing UWT Campus Buildings

Area-Wide Soil COCs were detected at concentrations greater than respective PCUL in the following locations.

- **Frederick Wilds Building.** Total cPAH TEQ and/or lead were detected at concentrations greater than the PCUL in three locations within the footprint of the Frederick Wilds Building from beneath the building slab to 1-foot bgs (Figures 17-10 and 17-12). The cPAH concentrations ranged between 0.42 mg/kg and 1.2 mg/kg. Lead exceeded the PCUL at one location at a concentration of 2,200 mg/kg.
- **Joy Building.** Total cPAH TEQ and/or cadmium were detected at concentrations greater than the PCUL in two locations within the footprint of the Joy Building from 2 to 4 feet bgs (Figures 17-10 and 17-12). The cPAH concentration was 0.72 mg/kg. The cadmium concentration was 110 mg/kg.
- **Tioga Library Building.** Arsenic was detected at a concentration (29 mg/kg) greater than the PCUL in one location within the footprint of the TLB beneath the slab (Figure 17-12).
- **TPS Building**. Benzene was detected at concentrations greater than the PCUL in one soil sample collected from boring 2D-B5 at a depth below the slab to 1-foot bgs (Figure 17-8). The source of benzene and toluene in soil is not known but likely related to fill in the area.

Residual TPH-D exceeds the VI SL for soil in four locations (SO-SS004 [Strom Property], MF-UST-A5 and MF-UST-B4 [Mattress Factory USTs], and Joy-CONF-SW2 [Joy Building]). Evaluation of the potential for vapor intrusion is included in Section 17.6.4.

17.6.3. Soil Vapor and Indoor Air

Based on the soil and/or groundwater sampling results representing current conditions, TPH-D was identified as a contaminant with the potential to migrate into enclosed spaces at concentrations exceeding Method B indoor air PCULs and/or SL for the protection of commercial workers. The potential for VI from soil and groundwater contaminants is further discussed below:

- **Petroleum-Related Soil Contamination**. Petroleum-related contaminants in soil were evaluated for potential VI based on Ecology's 2022 VI Guidance. Ecology's guidance states buildings located within the inclusion area (30 feet horizontal and 15 feet vertical separation distance) of soil with TPH-G concentrations greater than 100 mg/kg and TPH-D concentrations greater than 250 mg/kg may be at risk of VI into indoor air (1064). TPH-D was detected at concentrations greater than 250 mg/kg in six locations. An evaluation of the potential for VI based on current conditions for Area-Wide Soil is discussed below:
    - TPH-G was detected greater than 100 mg/kg in soil at UG-MW36D. Although there is no current potential for VI (i.e., no occupied spaces within 30 lateral feet), future redevelopment of the property for residential use may have the potential for VI. The potential for VI should be considered as part of the building design and construction if and when future residential redevelopment occurs.
    - TPH-D was detected at concentrations greater than 250 mg/kg in three locations (UG-MW37R, SO-SS004 and A6-MW8S outside of the inclusion area for the nearest buildings (Strom Building and Court 17 Apartments). Therefore, these TPH-D impacts to indoor air are not anticipated.
    - Residual TPH-D was detected within the inclusion zone of two buildings including confirmation sample Joy-CONF-SW2 collected beneath the Joy building (1.5 feet bgs) and samples collected from borings MF-UST-A5 and MF-UST-B4 located within 20 feet of the Mattress Factory (7 feet

bgs). The extent of TPH-D impacted soil in these areas is limited based on adjacent sample results (Figure 17-9). However, these samples are located within the 30 feet horizontal and 15 feet vertical separation distance recommended by Ecology under the VI guidance from any enclosed space. The results of the VI evaluation on other parts of campus (i.e., MDS Building, TPS Building, and Academic Block Buildings) indicate CVOC concentrations in groundwater are not impacting indoor air based on predictive modeling or the results of indoor air sampling completed. Although TPH-D was not included in this evaluation, it can be surmised that if CVOCs (i.e., highly volatile contaminants) are not impacting indoor air, then TPH-D (i.e., less volatile contaminants) is also unlikely to impact indoor air. Furthermore, UW-owned buildings in this area are for commercial and academic use with air exchange rates of at least 0.5 exchanges of outside air per hour and operate on a neutral to slightly positive building pressure that further limits the potential for VI and inhalation by the building occupants.

17.7 Contaminant Fate and Transport

The chemical properties of contaminants and the physical, chemical, and biological processes that they are exposed to affect their fate and transport. These properties/processes and how they impact the fate and transport of COCs in media of concern are discussed on a UWT Campus-wide basis in Section 18.0. Locally, soil contamination associated with Area-Wide Soil is located in shallow soil (generally less than 5 feet) and depths up to 25 feet at various locations on the UWT Campus. Residual TPH, petroleum-related VOCs, metals and PAH-contaminated soil remaining in place are generally capped with buildings or hardscapes which prevents direct human contact for the general public accessing this area (Figure 17-1). Residual TPH, metals and PAH-contaminated soil are exposed near the ground surface in undeveloped areas west of Jefferson Avenue. However, land use in this area is does not make exposure likely (i.e., low pedestrian traffic area). Furthermore, future development of these areas will either result in the removal of the identified shallow soil contamination or will result in this area being covered by impervious surface further limiting potential exposure.

Residual soil contamination for Area-Wide Soil is stable and is not leaching to groundwater based on groundwater sampling results. Furthermore, stormwater is captured by drainage systems that convey the stormwater away from areas of contaminated soil to prevent the vertical migration of contamination through the soil column via leaching. Areas where stormwater can infiltrate generally contain non-soluble COCs as discussed in Section 18.0 and are not a risk of impacting groundwater.

17.7. Summary

The UWT Campus was developed between the late 1800s and 1912. Historical uses included placement of contaminated fill material from unknown sources and grading material used at the property prior to development, atmospheric deposition from historical combustion (vehicle emissions, burning, etc.) and/or lead-based paint on historic buildings, and historical land use not specifically identified in other RI sections (referenced in Table 2-1). Additionally, USTs associated with historical buildings have been removed, closed in place or have not been located. These operations and actions led to the presence of metals (arsenic, cadmium, and lead), PAHs (naphthalene and cPAHs), petroleum (TPH-G, TPH-D, and TPH-O) and petroleum-related VOCs (BTEX and 1,2,4-TMB) within the UWT Campus at concentrations greater than the PCULs (Figure 17-1).

The majority of the identified contaminated soil is covered with concrete building slab or hardscapes (paving, concrete) to prevent direct human contact by the general public accessing these areas. However, undeveloped areas west of Jefferson Avenue contain contaminated soil near the ground surface. Residual

soil contamination within the Area-Wide Soil is stable based on the groundwater sampling results and is not migrating off property. Additionally, paving activities and stormwater collection systems further prevent the infiltration of precipitation that may lead to potential contaminant leaching from soil to groundwater. As discussed above, the adjacent buildings are a sufficient distance from TPH-D contaminated soil to prevent VI into enclosed spaces or VI is unlikely based on the type of building HVAC system and sampling results for CVOCs in the area. The nature and extent of TPH, PAHs, metals and petroleum-related VOCs in soil are shown on Figure 17-1 and by chemical/media on Figures 17-7 through 17-11.

18.0 ENVIRONMENTAL FATE AND TRANSPORT

The fate and transport of contaminants are affected by their chemical properties and the physical, chemical, and biological processes which they are exposed to. These properties and processes and how they impact the fate and transport of contaminants are discussed in the following sections (Sections 18.1 and 18.2).

18.1. Environmental Fate

The environmental fate of COCs identified for the UWT Campus are largely dependent on physical-chemical properties that affect their distribution, mobility and persistence in the environment. These chemical properties have a strong influence on the potential for humans and ecological receptors to be exposed to the COCs. Factors that influence the environmental fate of organic compounds (i.e., TPH, VOCs and PAHs), and non-organic compounds (i.e., metals including arsenic, cadmium, and lead) are described in the following sections.

18.1.1. Organic Compounds

Organic compounds identified for the UWT Campus at concentrations exceeding the PCUL for soil, groundwater, and/or soil vapor include TPH (TPH-G, TPH-D, and TPH-O), petroleum-related VOCs (BTEX, 1,2,4-TMB, and 1,3,5-TMB), CVOCs (PCE, TCE, trans-DCE, cis-DCE, vinyl chloride, DCA and chlorobenzene), and PAHs (naphthalene and total cPAH TEQ). These chemicals were identified as the Site COCs for the UWT Campus Property-Specific and/or Area-Wide petroleum and/or CVOC contamination sites. The evaluation of Site COCs is discussed in Section 4.5 on a UWT Campus-wide basis and in Sections 5.0 through 17.0.

TPH-D, TPH-O, and PAH compounds generally are nonpolar and have a strong affinity for bonding to soil particles, whereas VOCs are generally polar compounds that have a lower affinity for bonding to soil particles. The relative affinity of a particular COC for bonding to soil particles has important implications for the mobility and transport of the COC. Chemicals with a strong affinity for soil are less mobile than chemicals with a lower affinity for soil. The relative distribution of an organic compound between soil and water is described by the compound's partition coefficient (K_d) which is presented in Tables 3-1 and 3-2. The partition coefficient of a chemical is a calculated relationship between the mass of the solute sorbed per bulk dry mass of soil to the corresponding solute concentration.

Degradation processes for organic compounds include photodegradation, hydrolysis, and biodegradation. Some organic compounds including PAHs are relatively hard to degrade because of their chemical stability in the environment. As previously discussed, natural attenuation refers to naturally occurring processes in soil and groundwater that act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of chemicals in those media. These processes may include degradation, adsorption, dispersion, dilution, volatilization, and chemical or biological stabilization or destruction of the chemicals (1029).

18.1.2.Non-Organic Compounds

Non-organic compounds identified for the UWT Campus at concentrations exceeding the PCUL include the metals arsenic, cadmium, and lead. The evaluation of Site COCs is discussed in Section 4.5 on a UWT Campus-wide basis and in Sections 5.0 through 17.0.

In general, the fate of metals in the environment is primarily driven by speciation of the metal, which is a function of a number of variables, including oxidation and reduction potential, pH, temperature, and type and concentration of available organic and inorganic ligands (i.e., chemicals, either in solution or precipitated, capable of bonding with metal ions, such as sulfate, iron oxides, or natural organic matter). Equilibrium constants and kinetics also determine whether a metal will be associated primarily with the particulate or dissolved phase. The dissolved speciation and sorption of metals to solids affect their bioavailability and subsequent toxicity. Arsenic, cadmium, and lead are generally considered to be persistent in the environment because they cannot be degraded by natural processes and are not volatile.

Metals including arsenic and cadmium may form insoluble hydroxide precipitates, especially in environments with high pH. As pH decreases, the solubility (and thus mobility) of these hydroxide precipitates increases. Metal ions may bond with natural organic compounds such as humic and fulvic acid molecules to form metal-ligand complexes and thus can be more mobile in environments with high dissolved organic carbon concentrations. Metal ions may also adsorb onto clay and oxide minerals because of negative charges on their surface. Ion exchange may also occur at the particle surface, where metal ions of one element replace those of another element because of different properties of the element or environmental conditions. The oxidation state of the metal ion influences the speciation of the metal. Reduced metal species are soluble, whereas oxidized forms of these metals are in the particulate form and tend to also sorb other metals to their surface.

Microorganisms can play an important role in altering the mobility of metals although they do not degrade metals in the environment. Microbial oxidation of natural and anthropogenic carbon in the subsurface consumes available oxygen, sulfate, and carbon dioxide within the saturated zone creating reducing conditions. Reducing conditions can mobilize arsenic, and other metals naturally present in or sorbed to soil particles, although if sufficient sulfide is present, the precipitation of sulfides can be effective in decreasing the mobility of metals. In oxic conditions, the mobility of these metals is generally decreased through sorption to or coprecipitation with iron and manganese hydroxides. The combination of these processes can create a metals sequestering area in the transition zone between anoxic and oxic saturated soil.

18.2. Environmental Transport

The transport pathways applicable to media of concern are presented in the following sections (Sections 18.1.2.1 through 18.1.2.3.3

18.2.1. Soil

Potential transport pathways for COPCs in soil include the following:

- Transport of COPCs in soil from unpaved areas via wind erosion.
- Transport of COPCs in soil from unpaved areas via surface flow.
- Transport of COPCs from soil via volatilization.
- Transport of COPCs from soil to groundwater via leaching.

18.2.2. Groundwater

Potential transport pathways for COPCs in groundwater include the following:

- Transport of COPCs from groundwater via volatilization.
- Transport of COPCs in shallow groundwater to utility infrastructure (i.e., stormwater and/or sewer pipes) and transport via the pipe backfill or discharges via localized discontinuities (ex. pipe joints, cracks, or breaks) in the pipe.
- Transport of COPCs via groundwater to surface water in the Thea Foss Waterway.

18.2.3. Stormwater System and Building Drains

Stormwater utilities contain COPCs at concentrations greater than surface water PCULs within portions of South 19th Street and along portions of Market Street. The outlet of the stormwater system is the Thea Foss Waterway located approximately 1,000 feet from the UWT Campus. COPCs in stormwater utilities are the result of direct discharges (illicit or otherwise) during historical operations both on and off the UWT Campus and/or the infiltration of groundwater into the drainage pipes through pipe joints, cracks, or breaks where groundwater contamination is present, and the pipe/manhole is located below the water table.

As previously discussed, TCE-contaminated groundwater is collected in building drains which discharge into the stormwater system. Specifically, building drains constructed for the Y Student Center discharge TCE-contaminated groundwater to the stormwater line within Market Street. The City and Ecology approved this discharge into the stormwater system in 2015. TCE-contaminated groundwater also infiltrates into the stormwater system where the pipe is not sealed but is beneath the Qvi groundwater level on South 19th Street.

18.3. Receptors and Exposure Pathways

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

- **Direct Contact**. Terrestrial receptors are not considered a potential receptor based on the simplified TEE completed for the RI (Section 2.4). Construction workers are the primary human receptor and may potentially be exposed through direct contact with contaminated soil during excavation activities. Pedestrians may encounter these surficial contaminants in limited portions of the UWT Campus where COCs are present at the ground surface. However, potential exposure to this contamination is low given the land use in this area (i.e., vacated and away from public commercial/residential areas).
- **Drinking Water**. Groundwater within the Qvi and Qva aquifers beneath the UWT Campus as a whole is not considered to be a current source of drinking water as domestic water is supplied by City municipal water. However, drinking water is still being considered as a potential exposure pathway as required by Ecology.
- **Surface Water.** Surface water discharge from the stormwater system within the UWT Campus is generally not considered to be a current exposure pathway because the majority of ground surface is capped with hardscape, the stormwater utilities are above the groundwater, and the Thea Foss Waterway is located approximately 1,000 feet from the UWT Campus. However, as noted above, TCE-contaminated groundwater appears to be infiltrating into the stormwater system in areas where the stormwater system is below the water table and/or building drains are collecting TCE-contaminated

groundwater and discharging the water to the stormwater system. These discharges may provide a complete pathway to surface water. However, the distance to the Thea Foss Waterway is approximately 1,000 feet indicating the pathway may not be complete. For purposes of the RI, where these conditions are present, contaminants within the stormwater system have been evaluated and/or discussed with the City and Ecology.

- **Indoor Air**. VI into the UW-owned buildings within the UWT Campus is not considered to be a current exposure pathway based on the proximity of the identified contamination relative to the enclosed spaces, engineering controls established during new building construction, the results of the VI evaluations on portions of the UWT Campus and surrounding area (i.e., MDS Building, TPS Building, Academic Block Buildings, and Federal Courthouse). The VI evaluations indicate that CVOC concentrations in groundwater are not impacting indoor air based on predictive modeling or the results of indoor air sampling completed. Additionally, UW-owned buildings in this area are for commercial and academic use with air exchange rates of at least 0.5 exchanges of outside air per hour and operate on a neutral to slightly positive building pressure. The HVAC system in these buildings further limits the potential for VI and inhalation by the building occupants. VI was not evaluated on non-UW buildings as part of the RI.

19.0 CONCLUSIONS

This RI Report has been prepared for the UWT Campus in Tacoma, Washington in accordance with the 2016 Agreed Order. This RI Report has been prepared to document the investigation findings for the UWT Campus and surrounding area to define the nature and extent of contamination requiring cleanup evaluation. The results of the RI will be used as the basis for the FS that will identify and evaluate remedial alternatives and present the preferred cleanup action for addressing Site contamination pursuant to MTCA (WAC 173-340-750).

UW and others have completed multiple environmental investigations and remedial actions between 1991 and 2021. In accordance with the 2016 Agreed Order, additional remedial investigations were completed between 2016 and 2021 to supplement the existing environmental dataset, fill identified data gaps, present the information needed to develop a conceptual site model for the UWT Campus, define the nature and extent of contamination in media of concern, and provide sufficient data to identify and evaluate cleanup action alternatives in the FS.

19.1. 2016 Agreed Order Remedial Investigation

Soil conditions were further evaluated using a combination of TP exploration, HSA drilling, and sonic drilling methods in accordance with the RI Work Plan and associated RI Work Plan Addenda. In addition, groundwater conditions were further evaluated utilizing a network of new and existing monitoring wells positioned across the UWT Campus and surrounding area. The 2016 Agreed Order RI was completed during multiple field mobilization and sampling events between 2016 and 2021. During each sampling event, analytical results were evaluated following their receipt, and the RI Work Plan was amended (i.e., Work Plan Addendum Nos. 1 through 9) in coordination with Ecology to ensure adequate environmental data were collected to fill all data gaps and to define the nature and extent of contamination for cleanup evaluation as part of the FS. The investigations were completed to the extent practicable based on access limitations. The 2016 Agreed Order RI for UWT Campus included the following:

- **Soil Investigation**. Soil sampling was performed at 251 locations to further characterize subsurface soil conditions, to support development of the CSM and to define the nature and extent of contamination in soil. Exploration locations were positioned to collect soil samples to provide comprehensive coverage of the UWT Campus and to fill data gaps identified by the RI Work Plan and subsequent addenda. Soil samples collected during the RI were screened in the field for evidence of contamination, including visual observations of contamination (i.e., staining, etc.), water sheen testing and organic vapor monitoring. Based on the field screening results and the chemical analytical results from previous investigations, selected soil samples were submitted to an Ecology-accredited laboratory for a combination of chemical analyses including petroleum hydrocarbons (gasoline-, diesel- and oil-range hydrocarbons), VOCs, PAHs and metals as well as physical parameters including grain-size, density, moisture content, porosity, total organic carbon and pH at select locations.
- **Groundwater Investigation**. Hydrogeologic testing including hydraulic conductivity testing and characterizing groundwater gradients and flow in the shallow Qvi and deep Qva aquifers in up to 82 new and existing monitoring wells across the UWT Campus was conducted between October 2016 and September 2021. To further evaluate groundwater conditions, 142 permanent wells were installed. "Grab" water samples were collected at these wells and an additional 33 temporary well locations. Groundwater monitoring for permanent wells was then completed as a discrete event in December 2016 and then on a semi-annual basis between March 2018 and September 2020 at select locations in general accordance with the RI Work Plan and subsequent addenda. Groundwater samples collected during the RI were submitted to an Ecology-accredited laboratory for a combination of chemical analyses including petroleum hydrocarbons (gasoline-, diesel-, and oil-range hydrocarbons), VOCs, SVOCs, and total and dissolved metals as well as dissolved gases (ethene, ethane, and methane) and geochemical parameters (total iron, nitrate, nitrite, TOC, and BOD) at select locations.
- **Indoor/Outdoor Air and Soil Vapor Investigation**. Air sampling (indoor and outdoor) and soil vapor sampling were completed in general accordance with the Ecology-approved RI Work Plan and subsequent addenda to evaluate the potential for VI into occupied UWT Campus buildings and the downgradient Federal Courthouse Building. The VI evaluation including indoor and ambient (outdoor) air samples was also conducted in May 2017 for the UW-owned GWP, BB, BHS, and WCG Buildings and the Federal Courthouse to evaluate sub-slab soil vapor and air to characterize and evaluate the soil vapor conditions and evaluate the potential for VI.
- **Passive Soil Vapor Investigation.** Passive soil vapor sampling was completed in general accordance with the Ecology-approved RI Work Plan and subsequent addenda to evaluate potential source areas in the vicinity of Tacoma Avenue South. The passive soil vapor survey was completed in the vicinity of the sanitary sewer mainline within Tacoma Avenue South, generally between South 18th Street and South 19th Street, and within the footprint of the building located at 1722 Tacoma Avenue South.
- **Stormwater/Sanitary Sewer Investigation**. Stormwater/sanitary sewer investigation activities were completed to evaluate potential source areas and the migration of contaminants within the City's utility infrastructure. Sampling activities included the evaluation of baseline flow through these systems, collection of water and sediment samples at select locations including the stormwater system west of Market Street, 1934-1838 Market Street, within Market Street and within a potential dry well located at 1922 Tacoma Avenue South. Water and/or sediment samples collected during the RI were submitted to an Ecology-accredited laboratory for a combination of chemical analyses including petroleum hydrocarbons (gasoline-, diesel- and oil-range hydrocarbons) and VOCs. In addition, video surveys were completed on portions of the stormwater and sanitary sewer systems to identify laterals to adjacent buildings that could serve as potential preferential flow pathways.

- **Geophysical Surveys.** Geophysical surveys were completed at various portions of the UWT Campus to locate underground utilities (e.g., electric conduits, sanitary sewer pipes, stormwater pipes, etc.) and USTs, and to help identify magnetic anomalies recorded in previous investigations and/or identify geologic anomalies encountered during drilling activities (e.g., voids). These surveys included ground GPR, EM, and microgravity surveying methods.

The results from these investigations were used to characterize the stratigraphy and hydrogeologic conditions, identify Site COPCs based on protection of human health and ecological receptors for unrestricted land use and, in select cases, on protection of marine surface water. The results were also used to define the nature and extent of COCs on a Property-Specific and Area-Wide basis.

19.2. Summary of Findings

Remedial actions completed since the acquisition of the UWT Campus have included the removal and closure of 37 USTs as well as the completion of multiple phases of excavation and two in-situ treatment of contaminants. However, residual soil and groundwater contamination (petroleum-related, metals, and CVOC-related) remain for the UWT Campus associated with seven Property-Specific Sites, four Area-Wide groundwater plumes with multiple sources, and an Area-Wide soil contamination from multiple sources based on the findings of the RI. The contaminant distribution is highly influenced by the chemical properties of the contaminants, the location of the sources of contamination, underlying geology and hydrogeology, and the presence of building drains and storm utilities. Current soil conditions are represented by 3,614 soil samples collected from depths ranging from the ground surface to 140 feet bgs. Current groundwater conditions are represented by 1,213 samples collected between 2016 and 2021 (note that previous groundwater results were utilized in select areas in the absence of more recent data). Stormwater conditions are represented by 62 samples collected within and upgradient of the UWT Campus as well as building drain samples for the Y Student Center and catch basin/sump samples for 1934-1938 Market Street. Soil vapor and indoor air conditions are represented by the soil and groundwater results in addition to 48 soil vapor and air samples collected between 2014 and 2021[16].

Table 19-1 provides a detailed evaluation of source areas, identified PLPs, and contaminants identified in media of concern for Property-Specific and Area-Wide AOCs for the UWT Campus. The majority of sources of contamination are located on UW-owned property with the exception of five sources associated with the Westerly Plume located upgradient of UWT Campus, and one source associated with the Easterly Plume. Four of the sources located upgradient of the Westerly Plume have been identified as PLPs by Ecology, as described in Table 19-1[17]. The seven Property-Specific AOCs and associated Sites (areas of contamination) are shown on Figure 19-1. The four Area-Wide groundwater plumes and associated sources are shown on Figure 19-2. The approximate Sites of Area-Wide Soil contamination are shown on Figure 19-3. The extent of CVOC and petroleum-related groundwater plumes relative to the sources is shown on Figure 19-4. In general, petroleum-related contamination Sites tend to be limited in extent (both vertically and laterally) while CVOC contamination Sites tend to be widespread spanning much of the UWT Campus.

[16] Sample count does not include passive soil vapor samples collected in Tacoma Avenue South and within the footprint of 1722 Tacoma Avenue South because the samples were collected as a screening tool.

[17] Two source areas are currently part of one property owned by 1920 Tacoma Avenue LLC.

19.3. Feasibility Study Development

The nature and extent of contamination in media of concern for the UWT Campus have been characterized in accordance with the RI Work Plan and subsequent addenda using screening levels and exposure pathways to protect human health and the environment based on current and future land use. There is sufficient data to prepare the FS and to identify and evaluate cleanup alternatives for contaminants in media of concern based on the results of the RI for Property-Specific and Area-Wide AOCs. The FS will identify and evaluate applicable remedial technologies and alternatives for addressing both Property-Specific and Area-Wide contaminants for the UWT Campus.

20.0 LIMITATIONS

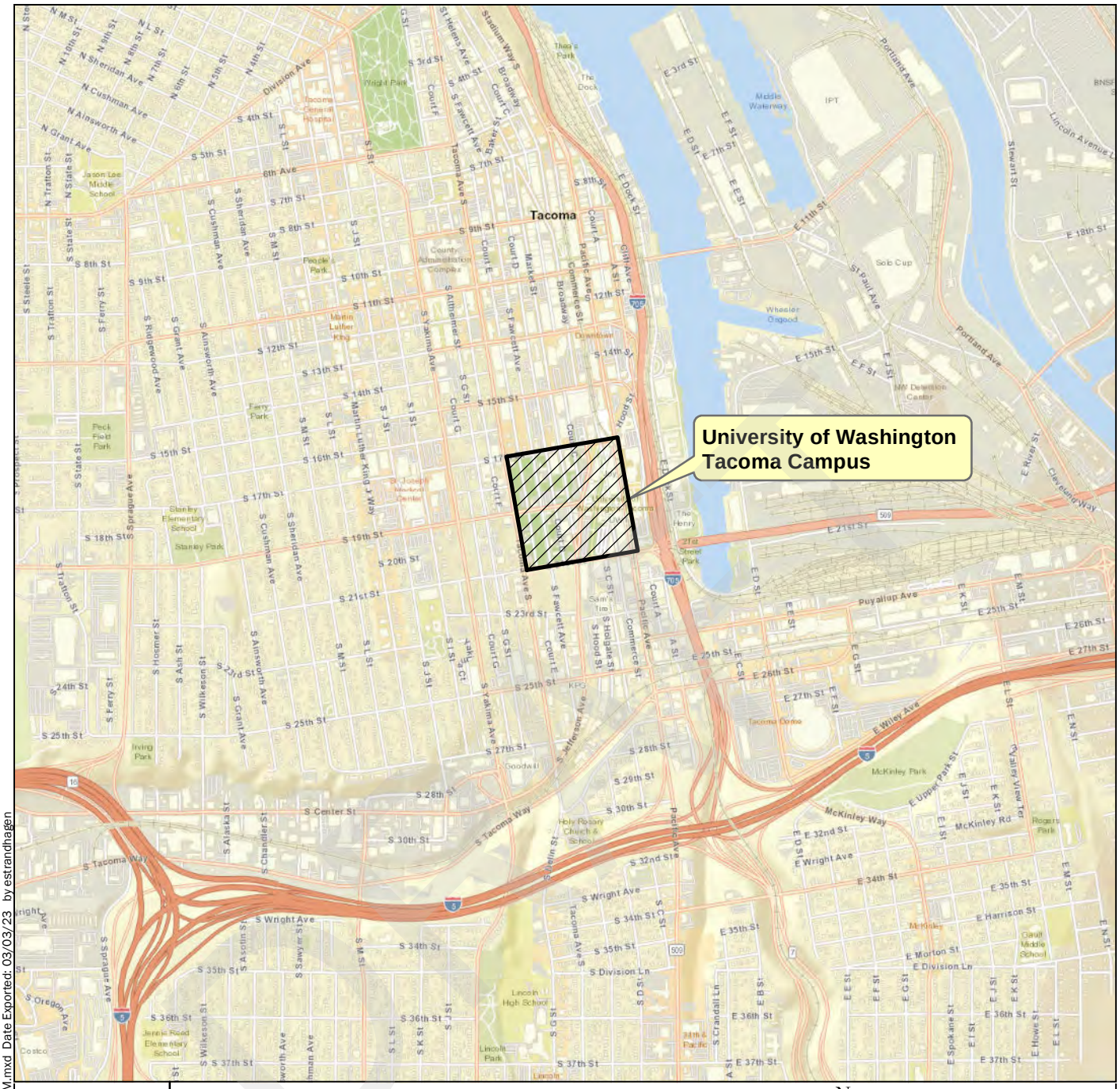
We have prepared this report for the exclusive use by UW, their authorized agents, and regulatory agencies for the UWT Campus located in Tacoma, Washington. No other party may rely on the product of our services unless we agree in advance and in writing to such reliance. Within the limitations of scope, schedule, and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any Appendices are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

Please refer to the Appendix S titled “Report Limitations and Guidelines for Use” for additional information pertaining to use of this report.

21.0 REFERENCES

References are organized by numerical identifier for simplicity. The technical reports are organized chronologically. The general references are organized by author. The numerical identifier and the respective reports are summarized in Tables 21-1 through 21-3.



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Feet

Vicinity Map

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 1-1

Notes:

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

Data Source: Mapbox Open Street Map, 2015

Projection: NAD 1983 UTM Zone 10N

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Table 2-1

Areas of Concern

University of Washington – Tacoma Campus
Tacoma, Washington

Area of Concern (AOC) Identification[1]	2016 Agreed Order Reference	Identified Source Area	Contaminants of Concern (COCs) Requiring Remedial Investigation[2]	Media of Concern	Referenced RI Report Section
Property-Specific AOC					
Cragle	AOC 1	Cragle Parcel	Residual Petroleum Hydrocarbon, Petroleum-Related VOC and PAH Contamination	Soil and Groundwater	Section 5.0
Williams Oil Filter	AOC 2	Williams Oil Filter Parcel	Residual Petroleum Hydrocarbon Contamination	Soil	Section 6.0
Prairie Line Trail	AOC 3	Prairie Line Trail	Residual Petroleum Hydrocarbon, PAH and Metal Contamination	Soil	Section 7.0
1742 Jefferson (Former Standard Oil Station)	AOC 4	1706 Jefferson Street Association	Residual Petroleum Hydrocarbon, Petroleum-Related VOC and CVOC Contamination	Soil and Groundwater	Section 8.0
Derville	AOC 8	Derville Parcel	Residual Petroleum Hydrocarbon Contamination	Contaminants Not Identified	Section 9.0
Kelly	AOC 9	Kelly Parcel	Residual Petroleum Hydrocarbon and CVOC Contamination	Soil	Section 10.0
Shaub-Ellison	AOC 11	Shaub-Ellison Parcel	Residual Petroleum Hydrocarbon and Petroleum-Related VOC Contamination	Groundwater	Section 11.0
Snoqualmie Library	AOC 11	Snoqualmie Library Parcel	Residual Petroleum Hydrocarbon Contamination	Soil and Groundwater	Section 12.0
Area-Wide AOC					
Westerly Plume[3]	AOC 4, AOC 6, AOC 9 and AOC 11	**UWT Campus Source Areas** ▪ 1701 Tacoma Avenue (Upton) ▪ 1742 Jefferson Avenue (1742 Jefferson) ▪ 1755 Fawcett Avenue (Kelly) **Upgradient Source Area to the UWT Campus** ▪ 1722 Tacoma Avenue South (PLP)[4] ▪ 1904-1908 Tacoma Avenue South (PLP)[4] ▪ 1922 Tacoma Avenue South (PLP)[4] ▪ 1934-1938 Tacoma Avenue South (PLP)[4] ▪ City of Tacoma Sanitary Sewer[4]	CVOC Contamination	Soil and Groundwater	Section 13.0
Northerly Plume[4]	AOC 5 and AOC 7	▪ 1754 Pacific Avenue (GWP Building Source Area) ▪ 1735 Jefferson Avenue (TPS Building Source Area)	Residual Petroleum Hydrocarbon, Petroleum-Related VOC and CVOC Contamination	Soil and Groundwater	Section 14.0
Easterly Plume[6]	AOC 11	▪ 1934-1938 Market Street Source Area ▪ Commerce Street Source Area ▪ South C Street Source Area	CVOC Contamination	Soil and Groundwater	Section 15.0
Southerly Plume[5]	AOC 10	**UW Owned Property** ▪ Jet Parking ▪ 1934-1938 Market Street Source Area **Non-UW Owned Property** ▪ 1956 Jefferson Avenue (1956 Jefferson Avenue Source Area) ▪ Unknown Spills in Market Street/Jefferson Avenue ROWs	Benzene and Petroleum Hydrocarbon Contamination	Soil and Groundwater	Section 16.0
Area-Wide Soil	AOC 12	Area-Wide Soil	Soil Containing Petroleum Hydrocarbon, Petroleum-Related VOC, PAH and Metal Contamination	Soil	Section 17.0

Notes:

[1] AOCs are shown relative to the University of Washington - Tacoma Campus on Figures 2-2 and 2-3.

[2] Remedial investigation for contaminants of concern listed for each AOC are referenced from Washington State Department of Ecology (Ecology) Agreed Order DE 11081 (2016 Agreed Order) based on previous environmental investigations performed.

[3] Chlorinated contamination associated with historical releases from property-specific source areas AOC 4, AOC 6 and AOC 9 as well as source properties west of Tacoma Avenue South form a single commingled contaminant plume. For the purpose of the RI, chlorinated contaminants sourcing from these areas are discussed together due to the commingled nature of PCE/TCE contamination and/or breakdown compounds.

[4] 1920 Tacoma Avenue LLC was identified as a PLP related to the 1922 Tacoma Avenue South and 1934 -1938 Tacoma Avenue South source properties on March 4, 2020. Kissler Enterprises Limited Partnership was identified as a PLP related to the 1904 - 1908 Tacoma Avenue South source property on March 4, 2020. 1722 Tacoma Ave LLC was identified as a PLP related to the 1722 Tacoma Avenue South source property on March 4, 2020. A preliminary determination of liability letter was sent by Ecology to City of Tacoma on

[5] Individual contaminant plumes sourcing from AOC 5 and AOC 7 extend off and downgradient of the initial release areas where they combine to form a single commingled plume. For the purpose of the RI, AOC 5 and AOC 7 are being discussed together due to the commingled nature of PCE contamination and/or breakdown compounds.

[6] Benzene and petroleum hydrocarbon contamination associated with Jet Parking (AOC 10) has been expanded to the west to include potential upgradient source properties (1956 Jefferson Avenue and 1934 Market Street). For the purpose of the RI, AOC 10 and potential upgradient source areas are being discussed together due to the commingled nature of petroleum and/or benzene contamination.

[7] Investigation activities indicate that historical operations at 1934-1938 Market Street and within portions of Commerce Street and South C Street resulted in the release of chlorinated compounds to soil and groundwater. Contamination associated with these source areas is identified as the Easterly Plume.

AOC = Area of Concern

COC = Contaminant of Concern

cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbons

CVOC = Chlorinated Volatile Organic Compound

GWP = Garretson Woodruff & Pratt Building

PAH = Polycyclic aromatic hydrocarbon

PCE = Tetrachloroethylene

PLP = potential liable party

RI = Remedial Investigation

ROW = Right-of-Way

TCE = Trichloroethylene

TPS = Tacoma Paper and Stationery Building

VOC = Volatile Organic Compounds

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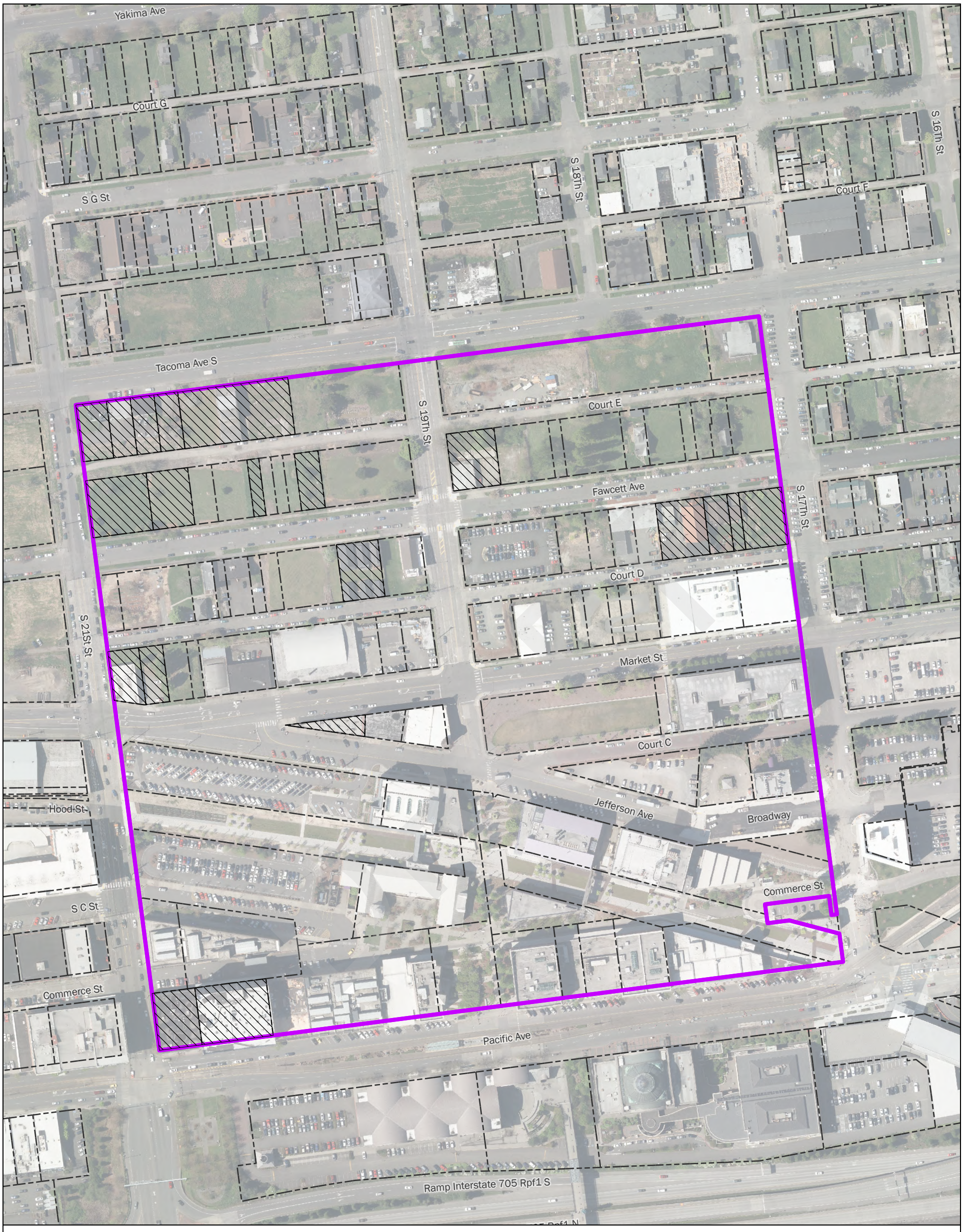

Legend

University of Washington - Tacoma Campus Master Plan Boundary

Property within the Tacoma Campus Master Plan Boundary Not Owned by the University Of Washington

Pierce County 2022 Parcel Boundary

W S N E

200 0 200

Feet

University of Washington - Tacoma Campus Overview

University of Washington - Tacoma Campus
Tacoma, Washington

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Figure 2-1

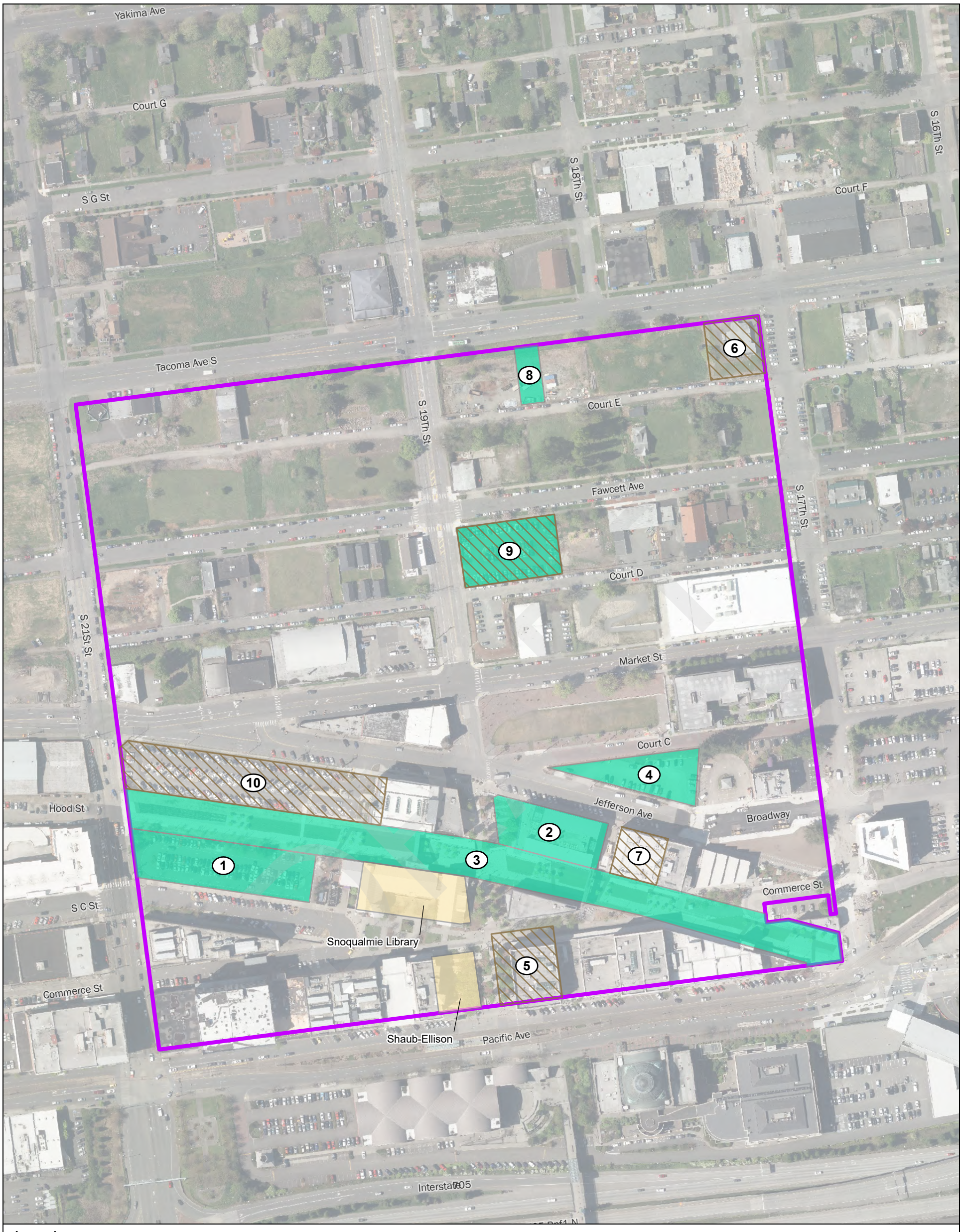
Notes:

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: Aerial from City of Tacoma, 2015.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

P:\0\0183109\GIS\MXDs\RI_working\Section2\Section2_RI.aprx\018310913_SS_AOC Date Exported: 06/26/23 by estrandhagen



Legend

- University of Washington - Tacoma Campus Master Plan Boundary
- 2016 Agreed Order Property-Specfiic Area of Concern (AOC)
- 2016 Agreed Order Property-Specific AOC Consolidated as Area-Wide AOC (see Figure 2-3)
- 1997 Agreed Order Property-Specific AOC Incorporated into UWT Campus Investigation

AOC Terminology in 2016 Agreed Order

1. Cragle Parcel (AOC 1)
2. Williams Oil Filter Parcel (AOC 2)
3. Prairie Line Trail Parcel (AOC 3)
4. 1706 Jefferson Street Association Parcel (AOC 4)
5. Howe Parcel (AOC 5)
6. Upton Parcel (AOC 6)
7. 1806 Jefferson Street Association Parcel (AOC 7)
8. Derville Parcel (AOC 8)
9. Kelly Parcel (AOC9)
10. Jet Parking Parcel (AOC 10)

W S N E

200 0 200

Feet

Notes:

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Data Source: Aerial from City of Tacoma, 2015.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Property-Specific Areas of Concern

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-2

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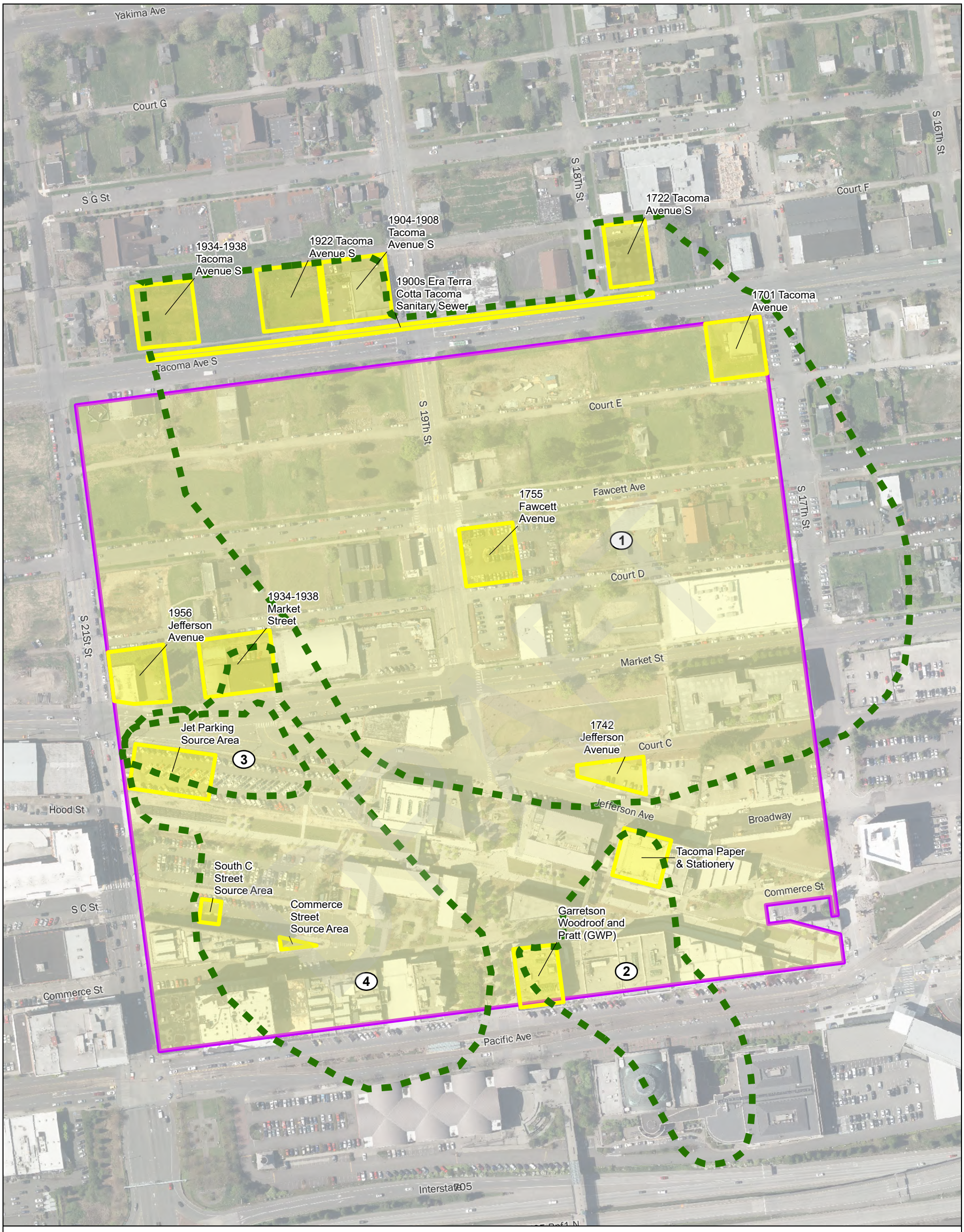

Legend

- University of Washington - Tacoma Campus Master Plan Boundary
- Area-Wide Soil and Groundwater Areas of Concern (AOC)
- Area-Wide Soil Areas of Concern
- Potential Source Area

(1) Westerly Plume
(2) Northerly Plume
(3) Southerly Plume
(4) Easterly Plume

200 0 200
Feet

Area-Wide Areas of Concern

University of Washington - Tacoma Campus
Tacoma, Washington

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Figure 2-3

Notes:
1. The locations of all features shown are approximate.
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Data Source: Aerial from City of Tacoma, 2015.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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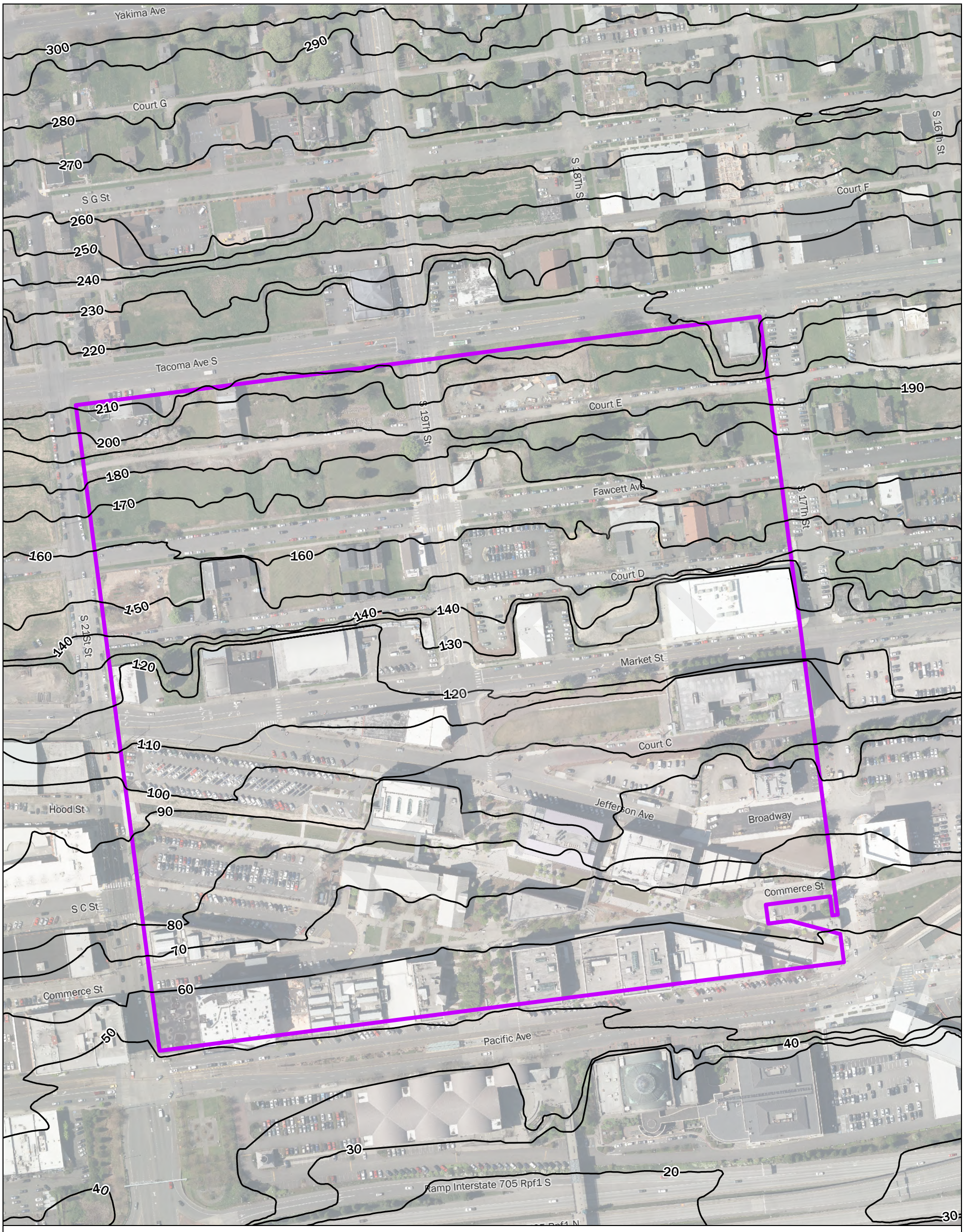

Legend

University of Washington - Tacoma
Campus Master Plan Boundary

Topographic Contours - 10 foot Interval
(National Geodetic Vertical Datum of 1929
[NGVD29])

200 0 200
Feet

Local Topography

University of Washington - Tacoma Campus
Tacoma, Washington

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Figure 2-4

Notes:

1. The locations of all features shown are approximate.
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Data Source: Aerial from City of Tacoma, 2015.
Contours provided by the City of Tacoma.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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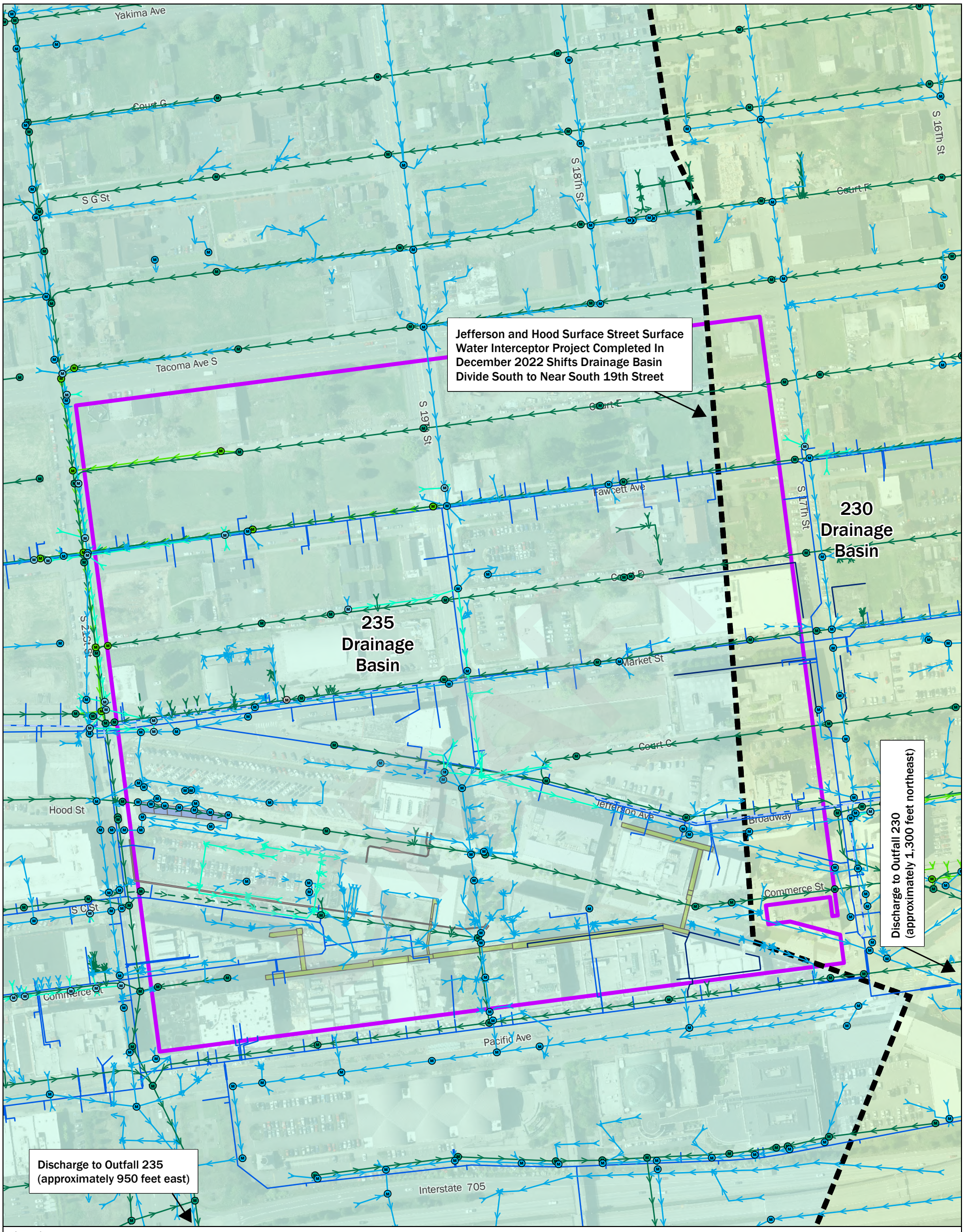

Legend

- University of Washington - Tacoma Campus Master Plan Boundary
- Estimated Active Sanitary Sewer Utility
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- New Sanitary Sewer Utility Installed after 2021
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Water Utility
- Abandoned Water Utility
- Building Drain Utility
- Stormwater Treatment Facility
- Underground Electrical Duct
- Utilidor Footprint
- Stormwater Basins
- 230 Drainage Basin
- 235 Drainage Basin
- New Stormwater Manhole Installed After 2021
- Active Stormwater Manhole
- New Sanitary Sewer Manhole Installed After 2021
- Active Sanitary Sewer Manhole
- Abandoned Manhole

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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.

Data Source: Aerial from City of Tacoma, 2015.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

W S N E

200 0 200

Feet

Utility Infrastructure and Stormwater Drainage Basins

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-5

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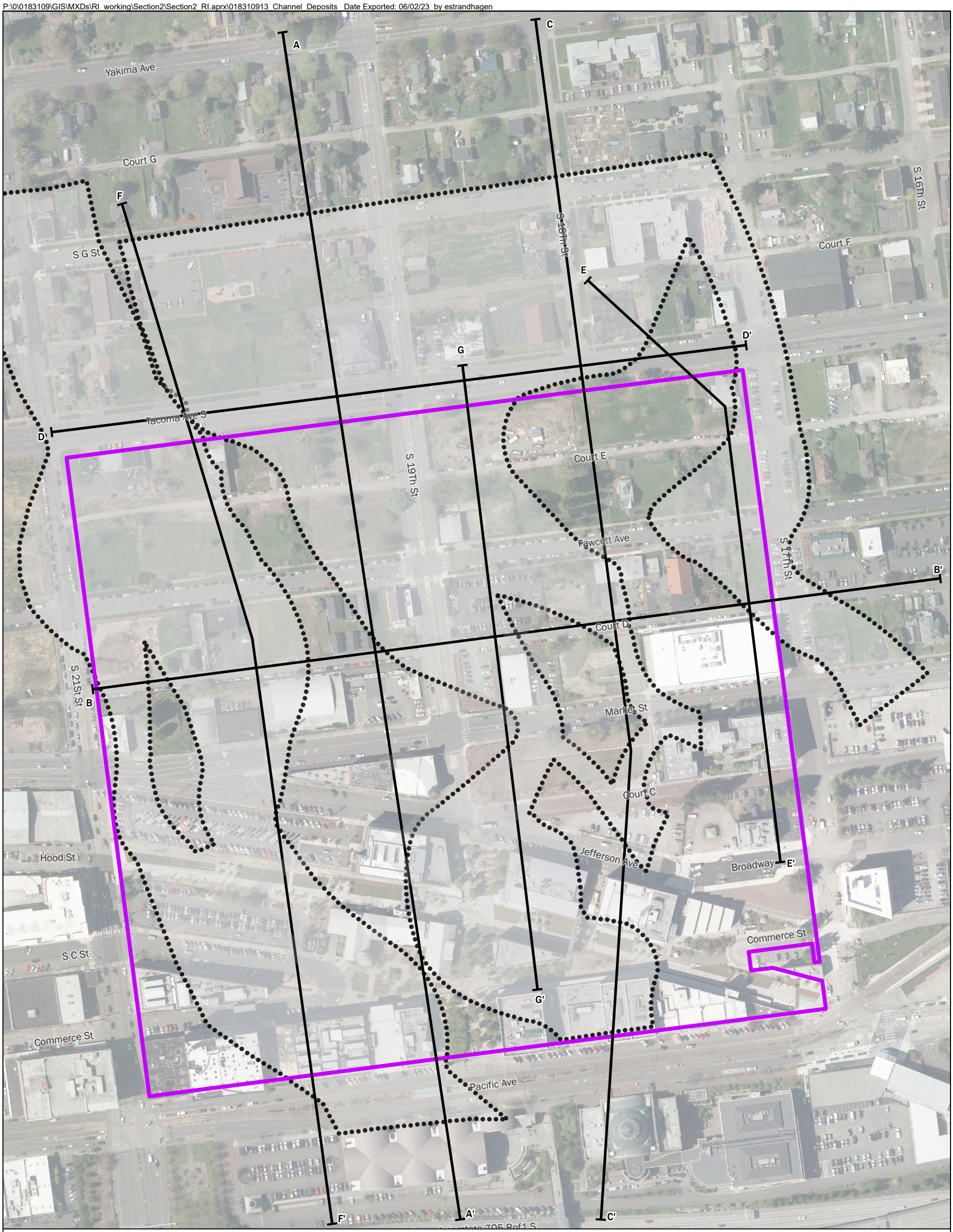

Legend

- University of Washington - Tacoma Campus Master Plan Boundary
- Vashon Drift Ice-Contact (Qvi) Channel Deposit
- Geologic Cross Section Location

200 0 200

Feet

Qvi Channel Deposits and Cross Sections

University of Washington - Tacoma Campus
Tacoma, Washington

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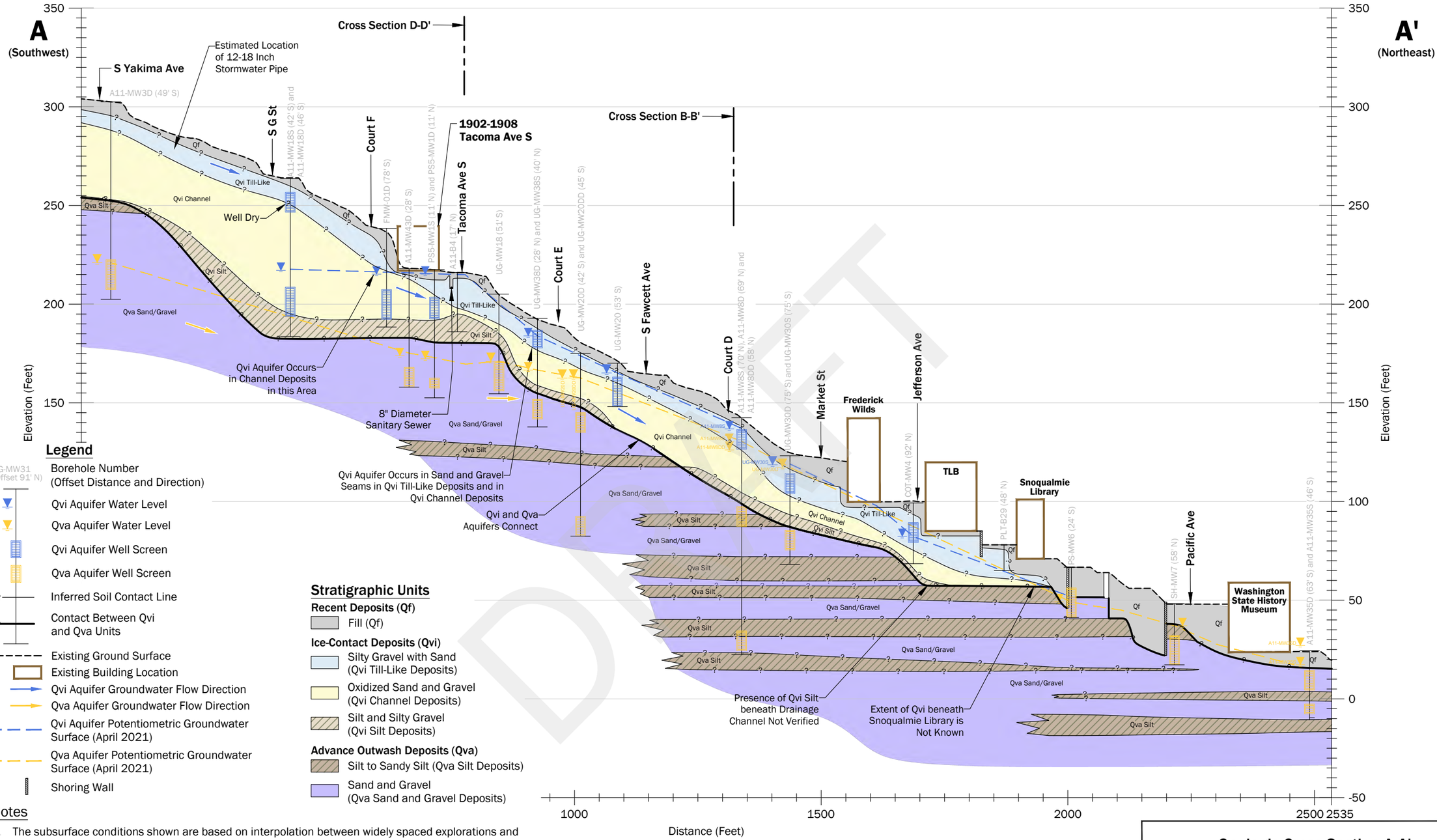
Figure 2-6

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: Aerial from City of Tacoma, 2015.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet



Legend

- Borehole Number (Offset Distance and Direction) — UG-MW31 (Offset 91' N)
- Qvi Aquifer Water Level
- Qva Aquifer Water Level
- Qvi Aquifer Well Screen
- Qva Aquifer Well Screen
- Inferred Soil Contact Line
- Contact Between Qvi and Qva Units
- Existing Ground Surface
- Existing Building Location
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Qvi Aquifer Potentiometric Groundwater Surface (April 2021)
- Qva Aquifer Potentiometric Groundwater Surface (April 2021)
- Shoring Wall

Stratigraphic Units

Recent Deposits (Qf)
- Fill (Qf)

Ice-Contact Deposits (Qvi)
- Silty Gravel with Sand (Qvi Till-Like Deposits)
- Oxidized Sand and Gravel (Qvi Channel Deposits)
- Silt and Silty Gravel (Qvi Silt Deposits)

Advance Outwash Deposits (Qva)
- Silt to Sandy Silt (Qva Silt Deposits)
- Sand and Gravel (Qva Sand and Gravel Deposits)

Notes

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.
2. TLB = Tioga Library Building

Datum: NGVD29

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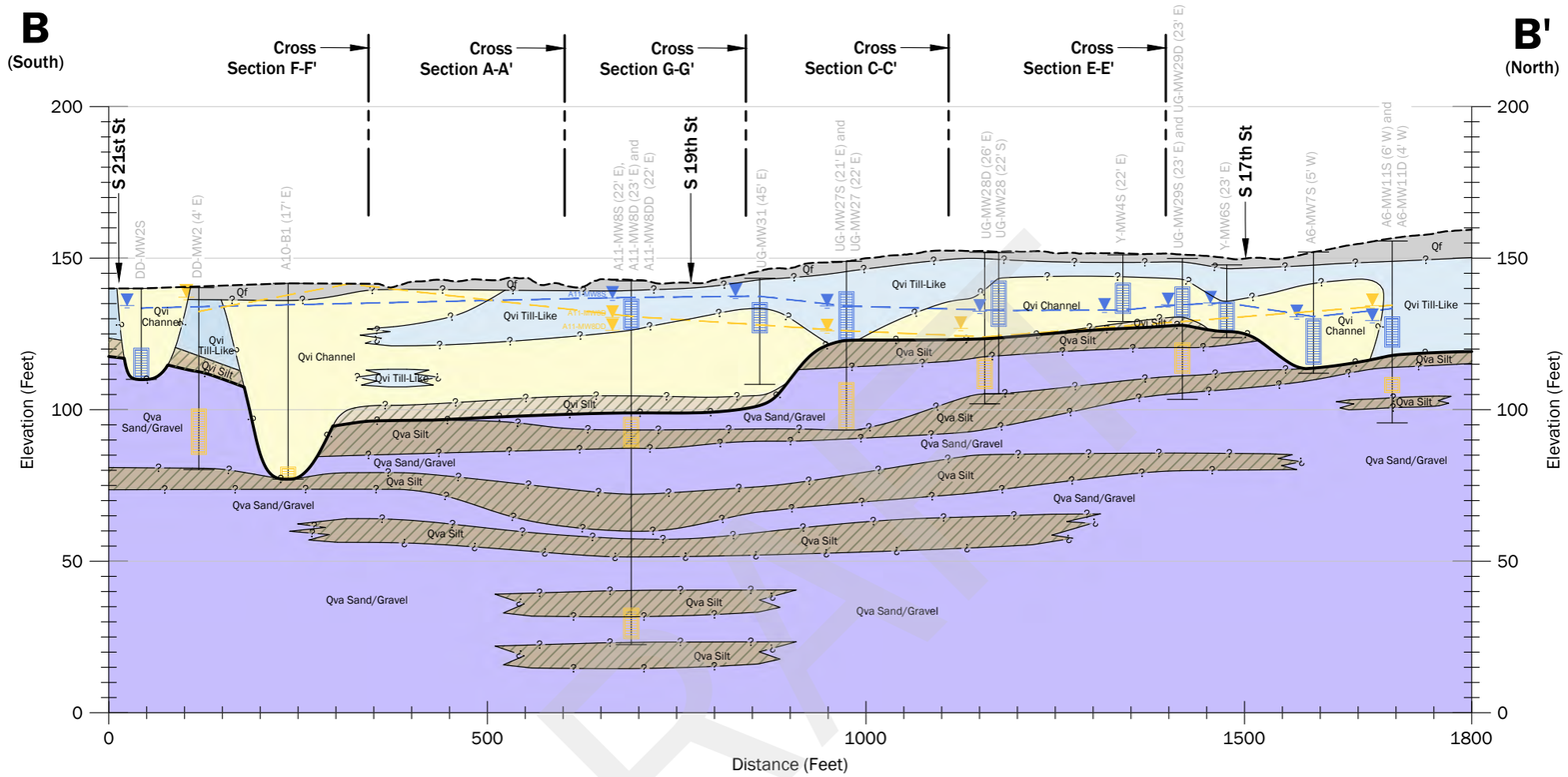
200 0 200
Horizontal Scale in Feet
50 0 50
Vertical Scale in Feet
Vertical Exaggeration: 4X

Geologic Cross Section A-A'

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-7



Legend

- Borehole Number (Offset Distance and Direction) — UG-MW31 (Offset 91' N)
- Qvi Aquifer Water Level
- Qva Aquifer Water Level
- Qvi Aquifer Well Screen
- Qva Aquifer Well Screen
- Inferred Soil Contact Line
- Contact Between Qvi and Qva Units
- Existing Ground Surface
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Qvi Aquifer Potentiometric Groundwater Surface (April 2021)
- Qva Aquifer Potentiometric Groundwater Surface (April 2021)

Stratigraphic Units

Recent Deposits (Qf)
- Fill (Qf)

Ice-Contact Deposits (Qvi)
- Silty Gravel with Sand (Qvi Till-Like Deposits)
- Oxidized Sand and Gravel (Qvi Channel Deposits)
- Silt and Silty Gravel (Qvi Silt Deposits)

Advance Outwash Deposits (Qva)
- Silt to Sandy Silt (Qva Silt Deposits)
- Sand and Gravel (Qva Sand and Gravel Deposits)

Note

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Datum: NGVD29

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200 0 200
Horizontal Scale in Feet
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Vertical Scale in Feet
Vertical Exaggeration: 4X

Geologic Cross Section B-B'

University of Washington - Tacoma Campus
Tacoma, Washington

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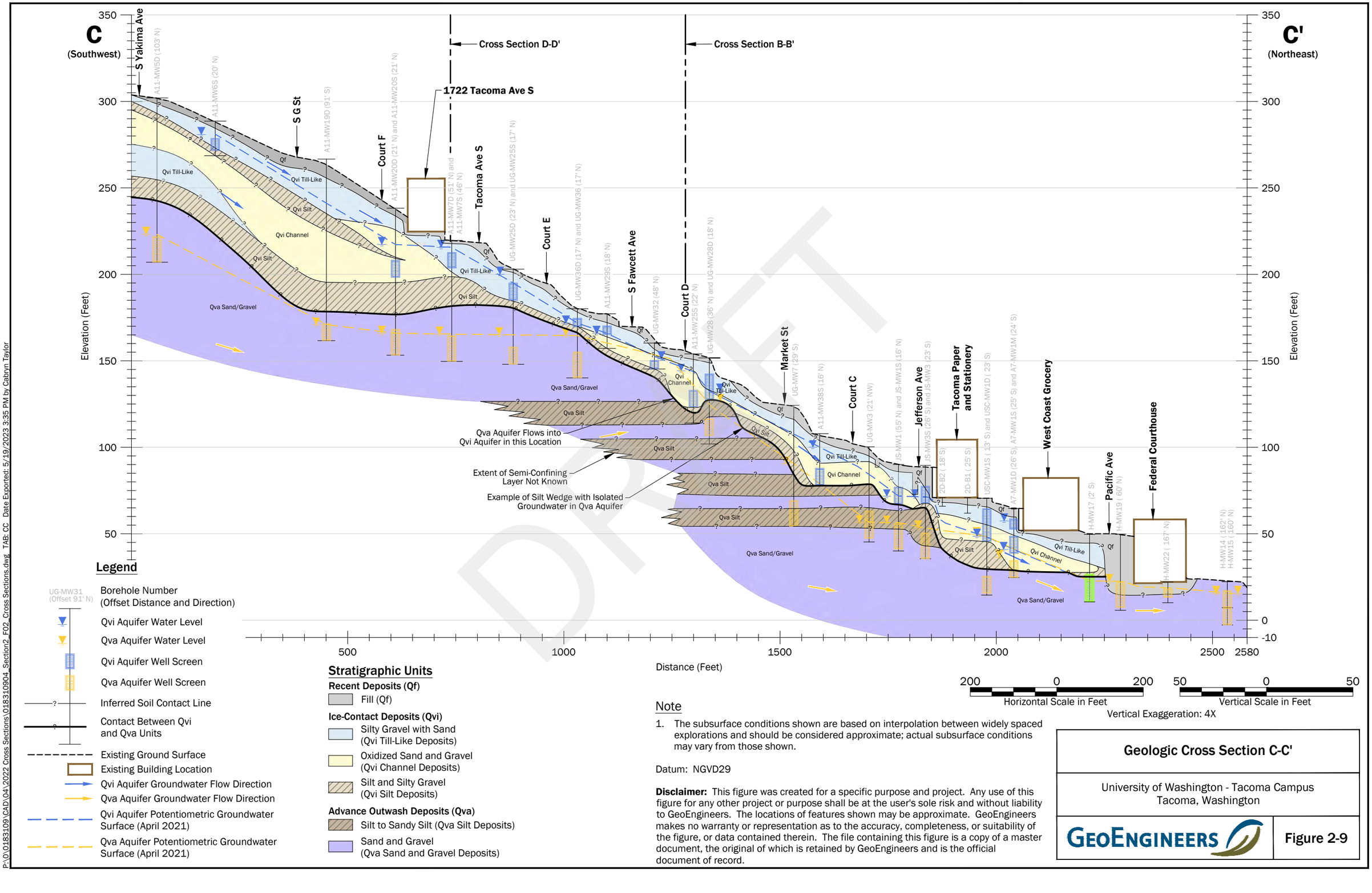
Figure 2-8



Legend

- Borehole Number (Offset Distance and Direction) — UG-MW31 (Offset 91' N)
- Qvi Aquifer Water Level
- Qva Aquifer Water Level
- Qvi Aquifer Well Screen
- Qva Aquifer Well Screen
- Inferred Soil Contact Line
- Contact Between Qvi and Qva Units
- Existing Ground Surface
- Existing Building Location
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Qvi Aquifer Potentiometric Groundwater Surface (April 2021)
- Qva Aquifer Potentiometric Groundwater Surface (April 2021)

Stratigraphic Units

Recent Deposits (Qf)
- Fill (Qf)

Ice-Contact Deposits (Qvi)
- Silty Gravel with Sand (Qvi Till-Like Deposits)
- Oxidized Sand and Gravel (Qvi Channel Deposits)
- Silt and Silty Gravel (Qvi Silt Deposits)

Advance Outwash Deposits (Qva)
- Silt to Sandy Silt (Qva Silt Deposits)
- Sand and Gravel (Qva Sand and Gravel Deposits)

Note

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.

Datum: NGVD29

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Geologic Cross Section C-C'

University of Washington - Tacoma Campus
Tacoma, Washington

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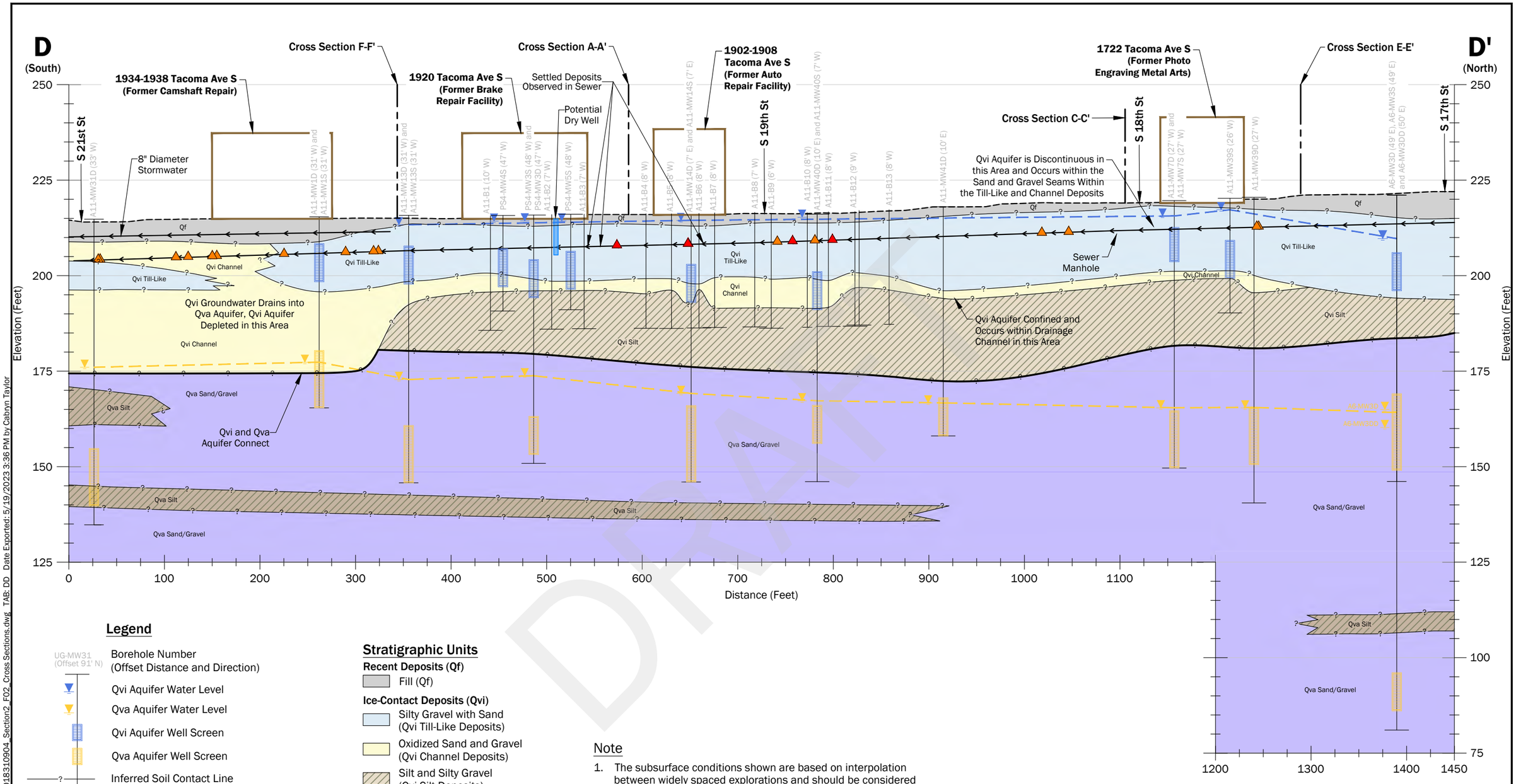
Figure 2-9



Legend

- UG-MW31 (Offset 91' N) — Borehole Number (Offset Distance and Direction)
- Qvi Aquifer Water Level
- Qva Aquifer Water Level
- Qvi Aquifer Well Screen
- Qva Aquifer Well Screen
- Inferred Soil Contact Line
- Contact Between Qvi and Qva Units
- Existing Ground Surface
- Existing Building Location
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Qvi Aquifer Potentiometric Groundwater Surface (April 2021)
- Qva Aquifer Potentiometric Groundwater Surface (April 2021)

Stratigraphic Units

Recent Deposits (Qf)
- Fill (Qf)

Ice-Contact Deposits (Qvi)
- Silty Gravel with Sand (Qvi Till-Like Deposits)
- Oxidized Sand and Gravel (Qvi Channel Deposits)
- Silt and Silty Gravel (Qvi Silt Deposits)

Advance Outwash Deposits (Qva)
- Silt to Sandy Silt (Qva Silt Deposits)
- Sand and Gravel (Qva Sand and Gravel Deposits)

Tacoma Avenue South Sewer Breaks

- Grade 4 Cracks
- Grade 5 Holes

Note

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.

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100 0 100
Horizontal Scale in Feet
25 0 25
Vertical Scale in Feet
Vertical Exaggeration: 4X

Geologic Cross Section D-D'

University of Washington - Tacoma Campus
Tacoma, Washington

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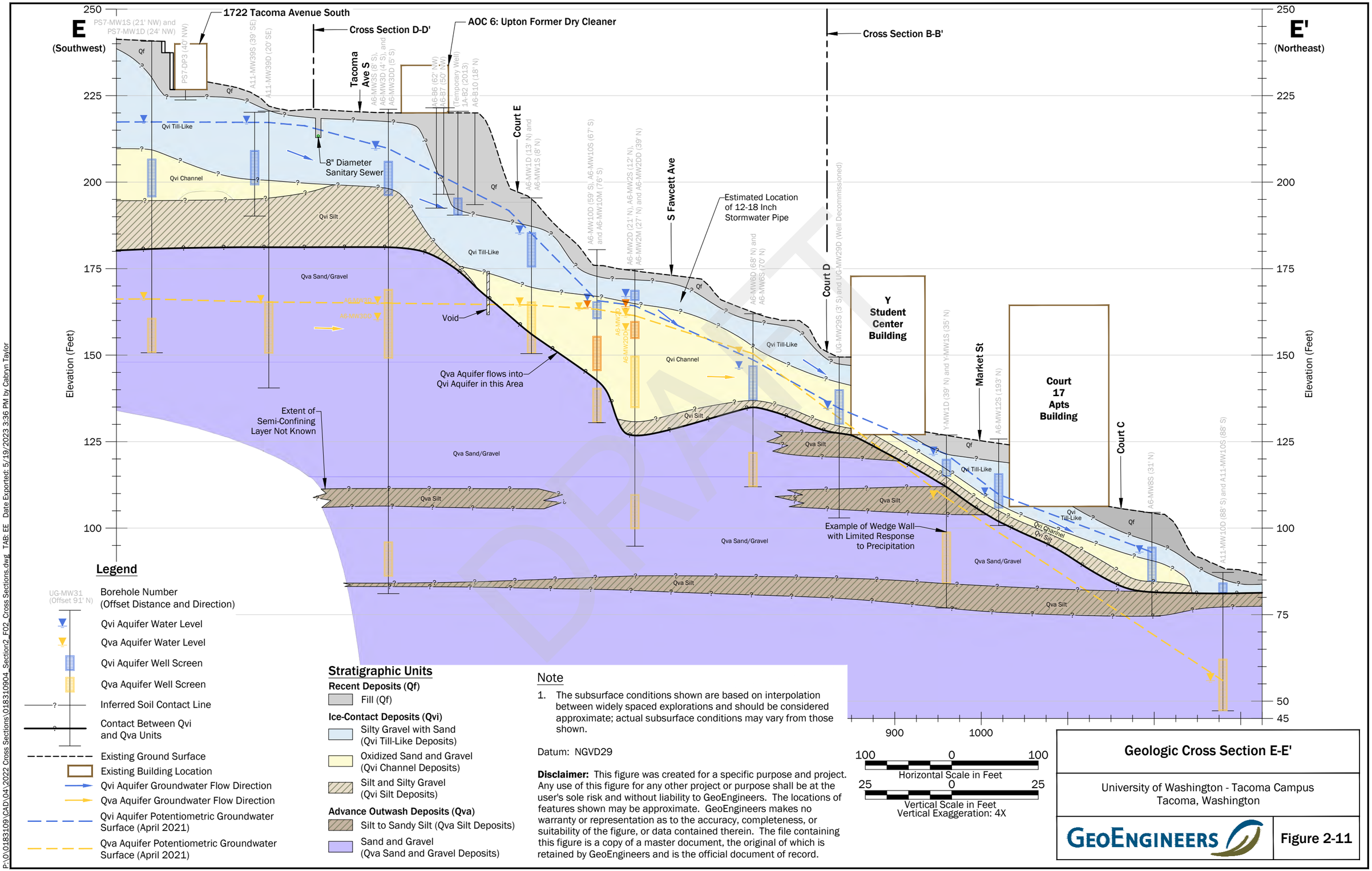
Figure 2-10



Legend

- UG-MW31 (Offset 91' N) — Borehole Number (Offset Distance and Direction)
- Qvi Aquifer Water Level
- Qva Aquifer Water Level
- Qvi Aquifer Well Screen
- Qva Aquifer Well Screen
- Inferred Soil Contact Line
- Contact Between Qvi and Qva Units
- Existing Ground Surface
- Existing Building Location
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Qvi Aquifer Potentiometric Groundwater Surface (April 2021)
- Qva Aquifer Potentiometric Groundwater Surface (April 2021)

Stratigraphic Units

Recent Deposits (Qf)
- Fill (Qf)

Ice-Contact Deposits (Qvi)
- Silty Gravel with Sand (Qvi Till-Like Deposits)
- Oxidized Sand and Gravel (Qvi Channel Deposits)
- Silt and Silty Gravel (Qvi Silt Deposits)

Advance Outwash Deposits (Qva)
- Silt to Sandy Silt (Qva Silt Deposits)
- Sand and Gravel (Qva Sand and Gravel Deposits)

Note

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100 0 100
Horizontal Scale in Feet

25 0 25
Vertical Scale in Feet
Vertical Exaggeration: 4X

Geologic Cross Section E-E'

University of Washington - Tacoma Campus
Tacoma, Washington

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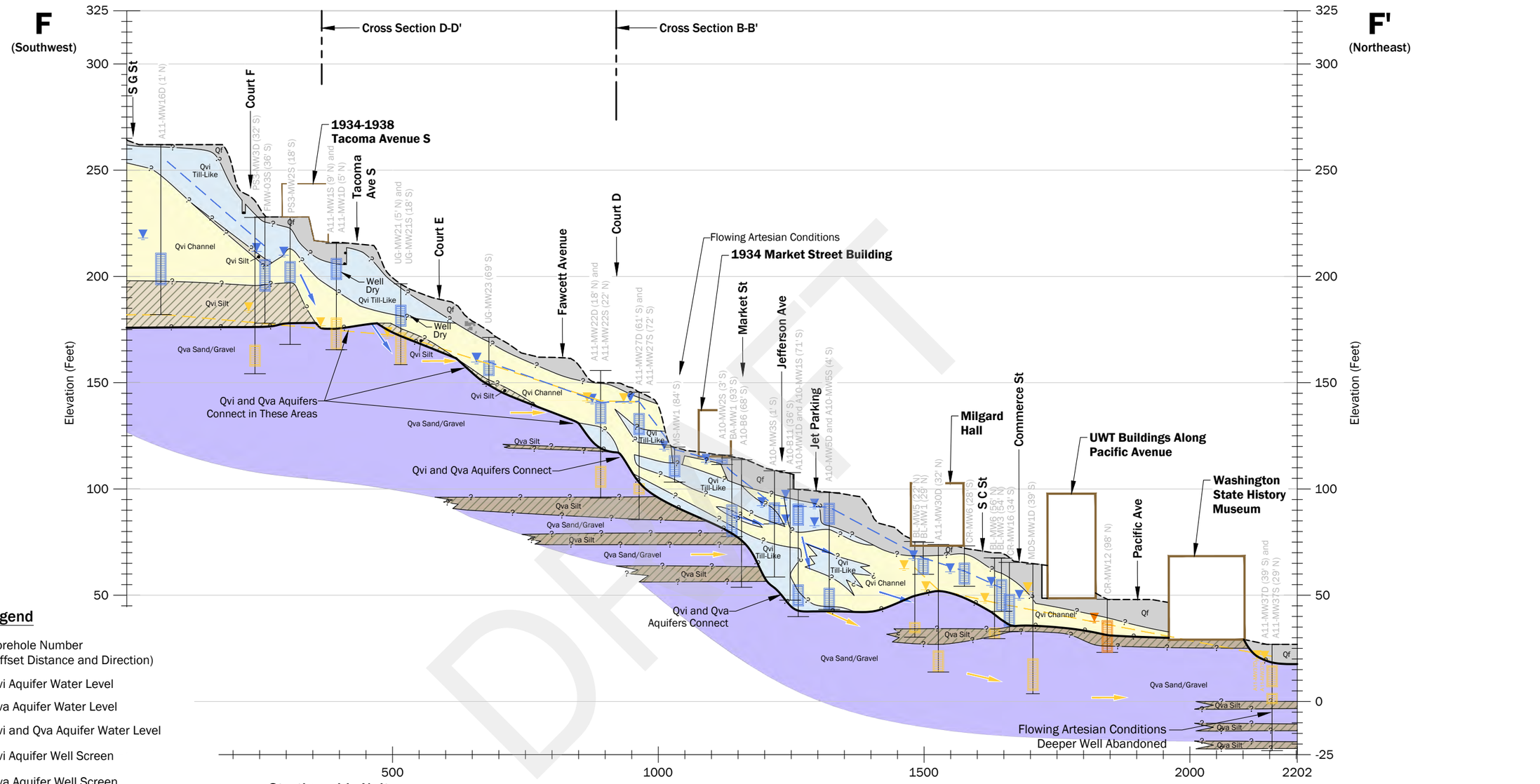
Figure 2-11



Legend

- Borehole Number (Offset Distance and Direction) — UG-MW31 (Offset 91' N)
- Qvi Aquifer Water Level
- Qva Aquifer Water Level
- Qvi and Qva Aquifer Water Level
- Qvi Aquifer Well Screen
- Qva Aquifer Well Screen
- Qvi and Qva Aquifer Well Screen
- Inferred Soil Contact Line
- Contact Between Qvi and Qva Units
- Existing Ground Surface
- Existing Building Location
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Qvi Aquifer Potentiometric Groundwater Surface (April 2021)
- Qva Aquifer Potentiometric Groundwater Surface (April 2021)

Stratigraphic Units

Recent Deposits (Qf)
- Fill (Qf)

Ice-Contact Deposits (Qvi)
- Silty Gravel with Sand (Qvi Till-Like Deposits)
- Oxidized Sand and Gravel (Qvi Channel Deposits)
- Silt and Silty Gravel (Qvi Silt Deposits)

Advance Outwash Deposits (Qva)
- Silt to Sandy Silt (Qva Silt Deposits)
- Sand and Gravel (Qva Sand and Gravel Deposits)

200 0 200 — Horizontal Scale in Feet

50 0 50 — Vertical Scale in Feet

Vertical Exaggeration: 4X

Note

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.

Datum: NGVD29

Geologic Cross Section F-F'

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-12

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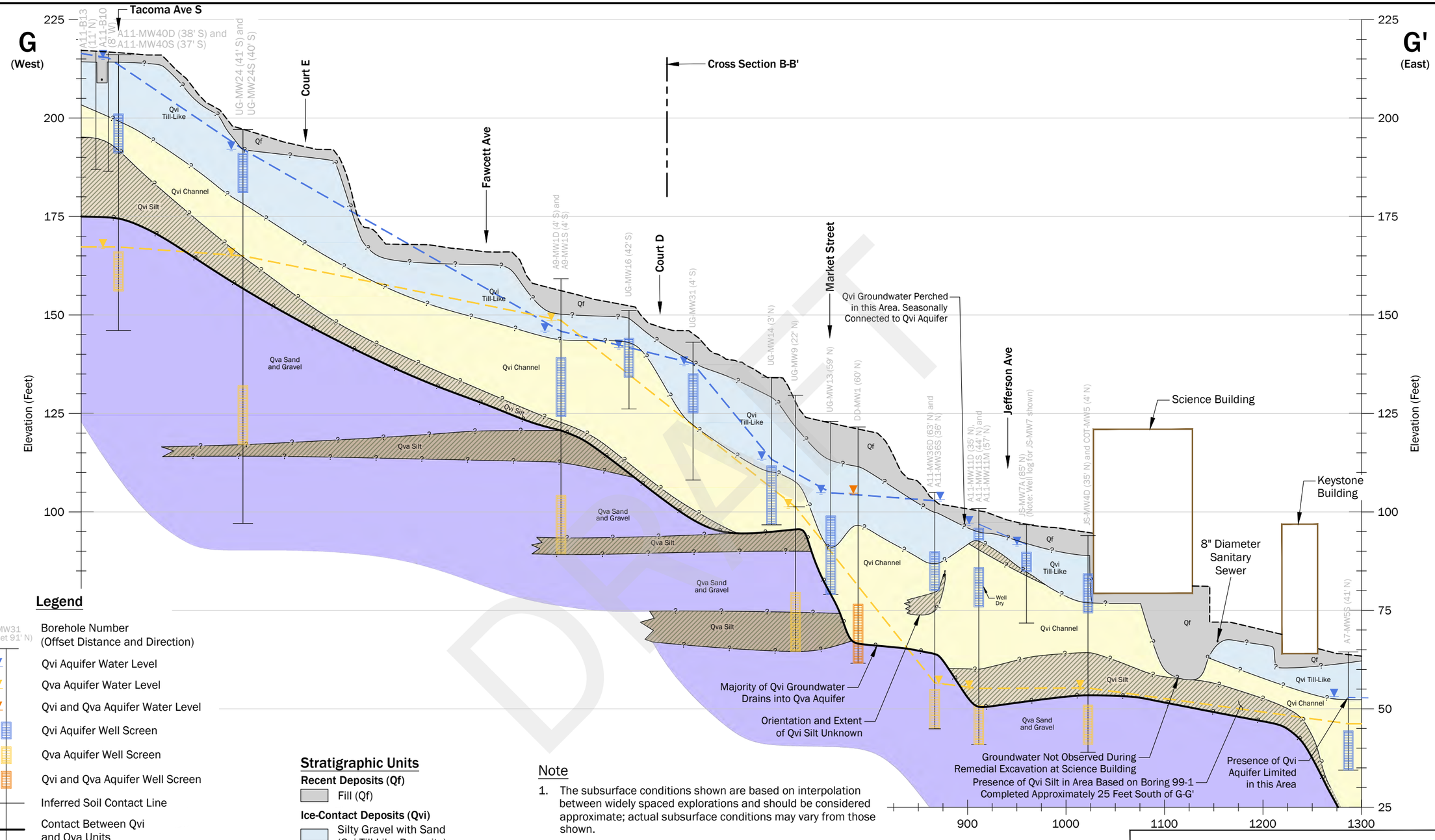


Legend

- UG-MW31 (Offset 91' N) — Borehole Number (Offset Distance and Direction)
- Qvi Aquifer Water Level
- Qva Aquifer Water Level
- Qvi and Qva Aquifer Water Level
- Qvi Aquifer Well Screen
- Qva Aquifer Well Screen
- Qvi and Qva Aquifer Well Screen
- Inferred Soil Contact Line
- Contact Between Qvi and Qva Units
- Existing Ground Surface
- Existing Building Location
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Qvi Aquifer Potentiometric Groundwater Surface (April 2021)
- Qva Aquifer Potentiometric Groundwater Surface (April 2021)

Stratigraphic Units

Recent Deposits (Qf)
- Fill (Qf)

Ice-Contact Deposits (Qvi)
- Silty Gravel with Sand (Qvi Till-Like Deposits)
- Oxidized Sand and Gravel (Qvi Channel Deposits)
- Silt and Silty Gravel (Qvi Silt Deposits)

Advance Outwash Deposits (Qva)
- Silt to Sandy Silt (Qva Silt Deposits)
- Sand and Gravel (Qva Sand and Gravel Deposits)

Note

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.

Datum: NGVD29

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.

100 0 100
Horizontal Scale in Feet

25 0 25
Vertical Scale in Feet
Vertical Exaggeration: 4X

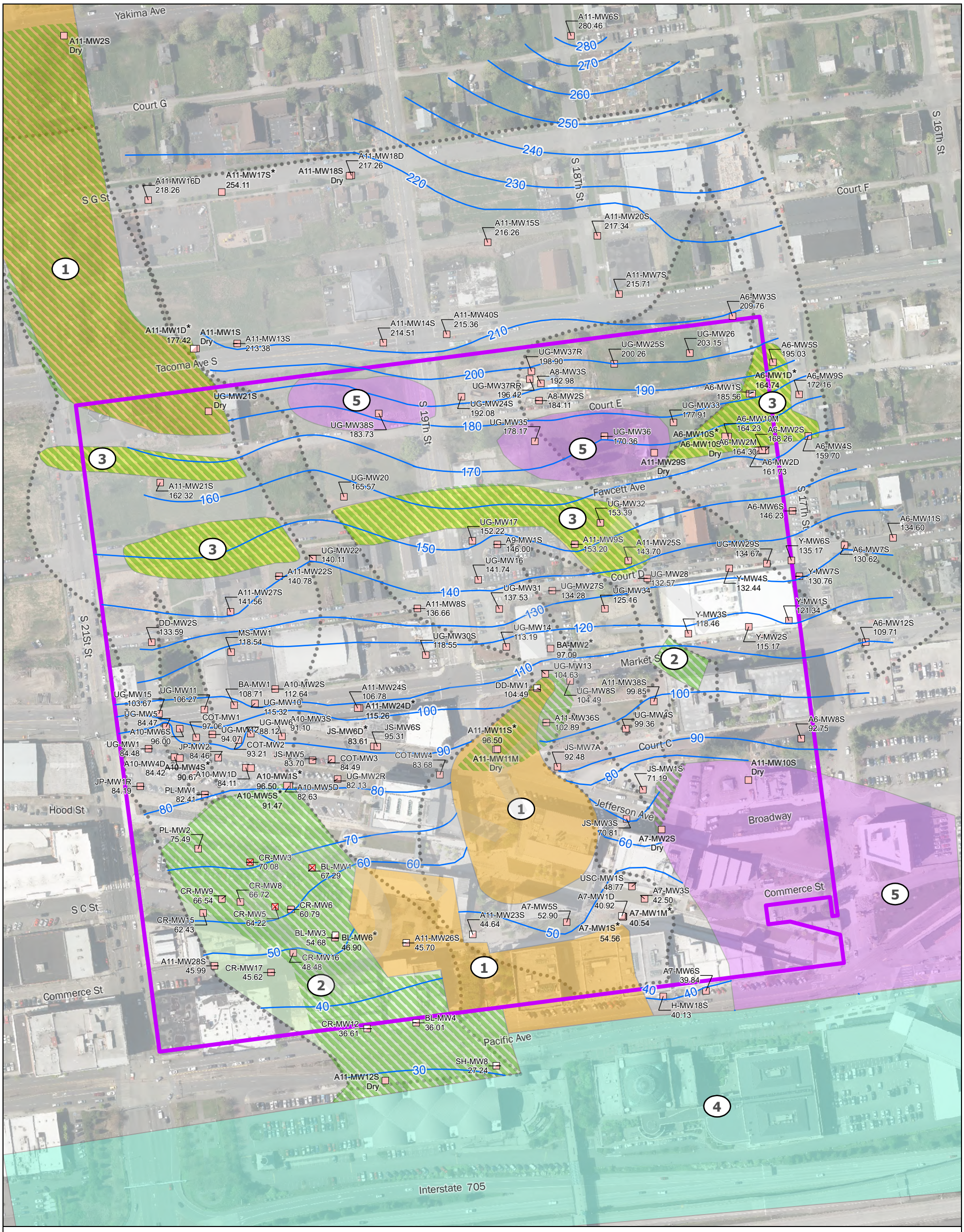
Geologic Cross Section G-G'

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-13

P:\0\0183109\GIS\MXDs\RI_working\Section2\Section2_RI.aprx\018310913_March2020_WaterLevels_Qvi Date Exported: 06/27/23 by estrandhagen



Legend

- Qvi Aquifer Monitoring Well
- Qvi/Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Groundwater Elevation Contour - 10 Foot Interval
- University of Washington - Tacoma Campus Master Plan Boundary
- Areas where Qvi and Qva Aquifers are Connected by Glacial Incision or Development
- Vashon Drift Ice-Contact (Qvi) Channel Deposit
- 1. Qvi Groundwater Flows into Qva Aquifer and Qvi Aquifer is Locally Depleted
- 2. Qvi Groundwater Locally Flows into Qva Aquifer, However Not Fully Depleted
- 3. Qva Groundwater Locally Flows into the Qvi Aquifer
- 4. Qvi Unit is Locally Absent
- 5. Qvi Groundwater is Locally Absent Due to Seasonal Variation or Other Unknown Condition

W S E N

200 0 200

Feet

Notes:

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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.
3. Asterisk (*) indicates water level in the monitoring well is not representative of the aquifer water level and therefore not used for contouring. See RI text for addition information.

Data Source: Aerial from City of Tacoma, 2015.
Contours generated in Surfer using the kriging interpolation method.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

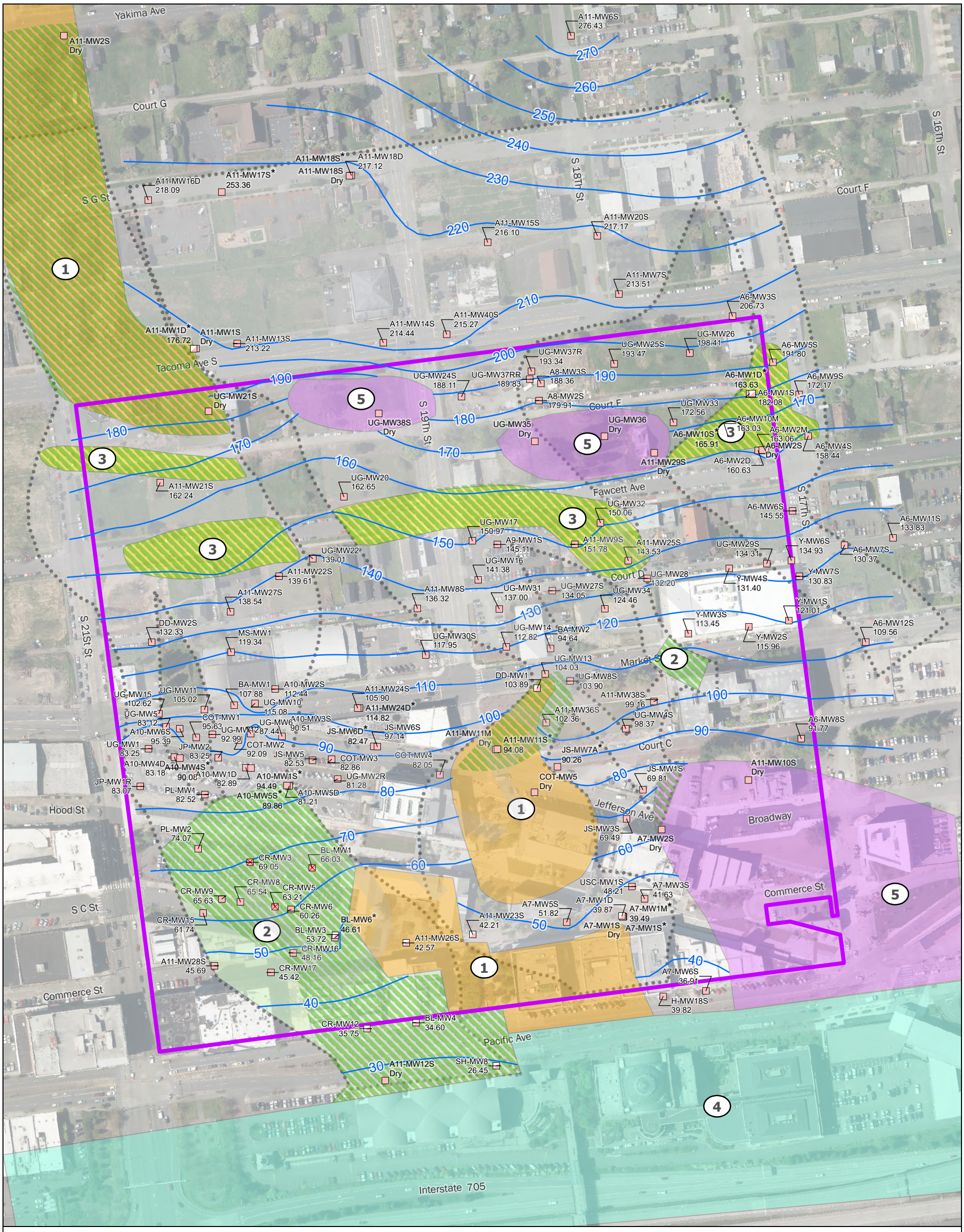
Groundwater Elevation Contours Qvi Aquifer (March 2020)

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-14

P:\0\0183109\GIS\MXDs\RI_working\Section2\Section2_RI.aprx\018310913_September2020_WaterLevels_Qvi Date Exported: 06/27/23 by estrandhagen



Legend

- Qvi Aquifer Monitoring Well
- Qvi/Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Groundwater Elevation Contour - 10 Foot Interval
- University of Washington - Tacoma Campus Master Plan Boundary
- Areas where Qvi and Qva Aquifers are Hydraulically Connected by Glacial Incision or Development
- Vashon Drift Ice-Contact (Qvi) Channel Deposit
- 1. Qvi Groundwater Flows into Qva Aquifer and Qvi Aquifer is Locally Depleted
- 2. Qvi Groundwater Locally Flows into Qva Aquifer, However Not Fully Depleted
- 3. Qva Groundwater Locally Flows into the Qvi Aquifer
- 4. Qvi Unit is Locally Absent
- 5. Qvi Groundwater is Locally Absent Due to Seasonal Variation or Other Unknown Condition

200 0 200
Feet

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Contours generated in Surfer using the kriging interpolation method.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Groundwater Elevation Contours
Qvi Aquifer (September 2020)

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-15

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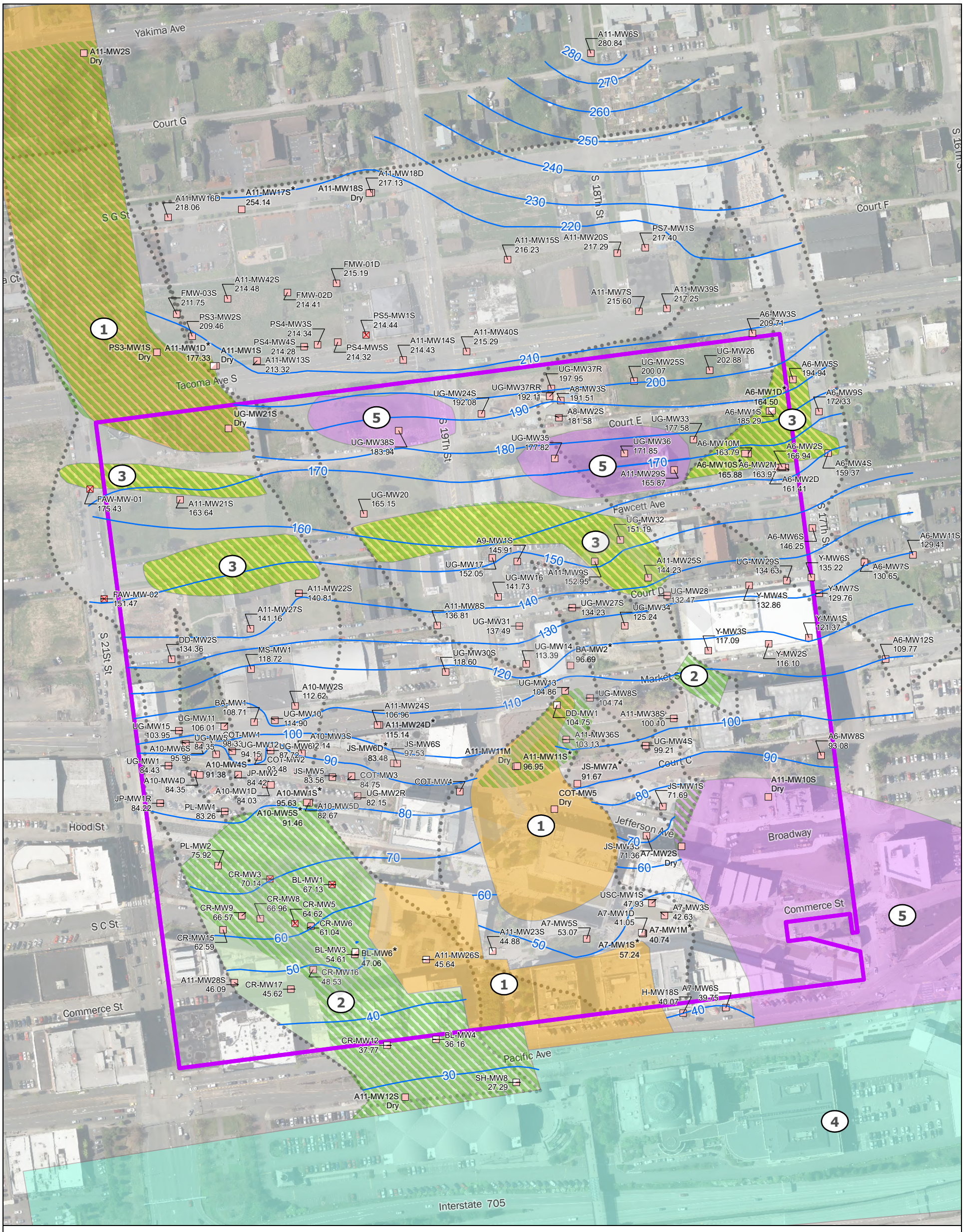

Legend

- Qvi Aquifer Monitoring Well
- Qvi/Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Groundwater Elevation Contour - 10 Foot Interval
- University of Washington - Tacoma Campus Master Plan Boundary
- Areas where Qvi and Qva Aquifers are Hydraulically Connected by Glacial Incision or Development
- Vashon Drift Ice-Contact (Qvi) Channel Deposit
- 1. Qvi Aquifer Locally Depleted
- 2. Qvi Groundwater Locally Flows into Qva Aquifer, However Not Fully Depleted
- 3. Qva Groundwater Locally Flows into the Qvi Aquifer
- 4. Qvi Unit is Locally Absent
- 5. Qvi Groundwater is Locally Absent Due to Seasonal Variation or Other Unknown Condition

W S N E

200 0 200

Feet

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Data Source: Aerial from City of Tacoma, 2015.
Contours generated in Surfer using the kriging interpolation method.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Groundwater Elevation Contours
Qvi Aquifer (April 2021)

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-16

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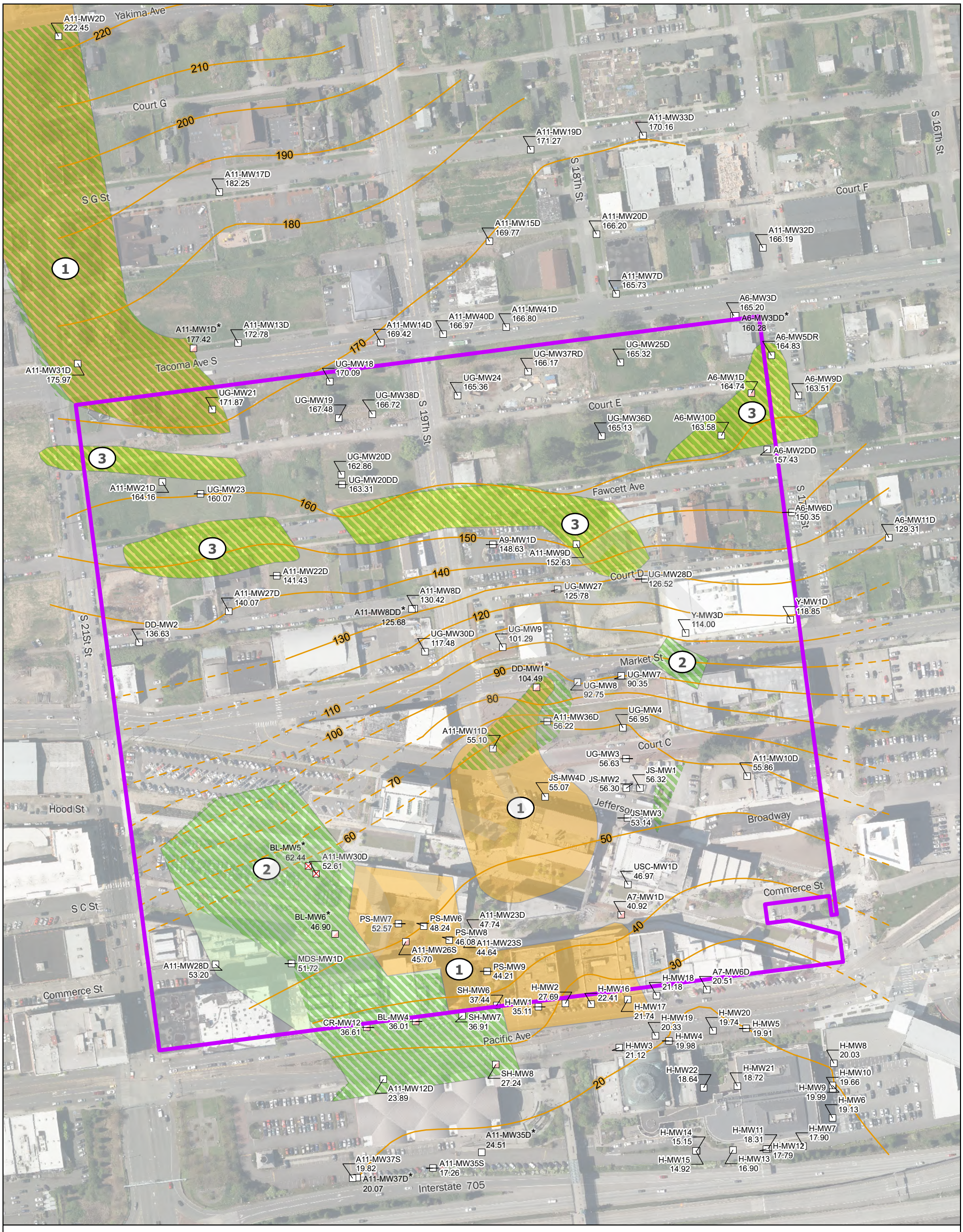

Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Qva Aquifer Groundwater Elevation Contour - 10 Foot Interval
- Inferred Qva Aquifer Groundwater Elevation Contour - 10 Foot Interval
- University of Washington - Tacoma Campus Master Plan Boundary
- Areas where Qvi and Qva Aquifers are Hydraulically Connected by Glacial Incision or Development
- 1. Qvi Groundwater Flows into Qva Aquifer and Qvi Aquifer is Locally Depleted
- 2. Qvi Groundwater Locally Flows into Qva Aquifer, However Not Fully Depleted
- 3. Qva Groundwater Locally Flows into the Qvi Aquifer

W S N E

200 0 200

Feet

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Data Source: Aerial from City of Tacoma, 2015.
Contours generated in Surfer using the kriging interpolation method with hand modifications.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

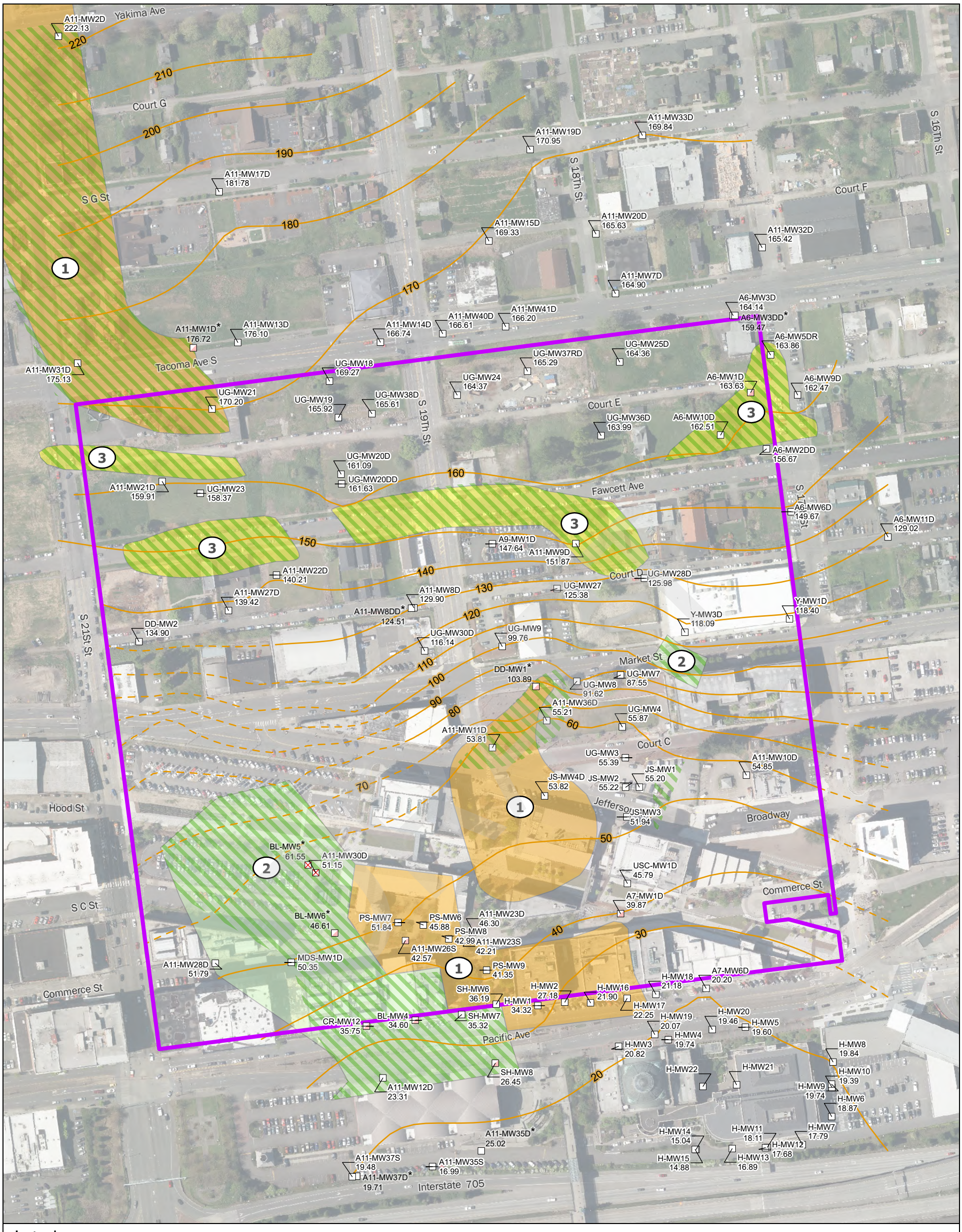
Groundwater Elevation Contours
Qva Aquifer (March 2020)

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-17

P:\0\0183109\GIS\MXDs\RI_working\Section2\Section2_RI.aprx\018310913_September2020_WaterLevels_Qva Date Exported: 06/28/23 by estrandhagen



Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Qva Aquifer Groundwater Elevation Contour - 10 Foot Interval
- Inferred Qva Aquifer Groundwater Elevation Contour - 10 Foot Interval
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W S N E

200 0 200

Feet

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Contours generated in Surfer using the kriging interpolation method.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

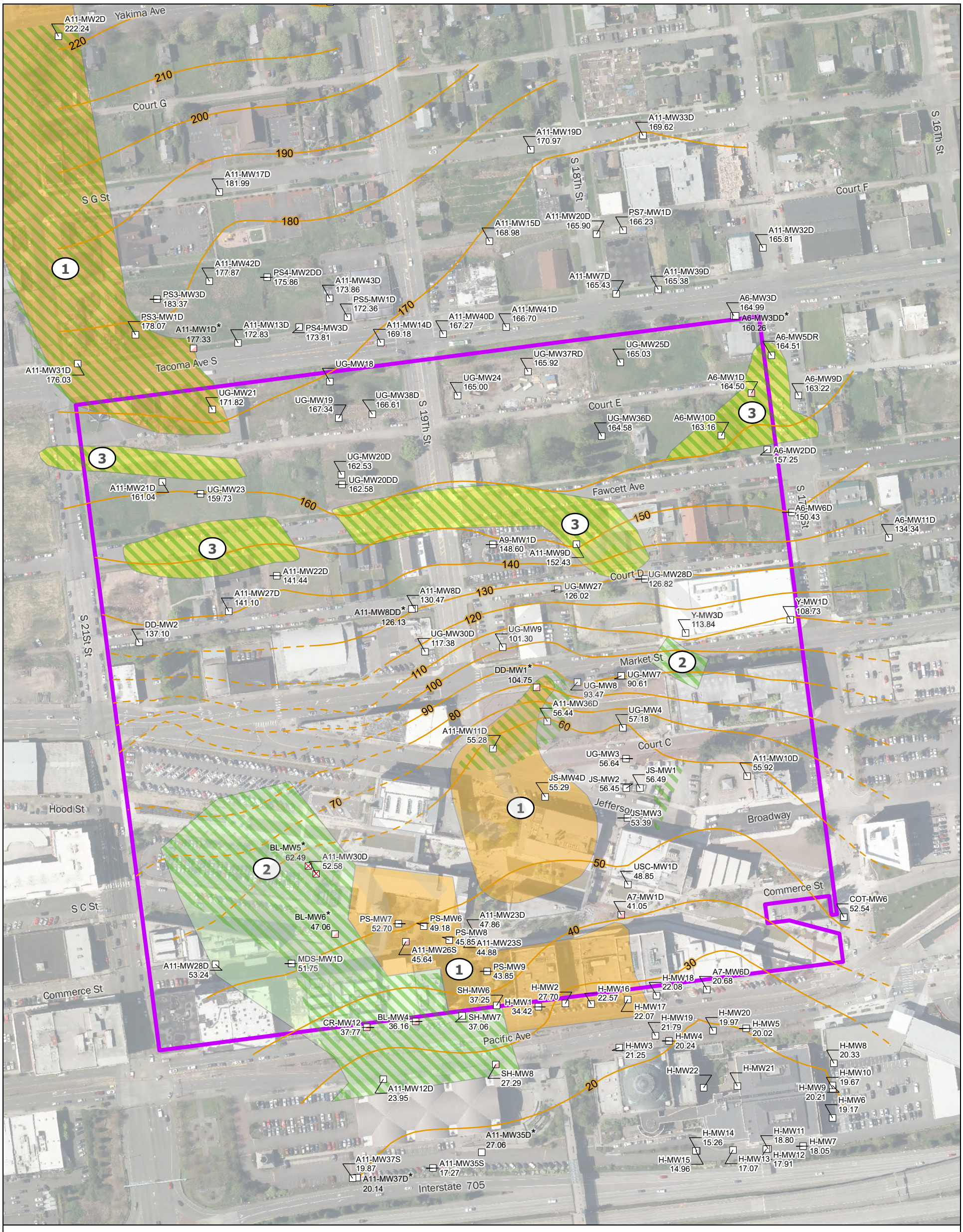
Groundwater Elevation Contours Qva Aquifer (September 2020)

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-18

P:\0\0183109\GIS\MXDs\RI_working\Section2\Section2_RI.aprx\018310913_April2021_WaterLevels_Qva Date Exported: 06/28/23 by estrandhagen



Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Qva Aquifer Groundwater Elevation Contour - 10 Foot Interval
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200 0 200
Feet

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Data Source: Aerial from City of Tacoma, 2015.
Contours generated in Surfer using the kriging interpolation method with hand modifications.
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Groundwater Elevation Contours
Qva Aquifer (April 2021)

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 2-19

Table 3-1

Proposed Soil Cleanup Levels - Direct Contact and Protection of Groundwater as Drinking Water and Surface Water

University of Washington - Tacoma Campus
Tacoma, Washington

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Surface Water and Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Petroleum Hydrocarbons															
Gasoline-Range Hydrocarbons (TPH-G) w/Benzene	n/a	--	--	--	--	--	--	3.0E+01	3.0E+01	3.0E+01	3.0E+01	--	5.0E+00	30	30
Gasoline-Range Hydrocarbons (TPH-G)	n/a	--	--	--	--	--	--	1.0E+02	1.0E+02	1.0E+02	1.0E+02	--	5.0E+00	100	100
Diesel-Range Hydrocarbons (TPH-D)	n/a	--	--	--	--	--	--	2.0E+03	2.0E+03	2.0E+03	2.0E+03	--	2.5E+01	2,000	2,000
Oil-Range Hydrocarbons (TPH-O)	n/a	--	--	--	--	--	--	2.0E+03	2.0E+03	2.0E+03	2.0E+03	--	5.0E+01	2,000	2,000
Metals															
Aluminum	7429-90-5	--	8.0E+04	--	1.5E+03	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+04	8.0E+04	3.3E+04	5.0E+00	80,000	80,000
Antimony	7440-36-0	--	3.2E+01	--	4.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+01	3.2E+01	--	5.0E+00	32	32
Arsenic	7440-38-2	6.7E-01	2.4E+01	--	2.9E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.7E-01	6.7E-01	2.0E+01	1.0E+01	20	20
Barium	7440-39-3	--	1.6E+04	--	4.1E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+04	1.6E+04	--	2.5E+00	16,000	16,000
Beryllium	7440-41-7	--	1.6E+02	--	7.9E+02	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+02	1.6E+02	6.0E-01	5.0E-01	160	160
Cadmium	7440-43-9	--	8.0E+01	--	6.7E+00	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	1.0E+00	5.0E-01	80	80
Calcium	7440-70-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E+01	NE	NE
Chromium III / Total	7440-47-3	--	1.2E+05	--	--	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.2E+05	1.2E+05	4.8E+01	5.0E-01	120,000	120,000
Chromium VI	18540-29-9	3.8E-01	2.4E+02	--	1.9E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.8E-01	3.8E-01	--	1.1E-01	0.38	0.38
Cobalt	7440-48-4	--	2.4E+01		4.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+01	2.4E+01	--	5.0E-01	24	24
Copper	7440-50-8	--	3.2E+03	--	2.2E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+03	3.2E+03	3.6E+01	1.0E+00	3,200	3,200
Iron	7439-89-6	--	5.6E+04	--	2.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E+04	5.6E+04	5.9E+04	2.5E+01	58,700	58,700
Lead	7439-92-1	2.5E+02		--	1.0E+04	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.5E+02	2.5E+02	2.4E+01	5.0E+00	250	250
Magnesium	7439-95-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E+01	NE	NE
Manganese	7439-96-5	--	3.7E+03	--	6.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.7E+03	3.7E+03	1.2E+03	5.0E-01	3,700	3,700
Mercury (mercuric chloride)	7439-97-6	--	2.4E+01	--	5.2E+01	1.2E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+01	2.4E+01	7.0E-02	2.5E-01	24	24
Nickel	7440-02-0	--	1.6E+03	--	6.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	4.8E+01	2.5E+00	1,600	1,600
Potassium	7440-09-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E+01	NE	NE
Selenium	7782-49-2	--	4.0E+02	--	5.0E+00	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	1.0E+01	400	400
Silver	7440-22-4	--	4.0E+02	--	8.3E+00	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	5.0E-01	400	400
Sodium	7440-23-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E+01	NE	NE
Thallium	7440-28-0	--	8.0E-01	--	7.1E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E-01	8.0E-01	--	1.0E-01	0.80	0.80
Vanadium	7440-62-2	--	4.0E+02	--	1.0E+03	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	5.0E-01	400	400
Zinc	7440-66-6	--	2.4E+04	--	6.2E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+04	2.4E+04	8.5E+01	2.5E+00	24,000	24,000
Cyanides															
Total Cyanide	544-92-3	--	4.0E+02	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	1.6E-01	400	400
Semi-Volatile Organic Compounds (SVOCs)															
1,2-Dinitrobenzene	528-29-0	--	8.0E+00	3.6E+02	3.6E-01	5.0E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+00	8.0E+00	--	3.3E-02	8.0	8.0
1,2-Diphenylhydrazine	122-66-7	1.3E+00	--	1.5E+03	1.5E+00	5.9E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.3E+00	1.3E+00	--	3.3E-02	1.3	1.3
1,3-Dinitrobenzene	99-65-0	--	8.0E+00	3.5E+02	3.5E-01	5.1E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+00	8.0E+00	--	3.3E-02	8.0	8.0
1,4-Dinitrobenzene	100-25-4	--	8.0E+00	3.5E+02	3.5E-01	8.4E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+00	8.0E+00	--	3.3E-02	8.0	8.0
2,3,4,6-Tetrachlorophenol	58-90-2	--	2.4E+03	2.8E+02	2.8E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+03	2.4E+03	--	3.3E-02	2,400	2,400
2,3,5,6-Tetrachlorophenol	935-95-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
2,3-Dichloroaniline	608-27-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
2,4,5-Trichlorophenol	95-95-4	--	8.0E+03	1.6E+03	1.6E+00	2.6E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	3.3E-02	8,000	8,000
2,4,6-Tribromophenol	118-79-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Surface Water and Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
2,4,6-Trichlorophenol	88-06-2	9.1E+01	8.0E+01	3.8E+02	3.8E-01	4.1E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	3.3E-02	80	80
2,4-Dichlorophenol	120-83-2	--	2.4E+02	1.5E+02	1.5E-01	7.5E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+02	2.4E+02	--	3.3E-02	240	240
2,4-Dimethylphenol	105-67-9	--	1.6E+03	4.9E+02	4.9E-01	1.4E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	3.3E-02	1,600	1,600
2,4-Dinitrophenol	51-28-5	--	1.6E+02	1.0E-02	1.0E-05	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+02	1.6E+02	--	1.7E-01	160	160
2,4-Dinitrotoluene	121-14-2	3.2E+00	1.6E+02	5.8E+02	5.8E-01	4.8E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+00	3.2E+00	--	3.3E-02	3.2	3.2
2,6-Dinitrotoluene	606-20-2	6.7E-01	2.4E+01	5.9E+02	5.9E-01	7.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.7E-01	6.7E-01	--	3.3E-02	0.67	0.67
2-Chlorophenol	95-57-8	--	4.0E+02	3.9E+02	3.9E-01	2.1E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	3.3E-02	400	400
2-Fluorophenol	367-12-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
2-methylphenol	95-48-7	--	4.0E+03	3.1E+02	3.1E-01	2.0E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+03	4.0E+03	--	3.3E-02	4,000	4,000
2-Nitroaniline	88-74-4	--	8.0E+02	1.1E+02	1.1E-01	6.1E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	3.3E-02	800	800
2-Nitrophenol	88-75-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
3,3'-Dichlorobenzidine	91-94-1	2.2E+00	--	3.2E+03	3.2E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.2E+00	2.2E+00	--	1.7E-01	2.2	2.2
3&4-Methylphenol	65794-96-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
3-Nitroaniline	99-09-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
4,6-Dinitro-2-Methylphenol	534-52-1	--	6.4E+00	7.5E+02	7.5E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+00	6.4E+00	--	1.7E-01	6.4	6.4
4-Bromophenyl phenyl ether	101-55-3	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
4-Chloro-3-Methylphenol	59-50-7	--	8.0E+03	4.9E+02	4.9E-01	4.0E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	3.3E-02	8,000	8,000
4-Chloroaniline	106-47-8	5.0E+00	3.2E+02	1.1E+02	1.1E-01	1.7E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E+00	5.0E+00	--	1.7E-01	5	5
4-Chlorophenyl phenyl ether	7005-72-3	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
4-Nitroaniline	100-01-6	5.0E+01	3.2E+02	1.1E+02	1.1E-01	1.1E-08	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E+01	5.0E+01	--	3.3E-02	50	50
4-Nitrophenol	100-02-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Aniline	62-53-3	1.8E+02	5.6E+02	7.0E+01	7.0E-02	3.6E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.8E+02	1.8E+02	--	1.7E-01	180	180
Benzidine	92-87-5	8.2E-04	2.4E+02	1.2E+03	1.2E+00	4.9E-10	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.2E-04	8.2E-04	--	2.0E+00	2.0	2.0
Benzoic Acid	65-85-0	--	3.2E+05	6.0E-01	6.0E-04	5.2E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+05	3.2E+05	--	2.0E+00	320,000	320,000
Benzyl Alcohol	100-51-6	--	8.0E+03	2.1E+01	2.1E-02	4.9E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.7E-01	8,000	8,000
Bis(2-Chloroethoxy)Methane	111-91-1	--	2.4E+02	1.4E+01	1.4E-02	6.6E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+02	2.4E+02	--	3.3E-02	240	240
Bis(2-Chloroethyl)Ether	111-44-4	9.1E-01	--	7.6E+01	7.6E-02	2.8E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	9.1E-01	9.1E-01	--	3.3E-02	0.91	0.91
Bis(2-chloroisopropyl) ether	39638-32-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Bis(2-Ethylhexyl) Phthalate	117-81-7	7.1E+01	1.6E+03	1.1E+05	1.1E+02	2.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	7.1E+01	7.1E+01	--	3.3E-02	71	71
Butyl benzyl Phthalate	85-68-7	5.3E+02	1.6E+04	1.4E+04	1.4E+01	1.5E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.3E+02	5.3E+02	--	3.3E-02	530	530
Carbazole	86-74-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Di(2-ethylhexyl)adipate	103-23-1	8.3E+02	4.8E+04	3.6E+04	3.6E+01	3.6E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.3E+02	8.3E+02	--	3.3E-02	830	830
Dibenzofuran	132-64-9	--	8.0E+01	9.2E+03	9.2E+00	1.8E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	3.3E-02	80	80
Dibutyl Phthalate	84-74-2	--	8.0E+03	1.6E+03	1.6E+00	1.0E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	3.3E-02	8,000	8,000
Diethyl Phthalate	84-66-2	--	6.4E+04	8.2E+01	8.2E-02	6.5E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+04	6.4E+04	--	1.7E-01	64,000	64,000
Dimethyl Phthalate	131-11-3	--	--	3.2E+01	3.2E-02	2.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Di-N-Octyl Phthalate	117-84-0	--	8.0E+02	1.4E+05	1.4E+02	1.5E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	3.3E-02	800	800
Hexachlorobenzene	118-74-1	6.3E-01	6.4E+01	8.0E+04	8.0E+01	2.2E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.3E-01	6.3E-01	--	3.3E-02	0.63	0.63
Hexachlorocyclopentadiene	77-47-4	--	4.8E+02	1.4E+03	1.4E+00	2.2E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+02	4.8E+02	--	3.3E-02	480	480
Hexachloroethane	67-72-1	2.5E+01	5.6E+01	2.0E+02	2.0E-01	6.0E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.5E+01	2.5E+01	--	3.3E-02	25	25
Isophorone	78-59-1	1.1E+03	1.6E+04	6.5E+01	6.5E-02	1.1E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.1E+03	1.1E+03	--	3.3E-02	1,100	1,100
m,p-Cresol	15831-10-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Nitrobenzene	98-95-3	--	1.6E+02	1.2E+02	1.2E-01	4.0E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+02	1.6E+02	--	3.3E-02	160	160
N-Nitrosodimethylamine	62-75-9	3.7E-03	6.4E-01	2.3E+01	2.3E-02	3.7E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.7E-03	3.7E-03	--	3.3E-02	0.033	0.033
N-Nitrosodi-n-propylamine	621-64-7	1.4E-01	--	2.8E+02	2.8E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.4E-01	1.4E-01	--	3.3E-02	0.14	0.14
N-Nitrosodiphenylamine	86-30-6	2.0E+02	--	2.6E+03	2.6E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.0E+02	2.0E+02	--	3.3E-02	200	200
Pentachlorophenol	87-86-5	2.5E+00	4.0E+02	5.9E+02	5.9E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.5E+00	2.5E+00	--	1.7E-01	2.5	2.5

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Surface Water and Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Phenol	108-95-2	--	2.4E+04	1.9E+02	1.9E-01	5.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+04	2.4E+04	--	3.3E-02	24,000	24,000
Pyridine	110-86-1	--	8.0E+01	7.2E+01	7.2E-02	4.7E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	3.3E-01	80	80
Volatile Organic Compounds (VOCs)															
1,1,1,2-Tetrachloroethane	630-20-6	3.8E+01	2.4E+03	8.6E+01	8.6E-02	4.7E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.8E+01	3.8E+01	--	1.0E-03	38	38
1,1,1-Trichloroethane (TCA)	71-55-6	--	1.6E+05	1.4E+02	1.4E-01	4.2E-01	2.0E+02	1.5E+00	8.4E-02	1.5E+00	8.4E-02	--	1.0E-03	1.5	0.084
1,1,2,2-Tetrachloroethane	79-34-5	5.0E+00	1.6E+03	7.9E+01	7.9E-02	7.3E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E+00	5.0E+00	--	1.0E-03	5.0	5.0
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	76-13-1	--	2.4E+06	2.0E+02	2.0E-01	1.4E+01	Not a GW COPC	not a GW COPC	Not a GW COPC	2.4E+06	2.4E+06	--	1.0E+01	2,400,000	2,400,000
1,1,2-Trichloroethane	79-00-5	1.8E+01	3.2E+02	7.5E+01	7.5E-02	1.8E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.8E+01	1.8E+01	--	1.0E-03	18	18
1,1-Dichloroethane (DCA)	75-34-3	1.8E+02	1.6E+04	5.3E+01	5.3E-02	1.4E-01	7.7E+00	4.1E-02	2.6E-03	4.1E-02	2.6E-03	--	1.0E-03	0.041	0.0026
1,1-Dichloroethylene (DCE)	75-35-4	--	4.0E+03	6.5E+01	6.5E-02	7.0E-01	7.0E+00	4.6E-02	2.5E-03	4.6E-02	2.5E-03	--	1.0E-03	0.046	0.0025
1,1-Dichloropropene	563-58-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
1,2,3-Trichlorobenzene	87-61-6	--	6.4E+01	1.4E+03	1.4E+00	1.7E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+01	6.4E+01	--	1.0E-03	64	64
1,2,3-Trichloropropane	96-18-4	6.3E-03	3.2E+02	1.2E+02	1.2E-01	6.7E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.3E-03	6.3E-03	--	1.0E-03	0.0063	0.0063
1,2,4-Trichlorobenzene	120-82-1	3.4E+01	8.0E+02	1.7E+03	1.7E+00	2.4E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.4E+01	3.4E+01	--	1.0E-03	34	34
1,2,4-Trimethylbenzene	95-63-6	--	8.0E+02	6.1E+02	6.1E-01	1.1E-01	8.0E+01	1.3E+00	7.2E-02	1.3E+00	7.2E-02	--	1.0E-03	1.3	0.072
1,2-Dibromo-3-Chloropropane	96-12-8	2.3E-01	1.6E+01	1.2E+02	1.2E-01	2.6E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.3E-01	2.3E-01	--	5.0E-03	0.23	0.23
1,2-Dibromoethane (EDB)	106-93-4	5.0E-01	7.2E+02	6.6E+01	6.6E-02	1.4E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E-01	5.0E-01	--	1.0E-03	0.5	0.5
1,2-Dichlorobenzene (1,2-DCB)	95-50-1	--	7.2E+03	3.8E+02	3.8E-01	3.7E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	7.2E+03	7.2E+03	--	1.0E-03	7,200	7,200
1,2-Dichloroethane (EDC)	107-06-2	1.1E+01	4.8E+02	3.8E+01	3.8E-02	2.8E-02	4.8E+00	2.3E-02	1.6E-03	2.3E-02	1.6E-03	--	1.0E-03	0.023	0.0016
1,2-Dichloropropane	78-87-5	2.7E+01	3.2E+03	4.7E+01	4.7E-02	6.5E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.7E+01	2.7E+01	--	1.0E-03	27	27
1,3,5-Trimethylbenzene	108-67-8	--	8.0E+02	6.0E+02	6.0E-01	1.6E-01	8.0E+01	1.3E+00	7.1E-02	1.3E+00	7.1E-02	--	1.0E-03	1.3	0.071
1,3-Dichlorobenzene (1,3-DCB)	541-73-1	--	--	3.8E+02	3.8E-01	5.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
1,3-Dichloropropane	142-28-9	--	1.6E+03	7.2E+01	7.2E-02	2.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	1.0E-03	1,600	1,600
1,4-Dichlorobenzene (1,4-DCB)	106-46-7	1.9E+02	5.6E+03	6.2E+02	6.2E-01	4.6E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.9E+02	1.9E+02	--	1.0E-03	190	190
2,2-Dichloropropane	594-20-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
2-Butanone, 4-(Acetyloxy)-	10150-87-5	--	--	--	--	--	NE	not a GW COPC	Not a GW COPC	NE	NE	--	1.0E+01	NE	NE
2-Chloroethyl vinyl ether	110-75-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
2-Chlorotoluene	95-49-8	--	1.6E+03	3.8E+02	3.8E-01	7.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	1.0E-03	1,600	1,600
2-Hexanone	591-78-6	--	4.0E+02	1.5E+01	1.5E-02	1.9E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	5.0E-03	400	400
4-Chlorotoluene	106-43-4	--	1.6E+03	3.8E+02	3.8E-01	8.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	1.0E-03	1,600	1,600
4-Isopropyltoluene	99-87-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
Acetic Acid, Methyl Ester	79-20-9	--	8.0E+04	3.1E+00	3.1E-03	2.8E-03	Not a GW COPC	not a GW COPC	Not a GW COPC	8.0E+04	8.0E+04	--	1.0E+01	80,000	80,000
Acetone	67-64-1	--	7.2E+04	2.4E+00	2.4E-03	8.8E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	7.2E+04	7.2E+04	--	5.0E-03	72,000	72,000
Benzene	71-43-2	1.8E+01	3.2E+02	6.2E+01	6.2E-02	1.3E-01	1.6E+00	8.8E-03	5.6E-04	8.8E-03	5.6E-04	--	1.0E-03	0.0088	0.0010
Bromobenzene	108-86-1	--	6.4E+02	2.3E+02	2.3E-01	4.3E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+02	6.4E+02	--	1.0E-03	640	640
Bromochloromethane	74-97-5	--	--	2.2E+01	2.2E-02	3.6E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
Bromoform	75-25-2	1.3E+02	1.6E+03	1.3E+02	1.3E-01	1.0E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.3E+02	1.3E+02	--	5.0E-03	130	130
Bromomethane	74-83-9	--	1.1E+02	9.0E+00	9.0E-03	2.1E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.1E+02	1.1E+02	--	1.0E-03	110	110
Carbon Disulfide	75-15-0	--	8.0E+03	2.2E+01	2.2E-02	3.8E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Carbon Tetrachloride	56-23-5	1.4E+01	3.2E+02	1.5E+02	1.5E-01	6.8E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.4E+01	1.4E+01	--	1.0E-03	14	14
Chlorobenzene	108-90-7	--	1.6E+03	2.2E+02	2.2E-01	6.6E-02	1.0E+02	8.6E-01	5.1E-02	8.6E-01	5.1E-02	--	1.0E-03	0.86	0.051
Chloroethane	75-00-3	--	--	2.2E+01	2.2E-02	3.1E-01	NE	--	--	NE	NE	--	5.0E-03	NE	NE
Chloroform	67-66-3	3.2E+01	8.0E+02	5.3E+01	5.3E-02	9.2E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+01	3.2E+01	--	1.0E-03	32	32
Chloromethane	74-87-3	--	--	6.0E+00	6.0E-03	2.7E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
cis-1,2-Dichloroethylene (cis-DCE)	156-59-2	--	1.6E+02	4.0E+01	4.0E-02	1.0E-01	1.6E+01	7.9E-02	5.2E-03	7.9E-02	5.2E-03	--	1.0E-03	0.079	0.0052
cis-1,3-Dichloropropene	10061-01-5	--	--	--	--	--	Not a GW COPC	--	--	NE	NE	--	1.0E-03	NE	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Surface Water and Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Cyclohexane	110-82-7	--	--	1.5E+02	1.5E-01	3.6E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.2E-02	NE	NE
Cycloehexane, Methyl-	108-87-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.2E-02	NE	NE
Dibromochloromethane	124-48-1	1.2E+01	1.6E+03	3.2E+01	3.2E-02	2.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.2E+01	1.2E+01	--	1.0E-03	12	12
Dibromomethane	74-95-3	--	8.0E+02	2.2E+01	2.2E-02	1.9E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	1.0E-03	800	800
Dichlorobromomethane	75-27-4	1.6E+01	1.6E+03	3.2E+01	3.2E-02	4.9E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+01	1.6E+01	--	1.0E-03	16	16
Dichlorodifluoromethane	75-71-8	--	1.6E+04	4.4E+01	4.4E-02	1.1E+01	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+04	1.6E+04	--	1.0E-03	16,000	16,000
Ethylbenzene	100-41-4	--	8.0E+03	2.0E+02	2.0E-01	1.6E-01	2.1E+01	1.8E-01	1.0E-02	1.8E-01	1.0E-02	--	1.0E-03	0.18	0.010
Hexachlorobutadiene	87-68-3	1.3E+01	8.0E+01	8.5E+02	8.5E-01	1.8E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.3E+01	1.3E+01	--	5.0E-03	13	13
Hexane	110-54-3	--	4.8E+03	3.4E+03	3.4E+00	4.5E+01	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+03	4.8E+03	--	5.0E-03	4,800	4,800
Isopropylbenzene	98-82-8	--	8.0E+03	7.0E+02	7.0E-01	2.0E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Methyl ethyl ketone (MEK)	78-93-3	--	4.8E+04	4.5E+00	4.5E-03	1.3E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+04	4.8E+04	--	5.0E-03	48,000	48,000
Methyl Iodide	74-88-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
Methyl isobutyl ketone	108-10-1	--	6.4E+03	1.3E+01	1.3E-02	2.9E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+03	6.4E+03	--	5.0E-03	6,400	6,400
Methyl tert-butyl ether (MTBE)	1634-04-4	5.6E+02	--	1.1E+01	1.1E-02	1.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E+02	5.6E+02	--	1.0E-03	560	560
Methylene Chloride	75-09-2	9.4E+01	4.8E+02	1.0E+01	1.0E-02	8.4E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	9.4E+01	9.4E+01	--	5.0E-03	94	94
n-Butylbenzene	104-51-8	--	4.0E+03	1.5E+03	1.5E+00	2.9E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+03	4.0E+03	--	1.0E-03	4,000	4,000
n-Propylbenzene	103-65-1	--	8.0E+03	8.1E+02	8.1E-01	2.0E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Sec-Butylbenzene	135-98-8	--	8.0E+03	1.3E+03	1.3E+00	2.8E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Styrene	100-42-5	--	1.6E+04	9.1E+02	9.1E-01	5.6E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+04	1.6E+04	--	1.0E-03	16,000	16,000
Tert-Butylbenzene	98-06-6	--	8.0E+03	1.0E+03	1.0E+00	2.1E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Tetrachloroethane	25322-20-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
Tetrachloroethylene (PCE)	127-18-4	4.8E+02	4.8E+02	2.7E+02	2.7E-01	3.8E-01	2.9E+00	2.9E-02	1.6E-03	2.9E-02	1.6E-03	--	1.0E-03	0.029	0.0016
Toluene	108-88-3	--	6.4E+03	1.4E+02	1.4E-01	1.5E-01	1.0E+02	7.2E-01	4.4E-02	7.2E-01	4.4E-02	--	5.0E-03	0.72	0.044
Total Xylenes	1330-20-7	--	1.6E+04	2.3E+02	2.3E-01	1.4E-01	1.1E+02	9.4E-01	5.5E-02	9.4E-01	5.5E-02	--	3.0E-03	0.94	0.055
trans-1,2-Dichloroethylene (trans-DCE)	156-60-5	--	1.6E+03	3.8E+01	3.8E-02	2.4E-01	1.0E+02	5.2E-01	3.2E-02	5.2E-01	3.2E-02	--	1.0E-03	0.52	0.032
trans-1,3-Dichloropropene	10061-02-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
Trichloroethylene (TCE)	79-01-6	1.2E+01	4.0E+01	9.4E+01	9.4E-02	2.3E-01	7.0E-01	4.4E-03	2.7E-04	4.4E-03	2.7E-04	--	1.0E-03	0.0044	0.0010
Trichlorofluoromethane	75-69-4	--	2.4E+04	4.4E+01	4.4E-02	2.7E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+04	2.4E+04	--	1.0E-03	24,000	24,000
Vinyl Acetate	108-05-4	--	8.0E+04	5.6E+00	5.6E-03	1.2E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+04	8.0E+04	--	5.0E-03	80,000	80,000
Vinyl Chloride	75-01-4	6.7E-01	2.4E+02	2.2E+01	2.2E-02	8.5E-01	2.0E-01	1.2E-03	6.2E-05	1.2E-03	6.2E-05	--	1.0E-03	0.0012	0.0010
Polycyclic Aromatic Hydrocarbons (PAHs)															
1-Methylnaphthalene	90-12-0	3.4E+01	5.6E+03	2.5E+03	2.5E+00	6.3E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.4E+01	3.4E+01	--	6.7E-03	34	34
2-Chloronaphthalene	91-58-7	--	6.4E+03	2.5E+03	2.5E+00	4.8E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+03	6.4E+03	--	3.3E-02	6,400	6,400
2-Methylnaphthalene	91-57-6	--	3.2E+02	2.5E+03	2.5E+00	7.0E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+02	3.2E+02	--	6.7E-03	320	320
Acenaphthene	83-32-9	--	4.8E+03	4.9E+03	4.9E+00	2.5E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+03	4.8E+03	--	6.7E-03	4,800	4,800
Acenaphthylene	208-96-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Anthracene	120-12-7	--	2.4E+04	2.3E+04	2.3E+01	6.5E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+04	2.4E+04	--	6.7E-03	24,000	24,000
Benzo(a)anthracene	56-55-3	--	--	3.6E+05	3.6E+02	9.6E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Benzo(a)pyrene	50-32-8	1.9E-01	2.4E+01	9.7E+05	9.7E+02	3.6E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.9E-01	1.9E-01	--	6.7E-03	0.19	0.19
Benzo(b)fluoranthene	205-99-2	--	--	6.0E+05	6.0E+02	6.0E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Benzo(g,h,i)perylene	191-24-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Benzo(j,k)fluoranthene	207-08-9	--	--	5.9E+05	5.9E+02	4.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Chrysene	218-01-9	--	--	1.8E+05	1.8E+02	3.9E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Dibenzo(a,h)anthracene	53-70-3	--	--	1.8E+06	1.8E+03	7.4E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Fluoranthene	206-44-0	--	3.2E+03	4.9E+04	4.9E+01	9.1E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+03	3.2E+03	--	6.7E-03	3,200	3,200
Fluorene	86-73-7	--	3.2E+03	7.7E+03	7.7E+00	1.2E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+03	3.2E+03	--	6.7E-03	3,200	3,200
Indeno(1,2,3-c,d)pyrene	193-39-5	--	--	2.0E+06	2.0E+03	2.1E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Surface Water and Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Naphthalene	91-20-3	--	1.6E+03	1.2E+03	1.2E+00	8.3E-03	1.6E+02	4.5E+00	2.4E-01	4.5E+00	2.4E-01	--	6.7E-03	4.5	0.24
Phenanthrene	85-01-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Pyrene	129-00-0	--	2.4E+03	6.8E+04	6.8E+01	1.1E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+03	2.4E+03	--	6.7E-03	2,400	2,400
Total cPAH TEQ	n/a	1.9E-01	2.4E+01	9.7E+05	9.7E+02	3.6E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.9E-01	1.9E-01	--	6.7E-03	0.19	0.19
Organophosphorus Pesticides															
Azinphos-methyl	86-50-0	--	2.4E+02	5.2E+01	5.2E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+02	2.4E+02	--	5.8E-02	240	240
Bolstar (Sulprofos)	35400-43-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Chlorpyrifos	2921-88-2	--	8.0E+01	7.3E+03	7.3E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	2.3E-02	80	80
Coumaphos	56-72-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Demeton-S	126-75-0	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Diazinon	333-41-5	--	5.6E+01	3.0E+03	3.0E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E+01	5.6E+01	--	2.3E-02	56	56
Dichlorvos (DDVP)	62-73-7	3.4E+00	4.0E+01	5.4E+01	5.4E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.4E+00	3.4E+00	--	2.3E-02	3.4	3.4
Dimethoate	60-51-5	--	1.8E+02	1.3E+01	1.3E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.8E+02	1.8E+02	--	2.3E-02	180	180
Disulfoton (Di-Syston)	298-04-4	--	3.2E+00	8.4E+02	8.4E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+00	3.2E+00	--	2.3E-02	3.2	3.2
EPN	2104-64-5	--	8.0E-01	1.5E+04	1.5E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E-01	8.0E-01	--	2.3E-02	0.80	0.80
Ethoprop	13194-48-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Fensulfothion	115-90-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.8E-02	NE	NE
Fenthion	55-38-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Malathion	121-75-5	--	1.6E+03	3.1E+01	3.1E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	2.3E-02	1,600	1,600
Methyl Parathion	298-00-0	--	2.0E+01	7.3E+02	7.3E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.0E+01	2.0E+01	--	2.3E-02	20	20
Mevinphos	7786-34-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Monocrotophos	6923-22-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.8E-02	NE	NE
Naled	300-76-5	--	1.6E+02	1.3E+02	1.3E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+02	1.6E+02	--	2.3E-02	160	160
Parathion (ethyl)	56-38-2	--	4.8E+02	2.4E+03	2.4E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+02	4.8E+02	--	2.3E-02	480	480
Phorate	298-02-2	--	1.6E+01	4.6E+02	4.6E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+01	1.6E+01	--	2.3E-02	16	16
Ronnel	299-84-3	--	4.0E+03	4.5E+03	4.5E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+03	4.0E+03	--	2.3E-02	4,000	4,000
Sulfotepp	3689-24-5	--	4.0E+01	2.7E+02	2.7E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+01	4.0E+01	--	2.3E-02	40	40
Tetrachlorvinphos (Gardona)	961-11-5	4.2E+01	2.4E+03	1.4E+03	1.4E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.2E+01	4.2E+01	--	2.3E-02	42	42
Tokuthion (Prothiofos)	34643-46-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Tributyl Phosphate	126-73-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Trichloronate	327-98-0	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Triphenyl Phosphate	115-86-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Pesticides															
4,4'-DDD	72-54-8	4.2E+00	4.0E+01	4.6E+04	4.6E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.2E+00	4.2E+00	--	1.0E-02	4.2	4.2
4,4'-DDE	72-55-9	2.9E+00	4.0E+01	8.6E+04	8.6E+01	4.4E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.9E+00	2.9E+00	--	1.0E-02	2.9	2.9
4,4'-DDT	50-29-3	2.9E+00	4.0E+01	6.8E+05	6.8E+02	1.3E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.9E+00	2.9E+00	--	1.0E-02	2.9	2.9
Aldrin	309-00-2	5.9E-02	2.4E+00	4.9E+04	4.9E+01	8.1E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.9E-02	5.9E-02	--	5.0E-03	0.059	0.059
Alpha-BHC	319-84-6	1.6E-01	6.4E+02	1.8E+03	1.8E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E-01	1.6E-01	--	5.0E-03	0.16	0.16
Beta-BHC	319-85-7	5.6E-01	--	2.1E+03	2.1E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E-01	5.6E-01	--	5.0E-03	0.56	0.56
cis-Chlordane	5103-71-9	--	4.0E+01	6.8E+04	6.8E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+01	4.0E+01	--	1.0E-02	40	40
Delta-BHC	319-86-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
Dieldrin	60-57-1	6.3E-02	4.0E+00	2.6E+04	2.6E+01	8.8E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.3E-02	6.3E-02	--	1.0E-02	0.063	0.063
Endosulfan I	959-98-8	--	--	6.8E+03	6.8E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
Endosulfan II	33213-65-9	--	--	6.8E+03	6.8E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-02	NE	NE
Endosulfan Sulfate	1031-07-8	--	4.8E+02	9.8E+03	9.8E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+02	4.8E+02	--	1.0E-02	480	480
Endrin	72-20-8	--	2.4E+01	1.1E+04	1.1E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+01	2.4E+01	--	1.0E-02	24	24
Endrin Aldehyde	7421-93-4	--	--	3.3E+03	3.3E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-02	NE	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Surface Water and Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Endrin Ketone	53494-70-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-02	NE	NE
Gamma-BHC	58-89-9	9.1E-01	2.4E+01	1.4E+03	1.4E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	9.1E-01	9.1E-01	--	5.0E-03	0.91	0.91
Heptachlor	76-44-8	2.2E-01	4.0E+01	9.5E+03	9.5E+00	3.8E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.2E-01	2.2E-01	--	5.0E-03	0.22	0.22
Heptachlor Epoxide	1024-57-3	1.1E-01	1.0E+00	1.0E+04	1.0E+01	2.0E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.1E-01	1.1E-01	--	5.0E-03	0.11	0.11
Methoxychlor	72-43-5	--	4.0E+02	8.0E+04	8.0E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	1.0E-02	400	400
Toxaphene	8001-35-2	9.1E-01	7.2E+00	9.6E+04	9.6E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	9.1E-01	9.1E-01	--	5.0E-02	0.91	0.91
trans-Chlordane	5103-74-2	--	4.0E+01	6.8E+04	6.8E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+01	4.0E+01	--	1.0E-02	40	40
Chlorinated Herbicides															
2,4,5-T	93-76-5	--	8.0E+02	1.1E+02	1.1E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	9.5E-03	800	800
2,4,5-TP	93-72-1	--	6.4E+02	1.8E+02	1.8E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+02	6.4E+02	--	9.5E-03	640	640
2,4-D	94-75-7	--	8.0E+02	3.0E+01	3.0E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	9.4E-03	800	800
2,4-DB	94-82-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	9.5E-03	NE	NE
2,4-Dichlorophenylacetic acid	19719-28-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	--	NE	NE
Dalapon	75-99-0	--	2.4E+03	3.2E+00	3.2E-03	1.0E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+03	2.4E+03	--	2.3E-01	2,400	2,400
Dicamba	1918-00-9	--	2.4E+03	2.9E+01	2.9E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+03	2.4E+03	--	9.4E-03	2,400	2,400
Dichlorprop	120-36-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	7.1E-02	NE	NE
Dinoseb	88-85-7	--	8.0E+01	4.3E+03	4.3E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	9.5E-03	80	80
MCPA	94-74-6	--	4.0E+01	3.0E+01	3.0E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+01	4.0E+01	--	9.4E-01	40	40
MCPP	93-65-2	--	8.0E+01	4.9E+01	4.9E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	9.4E-01	80	80
Pentachlorophenol	87-86-5	2.5E+00	4.0E+02	5.9E+02	5.9E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.5E+00	2.5E+00	--	4.8E-03	2.5	2.5
Polychlorinated Biphenyl (PCB) Aroclors															
PCB-Aroclor 1016	12674-11-2	1.4E+01	5.6E+00	1.1E+05	1.1E+02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E+00	5.6E+00	--	5.0E-02	5.6	5.6
PCB-Aroclor 1221	11104-28-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-02	NE	NE
PCB-Aroclor 1232	11141-16-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-02	NE	NE
PCB-Aroclor 1242	53469-21-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-02	NE	NE
PCB-Aroclor 1248	12672-29-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-02	NE	NE
PCB-Aroclor 1254	11097-69-1	5.0E-01	1.6E+00	1.3E+05	1.3E+02	3.1E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E-01	5.0E-01	--	5.0E-02	0.50	0.50
PCB-Aroclor 1260	11096-82-5	5.0E-01	--	8.2E+05	8.2E+02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E-01	5.0E-01	--	5.0E-02	0.50	0.50
Total PCB Aroclors	1336-36-3	5.0E-01	--	7.8E+04	7.8E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E-01	5.0E-01	--	5.0E-02	0.50	0.50

Notes:

[1] The Model Toxics Control Act (MTCA) Method A Cleanup Level was used for lead as no MTCA Method B Cleanup Level is available for lead.

[2] Values for K_{oc} are from Ecology's Cleanup Levels and Risk Calculation (CLARC) Table (Excel) dated January 2023.

[3] For ionizing and non-ionizing organics, $K_d = K_{oc} \times f_{oc}$ and uses the MTCA default f_{oc} of 0.1% in upland soil. Metals K_d values are from Ecology's CLARC Table dated January 2023.

[4] Values for Henry's law (H) are from Ecology's CLARC Table dated January 2023. Values are temperature-adjusted based on 13 degrees Celsius when available; otherwise values are based on 25 degrees Celsius.

[5] Soil concentrations protective of groundwater calculated per WAC 173-340-740(3)(b)(iii)(A) using Equations 747-1 and 747-2 referencing proposed groundwater cleanup levels presented in RI Table 3-3. The Method A Soil Cleanup Levels are used for TPH-G, TPH-D, and TPH-O concentrations protective of groundwater.

[6] Metals background values (Puget Sound Region 90th percentile values) are from *Natural Background Soil Metals Concentrations in Washington State* (Ecology Publication #94-115, 1994). Arsenic value from MTCA Table 740-1 (natural background for soil in Washington).

[7] Practical quantitation limit (PQL) is the typical value from OnSite Environmental, Inc. of Redmond, Washington.

-- = no screening criteria available

cPAH = carcinogenic polycyclic aromatic hydrocarbon

EPA = Environmental Protection Agency

RI = remedial investigation

TEQ = toxicity equivalent quotient

f_{oc} = sediment fraction of organic carbon

k_d = distribution coefficient

k_{oc} = soil organic carbon-water partitioning coefficient

L/kg = liter per kilogram

mg/kg = milligram per kilogram

µg/L = microgram per liter

n/a = not applicable

NE = not established

Not a GW COPC = Analyte is not a groundwater contaminant of potential concern (COPC); analyte was not detected in groundwater at a concentration greater than its groundwater Proposed Cleanup Level (PCUL; see RI Table 4-4).

Gray shading identifies the basis for the proposed soil cleanup level.

Green shading identifies the proposed soil cleanup level after adjustment for background and the PQL.

Table 3-2

Proposed Soil Cleanup Levels - Direct Contact and Protection of Groundwater as Drinking Water Only

University of Washington - Tacoma Campus

Tacoma, Washington

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Petroleum Hydrocarbons															
Gasoline-Range Hydrocarbons (TPH-G) w/Benzene	n/a	--	--	--	--	--	--	3.0E+01	3.0E+01	3.0E+01	3.0E+01	--	5.0E+00	30	30
Gasoline-Range Hydrocarbons (TPH-G)	n/a	--	--	--	--	--	--	1.0E+02	1.0E+02	1.0E+02	1.0E+02	--	5.0E+00	100	100
Diesel-Range Hydrocarbons (TPH-D)	n/a	--	--	--	--	--	--	2.0E+03	2.0E+03	2.0E+03	2.0E+03	--	2.5E+01	2,000	2,000
Oil-Range Hydrocarbons (TPH-O)	n/a	--	--	--	--	--	--	2.0E+03	2.0E+03	2.0E+03	2.0E+03	--	5.0E+01	2,000	2,000
Metals															
Aluminum	7429-90-5	--	8.0E+04	--	1.5E+03	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+04	8.0E+04	3.3E+04	5.0E+00	80,000	80,000
Antimony	7440-36-0	--	3.2E+01	--	4.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+01	3.2E+01	--	5.0E+00	32	32
Arsenic	7440-38-2	6.7E-01	2.4E+01	--	2.9E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.7E-01	6.7E-01	2.0E+01	1.0E+01	20	20
Barium	7440-39-3	--	1.6E+04	--	4.1E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+04	1.6E+04	--	2.5E+00	16,000	16,000
Beryllium	7440-41-7	--	1.6E+02	--	7.9E+02	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+02	1.6E+02	6.0E-01	5.0E-01	160	160
Cadmium	7440-43-9	--	8.0E+01	--	6.7E+00	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	1.0E+00	5.0E-01	80	80
Calcium	7440-70-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E+01	NE	NE
Chromium III / Total	7440-47-3	--	1.2E+05	--	--	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.2E+05	1.2E+05	4.8E+01	5.0E-01	120,000	120,000
Chromium VI	18540-29-9	3.8E-01	2.4E+02	--	1.9E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.8E-01	3.8E-01	--	1.1E-01	0.38	0.38
Cobalt	7440-48-4	--	2.4E+01		4.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+01	2.4E+01	--	5.0E-01	24	24
Copper	7440-50-8	--	3.2E+03	--	2.2E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+03	3.2E+03	3.6E+01	1.0E+00	3,200	3,200
Iron	7439-89-6	--	5.6E+04	--	2.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E+04	5.6E+04	5.9E+04	2.5E+01	58,700	58,700
Lead	7439-92-1	2.5E+02		--	1.0E+04	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.5E+02	2.5E+02	2.4E+01	5.0E+00	250	250
Magnesium	7439-95-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E+01	NE	NE
Manganese	7439-96-5	--	3.7E+03	--	6.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.7E+03	3.7E+03	1.2E+03	5.0E-01	3,700	3,700
Mercury (mercuric chloride)	7439-97-6	--	2.4E+01	--	5.2E+01	1.2E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+01	2.4E+01	7.0E-02	2.5E-01	24	24
Nickel	7440-02-0	--	1.6E+03	--	6.5E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	4.8E+01	2.5E+00	1,600	1,600
Potassium	7440-09-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E+01	NE	NE
Selenium	7782-49-2	--	4.0E+02	--	5.0E+00	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	1.0E+01	400	400
Silver	7440-22-4	--	4.0E+02	--	8.3E+00	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	5.0E-01	400	400
Sodium	7440-23-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E+01	NE	NE
Thallium	7440-28-0	--	8.0E-01	--	7.1E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E-01	8.0E-01	--	1.0E-01	0.80	0.80
Vanadium	7440-62-2	--	4.0E+02	--	1.0E+03	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	5.0E-01	400	400
Zinc	7440-66-6	--	2.4E+04	--	6.2E+01	0.0E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+04	2.4E+04	8.5E+01	2.5E+00	24,000	24,000
Cyanides															
Total Cyanide	544-92-3	--	4.0E+02	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	1.6E-01	400	400
Semi-Volatile Organic Compounds (SVOCs)															
1,2-Dinitrobenzene	528-29-0	--	8.0E+00	3.6E+02	3.6E-01	5.0E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+00	8.0E+00	--	3.3E-02	8.0	8.0
1,2-Diphenylhydrazine	122-66-7	1.3E+00	--	1.5E+03	1.5E+00	5.9E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.3E+00	1.3E+00	--	3.3E-02	1.3	1.3
1,3-Dinitrobenzene	99-65-0	--	8.0E+00	3.5E+02	3.5E-01	5.1E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+00	8.0E+00	--	3.3E-02	8.0	8.0
1,4-Dinitrobenzene	100-25-4	--	8.0E+00	3.5E+02	3.5E-01	8.4E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+00	8.0E+00	--	3.3E-02	8.0	8.0
2,3,4,6-Tetrachlorophenol	58-90-2	--	2.4E+03	2.8E+02	2.8E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+03	2.4E+03	--	3.3E-02	2,400	2,400
2,3,5,6-Tetrachlorophenol	935-95-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
2,3-Dichloroaniline	608-27-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
2,4,5-Trichlorophenol	95-95-4	--	8.0E+03	1.6E+03	1.6E+00	2.6E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	3.3E-02	8,000	8,000
2,4,6-Tribromophenol	118-79-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
2,4,6-Trichlorophenol	88-06-2	9.1E+01	8.0E+01	3.8E+02	3.8E-01	4.1E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	3.3E-02	80	80
2,4-Dichlorophenol	120-83-2	--	2.4E+02	1.5E+02	1.5E-01	7.5E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+02	2.4E+02	--	3.3E-02	240	240
2,4-Dimethylphenol	105-67-9	--	1.6E+03	4.9E+02	4.9E-01	1.4E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	3.3E-02	1,600	1,600
2,4-Dinitrophenol	51-28-5	--	1.6E+02	1.0E-02	1.0E-05	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+02	1.6E+02	--	1.7E-01	160	160
2,4-Dinitrotoluene	121-14-2	3.2E+00	1.6E+02	5.8E+02	5.8E-01	4.8E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+00	3.2E+00	--	3.3E-02	3.2	3.2
2,6-Dinitrotoluene	606-20-2	6.7E-01	2.4E+01	5.9E+02	5.9E-01	7.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.7E-01	6.7E-01	--	3.3E-02	0.67	0.67
2-Chlorophenol	95-57-8	--	4.0E+02	3.9E+02	3.9E-01	2.1E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	3.3E-02	400	400
2-Fluorophenol	367-12-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
2-methylphenol	95-48-7	--	4.0E+03	3.1E+02	3.1E-01	2.0E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+03	4.0E+03	--	3.3E-02	4,000	4,000
2-Nitroaniline	88-74-4	--	8.0E+02	1.1E+02	1.1E-01	6.1E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	3.3E-02	800	800
2-Nitrophenol	88-75-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
3,3'-Dichlorobenzidine	91-94-1	2.2E+00	--	3.2E+03	3.2E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.2E+00	2.2E+00	--	1.7E-01	2.2	2.2
3&4-Methylphenol	65794-96-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
3-Nitroaniline	99-09-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
4,6-Dinitro-2-Methylphenol	534-52-1	--	6.4E+00	7.5E+02	7.5E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+00	6.4E+00	--	1.7E-01	6.4	6.4
4-Bromophenyl phenyl ether	101-55-3	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
4-Chloro-3-Methylphenol	59-50-7	--	8.0E+03	4.9E+02	4.9E-01	4.0E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	3.3E-02	8,000	8,000
4-Chloroaniline	106-47-8	5.0E+00	3.2E+02	1.1E+02	1.1E-01	1.7E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E+00	5.0E+00	--	1.7E-01	5.0	5.0
4-Chlorophenyl phenyl ether	7005-72-3	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
4-Nitroaniline	100-01-6	5.0E+01	3.2E+02	1.1E+02	1.1E-01	1.1E-08	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E+01	5.0E+01	--	3.3E-02	50	50
4-Nitrophenol	100-02-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Aniline	62-53-3	1.8E+02	5.6E+02	7.0E+01	7.0E-02	3.6E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.8E+02	1.8E+02	--	1.7E-01	180	180
Benzidine	92-87-5	8.2E-04	2.4E+02	1.2E+03	1.2E+00	4.9E-10	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.2E-04	8.2E-04	--	2.0E+00	2.0	2.0
Benzoic Acid	65-85-0	--	3.2E+05	6.0E-01	6.0E-04	5.2E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+05	3.2E+05	--	2.0E+00	320,000	320,000
Benzyl Alcohol	100-51-6	--	8.0E+03	2.1E+01	2.1E-02	4.9E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.7E-01	8,000	8,000
Bis(2-Chloroethoxy)Methane	111-91-1	--	2.4E+02	1.4E+01	1.4E-02	6.6E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+02	2.4E+02	--	3.3E-02	240	240
Bis(2-Chloroethyl)Ether	111-44-4	9.1E-01	--	7.6E+01	7.6E-02	2.8E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	9.1E-01	9.1E-01	--	3.3E-02	0.91	0.91
Bis(2-chloroisopropyl) ether	39638-32-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Bis(2-Ethylhexyl) Phthalate	117-81-7	7.1E+01	1.6E+03	1.1E+05	1.1E+02	2.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	7.1E+01	7.1E+01	--	3.3E-02	71	71
Butyl benzyl Phthalate	85-68-7	5.3E+02	1.6E+04	1.4E+04	1.4E+01	1.5E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.3E+02	5.3E+02	--	3.3E-02	530	530
Carbazole	86-74-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Di(2-ethylhexyl)adipate	103-23-1	8.3E+02	4.8E+04	3.6E+04	3.6E+01	3.6E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.3E+02	8.3E+02	--	3.3E-02	830	830
Dibenzofuran	132-64-9	--	8.0E+01	9.2E+03	9.2E+00	1.8E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	3.3E-02	80	80
Dibutyl Phthalate	84-74-2	--	8.0E+03	1.6E+03	1.6E+00	1.0E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	3.3E-02	8,000	8,000
Diethyl Phthalate	84-66-2	--	6.4E+04	8.2E+01	8.2E-02	6.5E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+04	6.4E+04	--	1.7E-01	64,000	64,000
Dimethyl Phthalate	131-11-3	--	--	3.2E+01	3.2E-02	2.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Di-N-Octyl Phthalate	117-84-0	--	8.0E+02	1.4E+05	1.4E+02	1.5E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	3.3E-02	800	800
Hexachlorobenzene	118-74-1	6.3E-01	6.4E+01	8.0E+04	8.0E+01	2.2E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.3E-01	6.3E-01	--	3.3E-02	0.63	0.63
Hexachlorocyclopentadiene	77-47-4	--	4.8E+02	1.4E+03	1.4E+00	2.2E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+02	4.8E+02	--	3.3E-02	480	480
Hexachloroethane	67-72-1	2.5E+01	5.6E+01	2.0E+02	2.0E-01	6.0E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.5E+01	2.5E+01	--	3.3E-02	25	25
Isophorone	78-59-1	1.1E+03	1.6E+04	6.5E+01	6.5E-02	1.1E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.1E+03	1.1E+03	--	3.3E-02	1,100	1,100
m,p-Cresol	15831-10-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	3.3E-02	NE	NE
Nitrobenzene	98-95-3	--	1.6E+02	1.2E+02	1.2E-01	4.0E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+02	1.6E+02	--	3.3E-02	160	160
N-Nitrosodimethylamine	62-75-9	3.7E-03	6.4E-01	2.3E+01	2.3E-02	3.7E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.7E-03	3.7E-03	--	3.3E-02	0.033	0.033
N-Nitrosodi-n-propylamine	621-64-7	1.4E-01	--	2.8E+02	2.8E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.4E-01	1.4E-01	--	3.3E-02	0.14	0.14
N-Nitrosodiphenylamine	86-30-6	2.0E+02	--	2.6E+03	2.6E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.0E+02	2.0E+02	--	3.3E-02	200	200
Pentachlorophenol	87-86-5	2.5E+00	4.0E+02	5.9E+02	5.9E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.5E+00	2.5E+00	--	1.7E-01	2.5	2.5

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Phenol	108-95-2	--	2.4E+04	1.9E+02	1.9E-01	5.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+04	2.4E+04	--	3.3E-02	24,000	24,000
Pyridine	110-86-1	--	8.0E+01	7.2E+01	7.2E-02	4.7E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	3.3E-01	80	80
Volatile Organic Compounds (VOCs)															
1,1,1,2-Tetrachloroethane	630-20-6	3.8E+01	2.4E+03	8.6E+01	8.6E-02	4.7E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.8E+01	3.8E+01	--	1.0E-03	38	38
1,1,1-Trichloroethane (TCA)	71-55-6	--	1.6E+05	1.4E+02	1.4E-01	4.2E-01	2.0E+02	1.5E+00	8.4E-02	1.5E+00	8.4E-02	--	1.0E-03	1.5	0.084
1,1,2,2-Tetrachloroethane	79-34-5	5.0E+00	1.6E+03	7.9E+01	7.9E-02	7.3E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E+00	5.0E+00	--	1.0E-03	5.0	5.0
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	76-13-1	--	2.4E+06	2.0E+02	2.0E-01	1.4E+01	Not a GW COPC	not a GW COPC	Not a GW COPC	2.4E+06	2.4E+06	--	1.0E+01	2,400,000	2,400,000
1,1,2-Trichloroethane	79-00-5	1.8E+01	3.2E+02	7.5E+01	7.5E-02	1.8E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.8E+01	1.8E+01	--	1.0E-03	18	18
1,1-Dichloroethane (DCA)	75-34-3	1.8E+02	1.6E+04	5.3E+01	5.3E-02	1.4E-01	7.7E+00	4.1E-02	2.6E-03	4.1E-02	2.6E-03	--	1.0E-03	0.041	0.0026
1,1-Dichloroethylene (DCE)	75-35-4	--	4.0E+03	6.5E+01	6.5E-02	7.0E-01	7.0E+00	4.6E-02	2.5E-03	4.6E-02	2.5E-03	--	1.0E-03	0.046	0.0025
1,1-Dichloropropene	563-58-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
1,2,3-Trichlorobenzene	87-61-6	--	6.4E+01	1.4E+03	1.4E+00	1.7E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+01	6.4E+01	--	1.0E-03	64	64
1,2,3-Trichloropropane	96-18-4	6.3E-03	3.2E+02	1.2E+02	1.2E-01	6.7E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.3E-03	6.3E-03	--	1.0E-03	0.0063	0.0063
1,2,4-Trichlorobenzene	120-82-1	3.4E+01	8.0E+02	1.7E+03	1.7E+00	2.4E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.4E+01	3.4E+01	--	1.0E-03	34	34
1,2,4-Trimethylbenzene	95-63-6	--	8.0E+02	6.1E+02	6.1E-01	1.1E-01	8.0E+01	1.3E+00	7.2E-02	1.3E+00	7.2E-02	--	1.0E-03	1.3	0.072
1,2-Dibromo-3-Chloropropane	96-12-8	2.3E-01	1.6E+01	1.2E+02	1.2E-01	2.6E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.3E-01	2.3E-01	--	5.0E-03	0.23	0.23
1,2-Dibromoethane (EDB)	106-93-4	5.0E-01	7.2E+02	6.6E+01	6.6E-02	1.4E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E-01	5.0E-01	--	1.0E-03	0.5	0.5
1,2-Dichlorobenzene (1,2-DCB)	95-50-1	--	7.2E+03	3.8E+02	3.8E-01	3.7E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	7.2E+03	7.2E+03	--	1.0E-03	7,200	7,200
1,2-Dichloroethane (EDC)	107-06-2	1.1E+01	4.8E+02	3.8E+01	3.8E-02	2.8E-02	4.8E+00	2.3E-02	1.6E-03	2.3E-02	1.6E-03	--	1.0E-03	0.023	0.0016
1,2-Dichloropropane	78-87-5	2.7E+01	3.2E+03	4.7E+01	4.7E-02	6.5E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.7E+01	2.7E+01	--	1.0E-03	27	27
1,3,5-Trimethylbenzene	108-67-8	--	8.0E+02	6.0E+02	6.0E-01	1.6E-01	8.0E+01	1.3E+00	7.1E-02	1.3E+00	7.1E-02	--	1.0E-03	1.3	0.071
1,3-Dichlorobenzene (1,3-DCB)	541-73-1	--	--	3.8E+02	3.8E-01	5.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
1,3-Dichloropropane	142-28-9	--	1.6E+03	7.2E+01	7.2E-02	2.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	1.0E-03	1,600	1,600
1,4-Dichlorobenzene (1,4-DCB)	106-46-7	1.9E+02	5.6E+03	6.2E+02	6.2E-01	4.6E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.9E+02	1.9E+02	--	1.0E-03	190	190
2,2-Dichloropropane	594-20-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
2-Butanone, 4-(Acetyloxy)-	10150-87-5	--	--	--	--	--	NE	not a GW COPC	Not a GW COPC	NE	NE	--	1.0E+01	NE	NE
2-Chloroethyl vinyl ether	110-75-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
2-Chlorotoluene	95-49-8	--	1.6E+03	3.8E+02	3.8E-01	7.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	1.0E-03	1,600	1,600
2-Hexanone	591-78-6	--	4.0E+02	1.5E+01	1.5E-02	1.9E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	5.0E-03	400	400
4-Chlorotoluene	106-43-4	--	1.6E+03	3.8E+02	3.8E-01	8.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	1.0E-03	1,600	1,600
4-Isopropyltoluene	99-87-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
Acetic Acid, Methyl Ester	79-20-9	--	8.0E+04	3.1E+00	3.1E-03	2.8E-03	Not a GW COPC	not a GW COPC	Not a GW COPC	8.0E+04	8.0E+04	--	1.0E+01	80,000	80,000
Acetone	67-64-1	--	7.2E+04	2.4E+00	2.4E-03	8.8E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	7.2E+04	7.2E+04	--	5.0E-03	72,000	72,000
Benzene	71-43-2	1.8E+01	3.2E+02	6.2E+01	6.2E-02	1.3E-01	5.0E+00	2.7E-02	1.7E-03	2.7E-02	1.7E-03	--	1.0E-03	0.0274	0.0017
Bromobenzene	108-86-1	--	6.4E+02	2.3E+02	2.3E-01	4.3E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+02	6.4E+02	--	1.0E-03	640	640
Bromochloromethane	74-97-5	--	--	2.2E+01	2.2E-02	3.6E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
Bromoform	75-25-2	1.3E+02	1.6E+03	1.3E+02	1.3E-01	1.0E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.3E+02	1.3E+02	--	5.0E-03	130	130
Bromomethane	74-83-9	--	1.1E+02	9.0E+00	9.0E-03	2.1E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.1E+02	1.1E+02	--	1.0E-03	110	110
Carbon Disulfide	75-15-0	--	8.0E+03	2.2E+01	2.2E-02	3.8E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Carbon Tetrachloride	56-23-5	1.4E+01	3.2E+02	1.5E+02	1.5E-01	6.8E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.4E+01	1.4E+01	--	1.0E-03	14	14
Chlorobenzene	108-90-7	--	1.6E+03	2.2E+02	2.2E-01	6.6E-02	1.0E+02	8.6E-01	5.1E-02	8.6E-01	5.1E-02	--	1.0E-03	0.86	0.051
Chloroethane	75-00-3	--	--	2.2E+01	2.2E-02	3.1E-01	NE	--	--	NE	NE	--	5.0E-03	NE	NE
Chloroform	67-66-3	3.2E+01	8.0E+02	5.3E+01	5.3E-02	9.2E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+01	3.2E+01	--	1.0E-03	32	32
Chloromethane	74-87-3	--	--	6.0E+00	6.0E-03	2.7E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
cis-1,2-Dichloroethylene (cis-DCE)	156-59-2	--	1.6E+02	4.0E+01	4.0E-02	1.0E-01	1.6E+01	7.9E-02	5.2E-03	7.9E-02	5.2E-03	--	1.0E-03	0.079	0.0052
cis-1,3-Dichloropropene	10061-01-5	--	--	--	--	--	Not a GW COPC	--	--	NE	NE	--	1.0E-03	NE	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Cyclohexane	110-82-7	--	--	1.5E+02	1.5E-01	3.6E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.2E-02	NE	NE
Cycloehexane, Methyl-	108-87-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.2E-02	NE	NE
Dibromochloromethane	124-48-1	1.2E+01	1.6E+03	3.2E+01	3.2E-02	2.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.2E+01	1.2E+01	--	1.0E-03	12	12
Dibromomethane	74-95-3	--	8.0E+02	2.2E+01	2.2E-02	1.9E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	1.0E-03	800	800
Dichlorobromomethane	75-27-4	1.6E+01	1.6E+03	3.2E+01	3.2E-02	4.9E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+01	1.6E+01	--	1.0E-03	16	16
Dichlorodifluoromethane	75-71-8	--	1.6E+04	4.4E+01	4.4E-02	1.1E+01	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+04	1.6E+04	--	1.0E-03	16,000	16,000
Ethylbenzene	100-41-4	--	8.0E+03	2.0E+02	2.0E-01	1.6E-01	7.0E+02	5.9E+00	3.4E-01	5.9E+00	3.4E-01	--	1.0E-03	5.86	0.343
Hexachlorobutadiene	87-68-3	1.3E+01	8.0E+01	8.5E+02	8.5E-01	1.8E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.3E+01	1.3E+01	--	5.0E-03	13	13
Hexane	110-54-3	--	4.8E+03	3.4E+03	3.4E+00	4.5E+01	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+03	4.8E+03	--	5.0E-03	4,800	4,800
Isopropylbenzene	98-82-8	--	8.0E+03	7.0E+02	7.0E-01	2.0E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Methyl ethyl ketone (MEK)	78-93-3	--	4.8E+04	4.5E+00	4.5E-03	1.3E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+04	4.8E+04	--	5.0E-03	48,000	48,000
Methyl Iodide	74-88-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
Methyl isobutyl ketone	108-10-1	--	6.4E+03	1.3E+01	1.3E-02	2.9E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+03	6.4E+03	--	5.0E-03	6,400	6,400
Methyl tert-butyl ether (MTBE)	1634-04-4	5.6E+02	--	1.1E+01	1.1E-02	1.1E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E+02	5.6E+02	--	1.0E-03	560	560
Methylene Chloride	75-09-2	9.4E+01	4.8E+02	1.0E+01	1.0E-02	8.4E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	9.4E+01	9.4E+01	--	5.0E-03	94	94
n-Butylbenzene	104-51-8	--	4.0E+03	1.5E+03	1.5E+00	2.9E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+03	4.0E+03	--	1.0E-03	4,000	4,000
n-Propylbenzene	103-65-1	--	8.0E+03	8.1E+02	8.1E-01	2.0E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Sec-Butylbenzene	135-98-8	--	8.0E+03	1.3E+03	1.3E+00	2.8E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Styrene	100-42-5	--	1.6E+04	9.1E+02	9.1E-01	5.6E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+04	1.6E+04	--	1.0E-03	16,000	16,000
Tert-Butylbenzene	98-06-6	--	8.0E+03	1.0E+03	1.0E+00	2.1E-01	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+03	8.0E+03	--	1.0E-03	8,000	8,000
Tetrachloroethane	25322-20-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
Tetrachloroethylene (PCE)	127-18-4	4.8E+02	4.8E+02	2.7E+02	2.7E-01	3.8E-01	5.0E+00	5.0E-02	2.8E-03	5.0E-02	2.8E-03	--	1.0E-03	0.050	0.0028
Toluene	108-88-3	--	6.4E+03	1.4E+02	1.4E-01	1.5E-01	6.4E+02	4.5E+00	2.7E-01	4.5E+00	2.7E-01	--	5.0E-03	4.5	0.27
Total Xylenes	1330-20-7	--	1.6E+04	2.3E+02	2.3E-01	1.4E-01	1.6E+03	1.4E+01	8.3E-01	1.4E+01	8.3E-01	--	3.0E-03	14	0.83
trans-1,2-Dichloroethylene (trans-DCE)	156-60-5	--	1.6E+03	3.8E+01	3.8E-02	2.4E-01	1.0E+02	5.2E-01	3.2E-02	5.2E-01	3.2E-02	--	1.0E-03	0.52	0.032
trans-1,3-Dichloropropene	10061-02-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-03	NE	NE
Trichloroethylene (TCE)	79-01-6	1.2E+01	4.0E+01	9.4E+01	9.4E-02	2.3E-01	4.0E+00	2.5E-02	1.5E-03	2.5E-02	1.5E-03	--	1.0E-03	0.0251	0.0015
Trichlorofluoromethane	75-69-4	--	2.4E+04	4.4E+01	4.4E-02	2.7E+00	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+04	2.4E+04	--	1.0E-03	24,000	24,000
Vinyl Acetate	108-05-4	--	8.0E+04	5.6E+00	5.6E-03	1.2E-02	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+04	8.0E+04	--	5.0E-03	80,000	80,000
Vinyl Chloride	75-01-4	6.7E-01	2.4E+02	2.2E+01	2.2E-02	8.5E-01	2.9E-01	1.7E-03	8.9E-05	1.7E-03	8.9E-05	--	1.0E-03	0.0017	0.0010
Polycyclic Aromatic Hydrocarbons (PAHs)															
1-Methylnaphthalene	90-12-0	3.4E+01	5.6E+03	2.5E+03	2.5E+00	6.3E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.4E+01	3.4E+01	--	6.7E-03	34	34
2-Chloronaphthalene	91-58-7	--	6.4E+03	2.5E+03	2.5E+00	4.8E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+03	6.4E+03	--	3.3E-02	6,400	6,400
2-Methylnaphthalene	91-57-6	--	3.2E+02	2.5E+03	2.5E+00	7.0E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+02	3.2E+02	--	6.7E-03	320	320
Acenaphthene	83-32-9	--	4.8E+03	4.9E+03	4.9E+00	2.5E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+03	4.8E+03	--	6.7E-03	4,800	4,800
Acenaphthylene	208-96-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Anthracene	120-12-7	--	2.4E+04	2.3E+04	2.3E+01	6.5E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+04	2.4E+04	--	6.7E-03	24,000	24,000
Benzo(a)anthracene	56-55-3	--	--	3.6E+05	3.6E+02	9.6E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Benzo(a)pyrene	50-32-8	1.9E-01	2.4E+01	9.7E+05	9.7E+02	3.6E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.9E-01	1.9E-01	--	6.7E-03	0.19	0.19
Benzo(b)fluoranthene	205-99-2	--	--	6.0E+05	6.0E+02	6.0E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Benzo(g,h,i)perylene	191-24-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Benzo(j,k)fluoranthene	207-08-9	--	--	5.9E+05	5.9E+02	4.3E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Chrysene	218-01-9	--	--	1.8E+05	1.8E+02	3.9E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Dibenzo(a,h)anthracene	53-70-3	--	--	1.8E+06	1.8E+03	7.4E-07	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Fluoranthene	206-44-0	--	3.2E+03	4.9E+04	4.9E+01	9.1E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+03	3.2E+03	--	6.7E-03	3,200	3,200
Fluorene	86-73-7	--	3.2E+03	7.7E+03	7.7E+00	1.2E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+03	3.2E+03	--	6.7E-03	3,200	3,200
Indeno(1,2,3-c,d)pyrene	193-39-5	--	--	2.0E+06	2.0E+03	2.1E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Naphthalene	91-20-3	--	1.6E+03	1.2E+03	1.2E+00	8.3E-03	1.6E+02	4.5E+00	2.4E-01	4.5E+00	2.4E-01	--	6.7E-03	4.5	0.24
Phenanthrene	85-01-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	6.7E-03	NE	NE
Pyrene	129-00-0	--	2.4E+03	6.8E+04	6.8E+01	1.1E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+03	2.4E+03	--	6.7E-03	2,400	2,400
Total cPAH TEQ	n/a	1.9E-01	2.4E+01	9.7E+05	9.7E+02	3.6E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.9E-01	1.9E-01	--	6.7E-03	0.19	0.19
Organophosphorus Pesticides															
Azinphos-methyl	86-50-0	--	2.4E+02	5.2E+01	5.2E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+02	2.4E+02	--	5.8E-02	240	240
Bolstar (Sulprofos)	35400-43-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Chlorpyrifos	2921-88-2	--	8.0E+01	7.3E+03	7.3E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	2.3E-02	80	80
Coumaphos	56-72-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Demeton-S	126-75-0	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Diazinon	333-41-5	--	5.6E+01	3.0E+03	3.0E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E+01	5.6E+01	--	2.3E-02	56	56
Dichlorvos (DDVP)	62-73-7	3.4E+00	4.0E+01	5.4E+01	5.4E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.4E+00	3.4E+00	--	2.3E-02	3.4	3.4
Dimethoate	60-51-5	--	1.8E+02	1.3E+01	1.3E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.8E+02	1.8E+02	--	2.3E-02	180	180
Disulfoton (Di-Syston)	298-04-4	--	3.2E+00	8.4E+02	8.4E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	3.2E+00	3.2E+00	--	2.3E-02	3.2	3.2
EPN	2104-64-5	--	8.0E-01	1.5E+04	1.5E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E-01	8.0E-01	--	2.3E-02	0.80	0.80
Ethoprop	13194-48-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Fensulfothion	115-90-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.8E-02	NE	NE
Fenthion	55-38-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Malathion	121-75-5	--	1.6E+03	3.1E+01	3.1E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+03	1.6E+03	--	2.3E-02	1,600	1,600
Methyl Parathion	298-00-0	--	2.0E+01	7.3E+02	7.3E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.0E+01	2.0E+01	--	2.3E-02	20	20
Mevinphos	7786-34-7	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Monocrotophos	6923-22-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.8E-02	NE	NE
Naled	300-76-5	--	1.6E+02	1.3E+02	1.3E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+02	1.6E+02	--	2.3E-02	160	160
Parathion (ethyl)	56-38-2	--	4.8E+02	2.4E+03	2.4E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+02	4.8E+02	--	2.3E-02	480	480
Phorate	298-02-2	--	1.6E+01	4.6E+02	4.6E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E+01	1.6E+01	--	2.3E-02	16	16
Ronnel	299-84-3	--	4.0E+03	4.5E+03	4.5E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+03	4.0E+03	--	2.3E-02	4,000	4,000
Sulfotepp	3689-24-5	--	4.0E+01	2.7E+02	2.7E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+01	4.0E+01	--	2.3E-02	40	40
Tetrachlorvinphos (Gardona)	961-11-5	4.2E+01	2.4E+03	1.4E+03	1.4E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.2E+01	4.2E+01	--	2.3E-02	42	42
Tokuthion (Prothiofos)	34643-46-4	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Tributyl Phosphate	126-73-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Trichloronate	327-98-0	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Triphenyl Phosphate	115-86-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	2.3E-02	NE	NE
Pesticides															
4,4'-DDD	72-54-8	4.2E+00	4.0E+01	4.6E+04	4.6E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.2E+00	4.2E+00	--	1.0E-02	4.2	4.2
4,4'-DDE	72-55-9	2.9E+00	4.0E+01	8.6E+04	8.6E+01	4.4E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.9E+00	2.9E+00	--	1.0E-02	2.9	2.9
4,4'-DDT	50-29-3	2.9E+00	4.0E+01	6.8E+05	6.8E+02	1.3E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.9E+00	2.9E+00	--	1.0E-02	2.9	2.9
Aldrin	309-00-2	5.9E-02	2.4E+00	4.9E+04	4.9E+01	8.1E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.9E-02	5.9E-02	--	5.0E-03	0.059	0.059
Alpha-BHC	319-84-6	1.6E-01	6.4E+02	1.8E+03	1.8E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.6E-01	1.6E-01	--	5.0E-03	0.16	0.16
Beta-BHC	319-85-7	5.6E-01	--	2.1E+03	2.1E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E-01	5.6E-01	--	5.0E-03	0.56	0.56
cis-Chlordane	5103-71-9	--	4.0E+01	6.8E+04	6.8E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+01	4.0E+01	--	1.0E-02	40	40
Delta-BHC	319-86-8	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
Dieldrin	60-57-1	6.3E-02	4.0E+00	2.6E+04	2.6E+01	8.8E-05	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.3E-02	6.3E-02	--	1.0E-02	0.063	0.063
Endosulfan I	959-98-8	--	--	6.8E+03	6.8E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-03	NE	NE
Endosulfan II	33213-65-9	--	--	6.8E+03	6.8E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-02	NE	NE
Endosulfan Sulfate	1031-07-8	--	4.8E+02	9.8E+03	9.8E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.8E+02	4.8E+02	--	1.0E-02	480	480
Endrin	72-20-8	--	2.4E+01	1.1E+04	1.1E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+01	2.4E+01	--	1.0E-02	24	24
Endrin Aldehyde	7421-93-4	--	--	3.3E+03	3.3E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-02	NE	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Direct Contact		Concentrations Protective of Groundwater						Lowest Risk-Based Concentration		Modifying Factors		Proposed Soil Cleanup Level (After Background and PQL Adjustment)	
		MTCA Method B Value for Unrestricted Land Use[1]		Equilibrium Partition Coefficients			Soil Concentration Protective of Groundwater Cleanup Level (Drinking Water)[5]					Background Concentration[6]	PQL[7]		
		Carcinogen (mg/kg)	Non-Carcinogen (mg/kg)	K_{oc}[2] (L/kg)	K_d[3] (L/kg)	H[4] (-)	Groundwater PCUL (µg/L)	Vadose Zone Soil (mg/kg)	Saturated Soil (mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)	(mg/kg)	(mg/kg)	Vadose (mg/kg)	Saturated (mg/kg)
Endrin Ketone	53494-70-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	1.0E-02	NE	NE
Gamma-BHC	58-89-9	9.1E-01	2.4E+01	1.4E+03	1.4E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	9.1E-01	9.1E-01	--	5.0E-03	0.91	0.91
Heptachlor	76-44-8	2.2E-01	4.0E+01	9.5E+03	9.5E+00	3.8E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.2E-01	2.2E-01	--	5.0E-03	0.22	0.22
Heptachlor Epoxide	1024-57-3	1.1E-01	1.0E+00	1.0E+04	1.0E+01	2.0E-04	Not a GW COPC	Not a GW COPC	Not a GW COPC	1.1E-01	1.1E-01	--	5.0E-03	0.11	0.11
Methoxychlor	72-43-5	--	4.0E+02	8.0E+04	8.0E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+02	4.0E+02	--	1.0E-02	400	400
Toxaphene	8001-35-2	9.1E-01	7.2E+00	9.6E+04	9.6E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	9.1E-01	9.1E-01	--	5.0E-02	0.91	0.91
trans-Chlordane	5103-74-2	--	4.0E+01	6.8E+04	6.8E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+01	4.0E+01	--	1.0E-02	40	40
Chlorinated Herbicides															
2,4,5-T	93-76-5	--	8.0E+02	1.1E+02	1.1E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	9.5E-03	800	800
2,4,5-TP	93-72-1	--	6.4E+02	1.8E+02	1.8E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	6.4E+02	6.4E+02	--	9.5E-03	640	640
2,4-D	94-75-7	--	8.0E+02	3.0E+01	3.0E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+02	8.0E+02	--	9.4E-03	800	800
2,4-DB	94-82-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	9.5E-03	NE	NE
2,4-Dichlorophenylacetic acid	19719-28-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	--	NE	NE
Dalapon	75-99-0	--	2.4E+03	3.2E+00	3.2E-03	1.0E-06	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+03	2.4E+03	--	2.3E-01	2,400	2,400
Dicamba	1918-00-9	--	2.4E+03	2.9E+01	2.9E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.4E+03	2.4E+03	--	9.4E-03	2,400	2,400
Dichlorprop	120-36-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	7.1E-02	NE	NE
Dinoseb	88-85-7	--	8.0E+01	4.3E+03	4.3E+00	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	9.5E-03	80	80
MCPA	94-74-6	--	4.0E+01	3.0E+01	3.0E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	4.0E+01	4.0E+01	--	9.4E-01	40	40
MCPP	93-65-2	--	8.0E+01	4.9E+01	4.9E-02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	8.0E+01	8.0E+01	--	9.4E-01	80	80
Pentachlorophenol	87-86-5	2.5E+00	4.0E+02	5.9E+02	5.9E-01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	2.5E+00	2.5E+00	--	4.8E-03	2.5	2.5
Polychlorinated Biphenyl (PCB) Aroclors															
PCB-Aroclor 1016	12674-11-2	1.4E+01	5.6E+00	1.1E+05	1.1E+02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.6E+00	5.6E+00	--	5.0E-02	5.6	5.6
PCB-Aroclor 1221	11104-28-2	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-02	NE	NE
PCB-Aroclor 1232	11141-16-5	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-02	NE	NE
PCB-Aroclor 1242	53469-21-9	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-02	NE	NE
PCB-Aroclor 1248	12672-29-6	--	--	--	--	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	NE	NE	--	5.0E-02	NE	NE
PCB-Aroclor 1254	11097-69-1	5.0E-01	1.6E+00	1.3E+05	1.3E+02	3.1E-03	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E-01	5.0E-01	--	5.0E-02	0.50	0.50
PCB-Aroclor 1260	11096-82-5	5.0E-01	--	8.2E+05	8.2E+02	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E-01	5.0E-01	--	5.0E-02	0.50	0.50
Total PCB Aroclors	1336-36-3	5.0E-01	--	7.8E+04	7.8E+01	--	Not a GW COPC	Not a GW COPC	Not a GW COPC	5.0E-01	5.0E-01	--	5.0E-02	0.50	0.50

Notes:

[1] The Model Toxics Control Act (MTCA) Method A Cleanup Level was used for lead as no MTCA Method B Cleanup Level is available for lead.

[2] Values for K_{oc} are from Ecology's CLARC (Cleanup Levels and Risk Calculation) Table (Excel) dated January 2023.

[3] For ionizing and non-ionizing organics, $K_d = K_{oc} \times f_{oc}$ and uses the MTCA default f_{oc} of 0.1% in upland soil. Metals K_d values are from Ecology's CLARC Table dated January 2023.

[4] Values for Henry's Law (H) are from Ecology's CLARC Table dated January 2023. Values are temperature-adjusted based on 13 degrees Celsius when available; otherwise values are based on 25 degrees Celsius.

[5] Soil concentrations protective of groundwater calculated per WAC 173-340-740(3)(b)(iii)(A) using Equations 747-1 and 747-2 referencing proposed groundwater cleanup levels presented in RI Table 3-3. The Method A Soil Cleanup Levels are used for TPH-G, TPH-D, and TPH-O concentrations protective of groundwater.

[6] Metals background values (Puget Sound Region 90th percentile values) are from *Natural Background Soil Metals Concentrations in Washington State* (Ecology Publication #94-115, 1994). Arsenic value from MTCA Table 740-1 (natural background for soil in Washington).

[7] Practical quantitation limit (PQL) is the typical value from OnSite Environmental, Inc. of Redmond, Washington.

-- = no screening criteria available
cPAH = carcinogenic polycyclic aromatic hydrocarbon
EPA = Environmental Protection Agency
RI = remedial investigation
TEQ = toxicity equivalent quotient
f_{oc} = sediment fraction of organic carbon
k_d = distribution coefficient
k_{oc} = soil organic carbon-water partitioning coefficient
L/kg = liter per kilogram
mg/kg = milligram per kilogram
µg/L = microgram per liter
n/a = not applicable
NE = not established

Not a GW COPC = Analyte is not a groundwater contaminant of potential concern (COPC); analyte was not detected in groundwater at a concentration greater than its groundwater Proposed Cleanup Level (PCUL; see RI Table 4-4).

Gray shading identifies the basis for the proposed soil cleanup level.

Green shading identifies the proposed soil cleanup level after adjustment for background and the PQL.

Table 3-3

Proposed Groundwater Cleanup Levels

University of Washington - Tacoma Campus
Tacoma, Washington

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Drinking Water Criteria							Surface Water Criteria											Lowest Risk-Based Concentrations		Modifying Factor	Proposed Groundwater Cleanup Levels (After PQL Adjustment)	
									Chapter 173-201A WAC[1]			40 CFR 131.45[2]	Section 304 of the Clean Water Act[3]			MTCA Method B Formula Value[4,9]								
									Aquatic Life		Human Health	Human Health	Aquatic Life		Human Health	Human Health									
		Federal MCL[5] (µg/L)	State MCL[6] (µg/L)	State Secondary MCL[7] (µg/L)	MTCA Method B Formula Value[8,9] Carc. (µg/L)	Carc. Adjusted (µg/L)	Non-Carc. (µg/L)	Non-Carc. Adjusted (µg/L)	Acute (µg/L)	Chronic (µg/L)	Organism (µg/L)	Organism (µg/L)	Acute (µg/L)	Chronic (µg/L)	Organism (µg/L)	Carc. (µg/L)	Carc. Adjusted (µg/L)	Non-Carc. (µg/L)	Non-Carc. Adjusted (µg/L)	Protection of Drinking Water (µg/L)	Protection of Drinking Water and Surface Water (µg/L	PQL[10] (µg/L)	Protection of Drinking Water (µg/L)	Protection of Drinking Water and Surface Water (µg/L)
Petroleum Hydrocarbons																								
Gasoline-Range Hydrocarbons (TPH-G) w/Benzene	n/a	--	--	--	--	--	8.0E+02	8.0E+02	--	1.7E+03	--	--	--	--	--	--	--	--	--	8.0E+02	8.0E+02	1.0E+02	800	800
Gasoline-Range Hydrocarbons (TPH-G)	n/a	--	--	--	--	--	1.0E+03	1.0E+03	--	1.7E+03	--	--	--	--	--	--	--	--	--	1.0E+03	1.0E+03	1.0E+02	1,000	1,000
Diesel-Range Hydrocarbons (TPH-D)	n/a	--	--	--	--	--	5.0E+02	5.0E+02	--	2.1E+03	--	--	--	--	--	--	--	--	--	5.0E+02	5.0E+02	2.0E+02	500	500
Oil-Range Hydrocarbons (TPH-O)	n/a	--	--	--	--	--	5.0E+02	5.0E+02	--	2.1E+03	--	--	--	--	--	--	--	--	--	5.0E+02	5.0E+02	2.0E+02	500	500
Metals																								
Antimony	7440-36-0	6.0E+00	6.0E+00	--	--	--	6.4E+00	--	--	--	1.8E+02	9.0E+01	--	--	6.4E+02	--	--	1.0E+03	--	6.0E+00	6.0E+00	5.0E+00	6	6
Arsenic	7440-38-2	1.0E+01	1.0E+01	--	5.8E-02	5.8E-01	4.8E+00	4.8E+00	6.9E+01	3.6E+01	1.0E+01	1.4E-01	6.9E+01	3.6E+01	1.4E-01	9.8E-02	--	1.8E+01	--	5.8E-01	1.4E-01	3.0E+00	8 [11]	8 [11]
Barium	7440-39-3	2.0E+03	2.0E+03	--	--	--	3.2E+03	--	--	--	--	--	--	--	--	--	--	--	--	2.0E+03	2.0E+03	2.5E+01	2,000	2,000
Beryllium	7440-41-7	4.0E+00	4.0E+00	--	--	--	3.2E+01	--	--	--	--	--	--	--	--	--	--	2.7E+02	2.7E+02	4.0E+00	4.0E+00	1.0E+01	10	10
Cadmium	7440-43-9	5.0E+00	5.0E+00	--	--	--	8.0E+00	--	4.2E+01	9.3E+00	--	--	3.3E+01	7.9E+00	--	--	--	4.1E+01	--	5.0E+00	5.0E+00	4.0E+00	5	5
Chromium III / Total	7440-47-3	1.0E+02	1.0E+02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1.0E+02	1.0E+02	1.0E+01	100	100
Copper	7440-50-8	1.3E+03	1.3E+03	--	--	--	6.4E+02	6.4E+02	4.8E+00	3.1E+00	--	--	4.8E+00	3.1E+00	--	--	--	2.9E+03	--	6.4E+02	3.1E+00	1.0E+01	640	10
Iron	7439-89-6	--	--	3.0E+02	--	--	1.1E+04	1.1E+04	--	--	--	--	--	--	--	--	--	--	--	3.0E+02	3.0E+02	5.0E+01	300	300
Lead	7439-92-1	1.5E+01	1.5E+01	--	--	--	--	--	2.1E+02	8.1E+00	--	--	2.1E+02	8.1E+00	--	--	--	--	--	1.5E+01	8.1E+00	1.0E+00	15	8.1
Mercury (mercuric chloride)	7439-97-6	2.0E+00	2.0E+00	--	--	--	--	--	1.8E+00	2.5E-02	--	--	1.8E+00	9.4E-01	--	--	--	--	--	2.0E+00	2.5E-02	1.0E+00	2	1
Nickel	7440-02-0	--	--	--	--	--	3.2E+02	3.2E+02	7.4E+01	8.2E+00	1.9E+02	1.0E+02	7.4E+01	8.2E+00	4.6E+03	--	--	1.1E+03	--	3.2E+02	8.2E+00	2.0E+01	320	20
Selenium	7782-49-2	5.0E+01	5.0E+01	--	--	--	8.0E+01	--	2.9E+02	7.1E+01	4.8E+02	2.0E+02	2.9E+02	7.1E+01	4.2E+03	--	--	2.7E+03	--	5.0E+01	5.0E+01	5.0E+00	50	50
Silver	7440-22-4	--	--	1.0E+02	--	--	8.0E+01	8.0E+01	1.9E+00	--	--	--	1.9E+00	--	--	--	--	2.6E+04	--	8.0E+01	1.9E+00	1.0E+01	80	10
Thallium	7440-28-0	2.0E+00	2.0E+00	--	--	--	1.6E-01	1.6E-01	--	--	2.7E-01	[REMOVED]	--	--	4.7E-01	--	--	2.2E-01	2.2E-01	1.6E-01	1.6E-01	5.0E+00	5	5
Zinc	7440-66-6	--	--	5.0E+03	--	--	4.8E+03	4.8E+03	9.0E+01	8.1E+01	2.9E+03	1.0E+03	9.0E+01	8.1E+01	2.6E+04	--	--	1.7E+04	--	4.8E+03	8.1E+01	5.0E+01	4,800	81
Semi-Volatile Organic Compounds (SVOCs)																								
1,2-Dinitrobenzene	528-29-0	--	--	--	--	--	1.6E+00	1.6E+00	--	--	--	--	--	--	--	--	--	--	--	1.6E+00	1.6E+00	1.0E+00	1.6	1.6
1,2-Diphenylhydrazine	122-66-7	--	--	--	1.1E-01	1.1E-01	--	--	--	--	2.3E-02	2.0E-02	--	--	2.0E-01	3.3E-01	--	--	--	1.1E-01	2.0E-02	1.0E+00	1	1
1,3-Dinitrobenzene	99-65-0	--	--	--	--	--	1.6E+00	1.6E+00	--	--	--	--	--	--	--	--	--	--	--	1.6E+00	1.6E+00	1.0E+00	1.6	1.6
1,4-Dinitrobenzene	100-25-4	--	--	--	--	--	1.6E+00	1.6E+00	--	--	--	--	--	--	--	--	--	--	--	1.6E+00	1.6E+00	1.0E+00	1.6	1.6
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	--	--	--	4.8E+02	4.8E+02	--	--	--	--	--	--	--	--	--	--	--	4.8E+02	4.8E+02	1.0E+00	480	480
2,3,5,6-Tetrachlorophenol	935-95-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
2,3-Dichloroaniline	608-27-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
2,4,5-Trichlorophenol	95-95-4	--	--	--	--	--	1.6E+03	1.6E+03	--	--	--	--	--	--	6.0E+02	--	--	--	--	1.6E+03	6.0E+02	1.0E+00	1,600	600
2,4,6-Trichlorophenol	88-06-2	--	--	--	8.0E+00	8.0E+00	1.6E+01	1.6E+01	--	--	2.8E-01	--	--	--	2.8E+00	3.9E+00	--	1.7E+01	--	8.0E+00	2.8E-01	1.0E+00	8	1
2,4-Dichlorophenol	120-83-2	--	--	--	--	--	4.8E+01	4.8E+01	--	--	3.4E+01	1.0E+01	--	--	6.0E+01	--	--	1.9E+02	--	4.8E+01	1.0E+01	1.0E+00	48	10
2,4-Dimethylphenol	105-67-9	--	--	--	--	--	3.2E+02	3.2E+02	--	--	9.7E+01	--	--	--	3.0E+03	--	--	5.5E+02	--	3.2E+02	9.7E+01	1.0E+00	320	97
2,4-Dinitrophenol	51-28-5	--	--	--	--	--	3.2E+01	3.2E+01	--	--	6.1E+02	1.0E+02	--	--	3.0E+02	--	--	3.5E+03	--	3.2E+01	3.2E+01	5.0E+00	32	32
2,4-Dinitrotoluene	121-14-2	--	--	--	2.8E-01	2.8E-01	3.2E+01	3.2E+01	--	--	1.8E-01	--	--	--	1.7E+00	5.5E+00	--	1.4E+03	--	2.8E-01	1.8E-01	1.0E+00	1	1
2,6-Dinitrotoluene	606-20-2	--	--	--	5.8E-02	5.8E-02	4.8E+00	4.8E+00	--	--	--	--	--	--	--	--	--	--	--	5.8E-02	5.8E-02	1.0E+00	1	1
2-Chlorophenol	95-57-8	--	--	--	--	--	4.0E+01	4.0E+01	--	--	1.7E+01	--	--	--	8.0E+02	--	--	9.7E+01	--	4.0E+01	1.7E+01	1.0E+00	40	17
2-methylphenol	95-48-7	--	--	--	--	--	8.0E+02	8.0E+02	--	--	--	--	--	--	--	--	--	--	--	8.0E+02	8.0E+02	1.0E+00	800	800
2-Nitroaniline	88-74-4	--	--	--	--	--	1.6E+02	1.6E+02	--	--	--	--	--	--	--	--	--	--	--	1.6E+02	1.6E+02	1.0E+00	160	160
2-Nitrophenol	88-75-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
3,3'-Dichlorobenzidine	91-94-1	--	--	--	1.9E-01	1.9E-01	--	--	--	--	3.3E-03	--	--	--	1.5E-01	4.6E-02	--	--	--	1.9E-01	3.3E-03	1.0E+00	1	1
3+4-Methylphenol	65794-96-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
3-Nitroaniline	99-09-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
4,6-Dinitro-2-Methylphenol	534-52-1	--	--	--	--	--	1.3E+00	1.3E+00	--	--	2.5E+01	7.0E+00	--	--	3.0E+01	--	--	--	--	1.3E+00	1.3E+00	5.0E+00	5	5
4-Bromophenyl phenyl ether	101-55-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
4-Chloro-3-Methylphenol	59-50-7	--	--	--	--	--	1.6E+03	1.6E+03	--	--	3.6E+01	--	--	--	2.0E+03	--	--	--	--	1.6E+03	3.6E+01	1.0E+00	1,600	36
4-Chloroaniline	106-47-8	--	--	--	4.4E-01	4.4E-01	6.4E+01	6.4E+01	--	--	--	--	--	--	--	--	--	--	--	4.4E-01	4.4E-01	1.0E+00	1	1
4-Chlorophenyl phenyl ether	7005-72-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
4-Nitroaniline	100-01-6	--	--	--	4.4E+00	4.4E+00	6.4E+01	6.4E+01	--	--	--	--	--	--	--	--	--	--	--	4.4E+00	4.4E+00	1.0E+00	4.4	4.4
4-Nitrophenol	100-02-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	5.0E+00	NE	NE
Aniline	62-53-3	--	--	--	1.5E+01	1.5E+01	1.1E+02	1.1E+02	--	--	--	--	--	--	--	--	--	--	--	1.5E+01	1.5E+01	5.0E+00	15	15
Benzidine	92-87-5	--	--	--	1.0E-04	1.0E-04	4.8E+01	4.8E+01	--	--	2.3E-05	--	--	--	1.1E-02	5.3E-05	--	8.9E+01	--	1.0E-04	2.3E-05	5.0E+00	5	5
Benzoic Acid	65-85-0	--	--	--	--	--	6.4E+04	6.4E+04	--	--	--	--	--	--	--	--	--	--	--	6.4E+04	6.4E+04	5.0E+00	64,000	64,000
Benzyl Alcohol	100-51-6	--	--	--	--	--	1.6E+03	1.6E+03	--	--	--	--	--	--	--	--	--	--	--	1.6E+03	1.6E+03	1.0E+00	1,600	1,600
Bis(2-Chloroethoxy)Methane	111-91-1	--	--	--	--	--	4.8E+01	4.8E+01	--	--	--	--	--	--	--	--	--	--	--	4.8E+01	4.8E+01	1.0E+00	48	48
Bis(2-Chloroethyl)Ether	111-44-4	--	--	--	4.0E-02	4.0E-02	--	--	--	--	6.0E-02	--	--	--	2.2E+00	8.5E-01	--	--	--	4.0E-02	4.0E-02	1.0E+00	1	1
Bis(2-chloroisopropyl) ether	39638-32-9	--	--	--	--	--	--	--	--	--	--	9.0E+02	--	--	--	--	--	--	--	NE	9.0E+02	1.0E+00	NE	900
Bis(2-Ethylhexyl) Phthalate	117-81-7	6.0E+00	6.0E+00	--	6.3E+00	--	3.2E+02	--	--	--	2.5E-01	4.6E-02	--	--	3.7E-01	3.6E+00	--	4.0E+02	--	6.0E+00	4.6E-02	1.0E+00	6	1
Butyl benzyl Phthalate	85-68-7	--	--	--	4.6E+01	4.6E+01	3.2E+03	3.2E+03	--	--	5.8E-01	1.3E-02	--	--	1.0E-01	8.2E+00	--	1.3E+03	--	4.6E+01	1.3E-02	1.0E+00	46	1
Carbazole	86-74-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Drinking Water Criteria							Surface Water Criteria											Lowest Risk-Based Concentrations		Modifying Factor	Proposed Groundwater Cleanup Levels (After PQL Adjustment)	
									Chapter 173-201A WAC[1]			40 CFR 131.45[2]	Section 304 of the Clean Water Act[3]			MTCA Method B Formula Value[4,9]								
									Aquatic Life		Human Health	Human Health	Aquatic Life		Human Health	Human Health				Protection of Drinking Water (µg/L)	Protection of Drinking Water and Surface Water (µg/L	PQL[10] (µg/L)	Protection of Drinking Water (µg/L)	Protection of Drinking Water and Surface Water (µg/L)
		Federal MCL[5] (µg/L)	State MCL[6] (µg/L)	State Secondary MCL[7] (µg/L)	MTCA Method B Formula Value[8,9] Carc. (µg/L)	Carc. Adjusted (µg/L)	Non-Carc. (µg/L)	Non-Carc. Adjusted (µg/L)	Acute (µg/L)	Chronic (µg/L)	Organism (µg/L)	Organism (µg/L)	Acute (µg/L)	Chronic (µg/L)	Organism (µg/L)	Carc. (µg/L)	Carc. Adjusted (µg/L)	Non-Carc. (µg/L)	Non-Carc. Adjusted (µg/L)					
Di(2-ethylhexyl)adipate	103-23-1	4.0E+02	4.0E+02	--	7.3E+01	--	9.6E+03	--	--	--	--	--	--	--	--	--	--	--	--	4.0E+02	4.0E+02	5.0E+00	400	400
Dibenzofuran	132-64-9	--	--	--	--	--	8.0E+00	8.0E+00	--	--	--	--	--	--	--	--	--	--	--	8.0E+00	8.0E+00	1.0E+00	8	8
Dibutyl Phthalate	84-74-2	--	--	--	--	--	1.6E+03	1.6E+03	--	--	5.1E+02	8.0E+00	--	--	3.0E+01	--	--	2.9E+03	--	1.6E+03	8.0E+00	5.0E+00	1,600	8
Diethyl Phthalate	84-66-2	--	--	--	--	--	1.3E+04	1.3E+04	--	--	5.0E+03	2.0E+02	--	--	6.0E+02	--	--	2.8E+04	--	1.3E+04	2.0E+02	1.0E+00	13,000	200
Dimethyl Phthalate	131-11-3	--	--	--	--	--	--	--	--	--	1.3E+05	6.0E+02	--	--	2.0E+03	--	--	--	--	NE	6.0E+02	1.0E+00	NE	600
Di-N-Octyl Phthalate	117-84-0	--	--	--	--	--	1.6E+02	1.6E+02	--	--	--	--	--	--	--	--	--	--	--	1.6E+02	1.6E+02	1.0E+00	160	160
Hexachlorobenzene	118-74-1	1.0E+00	1.0E+00	--	2.7E-02	2.7E-01	6.4E+00	--	--	--	5.2E-05	5.0E-06	--	--	7.9E-05	4.7E-04	--	2.4E-01	--	2.7E-01	5.0E-06	1.0E+00	1	1
Hexachlorocyclopentadiene	77-47-4	5.0E+01	5.0E+01	--	--	--	4.8E+01	4.8E+01	--	--	6.3E+02	1.0E+00	--	--	4.0E+00	--	--	3.6E+03	--	4.8E+01	1.0E+00	1.0E+00	48	1
Hexachloroethane	67-72-1	--	--	--	1.1E+00	1.1E+00	5.6E+00	5.6E+00	--	--	1.3E-01	2.0E-02	--	--	1.0E-01	1.9E+00	--	2.1E+01	--	1.1E+00	2.0E-02	1.0E+00	1.1	1
Isophorone	78-59-1	--	--	--	9.2E+01	9.2E+01	3.2E+03	3.2E+03	--	--	1.1E+02	--	--	--	1.8E+03	1.6E+03	--	1.2E+05	--	9.2E+01	9.2E+01	1.0E+00	92	92
Nitrobenzene	98-95-3	--	--	--	--	--	1.6E+01	1.6E+01	--	--	3.2E+02	1.0E+02	--	--	6.0E+02	--	--	1.8E+03	--	1.6E+01	1.6E+01	1.0E+00	16	16
N-Nitrosodimethylamine	62-75-9	--	--	--	2.3E-04	2.3E-04	6.4E-02	6.4E-02	--	--	3.4E-01	--	--	--	3.0E+00	8.0E-01	--	8.0E+02	--	2.3E-04	2.3E-04	1.0E+00	1	1
N-Nitrosodi-n-propylamine	621-64-7	--	--	--	1.3E-02	1.3E-02	--	--	--	--	5.8E-02	--	--	--	5.1E-01	8.2E-01	--	--	--	1.3E-02	1.3E-02	1.0E+00	1	1
N-Nitrosodiphenylamine	86-30-6	--	--	--	1.8E+01	1.8E+01	--	--	--	--	6.9E-01	--	--	--	6.0E+00	9.7E+00	--	--	--	1.8E+01	6.9E-01	1.0E+00	18	1
Pentachlorophenol	87-86-5	1.0E+00	1.0E+00	--	2.2E-01	--	8.0E+01	--	1.3E+01	7.9E+00	1.0E-01	2.0E-03	1.3E+01	7.9E+00	4.0E-02	1.5E+00	--	1.2E+03	--	1.0E+00	2.0E-03	5.0E+00	5	5
Phenol	108-95-2	--	--	--	--	--	4.8E+03	4.8E+03	--	--	2.0E+05	7.0E+04	--	--	3.0E+05	--	--	5.6E+05	--	4.8E+03	4.8E+03	1.0E+00	4,800	4,800
Pyridine	110-86-1	--	--	--	--	--	8.0E+00	8.0E+00	--	--	--	--	--	--	--	--	--	--	--	8.0E+00	8.0E+00	1.0E+00	8	8
Volatile Organic Compounds (VOCs)																								
1,1,1,2-Tetrachloroethane	630-20-6	--	--	--	1.7E+00	1.7E+00	2.4E+02	2.4E+02	--	--	--	--	--	--	--	--	--	--	--	1.7E+00	1.7E+00	2.0E-01	1.7	1.7
1,1,1-Trichloroethane (TCA)	71-55-6	2.0E+02	2.0E+02	--	--	--	1.6E+04	--	--	--	1.6E+05	5.0E+04	--	--	2.0E+05	--	--	9.3E+05	--	2.0E+02	2.0E+02	2.0E-01	200	200
1,1,2,2-Tetrachloroethane	79-34-5	--	--	--	2.2E-01	2.2E-01	1.6E+02	1.6E+02	--	--	4.6E-01	3.0E-01	--	--	3.0E+00	6.5E+00	--	1.0E+04	--	2.2E-01	2.2E-01	2.0E-01	0.22	0.22
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	76-13-1	--	--	--	--	--	2.4E+05	2.4E+05	--	--	--	--	--	--	--	--	--	--	--	2.4E+05	2.4E+05	5.0E-01	240,000	240,000
1,1,2-Trichloroethane	79-00-5	5.0E+00	5.0E+00	--	7.7E-01	--	3.2E+01	--	--	--	1.8E+00	9.0E-01	--	--	8.9E+00	2.5E+01	--	2.3E+03	--	5.0E+00	9.0E-01	2.0E-01	5	0.9
1,1-Dichloroethane (DCA)	75-34-3	--	--	--	7.7E+00	7.7E+00	1.6E+03	1.6E+03	--	--	--	--	--	--	--	--	--	--	--	7.7E+00	7.7E+00	2.0E-01	7.7	7.7
1,1-Dichloroethylene (DCE)	75-35-4	7.0E+00	7.0E+00	--	--	--	4.0E+02	--	--	--	4.1E+03	4.0E+03	--	--	2.0E+04	--	--	2.3E+04	--	7.0E+00	7.0E+00	2.0E-01	7	7
1,1-Dichloropropene	563-58-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	2.0E-01	NE	NE
1,2,3-Trichlorobenzene	87-61-6	--	--	--	--	--	6.4E+00	6.4E+00	--	--	--	--	--	--	--	--	--	--	--	6.4E+00	6.4E+00	2.0E-01	6.4	6.4
1,2,3-Trichloropropane	96-18-4	--	--	--	3.8E-04	3.8E-04	3.2E+01	3.2E+01	--	--	--	--	--	--	--	--	--	--	--	3.8E-04	3.8E-04	2.0E-01	0.2	0.2
1,2,4-Trichlorobenzene	120-82-1	7.0E+01	7.0E+01	--	1.5E+00	1.5E+01	8.0E+01	--	--	--	1.4E-01	3.7E-02	--	--	7.6E-02	2.0E+00	--	2.3E+02	--	1.5E+01	3.7E-02	1.0E+00	15	1
1,2,4-Trimethylbenzene	95-63-6	--	--	--	--	--	8.0E+01	8.0E+01	--	--	--	--	--	--	--	--	--	--	--	8.0E+01	8.0E+01	2.0E-01	80	80
1,2-Dibromo-3-Chloropropane	96-12-8	2.0E-01	2.0E-01	--	1.4E-02	1.4E-01	1.6E+00	--	--	--	--	--	--	--	--	--	--	--	--	1.4E-01	1.4E-01	1.0E+00	1	1
1,2-Dibromoethane (EDB)	106-93-4	5.0E-02	5.0E-02	--	2.2E-02	--	7.2E+01	--	--	--	--	--	--	--	--	--	--	--	--	5.0E-02	5.0E-02	1.0E-02	0.05	0.05
1,2-Dichlorobenzene (1,2-DCB)	95-50-1	6.0E+02	6.0E+02	--	--	--	7.2E+02	--	--	--	2.5E+03	8.0E+02	--	--	3.0E+03	--	--	4.2E+03	--	6.0E+02	6.0E+02	1.0E+00	600	600
1,2-Dichloroethane (EDC)	107-06-2	5.0E+00	5.0E+00	--	4.8E-01	4.8E+00	4.8E+01	--	--	--	1.2E+02	7.3E+01	--	--	6.5E+02	5.9E+01	--	1.3E+04	--	4.8E+00	4.8E+00	2.0E-01	4.8	4.8
1,2-Dichloropropane	78-87-5	5.0E+00	5.0E+00	--	1.2E+00	--	3.2E+02	--	--	--	3.1E+00	--	--	--	3.1E+01	4.3E+01	--	2.5E+04	--	5.0E+00	3.1E+00	2.0E-01	5	3.1
1,3,5-Trimethylbenzene	108-67-8	--	--	--	--	--	8.0E+01	8.0E+01	--	--	--	--	--	--	--	--	--	--	--	8.0E+01	8.0E+01	2.0E-01	80	80
1,3-Dichlorobenzene (1,3-DCB)	541-73-1	--	--	--	--	--	--	--	--	--	1.6E+01	2.0E+00	--	--	1.0E+01	--	--	--	--	NE	2.0E+00	2.0E-01	NE	2
1,3-Dichloropropane	142-28-9	--	--	--	--	--	1.6E+02	1.6E+02	--	--	--	--	--	--	--	--	--	--	--	1.6E+02	1.6E+02	2.0E-01	160	160
1,4-Dichlorobenzene (1,4-DCB)	106-46-7	7.5E+01	7.5E+01	--	8.1E+00	--	5.6E+02	--	--	--	5.8E+02	2.0E+02	--	--	9.0E+02	2.2E+01	--	3.3E+03	--	7.5E+01	7.5E+01	2.0E-01	75	75
2,2-Dichloropropane	594-20-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	2.0E-01	NE	NE
2-Butanone, 4-(Acetyloxy)-	10150-87-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+01	NE	NE
2-Chloroethyl vinyl ether	110-75-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
2-Chlorotoluene	95-49-8	--	--	--	--	--	1.6E+02	1.6E+02	--	--	--	--	--	--	--	--	--	--	--	1.6E+02	1.6E+02	2.0E-01	160	160
2-Hexanone	591-78-6	--	--	--	--	--	4.0E+01	4.0E+01	--	--	--	--	--	--	--	--	--	--	--	4.0E+01	4.0E+01	2.0E+00	40	40
4-Chlorotoluene	106-43-4	--	--	--	--	--	1.6E+02	1.6E+02	--	--	--	--	--	--	--	--	--	--	--	1.6E+02	1.6E+02	2.0E-01	160	160
4-Isopropyltoluene	99-87-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	2.0E-01	NE	NE
Acetic Acid, Methyl Ester	79-20-9	--	--	--	--	--	8.0E+03	8.0E+03	--	--	--	--	--	--	--	--	--	--	--	8.0E+03	8.0E+03	5.0E-01	8,000	8,000
Acetone	67-64-1	--	--	--	--	--	7.2E+03	7.2E+03	--	--	--	--	--	--	--	--	--	--	--	7.2E+03	7.2E+03	5.0E+00	7,200	7,200
Benzene	71-43-2	5.0E+00	5.0E+00	--	8.0E-01	--	3.2E+01	--	--	2.3E+01	1.6E+00	--	--	--	1.6E+01	2.3E+01	--	2.0E+03	--	5.0E+00	1.6E+00	2.0E-01	5	1.6
Bromobenzene	108-86-1	--	--	--	--	--	6.4E+01	6.4E+01	--	--	--	--	--	--	--	--	--	--	--	6.4E+01	6.4E+01	2.0E-01	64	64
Bromochloromethane	74-97-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	2.0E-01	NE	NE
Bromoform	75-25-2	8.0E+01	8.0E+01	--	5.5E+00	5.5E+01	1.6E+02	--	--	--	2.7E+01	1.2E+01	--	--	1.2E+02	2.2E+02	--	1.4E+04	--	5.5E+01	1.2E+01	1.0E+00	55	12
Bromomethane	74-83-9	--	--	--	--	--	1.1E+01	1.1E+01	--	--	2.4E+03	--	--	--	1.0E+04	--	--	9.7E+02	9.7E+02	1.1E+01	1.1E+01	2.0E-01	11	11
Carbon Disulfide	75-15-0	--	--	--	--	--	8.0E+02	8.0E+02	--	--	--	--	--	--	--	--	--	--	--	8.0E+02	8.0E+02	2.0E-01	800	800
Carbon Tetrachloride	56-23-5	5.0E+00	5.0E+00	--	6.3E-01	--	3.2E+01	--	--	--	3.5E-01	--	--	--	5.0E+00	4.9E+00	--	5.5E+02	--	5.0E+00	3.5E-01	2.0E-01	5	0.35
Chlorobenzene	108-90-7	1.0E+02	1.0E+02	--	--	--	1.6E+02	--	--	--	8.9E+02	2.0E+02	--	--	8.0E+02	--	--	5.0E+03	--	1.0E+02	1.0E+02	2.0E-01	100	100
Chloroethane	75-00-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
Chloroform	67-66-3	8.0E+01	8.0E+01	--	1.4E+00	1.4E+01	8.0E+01	--	--	--	1.2E+03	6.0E+02	--	--	2.0E+03	5.6E+01	560	6.9E+03	--	1.4E+01	1.4E+01	2.0E-01	14	14
Chloromethane	74-87-3	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
cis-1,2-Dichloroethylene (cis-DCE)	156-59-2	7.0E+01	7.0E+01	--	--	--	1.6E+01	1.6E+01	--	--	--	--	--	--	--	--	--	--	--	1.6E+01	1.6E+01	2.0E-01	16	16
cis-1,3-Dichloropropene	10061-01-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	2.0E-01	NE	NE
Cyclohexane	110-82-7	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	5.0E-01	NE	NE
Cycloehexane, Methyl-	108-87-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	5.0E-01	NE	NE
Dibromochloromethane	124-48-1	8.0E+01	8.0E+01	--	5.2E-01	5.2E+00	1.6E+02	--	--	--	3.0E+00	2.2E+00	--	--	2.1E+01	2.1E+01	--	1.4E+04	--	5.2E+00	2.2E+00	2.0E-01	5.2	2.2
Dibromomethane	74-95-3	--	--	--	--	--	8.0E+01	8.0E+01	--	--	--	--	--	--	--	--	--	--	--	8.0E+01	8.0E+01	2.0E-01	80	80

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Drinking Water Criteria							Surface Water Criteria											Lowest Risk-Based Concentrations		Modifying Factor	Proposed Groundwater Cleanup Levels (After PQL Adjustment)	
									Chapter 173-201A WAC[1]			40 CFR 131.45[2]	Section 304 of the Clean Water Act[3]			MTCA Method B Formula Value[4,9]								
					MTCA Method B Formula Value[8,9]				Aquatic Life		Human Health	Human Health	Aquatic Life		Human Health	Human Health				Protection of Drinking Water (µg/L)	Protection of Drinking Water and Surface Water (µg/L	PQL[10] (µg/L)	Protection of Drinking Water (µg/L)	Protection of Drinking Water and Surface Water (µg/L)
		Federal MCL[5] (µg/L)	State MCL[6] (µg/L)	State Secondary MCL[7] (µg/L)	Carc. (µg/L)	Carc. Adjusted (µg/L)	Non-Carc. (µg/L)	Non-Carc. Adjusted (µg/L)	Acute (µg/L)	Chronic (µg/L)	Organism (µg/L)	Organism (µg/L)	Acute (µg/L)	Chronic (µg/L)	Organism (µg/L)	Carc. (µg/L)	Carc. Adjusted (µg/L)	Non-Carc. (µg/L)	Non-Carc. Adjusted (µg/L)					
Dichlorobromomethane	75-27-4	8.0E+01	8.0E+01	--	7.1E-01	7.1E+00	1.6E+02	--	--	--	3.6E+00	2.8E+00	--	--	2.7E+01	2.8E+01	--	1.4E+04	--	7.1E+00	2.8E+00	2.0E-01	7.1	2.8
Dichlorodifluoromethane	75-71-8	--	--	--	--	--	1.6E+03	1.6E+03	--	--	--	--	--	--	--	--	--	--	--	1.6E+03	1.6E+03	2.0E-01	1,600	1,600
Ethylbenzene	100-41-4	7.0E+02	7.0E+02	--	--	--	8.0E+02	--	--	2.1E+01	2.7E+02	3.1E+01	--	--	1.3E+02	--	--	6.9E+03	--	7.0E+02	2.1E+01	2.0E-01	700	21
Hexachlorobutadiene	87-68-3	--	--	--	5.6E-01	5.6E-01	8.0E+00	8.0E+00	--	--	4.1E+00	1.0E-02	--	--	1.0E-02	3.0E+01	--	9.3E+02	--	5.6E-01	1.0E-02	1.0E+00	1	1
Hexane	110-54-3	--	--	--	--	--	4.8E+02	4.8E+02	--	--	--	--	--	--	--	--	--	--	--	4.8E+02	4.8E+02	1.0E+00	480	480
Isopropylbenzene	98-82-8	--	--	--	--	--	8.0E+02	8.0E+02	--	--	--	--	--	--	--	--	--	--	--	8.0E+02	8.0E+02	2.0E-01	800	800
Methyl ethyl ketone (MEK)	78-93-3	--	--	--	--	--	4.8E+03	4.8E+03	--	--	--	--	--	--	--	--	--	--	--	4.8E+03	4.8E+03	5.0E+00	4,800	4,800
Methyl Iodide	74-88-4	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E+00	NE	NE
Methyl isobutyl ketone	108-10-1	--	--	--	--	--	6.4E+02	6.4E+02	--	--	--	--	--	--	--	--	--	--	--	6.4E+02	6.4E+02	2.0E+00	640	640
Methyl tert-butyl ether (MTBE)	1634-04-4	--	--	--	2.4E+01	2.4E+01	--	--	--	--	--	--	--	--	--	--	--	--	--	2.4E+01	2.4E+01	2.0E-01	24	24
Methylene Chloride	75-09-2	5.0E+00	5.0E+00	--	5.8E+00	--	4.8E+01	--	--	--	2.5E+02	1.0E+02	--	--	1.0E+03	5.9E+02	--	1.7E+04	--	5.0E+00	5.0E+00	1.0E+00	5	5
n-Butylbenzene	104-51-8	--	--	--	--	--	4.0E+02	4.0E+02	--	--	--	--	--	--	--	--	--	--	--	4.0E+02	4.0E+02	2.0E-01	400	400
n-Propylbenzene	103-65-1	--	--	--	--	--	8.0E+02	8.0E+02	--	--	--	--	--	--	--	--	--	--	--	8.0E+02	8.0E+02	2.0E-01	800	800
Sec-Butylbenzene	135-98-8	--	--	--	--	--	8.0E+02	8.0E+02	--	--	--	--	--	--	--	--	--	--	--	8.0E+02	8.0E+02	2.0E-01	800	800
Styrene	100-42-5	1.0E+02	1.0E+02	--	--	--	1.6E+03	--	--	--	--	--	--	--	--	--	--	--	--	1.0E+02	1.0E+02	2.0E-01	100	100
Tert-Butylbenzene	98-06-6	--	--	--	--	--	8.0E+02	8.0E+02	--	--	--	--	--	--	--	--	--	--	--	8.0E+02	8.0E+02	2.0E-01	800	800
Tetrachloroethylene (PCE)	127-18-4	5.0E+00	5.0E+00	--	2.1E+01	--	4.8E+01	--	--	--	7.1E+00	2.9E+00	--	--	2.9E+01	1.0E+02	--	5.0E+02	--	5.0E+00	2.9E+00	2.0E-01	5	2.9
Toluene	108-88-3	1.0E+03	1.0E+03	--	--	--	6.4E+02	6.4E+02	--	1.0E+02	4.1E+02	1.3E+02	--	--	5.2E+02	--	--	1.9E+04	--	6.4E+02	1.0E+02	1.0E+00	640	102
Total Xylenes	1330-20-7	1.0E+04	1.0E+04	--	--	--	1.6E+03	1.6E+03	--	1.1E+02	--	--	--	--	--	--	--	--	--	1.6E+03	1.1E+02	4.0E-01	1,600	106
trans-1,2-Dichloroethylene (trans-DCE)	156-60-5	1.0E+02	1.0E+02	--	--	--	1.6E+02	--	--	--	5.8E+03	1.0E+03	--	--	4.0E+03	--	--	3.3E+04	--	1.0E+02	1.0E+02	2.0E-01	100	100
trans-1,3-Dichloropropene	10061-02-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	2.0E-01	NE	NE
Trichloroethylene (TCE)	79-01-6	5.0E+00	5.0E+00	--	5.4E-01	--	4.0E+00	4.0E+00	--	--	8.6E-01	7.0E-01	--	--	7.0E+00	4.9E+00	--	1.2E+02	--	4.0E+00	7.0E-01	2.0E-01	4	0.7
Trichlorofluoromethane	75-69-4	--	--	--	--	--	2.4E+03	2.4E+03	--	--	--	--	--	--	--	--	--	--	--	2.4E+03	2.4E+03	2.0E-01	2,400	2,400
Vinyl Acetate	108-05-4	--	--	--	--	--	8.0E+03	8.0E+03	--	--	--	--	--	--	--	--	--	--	--	8.0E+03	8.0E+03	1.0E+00	8,000	8,000
Vinyl Chloride	75-01-4	2.0E+00	2.0E+00	--	2.9E-02	2.9E-01	2.4E+01	--	--	--	2.6E-01	1.8E-01	--	--	1.6E+00	3.7E+00	--	6.6E+03	--	2.9E-01	1.8E-01	2.0E-01	0.29	0.20
Xylene, m-,p-	179601-23-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	4.0E-01	NE	NE
Xylene, o-	95-47-6	--	--	--	--	--	1.6E+03	1.6E+03	--	--	--	--	--	--	--	--	--	--	--	1.6E+03	1.6E+03	2.0E-01	1,600	1,600
Polycyclic Aromatic Hydrocarbons (PAHs)																								
Anthracene	120-12-7	--	--	--	--	--	2.4E+03	2.4E+03	--	--	4.6E+03	1.0E+02	--	--	4.0E+02	--	--	2.6E+04	--	2.4E+03	1.0E+02	1.0E-02	2,400	100
Pyrene	129-00-0	--	--	--	--	--	2.4E+02	2.4E+02	--	--	4.6E+02	8.0E+00	--	--	3.0E+01	--	--	2.6E+03	--	2.4E+02	8.0E+00	1.0E-02	240	8
Benzo(g,h,i)perylene	191-24-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E-02	NE	NE
Indeno(1,2,3-c,d)pyrene	193-39-5	--	--	--	--	--	--	--	--	--	2.1E-02	1.6E-04	--	--	1.3E-03	--	--	--	--	NE	1.6E-04	1.0E-02	NE	0.010
Benzo(b)fluoranthene	205-99-2	--	--	--	--	--	--	--	--	--	2.1E-02	1.6E-04	--	--	1.3E-03	--	--	--	--	NE	1.6E-04	1.0E-02	NE	0.010
Fluoranthene	206-44-0	--	--	--	--	--	6.4E+02	6.4E+02	--	--	1.6E+01	6.0E+00	--	--	2.0E+01	--	--	9.0E+01	--	6.4E+02	6.0E+00	1.0E-02	640	6
Benzo(j,k)fluoranthene	207-08-9	--	--	--	--	--	--	--	--	--	2.1E-01	1.6E-03	--	--	1.3E-02	--	--	--	--	NE	1.6E-03	1.0E-02	NE	0.01
Acenaphthylene	208-96-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E-02	NE	NE
Chrysene	218-01-9	--	--	--	--	--	--	--	--	--	2.1E+00	1.6E-02	--	--	1.3E-01	--	--	--	--	NE	1.6E-02	1.0E-02	NE	0.016
Benzo(a)pyrene	50-32-8	2.0E-01	2.0E-01	--	2.3E-02	--	4.8E+00	--	--	--	2.1E-03	1.6E-05	--	--	1.3E-04	3.5E-02	--	2.6E+01	--	2.0E-01	1.6E-05	1.0E-02	0.2	0.01
Dibenzo(a,h)anthracene	53-70-3	--	--	--	--	--	--	--	--	--	2.1E-03	1.6E-05	--	--	1.3E-04	--	--	--	--	NE	1.6E-05	1.0E-02	NE	0.01
Benzo(a)anthracene	56-55-3	--	--	--	--	--	--	--	--	--	2.1E-02	1.6E-04	--	--	1.3E-03	--	--	--	--	NE	1.6E-04	1.0E-02	NE	0.01
Acenaphthene	83-32-9	--	--	--	--	--	4.8E+02	4.8E+02	--	--	1.1E+02	3.0E+01	--	--	9.0E+01	--	--	6.4E+02	--	4.8E+02	3.0E+01	1.0E-02	480	30
Phenanthrene	85-01-8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	1.0E-02	NE	NE
Fluorene	86-73-7	--	--	--	--	--	3.2E+02	3.2E+02	--	--	6.1E+02	1.0E+01	--	--	7.0E+01	--	--	3.5E+03	--	3.2E+02	1.0E+01	1.0E-02	320	10
1-Methylnaphthalene	90-12-0	--	--	--	1.5E+00	1.5E+00	5.6E+02	5.6E+02	--	--	--	--	--	--	--	--	--	--	--	1.5E+00	1.5E+00	1.0E-02	1.5	1.5
Naphthalene	91-20-3	--	--	--	--	--	1.6E+02	1.6E+02	--	--	--	--	--	--	--	--	--	4.9E+03	4.9E+03	1.6E+02	1.6E+02	1.0E-02	160	160
2-Methylnaphthalene	91-57-6	--	--	--	--	--	3.2E+01	3.2E+01	--	--	--	--	--	--	--	--	--	--	--	3.2E+01	3.2E+01	1.0E-02	32	32
2-Chloronaphthalene	91-58-7	--	--	--	--	--	6.4E+02	6.4E+02	--	--	1.8E+02	1.0E+02	--	--	1.0E+03	--	--	1.0E+03	--	6.4E+02	1.0E+02	1.0E-02	640	100
Total cPAH TEQ	n/a	2.0E-01	2.0E-01	--	2.3E-02	--	4.8E+00	--	--	--	2.1E-03	1.6E-05	--	--	1.3E-04	3.5E-02	--	2.6E+01	--	2.0E-01	1.6E-05	1.0E-02	0.20	0.010
Polychlorinated Biphenyl (PCB) Aroclors																								
PCB-Aroclor 1016	12674-11-2	--	--	--	6.3E-01	6.3E-01	5.6E-01	5.6E-01	--	--	--	--	--	--	--	3.0E-03	3.0E-03	5.8E-03	5.8E-03	5.6E-01	3.0E-03	5.0E-02	0.56	0.05
PCB-Aroclor 1221	11104-28-2	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	5.0E-02	NE	NE
PCB-Aroclor 1232	11141-16-5	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	5.0E-02	NE	NE
PCB-Aroclor 1242	53469-21-9	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	5.0E-02	NE	NE
PCB-Aroclor 1248	12672-29-6	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	NE	NE	5.0E-02	NE	NE
PCB-Aroclor 1254	11097-69-1	--	--	--	2.2E-02	2.2E-02	1.6E-01	1.6E-01	--	--	--	--	--	--	--	1.0E-04	1.0E-04	1.7E-03	1.7E-03	2.2E-02	1.0E-04	5.0E-02	0.050	0.050
PCB-Aroclor 1260	11096-82-5	--	--	--	2.2E-02	2.2E-02	--	--	--	--	--	--	--	--	--	--	--	--	--	2.2E-02	2.2E-02	5.0E-02	0.050	0.050
Total PCB Aroclors	1336-36-3	5.0E-01	5.0E-01	--	2.2E-02	2.2E-01	--	--	1.0E+01	3.0E-02	1.7E-04	7.0E-06	--	3.0E-02	6.4E-05	1.0E-04	--	--	--	2.2E-01	7.0E-06	1.0E-01	0.22	0.10

Notes:

[1] Ambient Water Quality Criteria (AWQC) for protection of aquatic life and human health from Chapter 173-201A Washington Administrative Code (WAC); values obtained from Ecology's CLARC (Cleanup Levels and Risk Calculation) Table (Excel) dated January 2023.

[2] United States Environmental Protection Agency (EPA) Federally Promulgated Human Health Criteria applicable to Washington; values obtained from Ecology's CLARC Table dated January 2023.

[3] National Recommended Water Quality Criteria (https://www.epa.gov/wqc/national-recommended-water-quality-criteria); values obtained from Ecology's CLARC Table dated January 2023.

[4] Model Toxics Control Act (MTCA) Method B surface water screening levels calculated according to Washington Administrative Code (WAC) 173-340-730(3)(b)(iii)(a) (equation 730-1) and WAC 173-340-730(3)(b)(iii)(b) (equation 730-2); values obtained from Ecology's CLARC Table dated January 2023.

[5] National Primary Drinking Water Regulation; http://water.epa.gov/drink/contaminants.index.cfm; values obtained from Ecology's CLARC Table dated January 2023.

[6] Primary maximum contaminant levels, WAC 246-290-310; values obtained from Ecology's CLARC Table dated January 2023.

[7] Secondary maximum contaminant levels, WAC 246-290-310; values obtained from Ecology's CLARC Table dated January 2023.

[8] MTCA Method B groundwater screening levels calculated according to WAC-173-340-720(3)(b)(iii)(A)(equation 720-1) and WAC-173-340-720(3)(b)(iii)(B)(equation 720-2); values obtained from Ecology's CLARC Table dated January 2023. The Method A Groundwater Cleanup Levels are used for TPH-G, TPH-D, and TPH-O concentrations protective of drinking water.

[9] "Carc. Adjusted" (i.e., carcinogenic adjusted) and "Non-Carc. Adjusted" (i.e., non-carcinogenic adjusted) columns are applicable when a state or federal surface water standard is available, but is not considered to be "sufficiently protective" under MTCA (that is, the standard is based on a hazard quotient greater than 1 or a cancer risk greater than 1 x 10^{-5}). In these cases WAC 173-340-720(7)(b) and -730(5)(b) allows the standard to be adjusted downward to a hazard quotient of 1 or a cancer risk of 1 x 10^{-5}. For this table, the "Carc. Adjusted" and "Non-Carc. Adjusted" column are also used in cases where no state or federal standards are available.

[10] Practical quantitation limit (PQL) is the typical value from OnSite Environmental, Inc. of Redmond, Washington. PQL adjusted for 1,2-Dibromoethane (EDB) based on Ecology's "Guidance for Remediation of Petroleum Contaminated Site" Table 7.3.

[12] Background level for groundwater in the Puget Sound Basin (Natural Background Groundwater Arsenic Concentrations in Washington State; Ecology 2022).

-- = no screening criteria available

µg/L = microgram per liter

Carc. = carcinogenic

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

MCL = maximum contaminant level

n/a = not applicable

NE = not established

PCUL = proposed cleanup level

TEQ = toxicity equivalent quotient

Gray shading identifies the basis for the proposed groundwater cleanup level.

Blue shading identifies the proposed groundwater cleanup level after adjustment for background and the PQL.

Table 3-4

Proposed Indoor Air Preliminary Cleanup Levels and Screening Levels for Commercial Workers

University of Washington - Tacoma Campus

Tacoma, Washington

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Inhalation						Human Health Inhalation					
		MTCA Method B Indoor Air Cleanup Level[1]			Commercial Worker Indoor Air Screening Level[2]			MTCA Method B Sub-Slab Screening Level[1]			Commercial Worker Sub-Slab Screening Level[2]		
		Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)
Petroleum Hydrocarbons													
Gasoline-Range Hydrocarbons (TPH-G) w/Benzene	n/a	--	--	--	--	--	--	--	--	--	--	--	--
Gasoline-Range Hydrocarbons (TPH-G)	n/a	--	--	--	--	--	--	--	--	--	--	--	--
Diesel-Range Hydrocarbons (TPH-D)	n/a	--	--	--	--	--	--	--	--	--	--	--	--
Oil-Range Hydrocarbons (TPH-O)	n/a	--	--	--	--	--	--	--	--	--	--	--	--
Total Petroleum Hydrocarbon Sum with BTEX	None	--	4.6E+01	46	--	3.9E+02	390	--	1.5E+03	1,500	--	1.3E+04	13,000
Metals													
Antimony	7440-36-0	--	--	NE	--	--	NE	--	--	--	--	--	--
Arsenic	7440-38-2	--	--	NE	--	--	NE	--	--	--	--	--	--
Barium	7440-39-3	--	--	NE	--	--	NE	--	--	--	--	--	--
Beryllium	7440-41-7	--	--	NE	--	--	NE	--	--	--	--	--	--
Cadmium	7440-43-9	--	--	NE	--	--	NE	--	--	--	--	--	--
Chromium III / Total	7440-47-3	--	--	NE	--	--	NE	--	--	--	--	--	--
Copper	7440-50-8	--	--	NE	--	--	NE	--	--	--	--	--	--
Iron	7439-89-6	--	--	NE	--	--	NE	--	--	--	--	--	--
Lead	7439-92-1	--	--	NE	--	--	NE	--	--	--	--	--	--
Mercury (mercuric chloride)	7439-97-6	--	1.4E-01	0.14	--	1.2E+00	1.2	--	4.6E+00	4.6	--	3.9E+01	39
Nickel	7440-02-0	--	--	NE	--	--	NE	--	--	--	--	--	--
Selenium	7782-49-2	--	--	NE	--	--	NE	--	--	--	--	--	--
Silver	7440-22-4	--	--	NE	--	--	NE	--	--	--	--	--	--
Thallium	7440-28-0	--	--	NE	--	--	NE	--	--	--	--	--	--
Zinc	7440-66-6	--	--	NE	--	--	NE	--	--	--	--	--	--
Semi-Volatile Organic Compounds (SVOCs)													
1,2-Dinitrobenzene	528-29-0	--	--	NE	--	--	NE	--	--	--	--	--	--
1,2-Diphenylhydrazine	122-66-7	--	--	NE	--	--	NE	--	--	--	--	--	--
1,3-Dinitrobenzene	99-65-0	--	--	NE	--	--	NE	--	--	--	--	--	--
1,4-Dinitrobenzene	100-25-4	--	--	NE	--	--	NE	--	--	--	--	--	--
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	NE	--	--	NE	--	--	--	--	--	--
2,3,5,6-Tetrachlorophenol	935-95-5	--	--	NE	--	--	NE	--	--	--	--	--	--
2,3-Dichloroaniline	608-27-5	--	--	NE	--	--	NE	--	--	--	--	--	--
2,4,5-Trichlorophenol	95-95-4	--	--	NE	--	--	NE	--	--	--	--	--	--
2,4,6-Trichlorophenol	88-06-2	--	--	NE	--	--	NE	--	--	--	--	--	--
2,4-Dichlorophenol	120-83-2	--	--	NE	--	--	NE	--	--	--	--	--	--
2,4-Dimethylphenol	105-67-9	--	--	NE	--	--	NE	--	--	--	--	--	--
2,4-Dinitrophenol	51-28-5	--	--	NE	--	--	NE	--	--	--	--	--	--
2,4-Dinitrotoluene	121-14-2	--	--	NE	--	--	NE	--	--	--	--	--	--
2,6-Dinitrotoluene	606-20-2	--	--	NE	--	--	NE	--	--	--	--	--	--
2-Chlorophenol	95-57-8	--	--	NE	--	--	NE	--	--	--	--	--	--
2-methylphenol	95-48-7	--	--	NE	--	--	NE	--	--	--	--	--	--

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Inhalation						Human Health Inhalation					
		MTCA Method B Indoor Air Cleanup Level[1]			Commercial Worker Indoor Air Screening Level[2]			MTCA Method B Sub-Slab Screening Level[1]			Commercial Worker Sub-Slab Screening Level[2]		
		Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)
2-Nitroaniline	88-74-4	--	--	NE	--	--	NE	--	--	--	--	--	--
2-Nitrophenol	88-75-5	--	--	NE	--	--	NE	--	--	--	--	--	--
3,3'-Dichlorobenzidine	91-94-1	--	--	NE	--	--	NE	--	--	--	--	--	--
3+4-Methylphenol	65794-96-9	--	--	NE	--	--	NE	--	--	--	--	--	--
3-Nitroaniline	99-09-2	--	--	NE	--	--	NE	--	--	--	--	--	--
4,6-Dinitro-2-Methylphenol	534-52-1	--	--	NE	--	--	NE	--	--	--	--	--	--
4-Bromophenyl phenyl ether	101-55-3	--	--	NE	--	--	NE	--	--	--	--	--	--
4-Chloro-3-Methylphenol	59-50-7	--	--	NE	--	--	NE	--	--	--	--	--	--
4-Chloroaniline	106-47-8	--	--	NE	--	--	NE	--	--	--	--	--	--
4-Chlorophenyl phenyl ether	7005-72-3	--	--	NE	--	--	NE	--	--	--	--	--	--
4-Nitroaniline	100-01-6	--	--	NE	--	--	NE	--	--	--	--	--	--
4-Nitrophenol	100-02-7	--	--	NE	--	--	NE	--	--	--	--	--	--
Aniline	62-53-3	--	--	NE	--	--	NE	--	--	--	--	--	--
Benzidine	92-87-5	--	--	NE	--	--	NE	--	--	--	--	--	--
Benzoic Acid	65-85-0	--	--	NE	--	--	NE	--	--	--	--	--	--
Benzyl Alcohol	100-51-6	--	--	NE	--	--	NE	--	--	--	--	--	--
Bis(2-Chloroethoxy)Methane	111-91-1	--	--	NE	--	--	NE	--	--	--	--	--	--
Bis(2-Chloroethyl)Ether	111-44-4	--	--	NE	--	--	NE	--	--	--	--	--	--
Bis(2-chloroisopropyl) ether	39638-32-9	--	--	NE	--	--	NE	--	--	--	--	--	--
Bis(2-Ethylhexyl) Phthalate	117-81-7	--	--	NE	--	--	NE	--	--	--	--	--	--
Butyl benzyl Phthalate	85-68-7	--	--	NE	--	--	NE	--	--	--	--	--	--
Carbazole	86-74-8	--	--	NE	--	--	NE	--	--	--	--	--	--
Di(2-ethylhexyl)adipate	103-23-1	--	--	NE	--	--	NE	--	--	--	--	--	--
Dibenzofuran	132-64-9	--	--	NE	--	--	NE	--	--	--	--	--	--
Dibutyl Phthalate	84-74-2	--	--	NE	--	--	NE	--	--	--	--	--	--
Diethyl Phthalate	84-66-2	--	--	NE	--	--	NE	--	--	--	--	--	--
Dimethyl Phthalate	131-11-3	--	--	NE	--	--	NE	--	--	--	--	--	--
Di-N-Octyl Phthalate	117-84-0	--	--	NE	--	--	NE	--	--	--	--	--	--
Hexachlorobenzene	118-74-1	5.4E-03	--	0.0054	2.5E-02	--	0.025	1.8E-01	--	0.18	8.5E-01	--	0.85
Hexachlorocyclopentadiene	77-47-4	--	9.1E-02	0.091	--	7.8E-01	0.78	--	3.0E+00	3.0	--	2.6E+01	26
Hexachloroethane	67-72-1	2.3E-01	1.4E+01	0.23	1.1E+00	1.2E+02	1.1	7.6E+00	4.6E+02	7.6	3.5E+01	3.9E+03	35
Isophorone	78-59-1	--	--	NE	--	--	NE	--	--	--	--	--	--
Nitrobenzene	98-95-3	--	--	NE	--	--	NE	--	--	--	--	--	--
N-Nitrosodimethylamine	62-75-9	--	--	NE	--	--	NE	--	--	--	--	--	--
N-Nitrosodi-n-propylamine	621-64-7	--	--	NE	--	--	NE	--	--	--	--	--	--
N-Nitrosodiphenylamine	86-30-6	--	--	NE	--	--	NE	--	--	--	--	--	--
Pentachlorophenol	87-86-5	--	--	NE	--	--	NE	--	--	--	--	--	--
Phenol	108-95-2	--	--	NE	--	--	NE	--	--	--	--	--	--
Pyridine	110-86-1	--	--	NE	--	--	NE	--	--	--	--	--	--
Volatile Organic Compounds (VOCs)													
1,1,1,2-Tetrachloroethane	630-20-6	3.4E-01	--	0.34	1.6E+00	--	1.6	1.1E+01	--	11	5.3E+01	--	53
1,1,1-Trichloroethane (TCA)	71-55-6	--	2.3E+03	2,286	--	1.9E+04	19,467	--	7.6E+04	76,000	--	6.5E+05	650,000
1,1,2,2-Tetrachloroethane	79-34-5	4.3E-02	--	0.043	2.0E-01	--	0.2	1.4E+00	--	1.4	6.7E+00	--	6.7
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	76-13-1	--	2.3E+03	2,286	--	1.9E+04	19,467	--	7.6E+04	76,000	--	6.5E+05	650,000

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Inhalation						Human Health Inhalation					
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		Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)
1,1,2-Trichloroethane	79-00-5	1.6E-01	9.1E-02	0.091	7.3E-01	7.8E-01	0.73	5.2E+00	3.0E+00	3	2.4E+01	2.6E+01	24
1,1-Dichloroethane (DCA)	75-34-3	1.6E+00	–	1.6	7.3E+00	–	7.3	5.2E+01	–	52	2.4E+02	–	240
1,1-Dichloroethylene (DCE)	75-35-4	–	9.1E+01	91	–	7.8E+02	779	–	3.0E+03	3,000	–	2.6E+04	26,000
1,1-Dichloropropene	563-58-6	–	–	NE	–	–	NE	–	–	–	–	–	–
1,2,3-Trichlorobenzene	87-61-6	–	–	NE	–	–	NE	–	–	–	–	–	–
1,2,3-Trichloropropane	96-18-4	–	1.4E-01	0.14	–	1.2E+00	1.2	–	4.6E+00	4.6	–	3.9E+01	39
1,2,4-Trichlorobenzene	120-82-1	–	9.1E-01	0.91	–	7.8E+00	7.8	–	3.0E+01	30	–	2.6E+02	260
1,2,4-Trimethylbenzene	95-63-6	–	2.7E+01	27	–	2.3E+02	234	–	9.1E+02	910	–	7.8E+03	7,800
1,2-Dibromo-3-Chloropropane	96-12-8	1.1E-04	9.1E-02	0.00011	1.9E-03	7.8E-01	0.0019	3.7E-03	3.0E+00	0.0037	6.5E-02	2.6E+01	0.1
1,2-Dibromoethane (EDB)	106-93-4	4.2E-03	4.1E+00	0.0042	1.9E-02	3.5E+01	0.019	1.4E-01	1.4E+02	0.1	6.5E-01	1.2E+03	0.7
1,2-Dichlorobenzene (1,2-DCB)	95-50-1	–	9.1E+01	91	–	7.8E+02	779	–	3.0E+03	3,000	–	2.6E+04	26,000
1,2-Dichloroethane (EDC)	107-06-2	9.6E-02	3.2E+00	0.096	4.5E-01	2.7E+01	0.45	3.2E+00	1.1E+02	3.2	1.5E+01	9.1E+02	15
1,2-Dichloropropane	78-87-5	6.8E-01	1.8E+00	0.68	3.2E+00	1.6E+01	3.2	2.3E+01	6.1E+01	23	1.1E+02	5.2E+02	110
1,3,5-Trimethylbenzene	108-67-8	–	2.7E+01	27	–	2.3E+02	234	–	9.1E+02	910	–	7.8E+03	7,800
1,3-Dichlorobenzene (1,3-DCB)	541-73-1	–	–	NE	–	–	NE	–	–	–	–	–	–
1,3-Dichloropropane	142-28-9	–	–	NE	–	–	NE	–	–	–	–	–	–
1,4-Dichlorobenzene (1,4-DCB)	106-46-7	2.3E-01	3.7E+02	0.23	1.1E+00	3.1E+03	1.1	7.6E+00	1.2E+04	7.6	3.5E+01	1.0E+05	35
2,2-Dichloropropane	594-20-7	–	–	NE	–	–	NE	–	–	–	–	–	–
2-Butanone, 4-(Acetyloxy)-	10150-87-5	–	–	NE	–	–	NE	–	–	–	–	–	–
2-Chloroethyl vinyl ether	110-75-8	–	–	NE	–	–	NE	–	–	–	–	–	–
2-Chlorotoluene	95-49-8	–	–	NE	–	–	NE	–	–	–	–	–	–
2-Hexanone	591-78-6	–	1.4E+01	14	–	1.2E+02	117	–	4.6E+02	460	–	3.9E+03	3,900
4-Chlorotoluene	106-43-4	–	–	NE	–	–	NE	–	–	–	–	–	–
4-Isopropyltoluene	99-87-6	–	–	NE	–	–	NE	–	–	–	–	–	–
Acetic Acid, Methyl Ester	79-20-9	–	–	NE	–	–	NE	–	–	–	–	–	–
Acetone	67-64-1	–	–	NE	–	–	NE	–	–	–	–	–	–
Benzene	71-43-2	3.2E-01	1.4E+01	0.32	1.5E+00	1.2E+02	1.5	1.1E+01	4.6E+02	11	5.0E+01	3.9E+03	50
Bromobenzene	108-86-1	–	2.7E+01	27	–	2.3E+02	234	–	9.1E+02	910	–	7.8E+03	7,800
Bromochloromethane	74-97-5	–	–	NE	–	–	NE	–	–	–	–	–	–
Bromoform	75-25-2	2.3E+00	–	2.3	1.1E+01	–	11	7.6E+01	–	76	3.5E+02	–	350
Bromomethane	74-83-9	–	2.3E+00	2.3	–	1.9E+01	19	–	7.6E+01	76	–	6.5E+02	650
Carbon Disulfide	75-15-0	–	3.2E+02	320	–	2.7E+03	2,725	–	1.1E+04	11,000	–	9.1E+04	91,000
Carbon Tetrachloride	56-23-5	4.2E-01	4.6E+01	0.42	1.9E+00	3.9E+02	1.9	1.4E+01	1.5E+03	14	6.5E+01	1.3E+04	65
Chlorobenzene	108-90-7	–	2.3E+01	23	–	1.9E+02	195	–	7.6E+02	760	–	6.5E+03	6,500
Chloroethane	75-00-3	–	4.6E+03	4,571	–	3.9E+04	38,933	–	1.5E+05	150,000	–	1.3E+06	1,300,000
Chloroform	67-66-3	1.1E-01	4.5E+01	0.11	5.1E-01	3.8E+02	0.51	3.6E+00	1.5E+03	3.6	1.7E+01	1.3E+04	17
Chloromethane	74-87-3	–	4.1E+01	41	–	3.5E+02	350	–	1.4E+03	1,400	–	1.2E+04	12,000
cis-1,2-Dichloroethylene (cis-DCE)	156-59-2	–	1.8E+01	18	–	1.6E+02	156	–	6.1E+02	610	–	5.2E+03	5,200
cis-1,3-Dichloropropene	10061-01-5	–	–	NE	–	–	NE	–	–	–	–	–	–
Cyclohexane	110-82-7	–	2.7E+03	2,743	–	2.3E+04	23,360	–	9.1E+04	91,000	–	7.8E+05	780,000
Cycloehexane, Methyl-	108-87-2	–	–	NE	–	–	NE	–	–	–	–	–	–
Dibromochloromethane	124-48-1	–	–	NE	–	–	NE	–	–	–	–	–	–
Dibromomethane	74-95-3	–	1.8E+00	1.8	–	1.6E+01	16	–	6.1E+01	61	–	5.2E+02	520
Dichlorobromomethane	75-27-4	6.8E-02	–	0.068	3.2E-01	–	0.32	2.3E+00	–	2.3	1.1E+01	–	11

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Human Health Inhalation						Human Health Inhalation					
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		Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)
Dichlorodifluoromethane	75-71-8	--	4.6E+01	46	--	3.9E+02	389	--	1.5E+03	1,500	--	1.3E+04	13,000
Ethylbenzene	100-41-4	--	4.6E+02	457	--	3.9E+03	3,893	--	1.5E+04	15,000	--	1.3E+05	130,000
Hexachlorobutadiene	87-68-3	1.1E-01	--	0.11	5.3E-01	--	0.53	3.8E+00	--	3.8	1.8E+01	--	18
Hexane	110-54-3	--	3.2E+02	320	--	2.7E+03	2,725	--	1.1E+04	11,000	--	9.1E+04	91,000
Isopropylbenzene	98-82-8	--	1.8E+02	183	--	1.6E+03	1,557	--	6.1E+03	6,100	--	5.2E+04	52,000
Methyl ethyl ketone (MEK)	78-93-3	--	2.3E+03	2,286	--	1.9E+04	19,467	--	7.6E+04	76,000	--	6.5E+05	650,000
Methyl Iodide	74-88-4	--	--	NE	--	--	NE	--	--	--	--	--	--
Methyl isobutyl ketone	108-10-1	--	1.4E+03	1,371	--	1.2E+04	11,680	--	4.6E+04	46,000	--	3.9E+05	390,000
Methyl tert-butyl ether (MTBE)	1634-04-4	9.6E+00	1.4E+03	9.6	4.5E+01	1.2E+04	45	3.2E+02	4.6E+04	320	1.5E+03	3.9E+05	1,500
Methylene Chloride	75-09-2	6.6E+01	2.7E+02	66	1.2E+03	2.3E+03	1,168	2.2E+03	9.1E+03	2,200	3.9E+04	7.8E+04	39,000
n-Butylbenzene	104-51-8	--	--	NE	--	--	NE	--	--	--	--	--	--
n-Propylbenzene	103-65-1	--	4.6E+02	457	--	3.9E+03	3,893	--	1.5E+04	15,000	--	1.3E+05	130,000
Sec-Butylbenzene	135-98-8	--	--	NE	--	--	NE	--	--	--	--	--	--
Styrene	100-42-5	--	4.6E+02	457	--	3.9E+03	3,893	--	1.5E+04	15,000	--	1.3E+05	130,000
Tert-Butylbenzene	98-06-6	--	--	NE	--	--	NE	--	--	--	--	--	--
Tetrachloroethylene (PCE)	127-18-4	9.6E+00	1.8E+01	9.6	4.5E+01	1.6E+02	45	3.2E+02	6.1E+02	320	1.5E+03	5.2E+03	1,500
Toluene	108-88-3	--	2.3E+03	2,286	--	1.9E+04	19,467	--	7.6E+04	76,000	--	6.5E+05	650,000
Total Xylenes	1330-20-7	--	4.6E+01	46	--	3.9E+02	389	--	1.5E+03	1,500	--	1.3E+04	13,000
trans-1,2-Dichloroethylene (trans-DCE)	156-60-5	--	1.8E+01	18	--	1.6E+02	156	--	6.1E+02	610	--	5.2E+03	5,200
trans-1,3-Dichloropropene	10061-02-6	--	--	NE	--	--	NE	--	--	--	--	--	--
Trichloroethylene (TCE)	79-01-6	3.3E-01	9.1E-01	0.33	2.8E+00	7.5E+00	2.8	1.1E+01	3.0E+01	11	9.5E+01	2.5E+02	95
Trichlorofluoromethane	75-69-4	--	3.2E+02	320	--	2.7E+03	2,725	--	1.1E+04	11,000	--	9.1E+04	91,000
Vinyl Acetate	108-05-4	--	9.1E+01	91	--	7.8E+02	779	--	3.0E+03	3,000	--	2.6E+04	26,000
Vinyl Chloride	75-01-4	2.8E-01	4.6E+01	0.28	1.3E+00	3.9E+02	1.3	9.5E+00	1.5E+03	9.5	4.4E+01	1.3E+04	44
Xylene, m-,p-	179601-23-1	--	--	NE	--	--	NE	--	--	--	--	--	--
Xylene, o-	95-47-6	--	--	NE	--	--	NE	--	--	--	--	--	--
Polycyclic Aromatic Hydrocarbons (PAHs)													
Anthracene	120-12-7	--	--	NE	--	--	NE	--	--	--	--	--	--
Pyrene	129-00-0	--	--	NE	--	--	NE	--	--	--	--	--	--
Benzo(g,h,i)perylene	191-24-2	--	--	NE	--	--	NE	--	--	--	--	--	--
Indeno(1,2,3-c,d)pyrene	193-39-5	--	--	NE	--	--	NE	--	--	--	--	--	--
Benzo(b)fluoranthene	205-99-2	--	--	NE	--	--	NE	--	--	--	--	--	--
Fluoranthene	206-44-0	--	--	NE	--	--	NE	--	--	--	--	--	--
Benzo(j,k)fluoranthene	207-08-9	--	--	NE	--	--	NE	--	--	--	--	--	--
Acenaphthylene	208-96-8	--	--	NE	--	--	NE	--	--	--	--	--	--
Chrysene	218-01-9	--	--	NE	--	--	NE	--	--	--	--	--	--
Benzo(a)pyrene	50-32-8	--	--	NE	--	--	NE	--	--	--	--	--	--
Dibenzo(a,h)anthracene	53-70-3	--	--	NE	--	--	NE	--	--	--	--	--	--
Benzo(a)anthracene	56-55-3	--	--	NE	--	--	NE	--	--	--	--	--	--
Acenaphthene	83-32-9	--	--	NE	--	--	NE	--	--	--	--	--	--
Phenanthrene	85-01-8	--	--	NE	--	--	NE	--	--	--	--	--	--
Fluorene	86-73-7	--	--	NE	--	--	NE	--	--	--	--	--	--
1-Methylnaphthalene	90-12-0	--	--	NE	--	--	NE	--	--	--	--	--	--
Naphthalene	91-20-3	7.4E-02	1.4E+00	0.074	3.4E-01	1.2E+01	0.34	2.5E+00	4.6E+01	2.5	1.1E+01	3.9E+02	11
2-Methylnaphthalene	91-57-6	--	--	NE	--	--	NE	--	--	--	--	--	--
2-Chloronaphthalene	91-58-7	--	--	NE	--	--	NE	--	--	--	--	--	--
Total cPAH TEQ	n/a	--	--	NE	--	--	NE	--	--	--	--	--	--

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		Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Cleanup Level (µg/m³)	Carcinogen (µg/m³)	Non-Carcinogen (µg/m³)	Proposed Screening Level (µg/m³)
Polychlorinated Biphenyl (PCB) Aroclors													
PCB-Aroclor 1016	12674-11-2	--	--	NE	--	--	NE	--	--	--	--	--	--
PCB-Aroclor 1221	11104-28-2	--	--	NE	--	--	NE	--	--	--	--	--	--
PCB-Aroclor 1232	11141-16-5	--	--	NE	--	--	NE	--	--	--	--	--	--
PCB-Aroclor 1242	53469-21-9	--	--	NE	--	--	NE	--	--	--	--	--	--
PCB-Aroclor 1248	12672-29-6	--	--	NE	--	--	NE	--	--	--	--	--	--
PCB-Aroclor 1254	11097-69-1	--	--	NE	--	--	NE	--	--	--	--	--	--
PCB-Aroclor 1260	11096-82-5	--	--	NE	--	--	NE	--	--	--	--	--	--
Total PCB Aroclors	1336-36-3	--	--	NE	--	--	NE	--	--	--	--	--	--

Notes:

[1] Model Toxics Control Act (MTCA) Method B indoor air cleanup levels for residential exposure assume an exposure scenario of 365 days/year, 24 hours/day for 30 years; Ecology's CLARC (Cleanup Levels and Risk Calculation) Table (Excel) dated January 2023.

[2] MTCA Method B commercial worker screening levels assume an exposure scenario of 250 days/year, 9 hours/day for 25 years; Ecology's CLARC Table dated January 2023.

-- = no screening criteria available

µg/m^3 = microgram per cubic meter

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

n/a = not applicable

TEQ = toxicity equivalent quotient

Gray shading identifies the basis for the proposed indoor air cleanup/screening level.

Orange shading identifies the proposed indoor air cleanup/screening level.

Table 3-5

Groundwater Vapor Intrusion Screening Levels

University of Washington - Tacoma Campus

Tacoma, Washington

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Vapor Intrusion Screening Value[1] Carc. (µg/L)	Vapor Intrusion Screening Value[1] Non-Carc. (µg/L)	Based Concentrations Protection of Vapor Intrusion (µg/L)	Modifying Factor PQL[2] (µg/L)	Screening Level for Protection of Vapor Intrusion (µg/L)
Metals						
Antimony	7440-36-0	--	--	NE	5.0E+00	NE
Arsenic	7440-38-2	--	--	NE	3.0E+00	NE
Barium	7440-39-3	--	--	NE	2.5E+01	NE
Beryllium	7440-41-7	--	--	NE	1.0E+01	NE
Cadmium	7440-43-9	--	--	NE	4.0E+00	NE
Chromium III / Total	7440-47-3	--	--	NE	1.0E+01	NE
Copper	7440-50-8	--	--	NE	1.0E+01	NE
Iron	7439-89-6	--	--	NE	5.0E+01	NE
Lead	7439-92-1	--	--	NE	1.0E+00	NE
Mercury (mercuric chloride)	7439-97-6	--	1.1E+00	1.1E+00	1.0E+00	1.1
Nickel	7440-02-0	--	--	NE	2.0E+01	NE
Selenium	7782-49-2	--	--	NE	5.0E+00	NE
Silver	7440-22-4	--	--	NE	1.0E+01	NE
Thallium	7440-28-0	--	--	NE	5.0E+00	NE
Zinc	7440-66-6	--	--	NE	5.0E+01	NE
Semi-Volatile Organic Compounds (SVOCs)						
1,2-Dinitrobenzene	528-29-0	--	--	NE	1.0E+00	NE
1,2-Diphenylhydrazine	122-66-7	--	--	NE	1.0E+00	NE
1,3-Dinitrobenzene	99-65-0	--	--	NE	1.0E+00	NE
1,4-Dinitrobenzene	100-25-4	--	--	NE	1.0E+00	NE
2,3,4,6-Tetrachlorophenol	58-90-2	--	--	NE	1.0E+00	NE
2,3,5,6-Tetrachlorophenol	935-95-5	--	--	NE	1.0E+00	NE
2,3-Dichloroaniline	608-27-5	--	--	NE	1.0E+00	NE
2,4,5-Trichlorophenol	95-95-4	--	--	NE	1.0E+00	NE
2,4,6-Trichlorophenol	88-06-2	--	--	NE	1.0E+00	NE
2,4-Dichlorophenol	120-83-2	--	--	NE	1.0E+00	NE
2,4-Dimethylphenol	105-67-9	--	--	NE	1.0E+00	NE
2,4-Dinitrophenol	51-28-5	--	--	NE	5.0E+00	NE
2,4-Dinitrotoluene	121-14-2	--	--	NE	1.0E+00	NE
2,6-Dinitrotoluene	606-20-2	--	--	NE	1.0E+00	NE
2-Chlorophenol	95-57-8	--	--	NE	1.0E+00	NE
2-methylphenol	95-48-7	--	--	NE	1.0E+00	NE
2-Nitroaniline	88-74-4	--	--	NE	1.0E+00	NE
2-Nitrophenol	88-75-5	--	--	NE	1.0E+00	NE
3,3'-Dichlorobenzidine	91-94-1	--	--	NE	1.0E+00	NE
3+4-Methylphenol	65794-96-9	--	--	NE	1.0E+00	NE
3-Nitroaniline	99-09-2	--	--	NE	1.0E+00	NE
4,6-Dinitro-2-Methylphenol	534-52-1	--	--	NE	5.0E+00	NE
4-Bromophenyl phenyl ether	101-55-3	--	--	NE	1.0E+00	NE
4-Chloro-3-Methylphenol	59-50-7	--	--	NE	1.0E+00	NE
4-Chloroaniline	106-47-8	--	--	NE	1.0E+00	NE
4-Chlorophenyl phenyl ether	7005-72-3	--	--	NE	1.0E+00	NE
4-Nitroaniline	100-01-6	--	--	NE	1.0E+00	NE
4-Nitrophenol	100-02-7	--	--	NE	5.0E+00	NE
Aniline	62-53-3	--	--	NE	5.0E+00	NE
Benzidine	92-87-5	--	--	NE	5.0E+00	NE
Benzoic Acid	65-85-0	--	--	NE	5.0E+00	NE
Benzyl Alcohol	100-51-6	--	--	NE	1.0E+00	NE
Bis(2-Chloroethoxy)Methane	111-91-1	--	--	NE	1.0E+00	NE
Bis(2-Chloroethyl)Ether	111-44-4	--	--	NE	1.0E+00	NE
Bis(2-chloroisopropyl) ether	39638-32-9	--	--	NE	1.0E+00	NE
Bis(2-Ethylhexyl) Phthalate	117-81-7	--	--	NE	1.0E+00	NE
Butyl benzyl Phthalate	85-68-7	--	--	NE	1.0E+00	NE
Carbazole	86-74-8	--	--	NE	1.0E+00	NE
Di(2-ethylhexyl)adipate	103-23-1	--	--	NE	5.0E+00	NE
Dibenzofuran	132-64-9	--	--	NE	1.0E+00	NE
Dibutyl Phthalate	84-74-2	--	--	NE	5.0E+00	NE
Diethyl Phthalate	84-66-2	--	--	NE	1.0E+00	NE
Dimethyl Phthalate	131-11-3	--	--	NE	1.0E+00	NE
Di-N-Octyl Phthalate	117-84-0	--	--	NE	1.0E+00	NE
Hexachlorobenzene	118-74-1	2.4E-01	--	2.4E-01	1.0E+00	1
Hexachlorocyclopentadiene	77-47-4	--	4.2E+00	4.2E+00	1.0E+00	4.2
Hexachloroethane	67-72-1	3.8E+00	2.3E+02	3.8E+00	1.0E+00	3.8
Isophorone	78-59-1	--	--	NE	1.0E+00	NE
Nitrobenzene	98-95-3	--	--	NE	1.0E+00	NE
N-Nitrosodimethylamine	62-75-9	--	--	NE	1.0E+00	NE
N-Nitrosodi-n-propylamine	621-64-7	--	--	NE	1.0E+00	NE
N-Nitrosodiphenylamine	86-30-6	--	--	NE	1.0E+00	NE

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Vapor Intrusion Screening Value[1]		Based Concentrations	Modifying Factor	Screening Level for Protection of Vapor Intrusion (µg/L)
		Carc. (µg/L)	Non-Carc. (µg/L)	Protection of Vapor Intrusion (µg/L)	PQL[2] (µg/L)	
Pentachlorophenol	87-86-5	--	--	NE	5.0E+00	NE
Phenol	108-95-2	--	--	NE	1.0E+00	NE
Pyridine	110-86-1	--	--	NE	1.0E+00	NE
Volatile Organic Compounds (VOCs)						
1,1,1,2-Tetrachloroethane	630-20-6	7.1E+00	--	7.1E+00	2.0E-01	7.1
1,1,1-Trichloroethane (TCA)	71-55-6	--	5.4E+03	5.4E+03	2.0E-01	5,400
1,1,2,2-Tetrachloroethane	79-34-5	5.9E+00	--	5.9E+00	2.0E-01	5.9
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	76-13-1	--	1.7E+02	1.7E+02	5.0E-01	170
1,1,2-Trichloroethane	79-00-5	8.8E+00	5.1E+00	5.1E+00	2.0E-01	5.1
1,1-Dichloroethane (DCA)	75-34-3	1.1E+01	--	1.1E+01	2.0E-01	11
1,1-Dichloroethylene (DCE)	75-35-4	--	1.3E+02	1.3E+02	2.0E-01	130
1,1-Dichloropropene	563-58-6	--	--	NE	2.0E-01	NE
1,2,3-Trichlorobenzene	87-61-6	--	--	NE	2.0E-01	NE
1,2,3-Trichloropropane	96-18-4	--	2.1E+01	2.1E+01	2.0E-01	21
1,2,4-Trichlorobenzene	120-82-1	--	3.9E+01	3.9E+01	1.0E+00	39
1,2,4-Trimethylbenzene	95-63-6	--	2.4E+02	2.4E+02	2.0E-01	240
1,2-Dibromo-3-Chloropropane	96-12-8	4.2E-02	3.5E+01	4.2E-02	1.0E+00	1
1,2-Dibromoethane (EDB)	106-93-4	3.0E-01	2.9E+02	3.0E-01	1.0E-02	0.3
1,2-Dichlorobenzene (1,2-DCB)	95-50-1	--	2.5E+03	2.5E+03	1.0E+00	2,500
1,2-Dichloroethane (EDC)	107-06-2	3.5E+00	1.2E+02	3.5E+00	2.0E-01	3.5
1,2-Dichloropropane	78-87-5	1.0E+01	2.8E+01	1.0E+01	2.0E-01	10
1,3,5-Trimethylbenzene	108-67-8	--	1.7E+02	1.7E+02	2.0E-01	170
1,3-Dichlorobenzene (1,3-DCB)	541-73-1	--	--	NE	2.0E-01	NE
1,3-Dichloropropane	142-28-9	--	--	NE	2.0E-01	NE
1,4-Dichlorobenzene (1,4-DCB)	106-46-7	5.0E+00	8.0E+03	5.0E+00	2.0E-01	5
2,2-Dichloropropane	594-20-7	--	--	NE	2.0E-01	NE
2-Butanone, 4-(Acetyloxy)-	10150-87-5	--	--	NE	1.0E+01	NE
2-Chloroethyl vinyl ether	110-75-8	--	--	NE	1.0E+00	NE
2-Chlorotoluene	95-49-8	--	--	NE	2.0E-01	NE
2-Hexanone	591-78-6	--	7.3E+03	7.3E+03	2.0E+00	7,300
4-Chlorotoluene	106-43-4	--	--	NE	2.0E-01	NE
4-Isopropyltoluene	99-87-6	--	--	NE	2.0E-01	NE
Acetic Acid, Methyl Ester	79-20-9	--	--	NE	5.0E-01	NE
Acetone	67-64-1	--	--	NE	5.0E+00	NE
Benzene	71-43-2	2.4E+00	1.0E+02	2.4E+00	2.0E-01	2.4
Bromobenzene	108-86-1	--	6.3E+02	6.3E+02	2.0E-01	630
Bromochloromethane	74-97-5	--	--	NE	2.0E-01	NE
Bromoform	75-25-2	2.2E+02	--	2.2E+02	1.0E+00	220
Bromomethane	74-83-9	--	1.1E+01	1.1E+01	2.0E-01	11
Carbon Disulfide	75-15-0	--	8.4E+02	8.4E+02	2.0E-01	840
Carbon Tetrachloride	56-23-5	6.2E-01	6.8E+01	6.2E-01	2.0E-01	0.62
Chlorobenzene	108-90-7	--	3.4E+02	3.4E+02	2.0E-01	340
Chloroethane	75-00-3	--	1.5E+04	1.5E+04	1.0E+00	15,000
Chloroform	67-66-3	1.2E+00	4.9E+02	1.2E+00	2.0E-01	1.2
Chloromethane	74-87-3	--	1.5E+02	1.5E+02	1.0E+00	150
cis-1,2-Dichloroethylene (cis-DCE)	156-59-2	--	1.8E+02	1.8E+02	2.0E-01	180
cis-1,3-Dichloropropene	10061-01-5	--	--	NE	2.0E-01	NE
Cyclohexane	110-82-7	--	7.5E+02	7.5E+02	5.0E-01	750
Cycloehexane, Methyl-	108-87-2	--	--	NE	5.0E-01	NE
Dibromochloromethane	124-48-1	--	--	NE	2.0E-01	NE
Dibromomethane	74-95-3	--	9.7E+01	9.7E+01	2.0E-01	97
Dichlorobromomethane	75-27-4	1.4E+00	--	1.4E+00	2.0E-01	1.4
Dichlorodifluoromethane	75-71-8	--	4.2E+00	4.2E+00	2.0E-01	4.2
Ethylbenzene	100-41-4	--	2.8E+03	2.8E+03	2.0E-01	2,800
Hexachlorobutadiene	87-68-3	6.4E-01	--	6.4E-01	1.0E+00	1
Hexane	110-54-3	--	7.2E+00	7.2E+00	1.0E+00	7.2
Isopropylbenzene	98-82-8	--	9.1E+02	9.1E+02	2.0E-01	910
Methyl ethyl ketone (MEK)	78-93-3	--	1.7E+06	1.7E+06	5.0E+00	1,700,000
Methyl Iodide	74-88-4	--	--	NE	1.0E+00	NE
Methyl isobutyl ketone	108-10-1	--	4.7E+05	4.7E+05	2.0E+00	470,000
Methyl tert-butyl ether (MTBE)	1634-04-4	8.6E+02	1.2E+05	8.6E+02	2.0E-01	860
Methylene Chloride	75-09-2	7.8E+02	3.3E+03	7.8E+02	1.0E+00	780
n-Butylbenzene	104-51-8	--	--	NE	2.0E-01	NE
n-Propylbenzene	103-65-1	--	2.3E+03	2.3E+03	2.0E-01	2,300
Sec-Butylbenzene	135-98-8	--	--	NE	2.0E-01	NE
Styrene	100-42-5	--	8.2E+03	8.2E+03	2.0E-01	8,200
Tert-Butylbenzene	98-06-6	--	--	NE	2.0E-01	NE
Tetrachloroethylene (PCE)	127-18-4	2.5E+01	4.8E+01	2.5E+01	2.0E-01	25
Toluene	108-88-3	--	1.5E+04	1.5E+04	1.0E+00	15,000
Total Xylenes	1330-20-7	--	3.2E+02	3.2E+02	4.0E-01	320
trans-1,2-Dichloroethylene (trans-DCE)	156-60-5	--	7.7E+01	7.7E+01	2.0E-01	77
trans-1,3-Dichloropropene	10061-02-6	--	--	NE	2.0E-01	NE
Trichloroethylene (TCE)	79-01-6	1.4E+00	3.9E+00	1.4E+00	2.0E-01	1.4

Contaminant of Potential Concern (COPC)	Chemical Abstracts Service (CAS) Number	Vapor Intrusion Screening Value[1]		Based Concentrations	Modifying Factor	Screening Level for Protection of Vapor Intrusion (µg/L)
		Carc. (µg/L)	Non-Carc. (µg/L)	Protection of Vapor Intrusion (µg/L)	PQL[2] (µg/L)	
Trichlorofluoromethane	75-69-4	--	1.2E+02	1.2E+02	2.0E-01	120
Vinyl Acetate	108-05-4	--	7.8E+03	7.8E+03	1.0E+00	7,800
Vinyl Chloride	75-01-4	3.3E-01	5.4E+01	3.3E-01	2.0E-01	0.33
Xylene, m-,p-	179601-23-1	--	--	NE	4.0E-01	NE
Xylene, o-	95-47-6	--	--	NE	2.0E-01	NE
Polycyclic Aromatic Hydrocarbons (PAHs)						
Anthracene	120-12-7	--	--	NE	1.0E-02	NE
Pyrene	129-00-0	--	--	NE	1.0E-02	NE
Benzo(g,h,i)perylene	191-24-2	--	--	NE	1.0E-02	NE
Indeno(1,2,3-c,d)pyrene	193-39-5	--	--	NE	1.0E-02	NE
Benzo(b)fluoranthene	205-99-2	--	--	NE	1.0E-02	NE
Fluoranthene	206-44-0	--	--	NE	1.0E-02	NE
Benzo(j,k)fluoranthene	207-08-9	--	--	NE	1.0E-02	NE
Acenaphthylene	208-96-8	--	--	NE	1.0E-02	NE
Chrysene	218-01-9	--	--	NE	1.0E-02	NE
Benzo(a)pyrene	50-32-8	--	--	NE	1.0E-02	NE
Dibenzo(a,h)anthracene	53-70-3	--	--	NE	1.0E-02	NE
Benzo(a)anthracene	56-55-3	--	--	NE	1.0E-02	NE
Acenaphthene	83-32-9	--	--	NE	1.0E-02	NE
Phenanthrene	85-01-8	--	--	NE	1.0E-02	NE
Fluorene	86-73-7	--	--	NE	1.0E-02	NE
1-Methylnaphthalene	90-12-0	--	--	NE	1.0E-02	NE
Naphthalene	91-20-3	8.9E+00	1.7E+02	8.9E+00	1.0E-02	8.9
2-Methylnaphthalene	91-57-6	--	--	NE	1.0E-02	NE
2-Chloronaphthalene	91-58-7	--	--	NE	1.0E-02	NE
Total cPAH TEQ	n/a	--	--	NE	1.0E-02	NE
Polychlorinated Biphenyl (PCB) Aroclors						
PCB-Aroclor 1016	12674-11-2	--	--	NE	5.0E-02	NE
PCB-Aroclor 1221	11104-28-2	--	--	NE	5.0E-02	NE
PCB-Aroclor 1232	11141-16-5	--	--	NE	5.0E-02	NE
PCB-Aroclor 1242	53469-21-9	--	--	NE	5.0E-02	NE
PCB-Aroclor 1248	12672-29-6	--	--	NE	5.0E-02	NE
PCB-Aroclor 1254	11097-69-1	--	--	NE	5.0E-02	NE
PCB-Aroclor 1260	11096-82-5	--	--	NE	5.0E-02	NE
Total PCB Aroclors	1336-36-3	--	--	NE	1.0E-01	NE

Notes:

[1] Model Toxics Control Act (MTCA) Method B groundwater screening levels protective of indoor air; values obtained from Ecology's Cleanup Levels and Risk Calculation (CLARC) Table (Excel) dated January 2023.

[2] Practical quantitation limit (PQL) is the typical value from OnSite Environmental, Inc. of Redmond, Washington.

-- = no screening criteria available

µg/L = microgram per liter

Carc. = carcinogenic

cPAHs = carcinogenic polycyclic aromatic hydrocarbons

n/a = not applicable

NE = not established

TEQ = toxicity equivalent quotient

Gray shading identifies the basis for the vapor intrusion screening level.

Blue shading identifies the vapor intrusion screening level after adjustment for background and the PQL.

Table 3-6

Petroleum Hydrocarbon Vapor Intrusion Screening Levels

University of Washington - Tacoma Campus

Tacoma, Washington

Media	Benzene	Total Petroleum Hydrocarbons	Vertical Separation Distance[1]	Horizontal Separation Distance[1]
Soil	≤ 10 mg/kg	≤ 100 mg/kg (unweathered gasoline) or ≤ 250 mg/kg (weathered gasoline, diesel)	6 feet	30 feet
	> 10 mg/kg (LNAPL)	> 100 mg/kg (unweathered gasoline) or > 250 mg/kg (weathered gasoline, diesel)	15 feet	
Groundwater	≤ 5,000 µg/L	≤ 30,000 µg/L	6 feet	30 feet
	>5,000 µg/L (LNAPL)	> 30,000 µg/L (LNAPL)	15 feet	

Notes:

[1] Vertical and horizontal separation distances represent the thickness of clean soil between the source of petroleum vapors and the lowest point of a current or future building.

LNAPL = Light non-aqueous phase liquid

µg/L = Microgram per liter

mg/kg = Milligram per kilogram

Table 4-1

Previous Investigation and Remedial Action Summary

University of Washington - Tacoma Campus

Tacoma, Washington

Investigation Area[1]	General Location	Type of Investigation	Completed By	Completed For	Timing of Investigation/ Remedial Action	Purpose of Investigation	Media Evaluated							Environmental Data Quality Review[2]	Usability of the Environmental Data
							Soil	Groundwater	Indoor/ Outdoor Air	Sub-slab Soil Vapor	Building Drain	Stormwater	Other		
Pre-1997 Agreed Order Investigations and Actions															
2	Eastern Campus - Cragle, Bleckert, Snoqualmie Library, Shaub-Ellison and Jet Parking Properties	Remedial Investigation/ Feasibility Study	AGI Technologies	UW	1993 to 1994	Soil and groundwater investigations were performed to evaluate the nature and extent of contamination based on historical land use and document the removal of USTs for the Cragle, Snoqualmie Library, Jet Parking, and Shaub-Ellison Properties. Investigation results were used to evaluate and select preferred cleanup action alternatives.	X	X						Data validation and laboratory reports not included in the RI/FS Report, however select data were validated in prior referenced reports. Analytical methods and sample collection methods are stated in the text. Petroleum methods are a mix of current (NWTPH) and historical (418.1 and 8015). Data used as reference, but may not be representative of current conditions.	Data are 28 years old and the majority of the data were collected prior to the 1995-1996 remediation. Data provide historical context prior to remediation. Select samples remain in place.
		Remedial Action	AGI Technologies	UW	1995 to 1996	Construction activities to remove multiple USTs, complete remedial excavation, and collect confirmation samples from USTs for the Cragle, Snoqualmie Library, Bleckert, Jet Parking, and Shaub-Ellison Properties. Petroleum-contaminated soil was left in place.	X						Water Disposal and Soil Treatment	Data validation completed, analytical methods verified, and chemical analytical report included in the report.	Confirmation samples were used to characterize post-remedial action soil conditions. Stockpile soil samples and water samples for disposal are not representative of current conditions. Treated soil was used as backfill but the actual sample locations are unknown. The treatment sample results were used to evaluate potential COPCs in the backfilled areas.
1997 Agreed Order Investigations and Actions															
1	Cragle	Remedial Action	Dames and Moore	UW	October 1997	Closure of dangerous waste management units including the sampling and demolition of the former concrete shed on the Cragle Property.							Concrete	Data validation not completed, but methods verified and chemical analytical report included in the report.	Data were not representative of subsurface conditions (i.e., concrete structure). Documentation of the removal of the shed is referenced by the RI.
3	Eastern Campus	Remedial Investigation	URS	UW	March 1997 to June 2002	Soil, groundwater, and indoor air investigation on the eastern portion of UWT Campus.	X	X	X					Data validation completed, methods verified, and chemical analytical report included in the report for the majority of samples. The chemical analytical report for Cragle samples for the hydraulic lift removal could not be located.	Data are considered usable except concrete samples of the former Cragle shed and stockpile samples.
See Referenced Building/Property	Garretson, Woodruff and Pratt (GWP) Building (formerly referred to as Howe)	Indoor Air Survey	URS	UW	January to June 2000	Evaluation of possible impacts from PCE in the subsurface of the GWP Building on indoor air quality.			X					Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
Supplemental Investigations and Actions Under the 1997 Agreed Order															
5 and 6	Market Street Area	Soil and Groundwater Investigation	Weston	UW	August 2004 to February 2005	Soil and groundwater investigation to assess two areas of known TCE plumes as part of a Targeted Brownfields Assessment. Investigation included installation of wells BA-MW1 and BA-MW2.	X	X						Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Soil and Groundwater Investigation	URS	UW	March to May 2007	Soil and groundwater investigation to assess the source areas of two CVOC groundwater plumes in Market Street. The investigation included six borings (MS-SB01 to MS-SB06) and installation of groundwater monitoring wells.	X	X						Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Soil and Groundwater Investigation	URS	UW	July and August 2008	Soil and groundwater investigation to assess the source areas of two CVOC groundwater plumes in Market Street. The investigation included installation of groundwater monitoring wells.	X	X						Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods verified.	Data as referenced by the RI are considered usable.

Investigation Area[1]	General Location	Type of Investigation	Completed By	Completed For	Timing of Investigation/ Remedial Action	Purpose of Investigation	Media Evaluated							Environmental Data Quality Review[2]	Usability of the Environmental Data
							Soil	Groundwater	Indoor/ Outdoor Air	Sub-slab Soil Vapor	Building Drain	Stormwater	Other		
7	Eastern Campus -Tacoma Avenue South to Market Street	Soil and Groundwater Investigation	URS	UW	May 2009	Soil and groundwater investigation to assess the source areas and lateral extent of the CVOC groundwater plumes in Market Street toward Tacoma Avenue South. The investigation included installation of groundwater monitoring wells.	X	X						Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods were verified. Depth of soil samples interpreted based on sample identification.	Data as referenced by the RI are considered usable.
8	Campus-Wide	Soil and Groundwater Investigation	GeoEngineers	UW	2013	Soil and groundwater investigation conducted to evaluate soil and groundwater throughout the UWT Campus in priority development areas. The investigation also included additional wells and groundwater sampling to further define the extent of the groundwater plumes on the UWT Campus.	X	X						Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
9	GWP Building (formerly referred to as Howe)	Groundwater Investigation and Indoor Air Assessment	URS	UW	December 2010 to May 2011	Investigation for the planning of the interim action, including installation of new wells, groundwater sampling of existing wells, and evaluation of indoor air in GWP Building and Federal Courthouse.		X	X					Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Interim Action and Associated Performance Groundwater Monitoring	URS and GeoEngineers	UW	2013 to 2018	2013 interim action to remediate PCE plume via injections and the results of the post-injection GW monitoring event (2013 to 2018). Additional monitoring wells were also installed.		X						Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
10	Shaub-Ellison (1902 Pacific Avenue Property)	Investigation and Design of Remediation System	GeoEngineers	UW	August to September 2005	Engineering Design to document proposed preferred cleanup action as described in the Interim Cleanup Action Plan for soil and groundwater. Report includes soil and groundwater sampling completed in 2005.	X	X						Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Remediation System Operation and Performance Monitoring	GeoEngineers	UW	October 2006 to May 2011	iSOC(TM) and bioventing performance monitoring results to evaluate the remediation system performance installed in October 2006 and operated from October 2006 to September 2010. Post-cleanup groundwater monitoring was completed in May 2011. The system was decommissioned in 2012.		X						Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	1742 Jefferson Avenue Property	Remedial Action	GeoEngineers	UW	August 2012	GPR survey, soil investigation, USTs removal, remedial excavation, and confirmation sampling.	X							Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods were verified.	Data as referenced by the RI are considered usable.
Capital Projects															
See Referenced Building/Property	Walsh Gardner Building	Remedial Action	AGI Technologies	UW	1996	Heating oil UST removed from the west side of Walsh Gardner Building. Confirmation samples were collected on the extent of excavation and contamination not encountered.	X							Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	Garretson Woodruff & Pratt (GWP) Building and Birmingham Block (BB) Building	Soil Investigation	AGI Technologies	UW	1996	Sampling completed during the redevelopment of the GWP and BB Buildings. Activities included: abandon in place and soil sampling around two heating oil USTs in the GWP and BB buildings (T06 and T04); decommissioning of a cistern and sample of water in the cistern in the GWP building; sample water in a footing drain, a sample of water in an unknown utility and sample of soil and water generated from elevator shaft drilling.	X						Sanitary and Unknown Pipe	Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	Science Building	Soil Investigation and Remedial Action	GeoEngineers	UW	May 2000	Summary of remedial excavation of petroleum-contaminated soil associated with former UST piping at Williams Oil Filter/Science Building. Petroleum-contaminated soil was left in place.	X							Data validation complete, however the EPH and PAH results were not included in the report.	Data are considered usable except for EPH and PAH results which are not available.

Investigation Area[1]	General Location	Type of Investigation	Completed By	Completed For	Timing of Investigation/ Remedial Action	Purpose of Investigation	Media Evaluated							Environmental Data Quality Review[2]	Usability of the Environmental Data
							Soil	Groundwater	Indoor/ Outdoor Air	Sub-slab Soil Vapor	Building Drain	Stormwater	Other		
11	Sound Care Nursing Home and 1748 Jefferson Way Property	Remedial Action	ATC Associates	UW	December 2000	Summary of removal of one diesel UST and remedial excavation of petroleum-contaminated soil at Sound Care parcel. Soil reportedly remediated.	X							Data validation was not completed, but analytical data was used in RI to show remedial excavation was complete.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	Mattress Factory Building and South 21st & Commerce Streets	Remedial Action	URS	UW	Phase I - October 2000 Phase II - January 2002	Borings and assessment for closure in place of two USTs located adjacent to the Mattress Factory building.	X							Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods verified.	Data as referenced by the RI are considered usable.
12	Southeast Portion of Campus (Phase IIB Utilities)	Soil and Groundwater Investigation	URS	UW	December 2001 to March 2002	Soil and groundwater investigation for Phase IIB excavation for landscaping and utility installation to evaluate soil that would be excavated between Cherry Parkes and Mattress Factory Buildings. Included installation of wells CR-MW13, CR-MW14, BL-MW7, and MF-MW1. Excavations anticipated up to 25 feet bgs.	X	X						Data validation completed, methods verified, and chemical analytical report included in the report.	Boring data are relevant as representative of typical conditions in the area, however, the majority of the soil was excavated during utility installations. Data are considered usable.
See Referenced Building/Property	Cherry Parkes Building (Phase IIB)	Soil and Groundwater Investigation	URS	UW	April 2002	Soil and groundwater investigation inside Cherry Parkes Building to assess if contaminated media would be encountered for the redevelopment.	X	X						Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	William W. Philip Hall (Former Assembly Hall and Dawg Shed)	Soil Investigation	GeoEngineers	UW	September 2004	Soil investigation to assess if contaminated media would be encountered during the construction of Assembly Hall at 1912 Pacific Avenue.	X							Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Soil Investigation for Design and Construction	GeoEngineers	UW	October 2006	Investigation to evaluate soil conditions in the current William W. Philip Hall prior to development.	X							Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
5	Market Street Area	Soil Sampling During Utility Replacement	City of Tacoma	City of Tacoma	October and November 2005	Soil sampling completed by the City of Tacoma beneath storm lines in Market Street near South 21st Street during a utility upgrade project.	X							Data validation, chemical analytical report, and chemical analytical method not included in the report. Sample collection methods verified.	Data are considered usable however are qualified because of analytical method is not known
13	Stoneway Electric (Former Kosin Property)	Remedial Action	Langseth Environmental Services	UW (Via Kidder Matthews)	February 2007	One heating oil UST removed at Stoneway Electric, 1914 Market Street. Confirmation soil samples collected.	X							Data validation not included in the report. Chemical analytical reports, analytical methods, sample collection methods verified.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	Tioga Library Building	Soil Investigation in Preparation for Design	GeoEngineers	UW	February 2008	Soil borings completed in Jet Parking Lot and within a former building to evaluate soil conditions for the development of the new Tioga Library Building.	X							Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Soil Investigation in Preparation for Construction	GeoEngineers	UW	May 2010	Borings advanced to characterize soil planned for excavation during the development of the Tioga Library Building prior to beginning construction activities.	X							Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Characterization During Construction, and Soil and Water Management	GeoEngineers	UW	2010 to 2012	Construction activities during redevelopment of Tioga Library Building including additional exploration to characterize soil for disposal, installation, and sampling of a replacement monitoring well, soil management for off-site disposal, and confirmation sampling following mass excavation.	X	X						Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	Russell T. Joy Building and 1716 to 1720 Pacific Avenue Properties	Soil Investigation in Preparation for Design	GeoEngineers	UW	February 2008	Soil borings completed in the Joy Building to evaluate soil conditions for the redevelopment of the Joy Building. The investigation included assessment of heating oil UST as well.	X						UST Product	Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Additional Characterization During Construction, Remedial Action, and Soil and Water Management	GeoEngineers	UW	2009 to 2011	Construction activities during redevelopment of Joy Building including removal of UST, remediation of contaminated soil and excavation of soil for construction, soil borings to evaluate soil for disposal; water sampling to evaluate long-term building drainage, confirmation samples to document soil remaining in place.	X	X						Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
5 and 6	Market Street Area	Soil Sampling During Utility Replacement	URS	UW	October 2012	Soil sampling along water and sanitary sewer lines in Market Street during City of Tacoma utility replacement project to evaluate leaks from the utilities associated with benzene and CVOC plume in the area.	X							Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.

Investigation Area[1]	General Location	Type of Investigation	Completed By	Completed For	Timing of Investigation/ Remedial Action	Purpose of Investigation	Media Evaluated							Environmental Data Quality Review[2]	Usability of the Environmental Data
							Soil	Groundwater	Indoor/ Outdoor Air	Sub-slab Soil Vapor	Building Drain	Stormwater	Other		
See Referenced Building/Property	Prairie Line Trail	Soil and Groundwater Investigation in Preparation for Design	GeoEngineers	UW	March to July 2013	Soil and groundwater sampling to evaluate the potential for contamination to assist with the design and remedial action plan of the Prairie Line Trail.	X	X						Data validation not included in the report. Chemical analytical reports, analytical methods, sample collection methods verified.	Data as referenced by the RI are considered usable.
		Additional Characterization During Construction, Remedial Action, and Soil Management	GeoEngineers	UW	2013 to 2014	Remediation and capping of contaminated soil along former rail line during the development of Prairie Line Trail. Sampling consisted of confirmation samples and stockpile samples.	X							Data validation not included in the report. Chemical analytical reports, analytical methods, sample collection methods verified.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	Security Building (Former Health Center)	Groundwater Seep Sampling	GeoEngineers	UW	August 2011	A sample of groundwater seepage was collected on the slope adjacent to the Student Health Building (Laborers) during the evaluation of upgrades to waterproofing of the building.		X				X		Data validation not included in the report. Chemical analytical reports, analytical methods, sample collection methods verified.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	Tacoma Paper and Stationery (TPS) Building and 1735 Jefferson Avenue Property	Soil, Sub-Slab Vapor and Groundwater Investigation	GeoEngineers	UW	October 2014	Soil, soil vapor and groundwater investigation to evaluate downgradient groundwater contamination and the potential for vapor intrusions into the building prior to redevelopment.	X	X		X				Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Additional Characterization During Construction, and Soil Management	GeoEngineers	UW	January 2016 to August 2017	Documentation of construction activities including soil management, potential dry well sampling/closure, and sealing of concrete in accordance with the vapor intrusion evaluation completed during design.	X							Data validation completed, methods verified and chemical analytical report included in the report.	Data associated with soil investigation are considered usable.
See Referenced Building/Property	McDonald Smith Building and 1932 to 1936 Pacific Avenue Properties	Soil, Sub-Slab Vapor and Groundwater Investigation	GeoEngineers	UW	October 2014	Soil, soil vapor and groundwater investigation to evaluate presence of TCE beneath the building and the potential for vapor intrusions into the building prior to redevelopment.	X	X		X				Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Soil Management and Construction Observation	GeoEngineers	UW	August to November 2015	Documentation of construction activities to seal a cistern and existing elevator pit in McDonald Smith Building in accordance with vapor intrusion evaluation completed during design.								Data validation completed, methods verified and chemical analytical report included in the report.	Relevant to show the cistern and elevator pit were appropriately decommissioned in accordance with vapor intrusion evaluation.
See Referenced Building/Property	University Y Student Center (Former Longshoreman) and 1710 Market Street Property	UST Removal and Assessment	Langseth Environmental Services	UW	October 2006	UST removal and confirmation sampling at former Longshoreman Building (current Y Student Center)	X							Data validation not included in the report. Chemical analytical reports, analytical methods, sample collection methods verified.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	University Y Student Center (Former Longshoreman) and 1710 Market Street Property	Soil and Groundwater Characterization in Preparation for Construction.	GeoEngineers	UW	September and October 2013	Soil and groundwater sampling results and contaminated media management plan for Y Student Center construction.	X	X			X	X		Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
		Additional Characterization During Construction, and Soil and Water Management	GeoEngineers	UW	January 2014 to December 2015	Results of construction activities and design modifications performed within TCE contaminated soil and groundwater at Y Student Center including installation of vapor mitigation system and building drain. The post construction building drain results and indoor air sampling are also included.	X		X		X			Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
21	19th and Fawcett Parking Lot (Kelly)	Soil Investigation	GeoEngineers	UW	January to February 2020	Soil characterization prior to construction and confirmation sampling post construction.	X							Data validation completed, methods verified and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
See Referenced Building/Property	Milgard Hall (Cragle)	Soil Investigation	GeoEngineers	UW	August 2020 and March 2021	Soil investigation to evaluate soil conditions to be excavated and develop a Remedial Action Plan in preparation for construction of Milgard Hall.	X							Data validation not included in the report. Chemical analytical reports, analytical methods, sample collection methods verified.	Data as referenced by the RI are considered usable.
		Remedial Excavation and Construction Activities	GeoEngineers	UW	July 2021 to present	Construction activities for the development of Milgard Hall including remedial excavation of petroleum-contaminated soil, decommissioning of wells, soil and water management, and installation of a vapor mitigation system.	X							Data validation not completed to date, but methods verified and chemical analytical report available.	Data as referenced by the RI are considered usable.

Investigation Area[1]	General Location	Type of Investigation	Completed By	Completed For	Timing of Investigation/ Remedial Action	Purpose of Investigation	Media Evaluated							Environmental Data Quality Review[2]	Usability of the Environmental Data
							Soil	Groundwater	Indoor/ Outdoor Air	Sub-slab Soil Vapor	Building Drain	Stormwater	Other		
14	Jefferson Hood Street Surface Water Interceptor Capital Project	Soil and groundwater investigation	GeoEngineers	City of Tacoma	December 2017 to May 2018	Soil and groundwater investigation to evaluate soil and groundwater conditions to be excavated, new utilities in Jefferson Avenue, Pacific, and Hood Street. The design was subsequently modified by the City of Tacoma and the new utility is no longer planned south of South 19th Street.	X	X						Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods were verified.	Groundwater data are usable to assist in delineating TCE and benzene groundwater plume in the area. The City of Tacoma transferred monitoring wells COT-MW1 to COT-MW4 to the UW to add to the monitoring network.
15	21st and Fawcett Utility Project	Soil and groundwater investigation	GeoEngineers	City of Tacoma	October to December 2020	Soil and groundwater investigation to evaluate soil and groundwater conditions to be excavated and develop soil and groundwater management plan in preparation for construction of new utilities in South 21st Street, Jefferson Avenue, and Fawcett Avenue.	X	X						Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods were verified.	Groundwater data are usable to assist in delineating the TCE groundwater plume in the area. Soil data in Jefferson Avenue are usable for delineating benzene and TCE plume in the area.
Environmental Due Diligence															
1	Eastern Campus - Cragle	Phase II ESA	Compliance Services International	Vest Commercial Real Estate	September 1992	GPR Survey, soil investigation, and hazardous building material survey on Cragle Parcel to evaluate the potential for USTs and contaminated soil.	X						Building Materials	Data validation not completed and petroleum methods are old methods. Additional investigation was completed in the same area as in a later investigation.	Unable to validate sampling location therefore environmental data not incorporated into RI.
5	Market Street Area	Remedial Action	Langseth Environmental	Fred Horne	July 2000	Summary of removal of four USTs (waste oil, heating oil, and two gasoline) and remedial excavation of petroleum-contaminated 1934 Market Street. Soil reportedly remediated. Solvents detected in UST product samples from the waste oil tank.	X	X					UST Product	Data validation was not completed, but analytical data was used in RI to show remedial excavation was complete.	Data as referenced by the RI are considered usable.
5 and 6	Market Street Area	Groundwater Investigation	URS	UW	May to June 2002	Groundwater investigation downgradient of Merlino and Laborers Properties for potential purchase by UW to assess VOCs and TPH compounds groundwater impact. Included installation and sampling of DD-MW1 and DD-MW2. Data are not included in the 2002 RI.		X						Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
13	Stoneway Electric (Former Kosin Property)	Phase II ESA	URS	UW	May 2003	Soil investigation to evaluate impacts in storm system and soil surrounding the active heating oil UST. PCB wipes were also completed in the broiler room.	X						PCB wipes	Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods were verified.	Data as referenced by the RI are considered usable.
4	South 21st Street and Pacific Avenue Area	Storm System Sampling	WA Ecology	Pugnetti Park	June 2003	Sampling completed by Ecology to evaluate groundwater infiltration into storm drains along South 21st Street.						X		Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods were verified.	Data as referenced by the RI are considered usable.
16	Strom Property - 1727, 1733, 1735 and 1737 Fawcett Avenue	Phase II ESA	Weston	UW	January 2004	Soil investigation to evaluate environmental concerns identified during the Phase I ESA at Strom Property between 1727 to 1737 Fawcett Avenue.	X							Data validation completed, and methods verified. The chemical analytical report was not included in the report.	Data as referenced by the RI are considered usable.
		Supplemental Phase II ESA	Clayton Group Services	UW	August 2004	Soil investigation to evaluate the extent of contaminated soil encountered in January 2004 at Strom Property between 1727 to 1737 Fawcett Avenue.	X							Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods were verified.	Data as referenced by the RI are considered usable.
		Remedial Action	Clayton Group Services	UW	October 2004	Post-excavation soil investigation to assess if the subsurface has been impacted by previous site operations at the Strom Property between 1727 to 1737 Fawcett Avenue.	X							Data validation not included in the report. A map of sample locations is not included, but locations are described relative to October 2004 investigation. Chemical analytical reports, analytical methods, and sample collection methods were verified.	Data as referenced by the RI are considered usable.

Investigation Area[1]	General Location	Type of Investigation	Completed By	Completed For	Timing of Investigation/ Remedial Action	Purpose of Investigation	Media Evaluated							Environmental Data Quality Review[2]	Usability of the Environmental Data
							Soil	Groundwater	Indoor/ Outdoor Air	Sub-slab Soil Vapor	Building Drain	Stormwater	Other		
See Referenced Building/Property	McDonald Smith Building and 1932 to 1936 Pacific Avenue Properties	Phase II ESA	Kane Environmental Inc.	UW	June 2006	Soil and groundwater investigation to evaluate environmental concerns identified during Phase I ESA including historic operations and upgradient CVOC-contaminated groundwater at the McDonald Smith Building.	X	X						Data validation and chemical analytical reports not included in the report. Analytical methods and sample collection methods are verified in the text.	Data as referenced by the RI are considered usable.
17	Merlino Property and 1920 South Fawcett Avenue Property	Phase II ESA	Kane Environmental Inc.	UW	November and December 2008	Soil borings and temporary groundwater wells set to evaluate soil and groundwater conditions for environmental concerns identified in Phase I ESA (drums on the property, Tacoma Asarco Plume, and contaminated site on the upgradient property).	X	X						Data validation not complete. Groundwater samples collected from hollow-stem auger and likely biased high. Methods were verified.	Data are considered usable to assist in evaluating extent of TCE and PCE plume in the area. Property not owned by UW, therefore surficial soil data on non-UW owned property not included in the RI.
18	Former Lam Property (Current Pathway) and 1726 Fawcett Avenue Property	Phase II ESA	URS	UW	January 2013	GPR Survey and test pits to evaluate the presence of potential USTs. USTs were not located.	X							Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods verified.	Data as referenced by the RI are considered usable.
19	1910 through 1916 Jefferson Avenue Properties (Frederick Wilds)	Phase II ESA	GeoEngineers	UW	July 2013	Soil and groundwater investigation to evaluate environmental concerns identified in Phase I ESA.	X	X					Sump	Data validation completed, methods verified, and chemical analytical report included in the report.	Data as referenced by the RI are considered usable.
5	1934 to 1938 Market Street Properties	Phase II ESA	GeoEngineers	UW Real Estate	December 2018	Soil, groundwater, and building drain sampling on the parcel to evaluate RECs identified in Phase I ESA including evaluating if the parcel was the source of CVOC contamination in Market Street. The investigation also included a summary of utility connections west of the building and in Market Street.	X	X			X			Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods were verified.	Data as referenced by the RI are considered usable.
20	Source Areas SA3 and SA4 (1920 to 1938 Tacoma Avenue)	Soil and groundwater investigation	Farallon Consulting	1920 Tacoma Avenue LLC (property owner)	November 2019	Soil and groundwater sampling to evaluate if the SA3 and SA4 properties are sources of PCE and TCE groundwater plumes on the UWT Campus.	X	X						Data validation not included in the report. Chemical analytical reports, analytical methods, and sample collection methods were verified.	Data as referenced by the RI are considered usable.

Notes:

[1] Investigation areas are shown on Figures 4-1 through 4-8.

[2] Environmental data were reviewed for quality and were considered usable by the RI if field sample collection and laboratory methods could be verified, laboratory data were available and the test method used met current standards.

AO = Agreed Order
bgs = below ground surface
UWT Campus = University of Washington Tacoma Campus
cPAHs = Carcinogenic Polycyclic Aromatic Hydrocarbons
CVOC = Chlorinated Volatile Organic Compound
EPH = extractable petroleum hydrocarbons
ESA = Environmental Site Assessment
FS = Feasibility Study
GPR = Ground Penetrating Radar
GW = Groundwater
iSOC™ = In-Situ Submerged Oxygen Curtain
PCE = Tetrachloroethene
REC = Recognized Environmental Condition
RI = Remedial Investigation
TCE = Trichloroethene
UST = Underground Storage Tank
UW = University of Washington
VOC = Volatile Organic Compound

Table 4-2

RI Work Plan and Addenda Summary

University of Washington - Tacoma Campus

Tacoma, Washington

Remedial Investigation (RI) Work Plan	Date	General Summary
Initial RI Work Plan	07/15/16	Summary of previous investigation and planned investigations to complete RI.
Addendum No. 1	08/04/16	Updates for 2016 Field Program including modified sampling intervals for soil and modified well locations.
Addendum No. 2	06/04/18	Updates for 2018 Field Program including changes to the schedule and the well network.
Addendum No. 3	03/11/19	Updates for 2019 Field Program including changes to the well network, additional borings to evaluate petroleum-contaminated soil identified in 2018, and changes to transducer network.
Addendum No. 4	04/26/19	Plan to complete passive soil vapor sampling in Tacoma Avenue South.
Addendum No. 5	03/05/20	Updates for 2020 Field Program including to the changes to the well network and chemical analyzed, addition of monitored natural attenuation (MNA) parameters to groundwater monitoring network, additional borings to further evaluate lithology and presence of contaminants in the soil on Tacoma Avenue South, Upton and Market Street areas, changes to aquifer testing program, changes to modeling approach, addition of 1934-1938 Market Street drain sampling.
Addendum No. 6	09/01/20	Passive soil vapor survey at source property 1722 Tacoma Avenue South.
Addendum No. 7	01/08/21	Soil and groundwater investigation at source property 1922-1938 Tacoma Avenue South.
Addendum No. 8	01/15/21	Soil and groundwater investigation at source property 1904-1908 Tacoma Avenue South.
Addendum No. 9	02/17/21	Soil and groundwater investigation at source property 1722 Tacoma Avenue South.

Table 4-3

Summary Statistics and Evaluation of Contaminants of Potential Concern for Vapor Intrusion

University of Washington - Tacoma Campus

Tacoma, Washington

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Screening Level (SL) for Protection of Vapor Intrusion (VI)[2]		Evaluation of Remedial Investigation (RI) Data Results[3]																Contaminant of Concern (COC) Selection Considerations		
				Soil VI Exceedance Evaluation								Groundwater VI Exceedance Evaluation								Groundwater COC Selection Criteria Met[6] (Yes/No)		
		Soil (mg/kg)	Groundwater (µg/L)	Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Number of Detections > SL	Frequency of SL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (µg/L)	Maximum Detected Concentration (µg/L)	Number of detections > SL	Frequency of SL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Potential for Soil VI	Potential for Groundwater VI	Comments/ Rationale
Petroleum Hydrocarbons																						
Gasoline-Range Hydrocarbons (TPH-G)	NWTPH-G/ EPA 8021/8260	100	NE	755	104	14%	2	580000	60	8%	**5,800**	715	46	6%	55.6	2,380	46	6%	n/a	**Yes**	No	Retained as a COC for soil VI evaluation
Diesel-Range Hydrocarbons (TPH-D)	NWTPH-Dx	250	NE	964	251	26%	10	25,400	87	9%	**102**	540	162	30%	1002.62	7,900,000	n/a	n/a	n/a	**Yes**	No	Retained as a COC for soil VI evaluation
Oil-Range Hydrocarbons (TPH-O)	NWTPH-Dx	NE	NE	922	279	30%	1595	24,000	0	n/a	n/a	504	41	8%	739	310,000	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Compounds																						
Benzene	EPA 8021/8260	10	2.4	2,826	173	6%	0.00088	9,200	1	<1%	**920**	1,384	173	13%	0.08	1,330,000	106	8%	**554,167**	**Yes**	**Yes**	Retained as a COC for soil and groundwater VI evaluation
Ethylbenzene	EPA 8021/8260	NE	2,800	2,826	97	3%	0.00073	6,700	0	n/a	n/a	1,383	94	7%	0.21	2,490,000	2	0%	**889**	No	**Yes**	Retained as a COC for groundwater VI evaluation
Toluene	EPA 8021/8260	NE	15,000	2,826	152	5%	0.00047	41,000	0	n/a	n/a	1,383	87	6%	0.1	6,500,000	2	0%	**433**	No	**Yes**	Retained as a COC for groundwater VI evaluation
Total Xylenes	EPA 8021/8260	NE	320	2,407	47	2%	0.00077	11,000	0	n/a	n/a	1,145	54	5%	0.2	3,000	4	0%	**9.4**	No	**Yes**	Retained as a COC for groundwater VI evaluation
Volatile Organic Compounds (VOCs)																						
Tetrachloroethylene (PCE)	EPA 8060/8270SIM	NE	25	3,273	255	8%	0.00076	26	0	n/a	n/a	1,813	464	26%	0.09	350	85	5%	**14**	No	**Yes**	Retained as a COC for groundwater VI evaluation
Trichloroethylene (TCE)	EPA 8260	NE	1.4	3,344	830	25%	0.00067	979	0	n/a	n/a	1,855	1097	59%	0.05	3700	851	**46%**	**2,643**	No	**Yes**	Retained as a COC for groundwater VI evaluation
trans-1,2-Dichloroethylene (trans-DCE)	EPA 8060/8270SIM	NE	77	3,241	75	2%	0.00098	0	0	n/a	n/a	1,792	203	11%	0.11	88	2	0%	1.1	No	No	Retained as a COC for groundwater VI evaluation
cis-1,2-Dichloroethylene (cis-DCE)	EPA 8060/8270SIM	NE	180	3,308	196	6%	0.00069	1	0	n/a	n/a	1,823	648	36%	0.05	1,650	60	3%	**9.2**	No	**Yes**	Retained as a COC for groundwater VI evaluation
1,1-Dichloroethylene (DCE)	EPA 8060/8270SIM	NE	130	3,241	24	1%	0.001	1	0	n/a	n/a	1,815	146	8%	0.091	51	0	0%	0.4	No	No	Not identified as a COC for VI
Vinyl Chloride	EPA 8060/8270SIM	NE	0.3	3,270	87	3%	0.00088	0	0	n/a	n/a	1,824	299	16%	0.022	338	239	**13%**	**1,024**	No	**Yes**	Retained as a COC for groundwater VI evaluation
1,1,1-Trichloroethane (TCA)	EPA 8260	NE	5,400	3,239	12	0%	0.001	0	0	n/a	n/a	1,550	33	2%	0.21	170	0	0%	<0.1	No	No	Not identified as a COC for VI
1,1-Dichloroethane (DCA)	EPA 8260	NE	11	3,239	7	0%	0.0022	0	0	n/a	n/a	1,534	55	4%	0.2	150	15	1%	**13.6**	No	**Yes**	Retained as a COC for groundwater VI evaluation
Chloroethane	EPA 8260	NE	15,000	3,229	0	0%	n/a	n/a	n/a	n/a	n/a	1,464	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,2,4-Trichlorobenzene	EPA 8260	NE	39	3,217	3	0%	0.002	34	0	n/a	n/a	1,444	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,4-Dichlorobenzene (1,4-DCB)	EPA 8260	NE	5.0	3,226	14	0%	0.001	0	0	n/a	n/a	1,444	4	0%	5.6	6	4	0%	1.2	No	No	Not identified as a COC for VI
Chlorobenzene	EPA 8260	NE	340	3,252	152	5%	0.00082	684	0	n/a	n/a	1,520	88	6%	0.22	980	10	1%	**2.9**	No	**Yes**	Retained as a COC for groundwater VI evaluation
Carbon Tetrachloride	EPA 8260	NE	0.6	3,230	1	0%	14	14	0	n/a	n/a	1,454	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Chloroform	EPA 8260	NE	1.2	3,230	8	0%	0.00088	32	0	n/a	n/a	1,541	65	4%	0.1	8.7	16	1%	**7.3**	No	No	Considered a tracer compound that provides a line of evidence of exfiltration from the sanitary sewer. No historical operation has been identified as a potential source.
Chloromethane	EPA 8260	NE	150	3,177	0	0%	n/a	n/a	n/a	n/a	n/a	1,449	4	0%	1.1	25.7	0	0%	0.2	No	No	Not identified as a COC for VI
1,2,4-Trimethylbenzene (1,2,4-TMB)	EPA 8260	NE	240	2,488	47	2%	0.00094	19,000	0	n/a	n/a	1,188	62	5%	0.26	5190	9	1%	**21.6**	No	**Yes**	Retained as a COC for groundwater VI evaluation
1,2-Dichloroethane (EDC)	EPA 8260	NE	3.5	3,236	1	0%	0.0016	0	0	n/a	n/a	1,514	5	0%	0.21	9.12	2	0%	**2.6**	No	**Yes**	Retained as a COC for groundwater VI evaluation
1,3,5-Trimethylbenzene (1,3,5-TMB)	EPA 8260	NE	170	2,481	31	1%	0.0011	6,200	0	n/a	n/a	1,166	47	4%	0.23	5490	6	1%	**32.3**	No	**Yes**	Retained as a COC for groundwater VI evaluation
2-Hexanone	EPA 8260	NE	7,300	2,353	2	0%	0.011	400	0	n/a	n/a	1,074	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
4-Isopropyltoluene	EPA 8260	NE	NE	2,380	38	2%	0.00082	560	0	n/a	n/a	1,128	19	2%	0.26	74	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Carbon Disulfide	EPA 8260	NE	840	2,351	255	11%	0.0006	8,000	0	n/a	n/a	1,060	11	1%	0.25	12.3	0	0%	<0.1	No	No	Not identified as a COC for VI
Isopropylbenzene	EPA 8260	NE	910	2,484	38	2%	0.00089	8,000	0	n/a	n/a	1,174	63	5%	0.26	230	0	0%	0.3	No	No	Not identified as a COC for VI
Methyl ethyl ketone (MEK)	EPA 8260	NE	1,700,000	2,352	80	3%	0.003	48,000	0	n/a	n/a	1,070	9	1%	7.2	1700	0	0%	<0.1	No	No	Not identified as a COC for VI
Methyl isobutyl ketone	EPA 8260	NE	470,000	2,329	25	1%	0.0045	6,400	0	n/a	n/a	1,014	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Methyl tert-butyl ether (MTBE)	EPA 8260	NE	860	2,373	1	0%	560	560	0	n/a	n/a	1,012	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Naphthalene	EPA 8260	NE	8.9	2,487	44	2%	0.00092	4,000	0	n/a	n/a	1,182	45	4%	1.01	3400	27	2%	**382**	No	**Yes**	Retained as a COC for groundwater VI evaluation
n-Butylbenzene	EPA 8260	NE	NE	2,434	29	1%	0.0011	4,000	0	n/a	n/a	1,163	41	4%	0.21	126	n/a	n/a	n/a	No	No	Not identified as a COC for VI
n-Propylbenzene	EPA 8260	NE	2,300	2,472	37	1%	0.00096	8,000	0	n/a	n/a	1,164	66	6%	0.24	803	0	0%	0.3	No	No	Not identified as a COC for VI
Sec-Butylbenzene	EPA 8260	NE	NE	2,409	41	2%	0.00099	8,000	0	n/a	n/a	1,163	48	4%	0.18	100	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Styrene	EPA 8260	NE	8,200	2,475	6	0%	0.0012	16,000	0	n/a	n/a	1,117	4	0%	0.27	230	0	0%	<0.1	No	No	Not identified as a COC for VI
Tert-Butylbenzene	EPA 8260	NE	NE	2,408	11	0%	0.00093	8,000	0	n/a	n/a	1,073	3	0%	0.24	0.32	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,1,1,2-Tetrachloroethane	EPA 8260	NE	7.1	3,167	1	0%	38	38	0	n/a	n/a	1,389	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,1,2,2-Tetrachloroethane	EPA 8260	NE	5.9	3,176	1	0%	5	5	0	n/a	n/a	1,392	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	EPA 8260	NE	170	5	1	20%	2400000	2,400,000	0	n/a	n/a	3	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,1,2-Trichloroethane	EPA 8260	NE	5.1	3,173	1	0%	18	18	0	n/a	n/a	1,392	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,1-Dichloropropene	EPA 8260	NE	NE	3,170	0	0%	n/a	n/a	n/a	n/a	n/a	1,377	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,2,3-Trichlorobenzene	EPA 8260	NE	NE	3,167	1	0%	64	64	0	n/a	n/a	1,384	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,2,3-Trichloropropane	EPA 8260	NE	21	3,167	1	0%	0.0063	0	0	n/a	n/a	1,384	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,2-Dibromo-3-Chloropropane	EPA 8260	NE	1.0	3,170	1	0%	0.23	0	0	n/a	n/a	1,387	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,2-Dichlorobenzene (1,2-DCB)	EPA 8260	NE	2,500	3,223	20	1%	0.00098	7,200	0	n/a	n/a	1,444	8	1%	0.22	27	0	0%	<0.1	No	No	Not identified as a COC for VI
1,2-Dibromoethane (EDB)	EPA 8260	NE	0.3	3,215	0	0%	n/a	n/a	n/a	n/a	n/a	1,483	2	0%	1.91	111	2	0%	**370**	No	**Yes**	Retained as a COC for groundwater VI evaluation

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Screening Level (SL) for Protection of Vapor Intrusion (VI)[2]		Evaluation of Remedial Investigation (RI) Data Results[3]																Contaminant of Concern (COC) Selection Considerations		
				Soil VI Exceedance Evaluation								Groundwater VI Exceedance Evaluation								Groundwater COC Selection Criteria Met[6] (Yes/No)		
		Soil (mg/kg)	Groundwater (µg/L)	Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Number of Detections > SL	Frequency of SL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (µg/L)	Maximum Detected Concentration (µg/L)	Number of detections > SL	Frequency of SL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Potential for Soil VI	Potential for Groundwater VI	Comments/ Rationale
1,2-Dichloropropane	EPA 8260	NE	10.0	3,176	1	0%	27	27	0	n/a	n/a	1,387	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,3-Dichlorobenzene (1,3-DCB)	EPA 8260	NE	NE	3,176	2	0%	0.001	0	0	n/a	n/a	1,387	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,3-Dichloropropane	EPA 8260	NE	NE	3,167	1	0%	1600	1,600	0	n/a	n/a	1,384	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,2-Dichloropropane	EPA 8260	NE	NE	3,170	0	0%	n/a	n/a	n/a	n/a	n/a	1,384	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2-Butanone, 4-(Acetyloxy)-	EPA 8260	NE	NE	--	--	--	--	--	--	--	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2-Chloroethyl vinyl ether	EPA 8260	NE	NE	3,081	0	0%	n/a	n/a	n/a	n/a	n/a	1,321	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2-Chlorotoluene	EPA 8260	NE	NE	3,168	1	0%	1600	1,600	0	n/a	n/a	1,426	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
4-Chlorotoluene	EPA 8260	NE	NE	3,168	1	0%	1600	1,600	0	n/a	n/a	1,426	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Cyclohexane	EPA 8260	NE	750	--	--	--	--	--	--	--	n/a	3	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Cyclohexane, Methyl-	EPA 8260	NE	NE	--	--	--	--	--	--	--	n/a	3	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Acetic Acid, Methyl Ester	EPA 8260	NE	NE	5	1	20%	80000	80,000	0	n/a	n/a	3	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Acetone	EPA 8260	NE	NE	2,353	611	26%	0.0037	72,000	0	n/a	n/a	1,159	54	5%	2.6	1500	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Bromobenzene	EPA 8260	NE	630	3,170	1	0%	640	640	0	n/a	n/a	1,383	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Bromochloromethane	EPA 8260	NE	NE	3,170	0	0%	n/a	n/a	n/a	n/a	n/a	1,384	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Bromoform	EPA 8260	NE	220	3,173	1	0%	130	130	0	n/a	n/a	1,386	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Bromomethane	EPA 8260	NE	11	3,181	4	0%	0.59	110	0	n/a	n/a	1,386	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
cis-1,3-Dichloropropene	EPA 8260	NE	NE	3,170	0	0%	n/a	n/a	n/a	n/a	n/a	1,378	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Dibromochloromethane	EPA 8260	NE	NE	3,173	1	0%	12	12	0	n/a	n/a	1,395	3	0%	0.21	0.42	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Dibromomethane	EPA 8260	NE	97	3,164	1	0%	800	800	0	n/a	n/a	1,383	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Dichlorobromomethane	EPA 8260	NE	1.4	3,172	1	0%	16	16	0	n/a	n/a	1,388	2	0%	0.42	0.98	0	0%	0.7	No	No	Not identified as a COC for VI
Dichlorodifluoromethane	EPA 8260	NE	4.2	3,173	2	0%	0.0013	16,000	0	n/a	n/a	1,387	2	0%	1.3	1.3	0	0%	0.3	No	No	Not identified as a COC for VI
Hexachlorobutadiene	EPA 8260	NE	1.0	3,167	1	0%	13	13	0	n/a	n/a	1,384	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Hexane	EPA 8260	NE	7.2	28	2	7%	0.00233	4,800	0	n/a	n/a	21	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Methyl Iodide	EPA 8260	NE	NE	3,079	0	0%	n/a	n/a	n/a	n/a	n/a	1,331	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Methylene Chloride	EPA 8260	NE	780	3,220	32	1%	0.001	94	0	n/a	n/a	1,540	2	0%	3	5.36	0	0%	<0.1	No	No	Not identified as a COC for VI
trans-1,3-Dichloropropene	EPA 8260	NE	NE	3,184	0	0%	n/a	n/a	n/a	n/a	n/a	1,378	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Trichlorofluoromethane	EPA 8260	NE	120	1,307	0	0%	n/a	n/a	n/a	n/a	n/a	1,387	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Vinyl Acetate	EPA 8260	NE	7,800	2,291	1	0%	80000	80,000	0	n/a	n/a	966	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Metals																						
Arsenic - Dissolved	EPA 200.7/200.8	NE	NE	--	--	--	--	--	--	--	n/a	22	4	18%	0.36	5.7	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Arsenic - Total	EPA 200.7/200.8	NE	NE	691	101	15%	0.51	280	0	n/a	n/a	39	7	18%	1.4	180	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Barium - Dissolved	EPA 200.7/200.8	NE	NE	--	--	--	--	--	--	--	n/a	7	3	43%	13	190	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Barium - Total	EPA 200.7/200.8	NE	NE	608	603	99%	20	16,000	0	n/a	n/a	29	16	55%	33	1100	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Cadmium - Dissolved	EPA 200.7/200.8	NE	NE	--	--	--	--	--	--	--	n/a	17	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Cadmium - Total	EPA 200.7/200.8	NE	NE	667	77	12%	0.05	530	0	n/a	n/a	39	2	5%	16	19	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Chromium - Dissolved	EPA 200.7/200.8	NE	NE	--	--	--	--	--	--	--	n/a	17	1	6%	15	15	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Chromium - Total	EPA 200.7/200.8	NE	NE	644	634	98%	1.6	120,000	0	n/a	n/a	39	6	15%	13	300	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Lead - Dissolved	EPA 200.7/200.8	NE	NE	--	--	--	--	--	--	--	n/a	26	1	4%	250	250	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Lead - Total	EPA 200.7/200.8	NE	NE	822	429	52%	1.29	14,000	0	n/a	n/a	49	18	37%	0.08	5700	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Mercury - Dissolved	EPA 200.7/200.8	NE	1.1	--	--	--	--	--	--	--	n/a	17	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Mercury - Total	EPA 200.7/200.8	NE	1.1	637	62	10%	0.023	24	0	n/a	n/a	39	1	3%	2.5	2.5	1	3%	**2.3**	No	No	Not detected greater than the VI SL as part of the 2016 Agreed Order RI.
Selenium - Dissolved	EPA 200.7/200.8	NE	NE	--	--	--	--	--	--	--	n/a	9	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Selenium - Total	EPA 200.7/200.8	NE	NE	609	8	1%	0.993	400	0	n/a	n/a	30	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Silver - Dissolved	EPA 200.7/200.8	NE	NE	--	--	--	--	--	--	--	n/a	9	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Silver - Total	EPA 200.7/200.8	NE	NE	617	4	1%	1.5	400	0	n/a	n/a	30	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Polychlorinated Biphenyls (PCBs) Aroclors																						
PCB-Aroclor 1016	EPA 8082	NE	NE	48	1	2%	5.6	6	0	n/a	n/a	14	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
PCB-Aroclor 1221	EPA 8082	NE	NE	48	0	0%	n/a	n/a	n/a	n/a	n/a	14	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	
PCB-Aroclor 1232	EPA 8082	NE	NE	48	0	0%	n/a	n/a	n/a	n/a	n/a	14	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	
PCB-Aroclor 1242	EPA 8082	NE	NE	42	2	5%	0.1	0.13	0	n/a	n/a	14	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	
PCB-Aroclor 1248	EPA 8082	NE	NE	48	0	0%	n/a	n/a	n/a	n/a	n/a	14	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	
PCB-Aroclor 1954	EPA 8082	NE	NE	51	5	10%	0.06	0.5	0	n/a	n/a	14	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	
PCB-Aroclor 1260	EPA 8082	NE	NE	48	5	10%	0.13	0.5	0	n/a	n/a	14	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	
Total PCB Aroclors	EPA 8082	NE	NE	58	10	17%	0.06	0.5	0	n/a	n/a	12	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Polycyclic Aromatic Hydrocarbons (PAHs)																						
1-Methylnaphthalene	EPA 8270/SIM	NE	NE	769	221	29%	0.006	34	0	n/a	n/a	50	2	4%	0.18	0.67	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2-Methylnaphthalene	EPA 8270/SIM	NE	NE	801	249	31%	0.0074	320	0	n/a	n/a	51	3	6%	0.27	100	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Acenaphthene	EPA 8270/SIM	NE	NE	784	115	15%	0.0072	4800	0	n/a	n/a	51	1	2%	0.65	0.65	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Acenaphthylene	EPA 8270/SIM	NE	NE	784	166	21%	0.0072	5.1	0	n/a	n/a	51	1	2%	0.12	0.12	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Anthracene	EPA 8270/SIM	NE	NE	784	210	27%	0.0076	24000	0	n/a	n/a	51	1	2%	0.66	0.66	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Benzo(a)anthracene	EPA 8270/SIM	NE	NE	822	317	39%	0.0053	29	0	n/a	n/a	52	11	21%	0.0095	1.2	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Benzo(a)pyrene	EPA 8270/SIM	NE	NE	858	321	37%	0.0072	21	0	n/a	n/a	52	4	8%	0.012	0.57	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Benzo(b)fluoranthene	EPA 8270/SIM	NE	NE	822	331	40%	0.0076	29	0	n/a	n/a	52	4	8%	0.012	1	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Benzo(g,h,i)perylene	EPA 8270/SIM	NE	NE	784	296	38%	0.0073	11	0	n/a	n/a	51	3	6%	0.01	0.23	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Benzo(j,k)fluoranthene	EPA 8270/SIM	NE	NE	705	207	29%	0.0076	8	0	n/a	n/a	44	1	2%	0.35	0.35	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Benzo(k)fluoranthene	EPA 8270/SIM	NE	NE	119	32	27%	0.0085	12	0	n/a	n/a	8	1	13%	0.013	0.013	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Chrysene	EPA 8270/SIM	NE	NE	859	338	39%	0.0078	32	0	n/a	n/a	52	3	6%	0.02	1.3	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Dibenzo(a,h)anthracene	EPA 8270/SIM	NE	NE	822	160	19%	0.0072	4.6	0	n/a	n/a	52	1	2%	0.076	0.076	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Fluoranthene	EPA 8270/SIM	NE	NE	823	335	41%	0.0077	3200	0	n/a	n/a	51	1	2%	3.9	3.9	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Fluorene	EPA 8270/SIM	NE	NE	784	146	19%	0.0076	3200	0	n/a	n/a	51	1	2%	0.5	0.5	n/a	n/a	n/a	No	No	Not identified as a COC for VI

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Screening Level (SL) for Protection of Vapor Intrusion (VI)[2]		Evaluation of Remedial Investigation (RI) Data Results[3]																Contaminant of Concern (COC) Selection Considerations		
				Soil VI Exceedance Evaluation							Groundwater VI Exceedance Evaluation								Groundwater COC Selection Criteria Met[6] (Yes/No)		
		Soil (mg/kg)	Groundwater (µg/L)	Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Number of Detections > SL	Frequency of SL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (µg/L)	Maximum Detected Concentration (µg/L)	Number of detections > SL	Frequency of SL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Potential for Soil VI	Potential for Groundwater VI	Comments/ Rationale
Indeno(1,2,3-c,d)pyrene	EPA 8270/SIM	NE	NE	822	288	35%	0.0052	12	0	n/a	n/a	52	2	4%	0.018	0.26	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Naphthalene	EPA 8270/SIM	NE	9	819	278	34%	0.0072	37	0	n/a	n/a	51	3	6%	1.5	3500	1	2%	**393**	No	**Yes**	Retained as a COC for groundwater VI evaluation
Phenanthrene	EPA 8270/SIM	NE	NE	786	337	43%	0.0074	43	0	n/a	n/a	51	1	2%	1.9	1.9	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Pyrene	EPA 8270/SIM	NE	NE	822	348	42%	0.0073	2400	0	n/a	n/a	51	1	2%	2.8	2.8	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Total cPAH TEQ[7] (ND=0.5RL)	EPA 8270/SIM	NE	NE	859	354	41%	0.0001	30	0	n/a	n/a	44	8	18%	0.00765	0.8316	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Semi-Volatile Organic Compounds (SVOCs)																						
1,2,4-Trichlorobenzene	EPA 8270	NE	39	24	1	4%	34	34	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,2-Dichlorobenzene (1,2-DCB)	EPA 8270	NE	2,500	24	1	4%	7200	7200	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,2-Dinitrobenzene	EPA 8270	NE	NE	10	1	10%	8	8	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,2-Diphenylhydrazine	EPA 8270	NE	NE	10	1	10%	1.3	1.3	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,3-Dichlorobenzene (1,3-DCB)	EPA 8270	NE	NE	24	0	0%	n/a	n/a	n/a	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,3-Dinitrobenzene	EPA 8270	NE	NE	10	1	10%	8	8	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,4-Dichlorobenzene (1,4-DCB)	EPA 8270	NE	5	24	1	4%	0.068	0.068	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
1,4-Dinitrobenzene	EPA 8270	NE	NE	10	1	10%	8	8	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,3,4,6-Tetrachlorophenol	EPA 8270	NE	NE	10	1	10%	2400	2400	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,3,5,6-Tetrachlorophenol	EPA 8270	NE	NE	10	0	0%	n/a	n/a	n/a	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,3-Dichloroaniline	EPA 8270	NE	NE	10	0	0%	n/a	n/a	n/a	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,4,5-Trichlorophenol	EPA 8270	NE	NE	24	1	4%	8000	8000	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,4,6-Trichlorophenol	EPA 8270	NE	NE	24	1	4%	80	80	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,4-Dichlorophenol	EPA 8270	NE	NE	23	1	4%	240	240	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,4-Dimethylphenol	EPA 8270	NE	NE	24	1	4%	1600	1600	0	n/a	n/a	6	1	17%	92	92	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,4-Dinitrophenol	EPA 8270	NE	NE	24	1	4%	160	160	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,4-Dinitrotoluene	EPA 8270	NE	NE	24	1	4%	3.2	3.2	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2,6-Dinitrotoluene	EPA 8270	NE	NE	24	1	4%	0.67	0.67	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2-Chloronaphthalene	EPA 8270	NE	NE	24	1	4%	6400	6400	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2-Chlorophenol	EPA 8270	NE	NE	24	1	4%	400	400	0	n/a	n/a	6	1	17%	11	11	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2-methylphenol	EPA 8270	NE	NE	24	1	4%	4000	4000	0	n/a	n/a	6	1	17%	260	260	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2-Nitroaniline	EPA 8270	NE	NE	24	1	4%	800	800	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
2-Nitrophenol	EPA 8270	NE	NE	24	0	0%	n/a	n/a	n/a	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
3&4-Methylphenol	EPA 8270	NE	NE	24	0	0%	n/a	n/a	n/a	n/a	n/a	6	1	17%	140	140	n/a	n/a	n/a	No	No	Not identified as a COC for VI
3,3'-Dichlorobenzidine	EPA 8270	NE	NE	24	1	4%	2.2	2.2	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
3-Nitroaniline	EPA 8270	NE	NE	24	0	0%	n/a	n/a	n/a	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
4,6-Dinitro-2-Methylphenol	EPA 8270	NE	NE	24	1	4%	6.4	6.4	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
4-Bromophenyl phenyl ether	EPA 8270	NE	NE	24	0	0%	n/a	n/a	n/a	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
4-Chloro-3-Methylphenol	EPA 8270	NE	NE	24	1	4%	8000	8000	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
4-Chloroaniline	EPA 8270	NE	NE	24	1	4%	5	5	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
4-Chlorophenyl phenyl ether	EPA 8270	NE	NE	24	0	0%	n/a	n/a	n/a	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
4-Nitroaniline	EPA 8270	NE	NE	24	1	4%	50	50	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
4-Nitrophenol	EPA 8270	NE	NE	24	0	0%	n/a	n/a	n/a	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Aniline	EPA 8270	NE	NE	11	1	9%	180	180	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Benzidine	EPA 8270	NE	NE	11	1	9%	2	2	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Benzyl Alcohol	EPA 8270	NE	NE	24	1	4%	8000	8000	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Bis(2-Chloroethoxy)Methane	EPA 8270	NE	NE	24	1	4%	240	240	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Bis(2-Chloroethyl)Ether	EPA 8270	NE	NE	24	1	4%	0.91	0.91	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Bis(2-chloroisopropyl) ether	EPA 8270	NE	NE	24	0	0%	n/a	n/a	n/a	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Bis(2-Ethylhexyl) Phthalate	EPA 8270	NE	NE	34	9	26%	0.065	71	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Butyl benzyl Phthalate	EPA 8270	NE	NE	69	9	13%	0.15	530	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Carbazole	EPA 8270	NE	NE	24	1	4%	0.049	0.049	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Di(2-ethylhexyl)adipate	EPA 8270	NE	NE	10	1	10%	830	830	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Dibenzofuran	EPA 8270	NE	NE	24	1	4%	80	80	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Dibutyl Phthalate	EPA 8270	NE	NE	35	5	14%	0.049	8000	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Diethyl Phthalate	EPA 8270	NE	NE	24	1	4%	64000	64000	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Dimethyl Phthalate	EPA 8270	NE	NE	24	0	0%	n/a	n/a	n/a	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Di-N-Octyl Phthalate	EPA 8270	NE	NE	24	1	4%	800	800	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Hexachlorobenzene	EPA 8270	NE	1.0	23	1	4%	0.63	0.63	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Hexachlorobutadiene	EPA 8270	NE	1.0	24	1	4%	13	13	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Hexachlorocyclopentadiene	EPA 8270	NE	4.2	24	1	4%	480	480	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Hexachloroethane	EPA 8270	NE	3.8	24	1	4%	25	25	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Isophorone	EPA 8270	NE	NE	24	1	4%	1100	1100	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Nitrobenzene	EPA 8270	NE	NE	24	1	4%	160	160	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
N-Nitrosodimethylamine	EPA 8270	NE	NE	11	1	9%	0.033	0.033	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
N-Nitrosodi-n-propylamine	EPA 8270	NE	NE	24	1	4%	0.14	0.14	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
N-Nitrosodiphenylamine	EPA 8270	NE	NE	24	2	8%	8.1	200	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Pentachlorophenol	EPA 8270	NE	NE	24	1	4%	2.5	2.5	0	n/a	n/a	6	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Phenol	EPA 8270	NE	NE	24	1	4%	24000	24000	0	n/a	n/a	6	1	17%	9.6	9.6	n/a	n/a	n/a	No	No	Not identified as a COC for VI
Pyridine	EPA 8270	NE	NE	10	1	10%	80	80	0	n/a	n/a	5	0	0%	n/a	n/a	n/a	n/a	n/a	No	No	Not identified as a COC for VI

Notes:

[1] COPCs were established for the Remedial Investiation (RI) based on a review of previous environmental studies. Previous groundwater study results are summarized in Appendix D.

[2] Proposed screening levels for vapor intrusion (VI) are referenced from Tables 3-5 and 3-6.

[3] The soil and groundwater data used for this RI consist of samples obtained by GeoEngineers and others (Appendix D and I).

[4] Number of samples with analyte detected or non-detect at a concentration greater than VI SL / total number of samples analyzed for analyte.

[5] ER (max) = ratio of maximum detected or non-detect concentration divided by the VI SL

[6] Initial COC selection criteria is met if exceedance frequency is greater or equal to 10 percent or if the exceedance ratio is greater than 2.

[7] Total carcinogenic polycyclic aromatic hydrocarbon (cPAH) toxicity equivalent quotients (TEQs) were calculated using Toxicity Equivalency Factors (TEFs) values referenced from Model Toxics Control Act (MTCA) Table 708.2 (Washington Administrative Code 173-340-900).

µg/L = micrograms per liter

mg/kg = milligram per kilogram

n/a = not applicable

NE = Not Established

Bold indicated satisfaction of initial COC or consideration of other selection criteria.

Yellow shading indicates analyte is identified as a COC based on both satisfaction of initial selection criteria and consideration of other selection criteria, or on consideration of other selection criteria alone.

Table 4-4

Summary Statistics and Evaluation of Groundwater Contaminants of Potential Concern

University of Washington - Tacoma Campus
Tacoma, Washington

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Proposed Groundwater Cleanup Level[2] (PCUL)		Units	Evaluation of Remedial Investigation Data Results[3]												Contaminant of Concern (COC) Selection Considerations			
										Surface Water PCUL Exceedance Evaluation			Drinking Water PCUL Exceedance Evaluation			Groundwater COC Selection Criteria Met[6] (Yes/No)			
		Protection of Surface Water	Protection of Drinking Water		Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (µg/L)	Maximum Detected Concentration (µg/L)	Number of Detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number of detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Protection of Surface Water	Protection of Drinking Water	Groundwater COC (Yes/No)	Comments/ Rationale
Petroleum Hydrocarbons																				
HCID-Gasoline-Range Hydrocarbons	NWTPH-HCID	800	800	µg/L	19	13	68%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	See Gasoline-Range
HCID-Diesel-Range Hydrocarbons	NWTPH-HCID	500	500	µg/L	19	9	47%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	See Diesel-Range
HCID-Lube Oil-Range Hydrocarbons	NWTPH-HCID	500	500	µg/L	19	4	21%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	See Oil-Range
Gasoline-Range Hydrocarbons (TPH-G)	NWTPH-G/SW 8015	800	800	µg/L	685	44	6%	55.6	2,380	11	2%	**3.0**	11	2%	**3.0**	**Yes**	**Yes**	**Yes**	Retained as a COC
Diesel-Range Hydrocarbons (TPH-D)	NWTPH-Dx/SW 8015	500	500	µg/L	514	155	30%	1,003	7,900,000	95	**18%**	**15,800**	95	**18%**	**15,800**	**Yes**	**Yes**	**Yes**	Retained as a COC
Oil-Range Hydrocarbons (TPH-O)	NWTPH-Dx	500	500	µg/L	478	27	6%	739	310,000	19	4%	**620**	19	4%	**620**	**Yes**	**Yes**	**Yes**	Retained as a COC
Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Compounds																			
Benzene	EPA 8021/8260	1.6	5.0	µg/L	1,316	168	13%	0.08	11,300	121	9%	**7,062.5**	84	6%	**2,260**	**Yes**	**Yes**	**Yes**	Retained as a COC
Ethylbenzene	EPA 8021/8260	21	700	µg/L	1,314	88	7%	0.21	5,290	19	1%	**251.9**	2	0%	**7.6**	**Yes**	**Yes**	**Yes**	Retained as a COC
Toluene	EPA 8021/8260	102	640	µg/L	1,314	79	6%	0.12	17,300	12	1%	**169.6**	7	1%	**27**	**Yes**	**Yes**	**Yes**	Retained as a COC
Total Xylenes	EPA 8021/8260	106	1,600	µg/L	1,320	105	8%	0.2	27,730	15	1%	**261.6**	5	0%	**17.3**	**Yes**	**Yes**	**Yes**	Retained as a COC
Volatile Organic Compounds (VOCs)																			
Tetrachloroethylene (PCE)	EPA 8060/8270SIM	2.9	5	µg/L	1,723	439	25%	0.09	350	227	**13%**	**120.7**	201	**12%**	**70**	**Yes**	**Yes**	**Yes**	Retained as a COC
Trichloroethylene (TCE)	EPA 8260	0.7	4.0	µg/L	1,759	1039	59%	0.05	3700	903	**51%**	**5,285.7**	643	**37%**	**925**	**Yes**	**Yes**	**Yes**	Retained as a COC
trans-1,2-Dichloroethylene (trans-DCE)	EPA 8060/8270SIM	100	100	µg/L	1,705	203	12%	0.11	88	0	0%	0.9	333	**20%**	0.9	No	**Yes**	**Yes**	Retained as a COC (PCE/TCE breakdown product)
cis-1,2-Dichloroethylene (cis-DCE)	EPA 8060/8270SIM	16	16	µg/L	1,735	637	37%	0.05	1,650	210	**12%**	**103.1**	0	0%	**103.1**	**Yes**	**Yes**	**Yes**	Retained as a COC
1,1-Dichloroethylene (DCE)	EPA 8060/8270SIM	7.0	7.0	µg/L	1,728	146	8%	0.091	51	34	2%	**7.3**	0	0%	**7.3**	**Yes**	**Yes**	**Yes**	Retained as a COC
Vinyl Chloride	EPA 8060/8270SIM	0.2	0.3	µg/L	1,736	292	17%	0.022	338	255	**15%**	**1,690.0**	0	0%	**1165.5**	**Yes**	**Yes**	**Yes**	Retained as a COC
1,1,1-Trichloroethane (TCA)	EPA 8260	200	200	µg/L	1,463	29	2%	0.21	170	0	0%	0.9	0	0%	0.9	No	No	**Yes**	Retained as a COC (DCA parent product)
1,1-Dichloroethane (DCA)	EPA 8260	7.7	7.7	µg/L	1,447	55	4%	0.2	150	17	1%	**19.5**	17	1%	**19.5**	**Yes**	**Yes**	**Yes**	Retained as a COC
Chloroethane	EPA 8260	NE	NE	µg/L	1,377	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	Retained as a COC (TCA/DCA breakdown product)
1,2,4-Trichlorobenzene	EPA 8260	1.0	15	µg/L	1,357	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,4-Dichlorobenzene (1,4-DCB)	EPA 8260	75	75	µg/L	1,357	4	0%	5.6	6	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Chlorobenzene	EPA 8260	100	100	µg/L	1,432	81	6%	0.22	980	30	2%	**9.8**	30	2%	**9.8**	**Yes**	**Yes**	**Yes**	Retained as a COC
Carbon Tetrachloride	EPA 8260	0.4	5.0	µg/L	1,367	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Chloroform	EPA 8260	14	14	µg/L	1,453	45	3%	0.2	8.7	0	0%	0.6	0	0%	0.6	No	No	No	Considered a tracer compound that provides a line of evidence of exfiltration from the sanitary sewer. No historical operation has been identified as a potential source.
Chloromethane	EPA 8260	NE	NE	µg/L	1,369	4	0%	1.1	25.7	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2,4-Trimethylbenzene (1,2,4-TMB)	EPA 8260	80	80	µg/L	1,122	56	5%	0.26	5190	11	1%	**64.9**	11	1%	**64.9**	**Yes**	**Yes**	**Yes**	Retained as a COC
1,2-Dichloroethane (EDC)	EPA 8260	4.8	4.8	µg/L	1,427	5	0%	0.21	9.12	2	0%	1.9	2	0%	1.9	No	No	**Yes**	Retained as a COC for consistency with MTCA Table 830-1 for Petroleum Releases
1,3,5-Trimethylbenzene (1,3,5-TMB)	EPA 8260	80	80	µg/L	1,100	43	4%	0.23	5490	5	0%	**68.6**	5	0%	**68.6**	**Yes**	**Yes**	**Yes**	Retained as a COC
2-Hexanone	EPA 8260	40	40	µg/L	1,013	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Isopropyltoluene	EPA 8260	NE	NE	µg/L	1,063	16	2%	0.43	56.3	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Carbon Disulfide	EPA 8260	800	800	µg/L	999	9	1%	0.25	12.3	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Isopropylbenzene	EPA 8260	800	800	µg/L	1,108	59	5%	0.26	230	0	0%	0.3	0	0%	0.3	No	No	No	Not identified as a COC
Methyl ethyl ketone (MEK)	EPA 8260	4,800	4,800	µg/L	1,009	6	1%	7.2	1700	0	0%	0.4	0	0%	0.4	No	No	No	Not identified as a COC
Methyl isobutyl ketone	EPA 8260	640	640	µg/L	960	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Methyl tert-butyl ether (MTBE)	EPA 8260	24	24	µg/L	958	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	Retained as a COC for consistency with MTCA Table 830-1 for Petroleum Releases
Naphthalene	EPA 8260	160	160	µg/L	1,116	42	4%	1.01	1110	24	2%	**124.7**	24	2%	**124.7**	**Yes**	**Yes**	**Yes**	Retained as a COC
n-Butylbenzene	EPA 8260	400	400	µg/L	1,098	41	4%	0.21	126	0	0%	0.3	0	0%	0.3	No	No	No	Not identified as a COC
n-Propylbenzene	EPA 8260	800	800	µg/L	1,099	63	6%	0.28	803	1	0%	1.0	1	0%	1.0	No	No	No	Not identified as a COC
Sec-Butylbenzene	EPA 8260	800	800	µg/L	1,098	45	4%	0.22	17	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Styrene	EPA 8260	100	100	µg/L	1,052	1	0%	1	1	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Tert-Butylbenzene	EPA 8260	800	800	µg/L	1,008	3	0%	0.24	0.32	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
1,2-Dibromoethane (EDB)	EPA 8260	0.1	0.1	µg/L	1,397	2	0%	1.91	111	2	0%	**2,220**	2	0%	**2,220**	**Yes**	**Yes**	**Yes**	Not identified as a COC[7]. However retained as a COC for consistency with MTCA Table 830-1 for Petroleum Releases
1,1,1,2-Tetrachloroethane	EPA 8260	1.7	1.7	µg/L	1,309	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,1,2,2-Tetrachloroethane	EPA 8260	0.2	0.2	µg/L	1,312	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	EPA 8260	240,000	240,000	µg/L	3	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,1,2-Trichloroethane	EPA 8260	0.9	5.0	µg/L	1,312	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,1-Dichloropropene	EPA 8260	NE	NE	µg/L	1,299	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2,3-Trichlorobenzene	EPA 8260	6.4	6.4	µg/L	1,304	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2,3-Trichloropropane	EPA 8260	0.2	0.2	µg/L	1,304	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Dibromo-3-Chloropropane	EPA 8260	1.0	1.0	µg/L	1,307	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Dichlorobenzene (1,2-DCB)	EPA 8260	600	600	µg/L	1,357	8	1%	0.22	27	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Proposed Groundwater Cleanup Level[2] (PCUL)		Units	Evaluation of Remedial Investigation Data Results[3]												Contaminant of Concern (COC) Selection Considerations			
										Surface Water PCUL Exceedance Evaluation			Drinking Water PCUL Exceedance Evaluation			Groundwater COC Selection Criteria Met[6] (Yes/No)			
		Protection of Surface Water	Protection of Drinking Water		Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (µg/L)	Maximum Detected Concentration (µg/L)	Number of Detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number of detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Protection of Surface Water	Protection of Drinking Water	Groundwater COC (Yes/No)	Comments/ Rationale
1,2-Dichloropropane	EPA 8260	3.1	5.0	µg/L	1,307	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,3-Dichlorobenzene (1,3-DCB)	EPA 8260	2.0	NE	µg/L	1,307	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,3-Dichloropropane	EPA 8260	160	160	µg/L	1,304	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,2-Dichloropropane	EPA 8260	NE	NE	µg/L	1,304	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Butanone, 4-(Acetyloxy)-	EPA 8260	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Chloroethyl vinyl ether	EPA 8260	NE	NE	µg/L	1,247	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Chlorotoluene	EPA 8260	160	160	µg/L	1,346	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Chlorotoluene	EPA 8260	160	160	µg/L	1,346	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Cyclohexane	EPA 8260	NE	NE	µg/L	3	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Cyclohexane, Methyl-	EPA 8260	NE	NE	µg/L	3	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Acetic Acid, Methyl Ester	EPA 8260	8,000	8,000	µg/L	3	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Acetone	EPA 8260	7,200	7,200	µg/L	1,105	42	4%	2.6	1100	0	0%	0.2	0	0%	0.2	No	No	No	Not identified as a COC
Bromobenzene	EPA 8260	64	64	µg/L	1,304	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bromochloromethane	EPA 8260	NE	NE	µg/L	1,304	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bromoform	EPA 8260	12	55	µg/L	1,307	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bromomethane	EPA 8260	11	11	µg/L	1,307	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
cis-1,3-Dichloropropene	EPA 8260	NE	NE	µg/L	1,301	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dibromochloromethane	EPA 8260	2.2	5.2	µg/L	1,307	1	0%	0.23	0.23	0	0%	0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Dibromomethane	EPA 8260	80	80	µg/L	1,304	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dichlorobromomethane	EPA 8260	2.8	7.1	µg/L	1,307	1	0%	0.98	0.98	0	0%	0.4	0	0%	0.1	No	No	No	Not identified as a COC
Dichlorodifluoromethane	EPA 8260	1,600	1,600	µg/L	1,307	2	0%	1.3	1.3	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Hexachlorobutadiene	EPA 8260	1.0	1.0	µg/L	1,304	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexane	EPA 8260	480	480	µg/L	21	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Methyl Iodide	EPA 8260	NE	NE	µg/L	1,256	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Methylene Chloride	EPA 8260	5.0	5.0	µg/L	1,459	2	0%	3	5.36	1	0%	1.1	1	0%	1.1	No	No	No	Not identified as a COC
trans-1,3-Dichloropropene	EPA 8260	NE	NE	µg/L	1,301	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Trichlorofluoromethane	EPA 8260	2,400	2,400	µg/L	1,307	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Vinyl Acetate	EPA 8260	8,000	8,000	µg/L	912	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Metals																			
Arsenic - Dissolved	EPA 200.7/200.8	8.0	8.0	µg/L	21	1	5%	5.7	5.7	0	0%	0.7	0	0%	0.7	No	No	No	Not retained as a groundwater COC[8]
Arsenic - Total	EPA 200.7/200.8	8.0	8.0	µg/L	34	3	9%	6.2	24	2	6%	**3.0**	2	6%	**3.0**	**Yes**	**Yes**	No	
Barium - Dissolved	EPA 200.7/200.8	2,000	2,000	µg/L	5	2	40%	13	22	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Barium - Total	EPA 200.7/200.8	2,000	2,000	µg/L	25	12	48%	33	110	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Cadmium - Dissolved	EPA 200.7/200.8	5.0	5.0	µg/L	16	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Cadmium - Total	EPA 200.7/200.8	5.0	5.0	µg/L	34	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Chromium - Dissolved	EPA 200.7/200.8	100	100	µg/L	16	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Chromium - Total	EPA 200.7/200.8	100	100	µg/L	34	3	9%	13	28	0	0%	0.3	0	0%	0.3	No	No	No	Not identified as a COC
Lead - Dissolved	EPA 200.7/200.8	8.1	15	µg/L	24	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not retained as a groundwater COC[9]
Lead - Total	EPA 200.7/200.8	8.1	15	µg/L	42	11	26%	1.3	439	4	10%	**54.2**	4	10%	**29.3**	**Yes**	**Yes**	No	
Mercury - Dissolved	EPA 200.7/200.8	1.0	2.0	µg/L	16	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Mercury - Total	EPA 200.7/200.8	1.0	2.0	µg/L	34	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Selenium - Dissolved	EPA 200.7/200.8	50	50	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Selenium - Total	EPA 200.7/200.8	50	50	µg/L	25	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Silver - Dissolved	EPA 200.7/200.8	10	80	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Silver - Total	EPA 200.7/200.8	10	80	µg/L	25	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Polychlorinated Biphenyls (PCBs) Aroclors																			
PCB-Aroclor 1016	EPA 8082	0.1	0.6	µg/L	15	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	See Total PCB Aroclors
PCB-Aroclor 1221	EPA 8082	NE	NE	µg/L	15	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
PCB-Aroclor 1232	EPA 8082	NE	NE	µg/L	15	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
PCB-Aroclor 1242	EPA 8082	NE	NE	µg/L	15	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
PCB-Aroclor 1248	EPA 8082	NE	NE	µg/L	15	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
PCB-Aroclor 1254	EPA 8082	0.1	0.1	µg/L	15	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
PCB-Aroclor 1260	EPA 8082	0.1	0.1	µg/L	15	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
Total PCB Aroclors	EPA 8082	0.1	0.1	µg/L	15	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	Retained as a COC for consistency with MTCA Table 830-1 for Petroleum Releases
Polycyclic Aromatic Hydrocarbons (PAHs)																			
1-Methylnaphthalene	EPA 8270/SIM	1.5	1.5	µg/L	46	2	4%	0.18	0.67	0	0%	0.4	0	0%	0.4	No	No	No	Not identified as a COC
2-Methylnaphthalene	EPA 8270/SIM	32	32	µg/L	46	2	4%	0.27	1.5	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Acenaphthene	EPA 8270/SIM	30	480	µg/L	46	1	2%	0.65	0.65	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Acenaphthylene	EPA 8270/SIM	NE	NE	µg/L	46	1	2%	0.12	0.12	0	0%	n/a	0	0%	n/a	No	No	No	Not identified as a COC
Anthracene	EPA 8270/SIM	100	2,400	µg/L	46	1	2%	0.66	0.66	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Benzo(a)anthracene	EPA 8270/SIM	0.01	NE	µg/L	47	7	15%	0.0095	1.2	0	0%	**120.0**	0	0%	n/a	**Yes**	No	No	See Total cPAH TEQ
Benzo(a)pyrene	EPA 8270/SIM	0.01	0.2	µg/L	47	2	4%	0.012	0.53	0	0%	**53.0**	0	0%	**2.7**	**Yes**	**Yes**	No	See Total cPAH TEQ
Benzo(b)fluoranthene	EPA 8270/SIM	0.01	NE	µg/L	47	3	6%	0.012	1	0	0%	**100.0**	0	0%	n/a	**Yes**	No	No	See Total cPAH TEQ
Benzo(g,h,i)perylene	EPA 8270/SIM	NE	NE	µg/L	46	2	4%	0.017	0.23	0	0%	n/a	0	0%	n/a	No	No	No	Not identified as a COC
Benzo(j,k)fluoranthene	EPA 8270/SIM	0.01	NE	µg/L	46	1	2%	0.35	0.35	0	0%	**35.0**	0	0%	n/a	**Yes**	No	No	See Total cPAH TEQ

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Proposed Groundwater Cleanup Level[2] (PCUL)		Units	Evaluation of Remedial Investigation Data Results[3]												Contaminant of Concern (COC) Selection Considerations			
										Surface Water PCUL Exceedance Evaluation			Drinking Water PCUL Exceedance Evaluation			Groundwater COC Selection Criteria Met[6] (Yes/No)			
		Protection of Surface Water	Protection of Drinking Water		Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (µg/L)	Maximum Detected Concentration (µg/L)	Number of Detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number of detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Protection of Surface Water	Protection of Drinking Water	Groundwater COC (Yes/No)	Comments/ Rationale
Benzo(k)fluoranthene	EPA 8270/SIM	0.01	NE	µg/L	1	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Chrysene	EPA 8270/SIM	0.02	NE	µg/L	47	2	4%	0.029	1.3	0	0%	**81.3**	0	0%	n/a	**Yes**	No	No	See Total cPAH TEQ
Dibenzo(a,h)anthracene	EPA 8270/SIM	0.01	NE	µg/L	47	1	2%	0.076	0.076	0	0%	**7.6**	0	0%	n/a	**Yes**	No	No	See Total cPAH TEQ
Fluoranthene	EPA 8270/SIM	6.0	640	µg/L	46	1	2%	3.9	3.9	0	0%	0.7	0	0%	<0.1	No	No	No	Not identified as a COC
Fluorene	EPA 8270/SIM	10.0	320	µg/L	46	1	2%	0.5	0.5	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Indeno(1,2,3-c,d)pyrene	EPA 8270/SIM	0.01	NE	µg/L	47	2	4%	0.018	0.26	0	0%	**26.0**	0	0%	n/a	**Yes**	No	No	See Total cPAH TEQ
Naphthalene	EPA 8270/SIM	160	160	µg/L	46	2	4%	1.5	2.8	0	0%	<0.1	0	0%	<0.1	No	No	**Yes**	Retained as a COC Based on VOC Result
Phenanthrene	EPA 8270/SIM	NE	NE	µg/L	46	1	2%	1.9	1.9	0	0%	n/a	0	0%	n/a	No	No	No	Not identified as a COC
Pyrene	EPA 8270/SIM	8.0	240	µg/L	46	1	2%	2.8	2.8	0	0%	0.4	0	0%	<0.1	No	No	No	Not identified as a COC
Total cPAH TEQ[10] (ND=0.5RL)	EPA 8270/SIM	0.01	0.2	µg/L	45	7	16%	0.00765	0.8316	0	0%	**83.2**	0	0%	**4.2**	**Yes**	**Yes**	No	Not retained as a groundwater COC[11]
Semi-Volatile Organic Compounds (SVOCs)																			
1,2,4-Trichlorobenzene	EPA 8270	1.0	15.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Dichlorobenzene (1,2-DCB)	EPA 8270	600	600	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Dinitrobenzene	EPA 8270	1.6	1.6	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Diphenylhydrazine	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,3-Dichlorobenzene (1,3-DCB)	EPA 8270	2.0	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,3-Dinitrobenzene	EPA 8270	1.6	1.6	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,4-Dichlorobenzene (1,4-DCB)	EPA 8270	75.0	75.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,4-Dinitrobenzene	EPA 8270	1.6	1.6	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,3,4,6-Tetrachlorophenol	EPA 8270	480	480	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,3,5,6-Tetrachlorophenol	EPA 8270	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,3-Dichloroaniline	EPA 8270	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4,5-Trichlorophenol	EPA 8270	600	1,600	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4,6-Trichlorophenol	EPA 8270	1.0	8.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4-Dichlorophenol	EPA 8270	10	48	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4-Dimethylphenol	EPA 8270	97	320	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4-Dinitrophenol	EPA 8270	32	32	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4-Dinitrotoluene	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,6-Dinitrotoluene	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Chloronaphthalene	EPA 8270	100	640	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Chlorophenol	EPA 8270	17	40	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-methylphenol	EPA 8270	800	800	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Nitroaniline	EPA 8270	160	160	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Nitrophenol	EPA 8270	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
3&4-Methylphenol	EPA 8270	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
3,3'-Dichlorobenzidine	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
3-Nitroaniline	EPA 8270	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4,6-Dinitro-2-Methylphenol	EPA 8270	5.0	5.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Bromophenyl phenyl ether	EPA 8270	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Chloro-3-Methylphenol	EPA 8270	36	1,600	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Chloroaniline	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Chlorophenyl phenyl ether	EPA 8270	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Nitroaniline	EPA 8270	4.4	4.4	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Nitrophenol	EPA 8270	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Aniline	EPA 8270	15	15	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Benzidine	EPA 8270	5.0	5.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Benzyl Alcohol	EPA 8270	1,600	1,600	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bis(2-Chloroethoxy)Methane	EPA 8270	48	48	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bis(2-Chloroethyl)Ether	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bis(2-chloroisopropyl) ether	EPA 8270	900	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bis(2-Ethylhexyl) Phthalate	EPA 8270	1.0	6.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Butyl benzyl Phthalate	EPA 8270	1.0	46.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Carbazole	EPA 8270	NE	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Di(2-ethylhexyl)adipate	EPA 8270	400	400	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dibenzofuran	EPA 8270	8.0	8.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dibutyl Phthalate	EPA 8270	8.0	1,600	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Diethyl Phthalate	EPA 8270	200	13,000	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dimethyl Phthalate	EPA 8270	600	NE	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Di-N-Octyl Phthalate	EPA 8270	160	160	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexachlorobenzene	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexachlorobutadiene	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexachlorocyclopentadiene	EPA 8270	1.0	48	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexachloroethane	EPA 8270	1.0	1.1	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Isophorone	EPA 8270	92	92	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Nitrobenzene	EPA 8270	16	16	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
N-Nitrosodimethylamine	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Proposed Groundwater Cleanup Level[2] (PCUL)		Units	Evaluation of Remedial Investigation Data Results[3]												Contaminant of Concern (COC) Selection Considerations			
										Surface Water PCUL Exceedance Evaluation			Drinking Water PCUL Exceedance Evaluation			Groundwater COC Selection Criteria Met[6] (Yes/No)			
		Protection of Surface Water	Protection of Drinking Water		Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (µg/L)	Maximum Detected Concentration (µg/L)	Number of Detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number of detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Protection of Surface Water	Protection of Drinking Water	Groundwater COC (Yes/No)	Comments/ Rationale
N-Nitrosodi-n-propylamine	EPA 8270	1.0	1.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
N-Nitrosodiphenylamine	EPA 8270	1.0	18	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Pentachlorophenol	EPA 8270	5.0	5.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Phenol	EPA 8270	4,800	4,800	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Pyridine	EPA 8270	8.0	8.0	µg/L	5	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC

Notes:

[1] Contaminants of potential concern (COPCs) were established for the RI based on a review of previous environmental studies. Previous groundwater study results are summarized in Appendix D.

[2] Proposed groundwater cleanup levels are referenced from Table 3-3.

[3] The groundwater data used for this Remedial Investigatino (RI) consist of samples obtained by GeoEngineers and others (Appendix D and H).

[4] Number of samples with analyte detected or non-detect at a concentration greater than PCUL / total number of samples analyzed for analyte.

[5] Exceedance Ratio (max) = ratio of maximum detected or non-detect concentration divided by the Screening Level.

[6] Initial COC selection criteria are met if exceedance frequency is greater or equal to 10 percent or if the exceedance ratio is greater than 2.

[7] EDB was detected at concentrations greater than the PCUL in two temporary wells samples (CR-MW9-12, and CR-MW9-27) completed in 1999 near permanent monitoring well CR-MW9. EDB was not detected in the permanent well CR-MW9. EDB was not identified as a COPC in the Agreed Order. EDB is not considered a groundwater COPC based on analytical data screening. However, EDB was retained for screening groundwater data for consistency with MTCA Table 830-1 for Petroleum Releases.

[8] Arsenic was detected at concentrations greater than the PCUL (5 µg/L)in three wells not located spatially near each other (UG-MW25D [2013, total 6.2 µg/L, dissolved 5.7 µg/L], BL-MW3 [2013, total 8.6 µg/L, dissolved ND], [UG-MW2 (2010, total 24 µg/L]).
Arsenic was not analyzed again in these wells. Arsenic was either not detected or detected at concentrations less than the PCUL in 46 other groundwater samples collected at the University of Washington Tacoma (UWT) Campus including crossgradient and downgradient locations to UG-MW25D, BL-MW3 and UG-MW2. The arsenic PCUL is based on the background level for groundwater in Washington (MTCA Table 720-1). However, groundwater has commonly been impacted with arsenic within the Puget Sound region of the Pacific Northwest due to leaching of arsenic from the rocks and soil based on regional studies performed by the United States Geological Survey (USGS) (USGS Water Supply Paper 94-4082 dated 1995). The results from the USGS studies indicate that arsenic has been detected at elevated concentrations (maximum concentration of 77 µg/L) within the Puget Sound region. Arsenic detected in groundwater in the three wells is possibly related to natural background levels in this area of the Puget Sound region. Arsenic is not considered a COPC to groundwater given the overall groundwater results on the UWT Campus.

[9] Total lead was detected at concentrations greater than the PCUL in three groundwater samples (MER-KSB-25, MER-KSB-24 and MER-KSB-22) collected from temporary wells during a 2008 Phase II ESA at 1920 Fawcett Avenue (parcel 2019100040 MER samples). Dissolved lead was not detected in these three samples. The temporary wells were installed inside hollow-stem auger borings with apparently no sand pack. The elevated lead is likely related to turbidity in the samples. Lead was also either not detected or detected at concentrations less than the PCUL in 53 other groundwater samples collected at the UWT campus including crossgradient and downgradient locations to MER-KSB-25, MER-KSB-24 and MER-KSB-22. Furthermore, University of Washington (UW) does not own the property where these samples were collected. Lead was not identified as a COPC in the Agreed Order. Lead is not considered a groundwater COPC.

[10] Total carcinogenic polycyclic aromatic hydrocarbon (cPAH) toxicity equivalent quotients (TEQs) were calculated using Toxicity Equivalency Factors (TEFs) values referenced from Model Toxics Control Act (MTCA) Table 708.2 (Washington Administrative Code [WAC] 173-340-900).

[11] cPAH TEQs exceed the groundwater PCUL protective of surface water and drinking water in one temporary boring (PLT-B10). cPAH TEQ exceed the groundwater PCUL protective of surface water in one temporary boring (PLT-B14). Borings PLT-B10 and PLT-B14 were collected in the same vicinity during the same sampling event (Prairie Line Trail Capital Project). This PCUL exceedance is attributed to the elevated turbidity observed in the sample and is not considered a true representation of groundwater conditions at this location. Additional monitoring events at PL-MW2 completed between 2016 and 2020 downgradient of locations PLT-B10 did not identify detectable concentrations of cPAHs in groundwater. cPAHs are not considered a COPC for groundwater.

µg/L = micrograms per liter

n/a = not applicable

NE = Not Established

HCID = hydrocarbon Identification

UWT Campus = University of Washington Tacoma Campus

Bold indicated satisfaction of initial COC or consideration of other selection criteria.

Yellow shading indicates analyte is identified as a COC based on both satisfaction of initial selection criteria and consideration of other selection criteria, or on consideration of other selection criteria alone.

Table 4-5

Summary Statistics and Evaluation of Soil Contaminants of Potential Concern

University of Washington - Tacoma Campus
Tacoma, Washington

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Proposed Soil Cleanup Level[2] (PCUL)		Units	Evaluation of Remedial Investigation Data Results[3]												Contaminant of Concern (COC) Selection Considerations			
										Direct Contact and Surface Water PCUL Exceedance Evaluation			Direct Contact and Drinking Water PCUL Exceedance Evaluation			Soil COC Selection Criteria Met[6] (Yes/No)			
		Protection of Direct Contact and Surface Water	Protection of Direct Contact and Drinking water		Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Number of Detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number of detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Protection of Direct Contact and/or Surface Water	Protection of Direct Contact and/or Drinking Water	Soil COC (Yes/No)	Comments/ Rationale
Petroleum Hydrocarbons																				
HCID-Gasoline-Range Hydrocarbons	NWTPH-HCID	30	30	mg/kg	776	27	3%	20	23	0	0%	0.8	0	0%	0.8	No	No	No	See Gasoline-Range
HCID-Diesel-Range Hydrocarbons	NWTPH-HCID	2,000	2,000	mg/kg	776	38	5%	50	250	0	0%	0.1	0	0%	0.1	No	No	No	See Diesel-Range
HCID-Lube Oil-Range Hydrocarbons	NWTPH-HCID	2,000	2,000	mg/kg	776	78	10%	55	337	0	0%	0.2	0	0%	0.2	No	No	No	See Oil-Range
Gasoline-Range Hydrocarbons (TPH-G)	NWTPH-G	30	30	mg/kg	753	103	14%	2	580,000	76	**10%**	**19,333**	76	**10%**	**19,333.3**	**Yes**	**Yes**	**Yes**	Retained as a COC
Diesel-Range Hydrocarbons (TPH-D)	NWTPH-Dx	2,000	2,000	mg/kg	962	249	26%	10.3	25,400	28	3%	**12.7**	28	3%	**12.7**	**Yes**	**Yes**	**Yes**	Retained as a COC
Oil-Range Hydrocarbons (TPH-O)	NWTPH-Dx	2,000	2,000	mg/kg	918	277	30%	25	24,000	21	2%	**12**	21	2%	**12**	**Yes**	**Yes**	**Yes**	Retained as a COC
Benzene, Toluene, Ethylbenzene and Xylene (BTEX) Compounds																				
Benzene	EPA 8021/8260	0.0017	0.0010	mg/kg	2,822	171	6%	0.00088	9,200	135	5%	**5,277,247**	159	6%	**9,200,000**	**Yes**	**Yes**	**Yes**	Retained as a COC
Ethylbenzene	EPA 8021/8260	0.34	0.010	mg/kg	2,822	97	3%	0.00073	6,700	34	1%	**19,706**	67	2%	**670,000**	**Yes**	**Yes**	**Yes**	Retained as a COC
Toluene	EPA 8021/8260	0.27	0.044	mg/kg	2,822	150	5%	0.00047	41,000	23	1%	**151,852**	34	1%	**931,818**	**Yes**	**Yes**	**Yes**	Retained as a COC
Total Xylenes	EPA 8021/8260	0.83	0.055	mg/kg	3,075	115	4%	0.00077	37,000	39	1%	**44,578**	69	2%	**672,727**	**Yes**	**Yes**	**Yes**	Retained as a COC
Volatile Organic Compounds (VOCs)																				
Tetrachloroethylene (PCE)	EPA 8260	0.0028	0.0016	mg/kg	3,271	254	8%	0.00076	26	158	5%	**9,286**	203	6%	**16,250**	**Yes**	**Yes**	**Yes**	Retained as a COC
Trichloroethylene (TCE)	EPA 8260	0.0015	0.0010	mg/kg	3,342	830	25%	0.00067	979	744	**22%**	**652,667**	804	**24%**	**979,000**	**Yes**	**Yes**	**Yes**	Retained as a COC
trans-1,2-Dichloroethylene (trans-DCE)	EPA 8260	0.032	0.032	mg/kg	3,239	74	2%	0.00098	0.29	2	0%	**9.1**	2	0%	**9.1**	**Yes**	**Yes**	**Yes**	Retained as a COC
cis-1,2-Dichloroethylene (cis-DCE)	EPA 8260	0.0052	0.0052	mg/kg	3,306	195	6%	0.00069	0.50	109	3%	**96.2**	109	3%	**96.2**	**Yes**	**Yes**	**Yes**	Retained as a COC
1,1-Dichloroethylene (DCE)	EPA 8260	0.0025	0.0025	mg/kg	3,239	23	1%	0.001	1.27	9	0%	**508.0**	9	0%	**508**	**Yes**	**Yes**	**Yes**	Retained as a COC
Vinyl Chloride	EPA 8260	0.0010	0.0010	mg/kg	3,268	87	3%	0.00088	0.035	77	2%	**35.0**	77	2%	**35**	**Yes**	**Yes**	**Yes**	Retained as a COC
1,1,1-Trichloroethane (TCA)	EPA 8260	0.084	0.084	mg/kg	3,237	11	0%	0.001	0.024	0	0%	0.3	0	0%	0.3	No	No	**Yes**	Groundwater COC, Therefore Retained
1,1-Dichloroethane (DCA)	EPA 8260	0.0026	0.0026	mg/kg	3,237	6	0%	0.0022	0.0038	4	0%	1.5	4	0%	1.5	No	No	**Yes**	Groundwater COC, Therefore Retained
Chloroethane	EPA 8260	NE	NE	mg/kg	3,227	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	Retained as a COC (TCA/DCA degradation product)
1,2,4-Trichlorobenzene	EPA 8260	34	34	mg/kg	3,215	2	0%	0.002	0.0032	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
1,4-Dichlorobenzene (1,4-DCB)	EPA 8260	0.068	0.068	mg/kg	3,224	13	0%	0.001	0.0177	0	0%	0.3	0	0%	0.3	No	No	No	Not identified as a COC
Chlorobenzene	EPA 8260	0.051	0.051	mg/kg	3,250	151	5%	0.00082	684	32	1%	**13,412**	32	1%	**13,412**	**Yes**	**Yes**	**Yes**	Retained as a COC
Carbon Tetrachloride	EPA 8260	14	14	mg/kg	3,228	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Chloroform	EPA 8260	32	32	mg/kg	3,228	7	0%	0.00088	0.2	0	0%	<0.1	0	0%	<0.1	No	No	No	Considered a tracer compound that provides a line of evidence of exfiltration from the sanitary sewer. No historical operation has been identified as a potential source.
Chloromethane	EPA 8260	NE	NE	mg/kg	3,175	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2,4-Trimethylbenzene (1,2,4-TMB)	EPA 8260	0.072	0.072	mg/kg	2,486	46	2%	0.00094	19,000	18	1%	**263,889**	18	1%	**263,889**	**Yes**	**Yes**	**Yes**	Retained as a COC
1,2-Dichloroethane (EDC)	EPA 8260	0.0016	0.0016	mg/kg	3,234	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	Retained as a COC for consistency with MTCA Table 830-1 for Petroleum Releases
1,3,5-Trimethylbenzene (1,3,5-TMB)	EPA 8260	0.071	0.071	mg/kg	2,479	30	1%	0.0011	6,200	14	1%	**87,324**	14	1%	**87,324**	**Yes**	**Yes**	**Yes**	Retained as a COC
2-Hexanone	EPA 8260	400	400	mg/kg	2,351	1	0%	0.011	0.011	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
4-Isopropyltoluene	EPA 8260	NE	NE	mg/kg	2,378	38	2%	0.00082	560	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Carbon Disulfide	EPA 8260	8,000	8,000	mg/kg	2,349	254	11%	0.0006	0.053	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Isopropylbenzene	EPA 8260	8,000	8,000	mg/kg	2,482	37	1%	0.00089	480	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Methyl ethyl ketone (MEK)	EPA 8260	48,000	48,000	mg/kg	2,350	79	3%	0.003	0.11	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Methyl isobutyl ketone	EPA 8260	6,400	6,400	mg/kg	2,327	24	1%	0.0045	0.025	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Methyl tert-butyl ether (MTBE)	EPA 8260	560	560	mg/kg	2,371	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	Retained as a COC for consistency with MTCA Table 830-1 for Petroleum Releases
Naphthalene	EPA 8260	0.24	0.24	mg/kg	2,485	43	2%	0.00092	4,000	15	1%	**16,667**	15	1%	**16,667**	**Yes**	**Yes**	**Yes**	Retained as a COC
n-Butylbenzene	EPA 8260	4,000	4,000	mg/kg	2,432	28	1%	0.0011	3.6	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
n-Propylbenzene	EPA 8260	8,000	8,000	mg/kg	2,470	36	1%	0.00096	1,900	0	0%	0.2	0	0%	0.2	No	No	No	Not identified as a COC
Sec-Butylbenzene	EPA 8260	8,000	8,000	mg/kg	2,407	40	2%	0.00099	230	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Styrene	EPA 8260	16,000	16,000	mg/kg	2,473	5	0%	0.0012	2.7	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Tert-Butylbenzene	EPA 8260	8,000	8,000	mg/kg	2,406	10	0%	0.00093	0.11	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
1,1,1,2-Tetrachloroethane	EPA 8260	38	38	mg/kg	3,165	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,1,2,2-Tetrachloroethane	EPA 8260	5	5	mg/kg	3,174	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,1,2-Trichloro-1,2,2-trifluoroethane (CFC-113)	EPA 8260	2,400,000	2,400,000	mg/kg	3	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,1,2-Trichloroethane	EPA 8260	18	18	mg/kg	3,171	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,1-Dichloropropene	EPA 8260	NE	NE	mg/kg	3,168	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2,3-Trichlorobenzene	EPA 8260	64	64	mg/kg	3,165	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2,3-Trichloropropane	EPA 8260	0.0063	0.0063	mg/kg	3,165	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Dibromo-3-Chloropropane	EPA 8260	0.23	0.23	mg/kg	3,168	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Dichlorobenzene (1,2-DCB)	EPA 8260	7,200	7,200	mg/kg	3,221	19	1%	0.00098	0.053	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
1,2-Dibromoethane (EDB)	EPA 8260	0.50	0.50	mg/kg	3,213	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Dichloropropane	EPA 8260	27	27	mg/kg	3,174	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,3-Dichlorobenzene (1,3-DCB)	EPA 8260	NE	NE	mg/kg	3,174	2	0%	0.001	0.0012	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,3-Dichloropropane	EPA 8260	1,600	1,600	mg/kg	3,165	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,2-Dichloropropane	EPA 8260	NE	NE	mg/kg	3,168	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Chloroethyl vinyl ether	EPA 8260	NE	NE	mg/kg	3,079	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Chlorotoluene	EPA 8260	1,600	1,600	mg/kg	3,166	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Chlorotoluene	EPA 8260	1,600	1,600	mg/kg	3,166	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Acetic Acid, Methyl Ester	EPA 8260	80,000	80,000	mg/kg	3	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Acetone	EPA 8260	72,000	72,000	mg/kg	2,351	610	26%	0.0037	16	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Bromobenzene	EPA 8260	640	640	mg/kg	3,168	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Proposed Soil Cleanup Level[2] (PCUL)		Units	Evaluation of Remedial Investigation Data Results[3]												Contaminant of Concern (COC) Selection Considerations			
										Direct Contact and Surface Water PCUL Exceedance Evaluation			Direct Contact and Drinking Water PCUL Exceedance Evaluation			Soil COC Selection Criteria Met[6] (Yes/No)			
		Protection of Direct Contact and Surface Water	Protection of Direct Contact and Drinking water		Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Number of Detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number of detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Protection of Direct Contact and/or Surface Water	Protection of Direct Contact and/or Drinking Water	Soil COC (Yes/No)	Comments/ Rationale
Bromochloromethane	EPA 8260	NE	NE	mg/kg	3,168	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bromoform	EPA 8260	130	130	mg/kg	3,171	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bromomethane	EPA 8260	110	110	mg/kg	3,179	3	0%	0.59	0.69	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
cis-1,3-Dichloropropene	EPA 8260	NE	NE	mg/kg	3,168	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dibromochloromethane	EPA 8260	12	12	mg/kg	3,171	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dibromomethane	EPA 8260	800	800	mg/kg	3,162	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dichlorobromomethane	EPA 8260	16	16	mg/kg	3,170	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dichlorodifluoromethane	EPA 8260	16,000	16,000	mg/kg	3,171	1	0%	0.0013	0.0013	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Hexachlorobutadiene	EPA 8260	13	13	mg/kg	3,165	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexane	EPA 8260	4,800	4,800	mg/kg	26	1	4%	0.0023	0.0023	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Methyl Iodide	EPA 8260	NE	NE	mg/kg	3,077	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Methylene Chloride	EPA 8260	94	94	mg/kg	3,218	31	1%	0.001	0.31	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
trans-1,3-Dichloropropene	EPA 8260	NE	NE	mg/kg	3,182	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Trichlorofluoromethane	EPA 8260	24,000	24,000	mg/kg	3,171	119	4%	0.0007	0.01	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Vinyl Acetate	EPA 8260	80,000	80,000	mg/kg	2,289	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Polycyclic Aromatic Hydrocarbons (PAHs)																			
1-Methylnaphthalene	EPA 8270/SIM	34	34	mg/kg	767	220	29%	0.006	14	0	0%	0.4	0	0%	0.4	No	No	No	Not identified as a COC
2-Methylnaphthalene	EPA 8260/8270/SIM	320	320	mg/kg	801	250	31%	0.0074	72	0	0%	0.2	0	0%	0	No	No	No	Not identified as a COC
Acenaphthene	EPA 8270/SIM	4,800	4,800	mg/kg	782	114	15%	0.0072	5.5	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Acenaphthylene	EPA 8270/SIM	NE	NE	mg/kg	782	166	21%	0.0072	5.1	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Anthracene	EPA 8270/SIM	24,000	24,000	mg/kg	782	209	27%	0.0076	15	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Benzo(a)anthracene	EPA 8270/SIM	NE	NE	mg/kg	820	317	39%	0.0053	29	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	See Total cPAH TEQ
Benzo(a)pyrene	EPA 8270/SIM	0.19	0.19	mg/kg	856	320	37%	0.0072	21	61	7%	**110.5**	61	7%	**110.5**	**Yes**	**Yes**	**Yes**	See Total cPAH TEQ
Benzo(b)fluoranthene	EPA 8270/SIM	NE	NE	mg/kg	820	331	40%	0.0076	29	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	See Total cPAH TEQ
Benzo(g,h,i)perylene	EPA 8270/SIM	NE	NE	mg/kg	782	296	38%	0.0073	11	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Benzo(j,k)fluoranthene	EPA 8270/SIM	NE	NE	mg/kg	703	207	29%	0.0076	8	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	See Total cPAH TEQ
Benzo(k)fluoranthene	EPA 8270/SIM	NE	NE	mg/kg	117	32	27%	0.0085	12	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Benzofluoranthenes (Total)	EPA 8270/SIM	NE	NE	mg/kg	28	4	14%	0.077	5.8	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Chrysene	EPA 8270/SIM	NE	NE	mg/kg	857	338	39%	0.0078	32	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	See Total cPAH TEQ
Dibenzo(a,h)anthracene	EPA 8270/SIM	NE	NE	mg/kg	820	160	20%	0.0072	4.6	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	See Total cPAH TEQ
Fluoranthene	EPA 8270/SIM	3,200	3,200	mg/kg	821	334	41%	0.0077	46	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Fluorene	EPA 8260/8270/SIM	3,200	3,200	mg/kg	784	146	19%	0.0076	11	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Indeno(1,2,3-c,d)pyrene	EPA 8270/SIM	NE	NE	mg/kg	820	288	35%	0.0052	12	n/a	n/a	n/a	n/a	n/a	n/a	No	No	**Yes**	See Total cPAH TEQ
Naphthalene	EPA 8260/8270/SIM	0.24	0.24	mg/kg	821	279	34%	0.0072	37	52	6%	**154.2**	52	6%	**154**	**Yes**	**Yes**	**Yes**	Retained as a COC
Phenanthrene	EPA 8260/8270/SIM	NE	NE	mg/kg	786	338	43%	0.0074	43	0	0%	n/a	0	0%	n/a	No	No	No	Not identified as a COC
Pyrene	EPA 8270/SIM	2,400	2,400	mg/kg	820	347	42%	0.0073	41	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Total cPAH TEQ (ND=0.5RL)	EPA 8270/SIM	0.19	0.19	mg/kg	857	353	41%	0.0001	30	73	9%	**157.9**	73	9%	**157.9**	**Yes**	**Yes**	**Yes**	Retained as a COC
Semi-Volatile Organic Compounds (SVOCs)																			
1,2,4-Trichlorobenzene	EPA 8270	34	34	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Dichlorobenzene (1,2-DCB)	EPA 8270	7,200	7,200	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Dinitrobenzene	EPA 8270	8	8	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,2-Diphenylhydrazine	EPA 8270	1.3	1.3	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,3-Dichlorobenzene (1,3-DCB)	EPA 8270	NE	NE	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,3-Dinitrobenzene	EPA 8270	8	8	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,4-Dichlorobenzene (1,4-DCB)	EPA 8270	0.068	0.068	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
1,4-Dinitrobenzene	EPA 8270	8	8	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,3,4,6-Tetrachlorophenol	EPA 8270	2,400	2,400	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,3,5,6-Tetrachlorophenol	EPA 8270	NE	NE	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,3-Dichloroaniline	EPA 8270	NE	NE	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4,5-Trichlorophenol	EPA 8270	8,000	8,000	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4,6-Tribromophenol	EPA 8270	NE	NE	mg/kg	0	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4,6-Trichlorophenol	EPA 8270	80	80	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4-Dichlorophenol	EPA 8270	240	240	mg/kg	21	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4-Dimethylphenol	EPA 8270	1,600	1,600	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4-Dinitrophenol	EPA 8270	160	160	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,4-Dinitrotoluene	EPA 8270	3.2	3.2	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2,6-Dinitrotoluene	EPA 8270	0.67	0.67	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Chloronaphthalene	EPA 8270	6,400	6,400	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Chlorophenol	EPA 8270	400	400	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Fluorophenol	EPA 8270	NE	NE	mg/kg	0	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-methylphenol	EPA 8270	4,000	4,000	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Nitroaniline	EPA 8270	800	800	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
2-Nitrophenol	EPA 8270	NE	NE	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
3&4-Methylphenol	EPA 8270	NE	NE	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
3,3'-Dichlorobenzidine	EPA 8270	2.2	2.2	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
3-Nitroaniline	EPA 8270	NE	NE	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4,6-Dinitro-2-Methylphenol	EPA 8270	6.4	6.4	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Bromophenyl phenyl ether	EPA 8270	NE	NE	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Chloro-3-Methylphenol	EPA 8270	8,000	8,000	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Chloroaniline	EPA 8270	5	5	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Chlorophenyl phenyl ether	EPA 8270	NE	NE	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Nitroaniline	EPA 8270	50	50	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4-Nitrophenol	EPA 8270	NE	NE	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Proposed Soil Cleanup Level[2] (PCUL)		Units	Evaluation of Remedial Investigation Data Results[3]												Contaminant of Concern (COC) Selection Considerations			
										Direct Contact and Surface Water PCUL Exceedance Evaluation			Direct Contact and Drinking Water PCUL Exceedance Evaluation			Soil COC Selection Criteria Met[6] (Yes/No)			
		Protection of Direct Contact and Surface Water	Protection of Direct Contact and Drinking water		Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Number of Detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number of detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Protection of Direct Contact and/or Surface Water	Protection of Direct Contact and/or Drinking Water	Soil COC (Yes/No)	Comments/ Rationale
Aniline	EPA 8270	180	180	mg/kg	9	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Benzidine	EPA 8270	2	2	mg/kg	9	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Benzoic Acid	EPA 8270	320,000	320,000	mg/kg	14	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Benzyl Alcohol	EPA 8270	8,000	8,000	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bis(2-Chloroethoxy)Methane	EPA 8270	240	240	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bis(2-Chloroethyl)Ether	EPA 8270	0.91	0.91	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bis(2-chloroisopropyl) ether	EPA 8270	NE	NE	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bis(2-Ethylhexyl) Phthalate	EPA 8270	71	71	mg/kg	32	8	25%	0.065	0.46	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Butyl benzyl Phthalate	EPA 8270	530	530	mg/kg	67	8	12%	0.15	4.5	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Carbazole	EPA 8270	NE	NE	mg/kg	22	1	5%	0.049	0.049	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Cyclohexane	EPA 8270	NE	NE	mg/kg	3	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Cyclohexane, Methyl-	EPA 8270	NE	NE	mg/kg	3	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Di(2-ethylhexyl)adipate	EPA 8270	830	830	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dibenzofuran	EPA 8270	80	80	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dibutyl Phthalate	EPA 8270	8,000	8,000	mg/kg	33	4	12%	0.049	0.099	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Diethyl Phthalate	EPA 8270	64,000	64,000	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dimethyl Phthalate	EPA 8270	NE	NE	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Di-N-Octyl Phthalate	EPA 8270	800	800	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexachlorobenzene	EPA 8270	0.63	0.63	mg/kg	21	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexachlorobutadiene	EPA 8270	13	13	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexachlorocyclopentadiene	EPA 8270	480	480	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Hexachloroethane	EPA 8270	25	25	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Isophorone	EPA 8270	1,100	1,100	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
m,p-Cresol	EPA 8270	NE	NE	mg/kg	0	0	#DIV/0!	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Methylene Chloride	EPA 8270	94	94	mg/kg	10	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Nitrobenzene	EPA 8270	160	160	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
N-Nitrosodimethylamine	EPA 8270	0.033	0.033	mg/kg	9	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
N-Nitrosodi-n-propylamine	EPA 8270	0.14	0.14	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
N-Nitrosodiphenylamine	EPA 8270	200	200	mg/kg	22	1	5%	8.1	8.1	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Pentachlorophenol	EPA 8270	3	3	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Phenol	EPA 8270	24,000	24,000	mg/kg	22	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Pyridine	EPA 8270	80	80	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Metals																			
Aluminum	EPA 6000/7000	80,000	80,000	mg/kg	8	8	100%	11,500	21,700	0	0%	0.3	0	0%	0.3	No	No	No	Not identified as a COC
Antimony	EPA 6000/7000	32	32	mg/kg	9	2	22%	4.7	4.7	0	0%	0.1	0	0%	0.1	No	No	No	Not identified as a COC
Arsenic	EPA 6000/7000	20	20	mg/kg	689	100	15%	0.51	280	9	1%	**14.0**	9	1%	**14.0**	**Yes**	**Yes**	**Yes**	Retained as a COC
Barium	EPA 6000/7000	16,000	16,000	mg/kg	606	602	99%	20	1,700	0	0%	0.1	0	0%	0.1	No	No	No	Not identified as a COC
Beryllium	EPA 6000/7000	160	160	mg/kg	17	8	47%	0.31	0.55	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Cadmium	EPA 6000/7000	80	80	mg/kg	665	76	11%	0.05	530	2	0%	**6.6**	2	0%	**6.6**	**Yes**	**Yes**	**Yes**	Retained as a COC
Calcium	EPA 6000/7000	NE	NE	mg/kg	8	8	100%	4,510	6,590	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Chromium III / Total	EPA 6000/7000	120,000	120,000	mg/kg	642	633	99%	1.6	190	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Chromium VI	EPA 6000/7000	0.38	0.38	mg/kg	15	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Cobalt	EPA 6000/7000	24	24	mg/kg	8	8	100%	8.7	15.2	0	0%	0.6	0	0%	0.6	No	No	No	Not identified as a COC
Copper	EPA 6000/7000	3,200	3,200	mg/kg	17	17	100%	14	156	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Iron	EPA 6000/7000	58,700	58,700	mg/kg	8	8	100%	17,700	48,700	0	0%	0.8	0	0%	0.8	No	No	No	Not identified as a COC
Lead	EPA 6000/7000	250	250	mg/kg	820	428	52%	1.29	14,000	61	7%	**56.0**	61	7%	**56.0**	**Yes**	**Yes**	**Yes**	Retained as a COC
Magnesium	EPA 6000/7000	NE	NE	mg/kg	8	8	100%	4,090	6,430	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Manganese	EPA 6000/7000	3,700	3,700	mg/kg	8	8	100%	284	641	0	0%	0.2	0	0%	0.2	No	No	No	Not identified as a COC
Mercury	EPA 6000/7000	24	24	mg/kg	635	61	10%	0.023	6.5	0	0%	0.3	0	0%	0.3	No	No	No	Not identified as a COC
Nickel	EPA 6000/7000	1,600	1,600	mg/kg	18	17	94%	13	52.6	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Potassium	EPA 6000/7000	NE	NE	mg/kg	8	8	100%	707	1,090	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Selenium	EPA 6000/7000	400	400	mg/kg	607	7	1%	0.993	6.7	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Silver	EPA 6000/7000	400	400	mg/kg	615	3	0%	1.5	4.5	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Sodium	EPA 6000/7000	NE	NE	mg/kg	8	8	100%	245	568	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Thallium	EPA 6000/7000	0.8	0.8	mg/kg	17	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Vanadium	EPA 6000/7000	400	400	mg/kg	8	8	100%	38.2	61.6	0	0%	0.2	0	0%	0.2	No	No	No	Not identified as a COC
Zinc	EPA 6000/7000	24,000	24,000	mg/kg	17	17	100%	18	1,800	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Organophosphorus Compounds																			
Azinphos-methyl	EPA 8141	240	240	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Bolstar (Sulprofos)	EPA 8141	NE	NE	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Chlorpyrifos	EPA 8141	80	80	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Coumaphos	EPA 8141	NE	NE	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Demeton-S	EPA 8141	NE	NE	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Diazinon	EPA 8141	56	56	mg/kg	4	1	25%	0.25	0.25	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Dichlorvos (DDVP)	EPA 8141	3.40	3.40	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dimethoate	EPA 8141	180	180	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Disulfoton (Di-Syston)	EPA 8141	3.2	3.2	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
EPN	EPA 8141	0.8	0.8	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Ethoprop	EPA 8141	NE	NE	mg/kg	4	2	50%	0.039	0.072	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Fensulfothion	EPA 8141	NE	NE	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Fenthion	EPA 8141	NE	NE	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Malathion	EPA 8141	1,600	1,600	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Methyl Parathion	EPA 8141	20	20	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC

Contaminant of Potential Concern[1] (COPC)	Analytical Method	Proposed Soil Cleanup Level[2] (PCUL)		Units	Evaluation of Remedial Investigation Data Results[3]												Contaminant of Concern (COC) Selection Considerations			
										Direct Contact and Surface Water PCUL Exceedance Evaluation			Direct Contact and Drinking Water PCUL Exceedance Evaluation			Soil COC Selection Criteria Met[6] (Yes/No)			
		Protection of Direct Contact and Surface Water	Protection of Direct Contact and Drinking water		Number Samples Analyzed	Number of Detections	Detection Frequency (%)	Minimum Detected Concentration (mg/kg)	Maximum Detected Concentration (mg/kg)	Number of Detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Number of detections > PCUL	Frequency of PCUL Exceedance[4] (%)	Maximum Exceedance Ratio[5] (ER)	Protection of Direct Contact and/or Surface Water	Protection of Direct Contact and/or Drinking Water	Soil COC (Yes/No)	Comments/ Rationale
Mevinphos	EPA 8141	NE	NE	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Monocrotophos	EPA 8141	NE	NE	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Naled	EPA 8141	160	160	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Parathion (ethyl)	EPA 8141	480	480	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Phorate	EPA 8141	16	16	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Ronnel	EPA 8141	4,000	4,000	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Sulfotepp	EPA 8141	40	40	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Tetrachlorvinphos (Gardona)	EPA 8141	42	42	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Tokuthion (Prothiofos)	EPA 8141	NE	NE	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Trichloronate	EPA 8141	NE	NE	mg/kg	4	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Pesticides																			
4,4'-DDD	CLPOLM04.3	4.2	4.2	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
4,4'-DDE	CLPOLM04.3	2.9	2.9	mg/kg	8	1	13%	0.016	0.016	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
4,4'-DDT	CLPOLM04.3	2.9	2.9	mg/kg	10	1	10%	0.017	0.017	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Aldrin	CLPOLM04.3	0.059	0.059	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Alpha-BHC	CLPOLM04.3	0.16	0.16	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Beta-BHC	CLPOLM04.3	0.56	0.56	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
cis-Chlordane	CLPOLM04.3	40	40	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Delta-BHC	CLPOLM04.3	NE	NE	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Dieldrin	CLPOLM04.3	0.063	0.063	mg/kg	8	1	13%	0.0062	0.0062	0	0%	<0.1	0	0%	<0.1	No	No	No	Not identified as a COC
Endosulfan I	CLPOLM04.3	NE	NE	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Endosulfan II	CLPOLM04.3	NE	NE	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Endosulfan Sulfate	CLPOLM04.3	480	480	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Endrin	CLPOLM04.3	24	24	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Endrin Aldehyde	CLPOLM04.3	NE	NE	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Endrin Ketone	CLPOLM04.3	NE	NE	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Gamma-BHC	CLPOLM04.3	0.91	0.91	mg/kg	10	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Heptachlor	CLPOLM04.3	0.22	0.22	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Heptachlor Epoxide	CLPOLM04.3	0.11	0.11	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Methoxychlor	CLPOLM04.3	400	400	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Toxaphene	CLPOLM04.3	0.91	0.91	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
trans-Chlordane	CLPOLM04.3	40	40	mg/kg	8	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	Not identified as a COC
Polychlorinated Biphenyl (PCB) Aroclors																			
PCB-Aroclor 1016	EPA 8082	5.6	5.6	mg/kg	46	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
PCB-Aroclor 1221	EPA 8082	NE	NE	mg/kg	46	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
PCB-Aroclor 1232	EPA 8082	NE	NE	mg/kg	46	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
PCB-Aroclor 1242	EPA 8082	NE	NE	mg/kg	40	2	5%	0.10	0.13	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	See Total PCB Aroclors
PCB-Aroclor 1248	EPA 8082	NE	NE	mg/kg	46	0	0%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	No	No	No	
PCB-Aroclor 1254	EPA 8082	0.5	0.5	mg/kg	49	4	8%	0.06	0.17	0	0%	0.3	0	0%	0.3	No	No	No	
PCB-Aroclor 1260	EPA 8082	0.5	0.5	mg/kg	46	4	9%	0.13	0.20	0	0%	0.4	0	0%	0.4	No	No	No	
Total PCB Aroclors	EPA 8082	0.5	0.5	mg/kg	56	9	16%	0.06	0.32	0	0%	0.6	0	0%	0.6	No	No	**Yes**	Retained as a COC for consistency with MTCA Table 830-1 for Petroleum Releases

Notes:

[1] COPCs were established for the Remedial Investigation (RI) based on a review of previous environmental studies. Previous soil study results are summarized in Appendix D.

[2] Proposed soil cleanup levels are referenced from Tables 3-1 and 3-2 for protection of direct contact and surface water (Table 3-1) or protection of direct contact and groundwater (Table 3-2) for saturated soil.

[3] The soil data used for this RI consist of samples obtained by GeoEngineers and others (Appendix D and I).

[4] Number of samples with analyte detected or non-detect at a concentration greater than PCUL / total number of samples analyzed for analyte.

[5] ER (max) = ratio of maximum detected or non-detect concentration divided by the Screening Level.

[6] Initial COC selection criteria are met if exceedance frequency is greater or equal to 10 percent or if the exceedance ratio is greater than 2.

[7] Total carcinogenic polycyclic aromatic hydrocarbon (cPAH) toxicity equivalent quotients (TEQs) were calculated using Toxicity Equivalency Factors (TEFs) values referenced from Model Toxics Control Act (MTCA) Table 708.2 (Washington Administrative Code [WAC] 173-340-900).

µg/L = micrograms per liter

n/a = not applicable

NE = Not Established

UWT Campus = University of Washington Tacoma Campus

Bold indicated satisfaction of initial COC or consideration of other selection criteria.

Yellow shading indicates analyte is identified as a COC based on both satisfaction of initial selection criteria and consideration of other selection criteria, or on consideration of other selection criteria alone.

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Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Boring
- Test Pit
- Confirmation Sample
- UWT Master Plan Campus Boundary
- Existing Building Footprint
- General Investigation Area (See Table 4-1)
- Approximate Lateral Extent of Remedial Excavation

200 0 200

Feet

Remedial Investigations and Actions Prior to 1997 Agreed Order

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 4-1

Notes:

1. Locations and chemical analytical data sourced from GeoEngineers EQuIS UWT database. 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.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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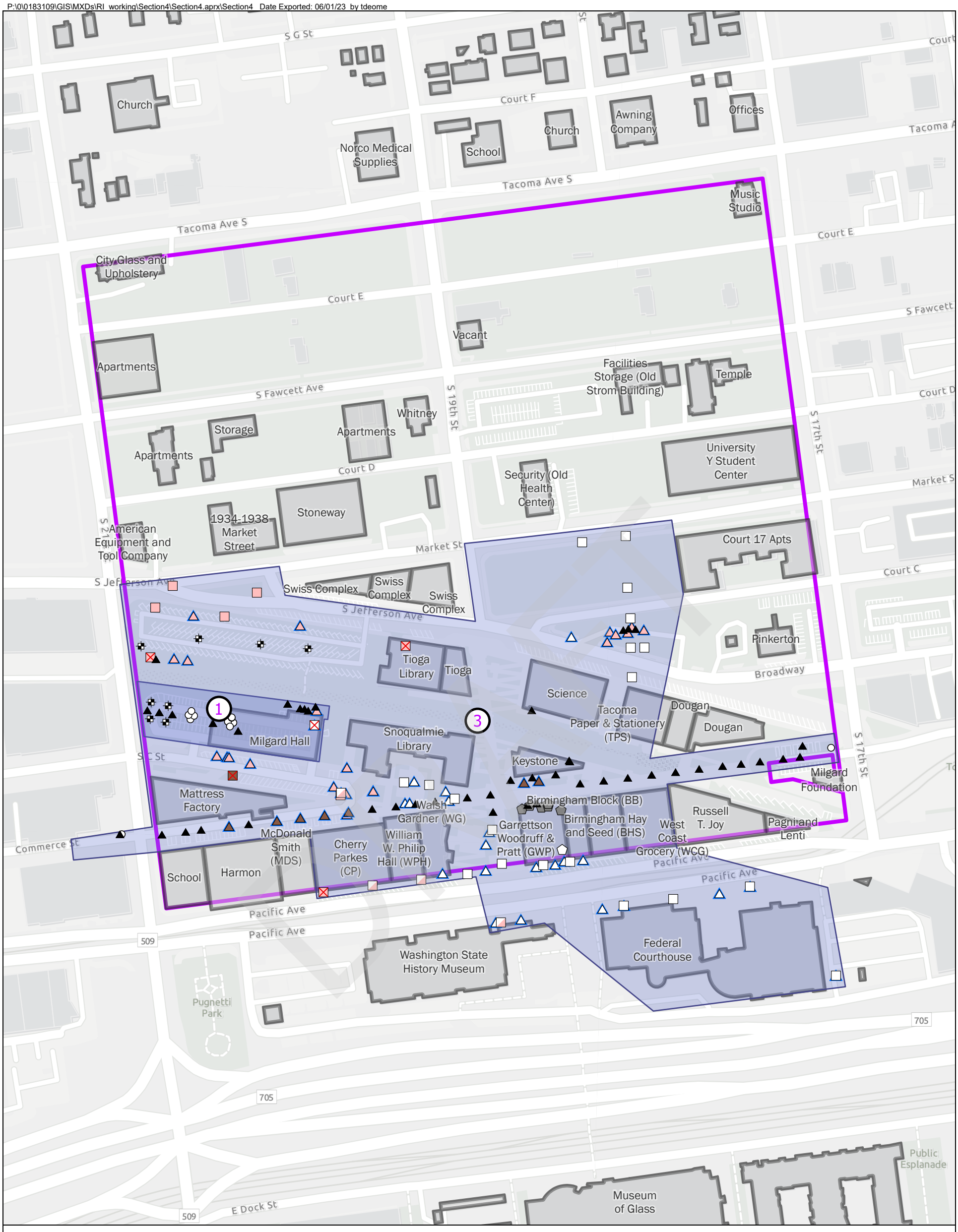

Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Unconfirmed Aquifer Monitoring Well - Decommissioned
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Boring with Grab Groundwater Sample in Qva Aquifer
- Boring with Grab Groundwater Sample in Unconfirmed Aquifer
- Boring
- Test Pit
- Confirmation Sample
- Indoor Air
- Outdoor Air
- UWT Master Plan Campus Boundary
- Existing Building Footprint
- General Investigation Area (See Table 4-1)
- Approximate Lateral Extent of Remedial Excavation

200 0 200

Feet

Notes:

1. Locations and chemical analytical data sourced from GeoEngineers EQuIS UWT database. The locations of all features shown are approximate.
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Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

1997 Agreed Order Remedial Investigations and Actions

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 4-2

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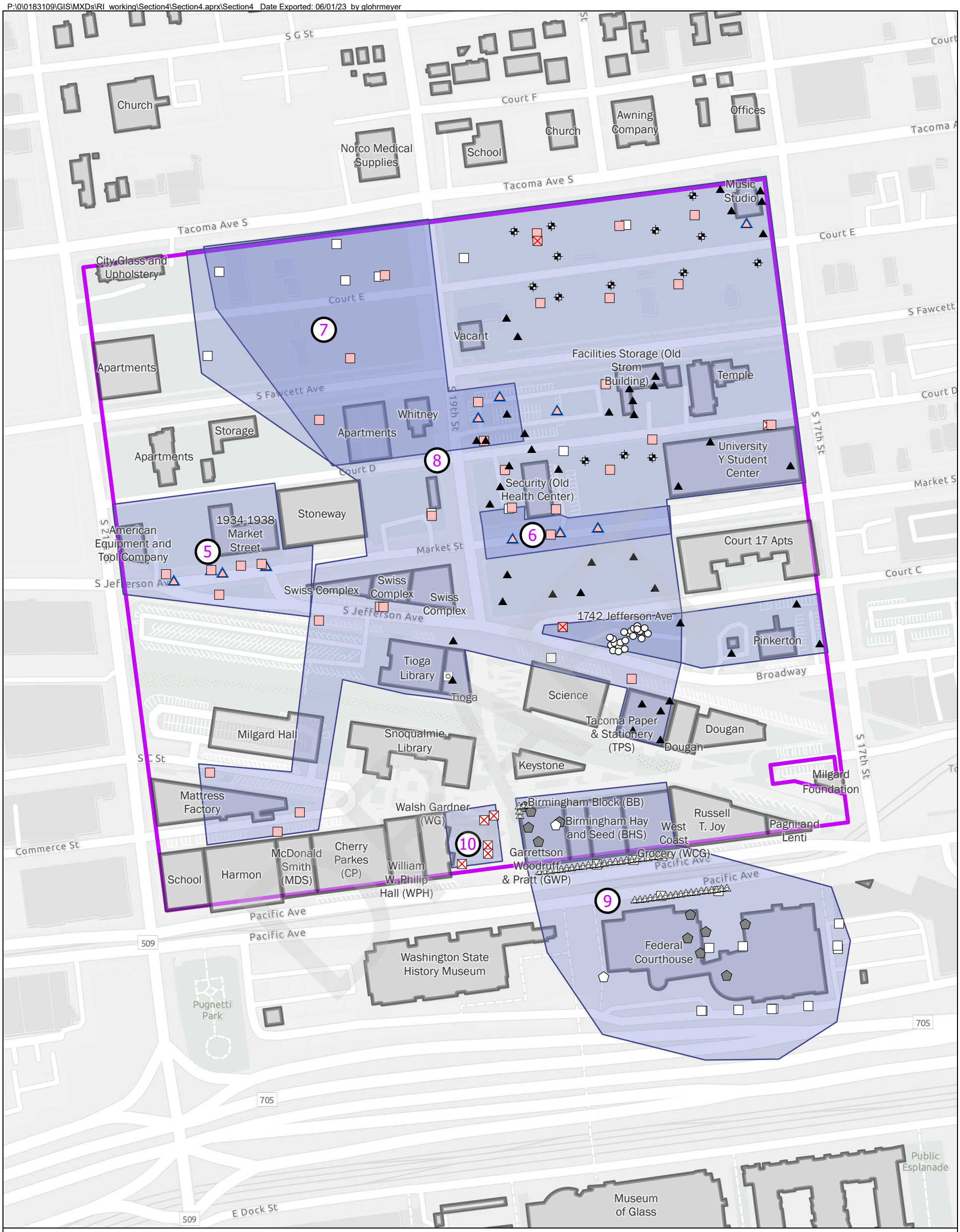

Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Boring
- Injection Boring
- Test Pit
- Confirmation Sample
- Sump
- Indoor Air
- Outdoor Air
- UWT Master Plan Campus Boundary
- Existing Building Footprint
- General Investigation Area (See Table 4-1)
- Approximate Lateral Extent of Remedial Excavation

200 0 200

Feet

Supplemental Remedial Investigations and Actions Under the 1997 Agreed Order

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 4-3

Notes:

1. Locations and chemical analytical data sourced from GeoEngineers EQuIS UWT database. 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.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

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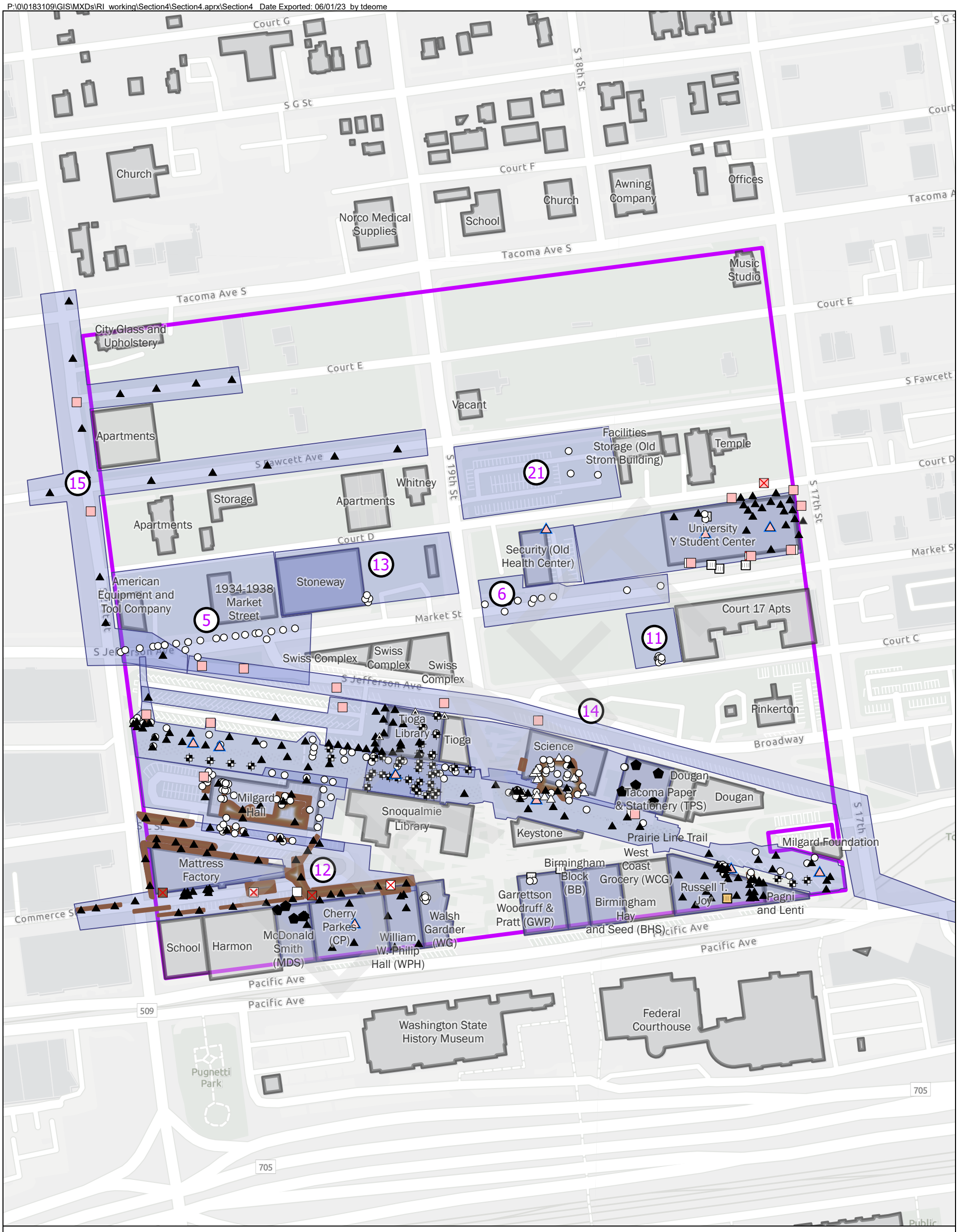

Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well - Decommissioned
- Unconfirmed Aquifer Monitoring Well - Decommissioned
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Boring
- Drilled Shaft During Construction
- Boring Not Completed
- Boring with No Analysis
- Test Pit
- Confirmation Sample
- Building Drain
- Drain
- Subslab Vapor
- UWT Master Plan Campus Boundary
- Existing Building Footprint
- General Investigation Area (See Table 4-1)
- Approximate Lateral Extent of Remedial Excavation

200 0 200

Feet

Notes:

1. Locations and chemical analytical data sourced from GeoEngineers EQuIS UWT database. 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.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Capital Projects

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 4-4

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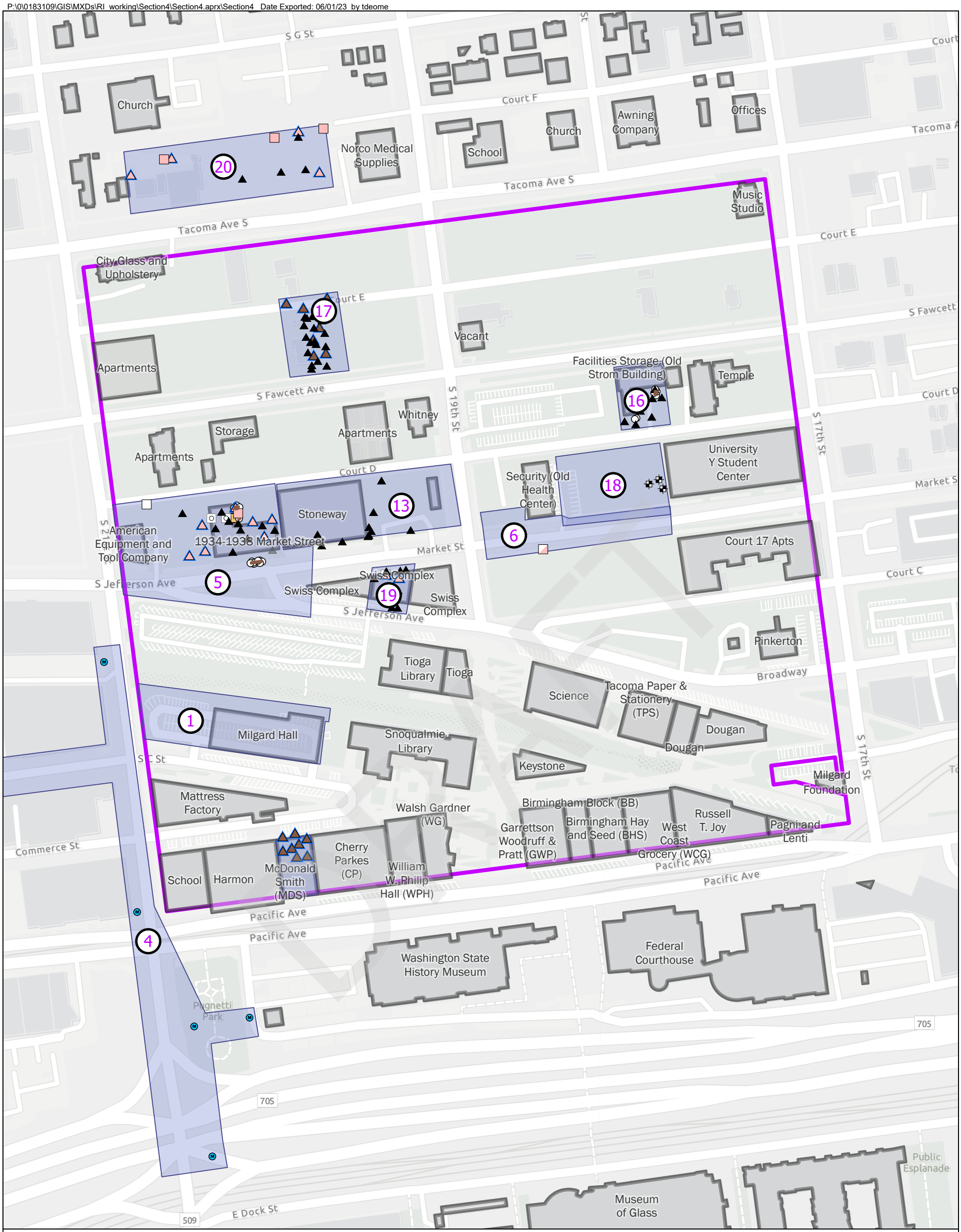

Legend

- Qva Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well
- Qvi/Qva Aquifer Monitoring Well
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Boring with Grab Groundwater Sample in Unconfirmed Aquifer
- Boring
- Boring Not Completed
- Test Pit
- Confirmation Sample
- Drain
- Sump
- Manhole
- UWT Master Plan Campus Boundary
- Existing Building Footprint
- Approximate Lateral Extent of Remedial Excavation
- General Investigation Area (See Table 4-1)

W N E S

200 0 200

Feet

Notes:

1. Locations and chemical analytical data sourced from GeoEngineers EQuIS UWT database. 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.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Environmental Due Diligence

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 4-5

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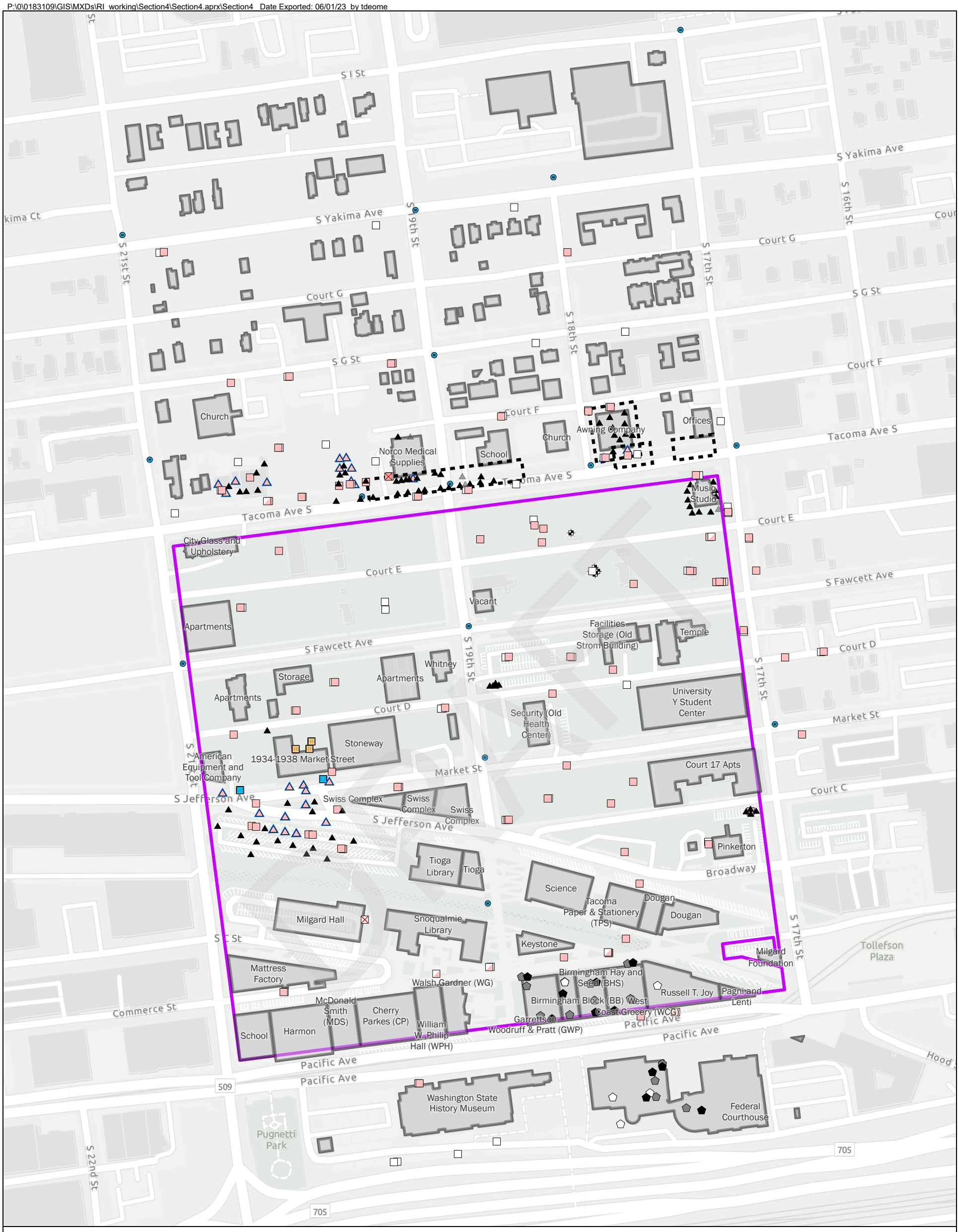

Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Boring
- Boring Not Completed
- Test Pit
- Catch Basin
- Drain
- Manhole
- Indoor Air
- Outdoor Air
- Subslab Vapor
- UWT Master Plan Campus Boundary
- Existing Building Footprint
- Passive Soil Vapor Sampling Test Area

Notes:

1. Locations and chemical analytical data sourced from GeoEngineers EQuIS UWT database. 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.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

W S N E

250 0 250

Feet

2016 Agreed Order Remedial Investigation Sampling Locations

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 4-6

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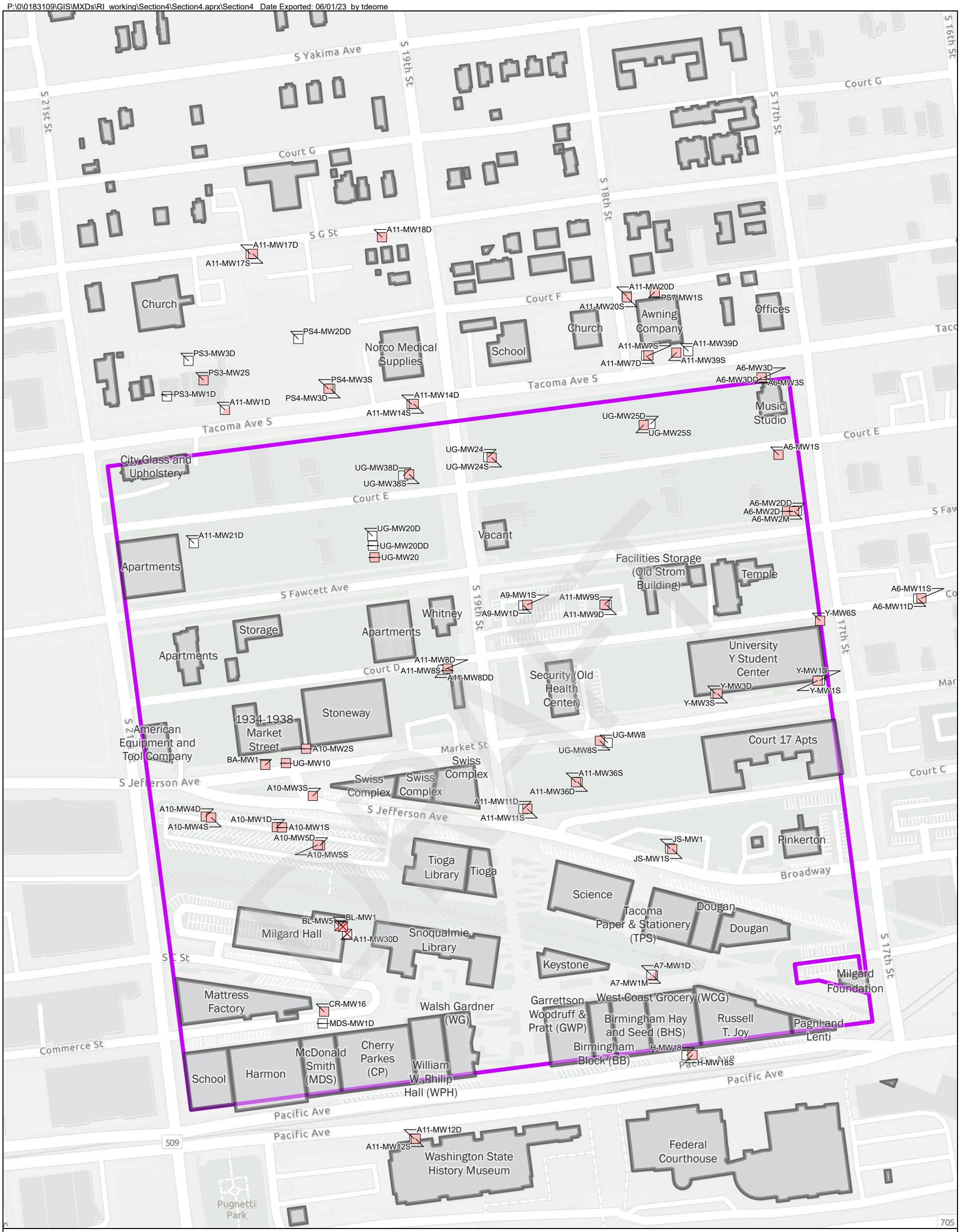


Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- UWT Master Plan Campus Boundary
- Existing Building Footprint

W N S E

200 0 200

Feet

Notes:

1. Locations and chemical analytical data sourced from GeoEngineers EQuIS UWT database. 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.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

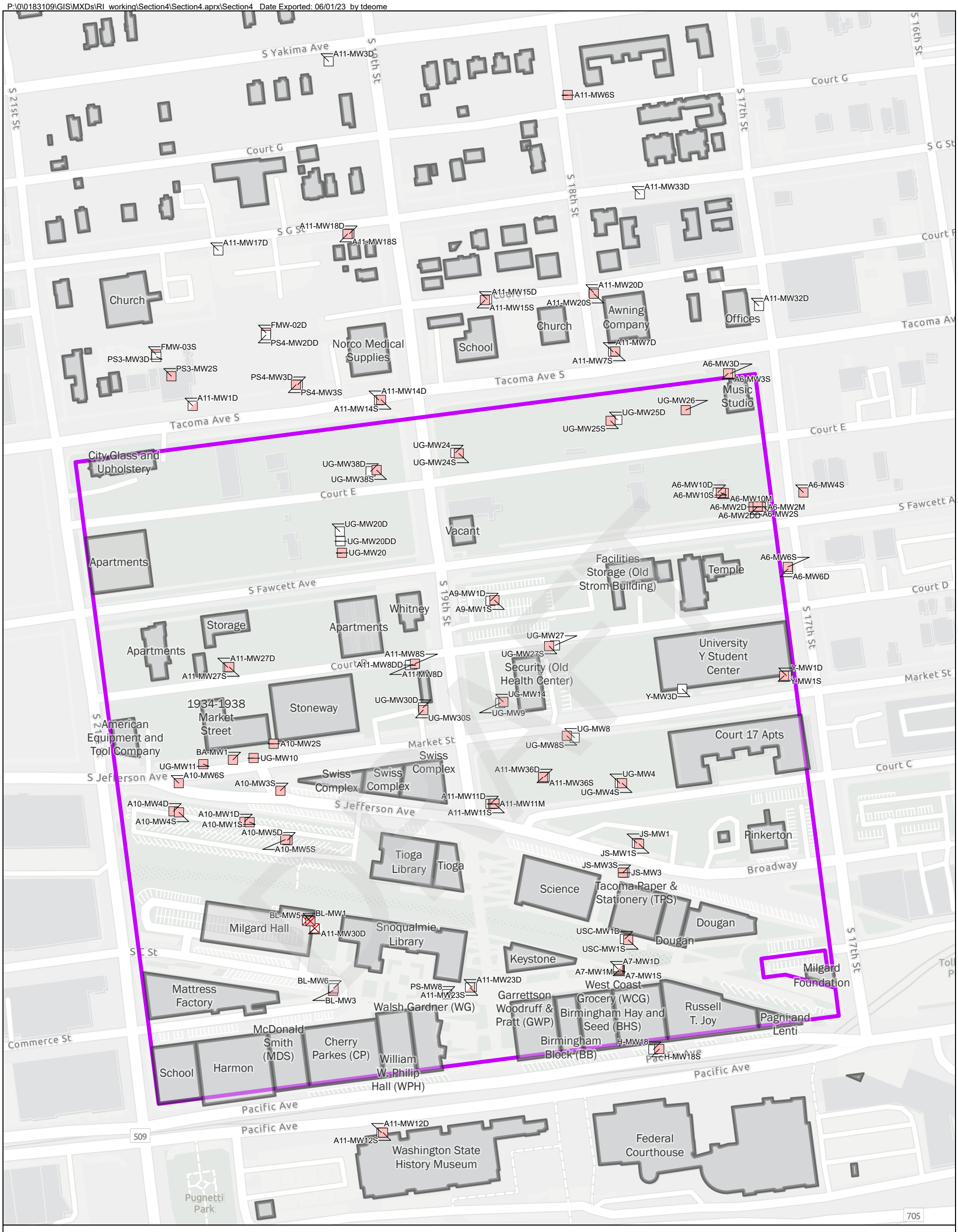
Hydrogeologic Evaluation - Slug Test Locations

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 4-7

P:\0\0183109\GIS\MXDs\RI_working\Section4\Section4.aprx\Section4 Date Exported: 06/01/23 by tdeome



Legend

- Qva Aquifer Monitoring Well
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- UWT Master Plan Campus Boundary
- Existing Building Footprint

Notes:

1. Locations and chemical analytical data sourced from GeoEngineers EQuIS UWT database. 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.

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

200 0 200

Feet

Hydrogeologic Evaluation - Transducer Locations

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 4-8

Table 5-1

Soil Investigation Summary - Cragle

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticides
Pre-1997 Agreed Order Investigation and Remedial Action																				
BL-10-19-B	10/19/93	AGI	Confirmation	Grab	73	--	X	X	X	X	X									
BL-10-19-N	10/19/93	AGI	Confirmation	Grab	73	--	X	X	X	X	X									
BL-10-19-S	10/19/93	AGI	Confirmation	Grab	73	--	X			X										
BL-MW1	07/21/93	AGI	Exploration	HSA	75.05	22.5	X													
BL-MW2	05/26/94	AGI	Exploration	HSA	72	21.5	X													
BL-TP2	03/15/94	AGI	Exploration	Test Pit	73	8	X													
BL-UST-SS-11	03/15/94	AGI	Confirmation	Grab	73	--	X													
BL-UST-SS-12	03/15/94	AGI	Confirmation	Grab	73	--	X													
CR-10-15-East	10/15/93	AGI	Confirmation	Grab	78	--			X	X										
CR-10-15-North	10/15/93	AGI	Confirmation	Grab	78	--			X	X										
CR-10-15-Tank 1	10/15/93	AGI	Confirmation	Grab	78	--	X	X	X	X	X									
CR-10-15-Tank 2	10/15/93	AGI	Confirmation	Grab	78	--	X				X	X	X		X	X				
CR-10-15-Tank 3	10/15/93	AGI	Confirmation	Grab	78	--	X	X	X	X	X									
CR-10-15-West	10/15/93	AGI	Confirmation	Grab	78	--			X	X										
CR-B8	03/31/94	AGI	Exploration	Direct Push	75	18		X	X		X	X	X		X		X	X		X
CR-B9	03/31/94	AGI	Exploration	Direct Push	75	18		X	X		X	X	X		X		X	X		X
CR-MW1	07/21/93	AGI	Exploration	HSA	74.5	21	X	X	X		X									
CR-MW2	07/21/93	AGI	Exploration	HSA	74	15.5	X													
CR-MW3	07/21/93	AGI	Exploration	HSA	79.34	22.5	X													
CR-MW4	07/21/93	AGI	Exploration	HSA	78	22	X	X			X									
CR-MW5	05/26/94	AGI	Exploration	HSA	74.91	18		X	X		X	X	X		X		X			
CR-MW6	05/26/94	AGI	Exploration	HSA	73.24	18	X				X	X	X		X		X			
CR-MW7	05/26/94	AGI	Exploration	HSA	73.03	17	X													
CR-S1	10/12/94	AGI	Confirmation	Grab	73	--		X	X	X	X	X	X	X	X		X			
CR-S2	10/12/94	AGI	Confirmation	Grab	73	--		X	X	X	X						X			
CR-S3	10/12/94	AGI	Confirmation	Grab	74	--		X	X	X	X						X			
CR-S4	10/12/94	AGI	Confirmation	Grab	74	--		X	X	X	X						X			
CR-S5	10/13/94	AGI	Confirmation	Grab	75	--		X	X	X	X						X			
CR-S6	10/13/94	AGI	Confirmation	Grab	73	--		X	X	X	X	X	X	X	X		X			
CR-S7	10/13/94	AGI	Confirmation	Grab	77	--		X	X	X	X						X			
CR-S8	10/14/94	AGI	Confirmation	Grab	75	--		X	X	X	X						X			
CR-S11	10/18/94	AGI	Confirmation	Grab	80	--		X	X	X	X						X			
CR-S12	10/19/94	AGI	Confirmation	Grab	74	--		X	X	X	X	X	X	X	X		X			
CR-S12A	06/28/95	AGI	Confirmation	Grab	74	--		X	X	X										

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticides
CR-S13	10/19/94	AGI	Confirmation	Grab	74	--		X	X	X	X						X			
CR-S14	10/19/94	AGI	Confirmation	Grab	75	--		X	X	X	X						X			
CR-S14A	06/28/95	AGI	Confirmation	Grab	75	--		X	X	X										
CR-S15	10/20/94	AGI	Confirmation	Grab	75	--		X	X	X	X						X			
CR-S15A	06/28/95	AGI	Confirmation	Grab	75	--		X	X	X										
CR-S16	10/20/94	AGI	Confirmation	Grab	76	--		X	X	X	X						X			
CR-S16A	06/28/95	AGI	Confirmation	Grab	76	--		X	X	X										
CR-S17	10/20/94	AGI	Confirmation	Grab	76	--		X	X	X	X						X			
CR-S18	10/20/94	AGI	Confirmation	Grab	77	--		X	X	X	X						X			
CR-S19	10/25/94	AGI	Confirmation	Grab	78	--		X	X	X	X						X			
CR-S20	10/25/94	AGI	Confirmation	Grab	77	--		X	X	X	X						X			
CR-S21	10/25/94	AGI	Confirmation	Grab	80	--		X	X	X	X	X	X	X	X		X			
CR-S23	10/27/94	AGI	Confirmation	Grab	80	--		X	X	X	X						X			
CR-S24	10/27/94	AGI	Confirmation	Grab	80	--		X	X	X	X						X			
CR-S25	10/28/94	AGI	Confirmation	Grab	78	--		X	X	X	X						X			
CR-S26	10/28/94	AGI	Confirmation	Grab	78	--		X	X	X	X						X			
CR-S28	10/28/94	AGI	Confirmation	Grab	80	--		X	X	X	X						X			
CR-S29	10/28/94	AGI	Confirmation	Grab	80	--		X	X	X	X						X			
CR-S30	10/28/94	AGI	Confirmation	Grab	80	--		X	X	X	X						X			
CR-TP-10	03/16/94	AGI	Exploration	Test Pit	77	9	X													
CR-TP-11	03/16/94	AGI	Exploration	Test Pit	79	9.5	X													
CR-TP-12	03/16/94	AGI	Exploration	Test Pit	76	8	X													
CR-TP-13	03/16/94	AGI	Exploration	Test Pit	75	8	X													
CR-W-East	10/13/93	AGI	Confirmation	Grab	75	--	X	X	X	X	X									
CR-W-North	10/13/93	AGI	Confirmation	Grab	75	--	X	X	X		X									
CR-W-South	10/13/93	AGI	Confirmation	Grab	75	--	X	X	X		X									
CR-W-West	10/13/93	AGI	Confirmation	Grab	75	--	X	X	X	X	X	X	X		X	X				
BL-S1	10/01/96	AGI	Confirmation	Grab	73	--			X	X										
BL-S2	10/01/96	AGI	Confirmation	Grab	73	--			X	X										
BL-S3	10/01/96	AGI	Confirmation	Grab	73	--			X	X	X									
BL-S4	10/01/96	AGI	Confirmation	Grab	73	--			X	X										
BL-S5	10/01/96	AGI	Confirmation	Grab	73	--			X	X										
1997 Agreed Order Investigation																				
BL-B1	09/21/00	URS	Exploration	Direct Push	76	12					X		X							
BL-MW5	03/20/00	URS	Exploration	HSA	75.13	43					X		X							
BL-MW6	03/21/00	URS	Exploration	HSA	67.59	38					X		X							
CR-B1	08/25/98	URS	Exploration	Direct Push	85	15			X	X	X	X		X						
CR-B2	08/25/98	URS	Exploration	Direct Push	85	16			X	X	X	X		X						
CR-B3	08/25/98	URS	Exploration	Direct Push	85	16			X	X	X	X		X						
CR-B4	08/25/98	URS	Exploration	Direct Push	80	12		X	X	X										

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticides
CR-B5	08/25/98	URS	Exploration	Direct Push	80	12		X	X	X										
CR-B6	09/21/00	URS	Exploration	Direct Push	75	16					X	X		X						
CR-B7	09/21/00	URS	Exploration	Direct Push	75	12					X	X		X						
CR-C-B1	06/04/98	URS	Exploration	Boring	75	0					X		X	X						
CR-C-B2	06/04/98	URS	Exploration	Boring	75	2.5					X		X	X						
CR-C-B3	06/04/98	URS	Exploration	Boring	76	0					X		X	X						
CR-GW1	08/27/98	URS	Exploration	Direct Push	80	16		X	X	X	X									
CR-GW2	08/26/98	URS	Exploration	Direct Push	77	16		X	X	X	X	X		X						
CR-HPN-B	01/17/97	URS	Confirmation	Grab	80	--			X											
CR-HPN-E	01/17/97	URS	Confirmation	Grab	80	--			X											
CR-NHP2-E	04/14/97	URS	Confirmation	Grab	80	--			X											
CR-HPN-N	01/17/97	URS	Confirmation	Grab	80	--			X											
CR-HPN-S	01/17/97	URS	Confirmation	Grab	80	--			X											
CR-HPN-W	01/17/97	URS	Confirmation	Grab	80	--			X											
CR-NHP2-W	04/14/97	URS	Confirmation	Grab	80	--			X											
CR-HPS-B	01/17/97	URS	Confirmation	Grab	82	--			X											
CR-HPS-E	01/17/97	URS	Confirmation	Grab	82	--			X											
CR-HPS-N	01/17/97	URS	Confirmation	Grab	82	--			X											
CR-HPS-S	01/17/97	URS	Confirmation	Grab	82	--			X											
CR-HPS-W	01/17/97	URS	Confirmation	Grab	82	--			X											
CR-MW9	12/07/94	AGI	Exploration	Sonic	79	20		X	X	X	X	X	X	X						
CR-MW10	09/25/98	URS	Exploration	HSA	77	33		X	X	X	X									
CR-TP1	12/22/97	URS	Exploration	Test Pit	85	6		X	X	X	X									
CR-TP2	12/22/97	URS	Exploration	Test Pit	85	6		X	X	X	X									
CR-TP3	12/22/97	URS	Exploration	Test Pit	85	6		X	X	X	X									
CR-TP4	12/22/97	URS	Exploration	Test Pit	85	6		X	X	X	X									
Supplemental Investigations Under the 1997 Agreed Order																				
CR-MW15	08/28/13	GeoEngineers	Exploration	Sonic	79.84	30	X	X			X	X	X	X	X		X			
2016 Agreed Order Investigation																				
A11-MW30D	06/21/19	GeoEngineers	Exploration	Sonic	74.18	60	X				X	X	X	X	X		X			
Phase IIB Utility Capital Project																				
Phase II B-2	01/30/02	URS	Exploration	Direct Push	84	6		X	X	X	X	X	X	X						
Phase II B-3	01/31/02	URS	Exploration	Direct Push	83	6		X	X	X	X	X	X	X						
Phase II B-4	01/30/02	URS	Exploration	Direct Push	83	6		X	X	X	X	X	X	X						
Phase II B-5	01/30/02	URS	Exploration	Direct Push	82	6		X	X	X	X	X	X	X						
Phase II B-6	01/30/02	URS	Exploration	Direct Push	80	6		X	X	X	X	X	X	X						
Phase II B-7	01/30/02	URS	Exploration	Direct Push	79	6		X	X	X	X	X	X	X						
Phase II B-8	02/04/02	URS	Exploration	Direct Push	83	6		X	X	X	X	X	X	X						
Phase II B-9	02/04/02	URS	Exploration	Direct Push	81	6		X	X	X	X	X	X	X			X			
Phase II B-10	02/04/02	URS	Exploration	Direct Push	79	6		X	X	X	X	X	X	X						

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticides
Phase II B-11	02/04/02	URS	Exploration	Direct Push	77	6		X	X	X	X	X	X	X						
Phase II B-12	02/04/02	URS	Exploration	Direct Push	75	6		X	X	X	X	X	X	X			X			
Phase II B-13	01/31/02	URS	Exploration	Direct Push	72	5		X	X	X	X	X	X	X						
Phase II B-14	01/31/02	URS	Exploration	Direct Push	71	5		X	X	X	X	X	X	X						
Phase II B-15	02/01/02	URS	Exploration	HSA	72	26.5		X	X	X	X	X	X	X						
Prairie Line Trail Capital Project																				
PL-MW2	03/28/13	GeoEngineers	Exploration	Sonic	83.19	26		X	X	X	X	X	X	X	X		X			
Milgard Hall Capital Project																				
MIL-B1	08/12/20	GeoEngineers	Exploration	Direct Push	79	30.75		X	X	X	X	X	X	X	X		X			
MIL-B2	08/12/20	GeoEngineers	Exploration	Direct Push	75	31.5		X	X	X	X	X	X	X	X		X			
MIL-B3	08/12/20	GeoEngineers	Exploration	Direct Push	77	31.5		X	X	X	X	X	X	X	X		X			
MIL-B5	03/23/21	GeoEngineers	Exploration	Direct Push	80	10		X	X	X	X	X	X	X	X		X			
MIL-B6	03/23/21	GeoEngineers	Exploration	Direct Push	77	10		X	X	X	X	X	X	X	X		X			
MIL-B7	03/23/21	GeoEngineers	Exploration	Direct Push	78	10		X			X	X	X	X						
MIL-B8	03/23/21	GeoEngineers	Exploration	Direct Push	82	10		X	X	X	X	X	X	X	X		X			
MIL-B9	03/23/21	GeoEngineers	Exploration	Direct Push	79	20		X	X	X	X	X	X	X						
MIL-B10	03/23/21	GeoEngineers	Exploration	Direct Push	80	25		X	X	X	X	X	X	X	X		X			
MIL-B11	03/23/21	GeoEngineers	Exploration	Direct Push	79	25		X	X	X	X	X	X	X	X		X	X		
MIL-B12	03/23/21	GeoEngineers	Exploration	Direct Push	77	20					X	X	X	X						
MIL-B13	03/23/21	GeoEngineers	Exploration	Direct Push	74	20		X	X	X	X	X	X	X	X		X			
MIL-B14	03/23/21	GeoEngineers	Exploration	Direct Push	71	15		X	X	X	X	X	X	X	X		X			
MIL-A1-CONF-1	08/12/21	GeoEngineers	Confirmation	Grab	73	--					X	X	X	X						
MIL-A1-CONF-2	08/12/21	GeoEngineers	Confirmation	Grab	74	--					X	X	X	X						
MIL-A1-CONF-3	08/12/21	GeoEngineers	Confirmation	Grab	75	--					X	X	X	X						
MIL-A1-CONF-4	08/12/21	GeoEngineers	Confirmation	Grab	74	--					X	X	X	X						
MIL-A1-CONF-5	08/12/21	GeoEngineers	Confirmation	Grab	75	--					X	X	X	X						
MIL-A1-CONF-6	08/12/21	GeoEngineers	Confirmation	Grab	75	--					X	X	X	X						
MIL-A1-CONF-7	08/12/21	GeoEngineers	Confirmation	Grab	80	--					X	X	X	X						
MIL-A2-CONF-1	07/29/21	GeoEngineers	Confirmation	Grab	87	--			X	X	X	X	X	X	X					
MIL-A2-CONF-2	07/29/21	GeoEngineers	Confirmation	Grab	82	--			X	X	X	X	X	X	X					
MIL-A2-CONF-3	07/29/21	GeoEngineers	Confirmation	Grab	82	--			X	X	X	X	X	X	X					
MIL-A2-CONF-4	07/29/21	GeoEngineers	Confirmation	Grab	82	--			X	X	X	X	X	X	X					
MIL-A3-CONF-B	07/27/21	GeoEngineers	Confirmation	Grab	77	--					X	X	X	X						
MIL-A3-CONF-ESW	08/03/21	GeoEngineers	Confirmation	Grab	77	--					X	X	X	X						
MIL-A3-CONF-NSW	08/03/21	GeoEngineers	Confirmation	Grab	77	--					X	X	X	X						
MIL-A3-CONF-SSW	08/03/21	GeoEngineers	Confirmation	Grab	77	--					X	X	X	X						
MIL-A3-CONF-WSW	08/03/21	GeoEngineers	Confirmation	Grab	77	--					X	X	X	X						
MIL-A4-CONF-Base	09/15/21	GeoEngineers	Confirmation	Grab	79	--		X	X	X	X				X					
MIL-A4-CONF-BaseR	08/23/21	GeoEngineers	Confirmation	Grab	78	--		X	X	X	X				X					
MIL-A4-CONF-ESW	09/15/21	GeoEngineers	Confirmation	Grab	78	--		X	X	X	X				X					

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticides
MIL-A4-CONF-ESWR	08/23/21	GeoEngineers	Confirmation	Grab	78	--		X	X	X	X				X					
MIL-A4-CONF-NSW	08/23/21	GeoEngineers	Confirmation	Grab	77	--		X	X	X	X				X					
MIL-A4-CONF-SSW	09/15/21	GeoEngineers	Confirmation	Grab	79	--		X	X	X	X				X					
MIL-A4-CONF-SSWR	08/23/21	GeoEngineers	Confirmation	Grab	79	--		X	X	X	X									
MIL-A4-CONF-WSW	09/15/21	GeoEngineers	Confirmation	Grab	79	--		X	X	X	X				X					
MIL-A4-CONF-WSWR	08/23/21	GeoEngineers	Confirmation	Grab	78	--		X	X	X	X				X					
MIL-A5-CONF-Base	08/19/21	GeoEngineers	Confirmation	Grab	74	--		X	X	X	X									
MIL-A5-CONF-ESW	08/19/21	GeoEngineers	Confirmation	Grab	74	--		X	X	X	X									
MIL-A5-CONF-NSW	08/19/21	GeoEngineers	Confirmation	Grab	73	--		X	X	X	X									
MIL-A5-CONF-SSW	08/19/21	GeoEngineers	Confirmation	Grab	75	--		X	X	X	X									
MIL-A5-CONF-WSW	08/19/21	GeoEngineers	Confirmation	Grab	74	--		X	X	X	X									
MIL-GL13/F-3	11/02/21	GeoEngineers	Confirmation	Grab	80	--		X	X	X	X	X	X	X	X					
MIL-GL15.5/FG-NSW	10/14/21	GeoEngineers	Confirmation	Grab	80	--			X	X					X					
MIL-GL15.5/H-NSW	10/14/21	GeoEngineers	Confirmation	Grab	81	--			X	X										
MIL-GL15/A-CONF	09/13/21	GeoEngineers	Confirmation	Grab	80	--		X	X	X	X									
MIL-GL16.5/FG-SSW	10/14/21	GeoEngineers	Confirmation	Grab	81	--			X	X										
MIL-GL16.5/H-SSW	10/14/21	GeoEngineers	Confirmation	Grab	82	--			X	X										
MIL-GL16/E-Base	10/12/21	GeoEngineers	Confirmation	Grab	81	--		X	X	X	X	X	X	X	X					
MIL-GL16/E-SSW	10/12/21	GeoEngineers	Confirmation	Grab	81	--			X	X					X					
MIL-GL16/FG-Base	10/14/21	GeoEngineers	Confirmation	Grab	81	--			X	X					X					
MIL-GL16/H-Base	10/14/21	GeoEngineers	Confirmation	Grab	81	--		X	X	X	X	X	X	X	X					
MIL-GL16/H-ESW	10/07/21	GeoEngineers	Confirmation	Grab	81	--		X	X	X	X	X	X	X						
MIL-GL16/H-SSW	10/07/21	GeoEngineers	Confirmation	Grab	81	--		X	X	X	X	X	X	X						
MIL-GL16/H-WSW	10/14/21	GeoEngineers	Confirmation	Grab	81	--		X	X	X	X	X	X	X						
MIL-SD-B1	12/13/21	GeoEngineers	Confirmation	Grab	83	--			X	X					X					
MIL-SD-NSW1	12/13/21	GeoEngineers	Confirmation	Grab	83	--			X	X					X					
MIL-SD-SSW1	12/14/21	GeoEngineers	Confirmation	Grab	83	--			X	X					X					
MIL-SD-SSW2	12/13/21	GeoEngineers	Confirmation	Grab	83	--			X	X					X					
MIL-SD-WSW1	12/13/21	GeoEngineers	Confirmation	Grab	84	--			X	X					X					
MIL-STORMDRAIN	12/01/21	GeoEngineers	Confirmation	Grab	83	--		X	X	X	X	X	X	X	X					

Notes:

[1] Sample locations are shown on Figures 5-4 through 5-6.

[2] Ground surface elevation is based on estimates from topographic surveys, Pierce County Light Detection and Range (LiDAR) 2010 Survey or individual surveys for a monitoring well. Select wells were modified over time during construction. The current elevation is shown. See surveys and summary of changes in Appendix K.

[3] Chemical analytical results associated with Cragle are summarized in Table 5-5. Chemical analytical results associated with other areas or concern and area-wide groundwater plumes are presented in other report sections as referenced in the text.

AGI = AGI Technologies
BTEX = benzene, toluene, ethylbenzene and xylenes
CVOCs = chlorinated volatile organic compounds
HSA = hollow stem auger
NGVD29 = National Geodetic Vertical Datum of 1929
PAHs = polycyclic aromatic hydrocarbons
PCBs = polychlorinated biphenyl Aroclors
SVOCs = semi-volatile organic compounds
TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil
TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification
URS = United Research Services Corporation (formerly)
VOCs = volatile organic compounds

Table 5-2

Groundwater Investigation Summary - Cragle

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Date	Sampled By	Monitoring Well Type[2]	Groundwater Unit	Schedule of Analysis[3]												
					Petroleum Hydrocarbons				VOCs								
					TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	Dissolved Gases	PAHs	SVOCs	Metals	PCBs
Pre-1997 Agreed Order Investigation and Remedial Action																	
BL-MW1	06/11/93	AGI	Permanent	Qvi		X	X		X								
BL-MW1	04/07/94	AGI	Permanent	Qvi		X	X										
BL-MW2	04/01/94	AGI	Permanent	Qvi		X	X										
CR-MW1	06/11/93	AGI	Permanent	Qvi		X	X		X								
CR-MW1	04/07/94	AGI	Permanent	Qvi		X	X		X	X	X	X					
CR-MW2	06/11/93	AGI	Permanent	Qvi		X	X		X								
CR-MW3	06/11/93	AGI	Permanent	Qvi		X	X		X								
CR-MW3	04/07/94	AGI	Permanent	Qvi		X	X		X	X	X	X					
CR-MW4	06/11/93	AGI	Permanent	Qvi		X	X		X								
CR-MW4	04/07/94	AGI	Permanent	Qvi		X	X		X	X	X	X					
CR-MW5	04/06/94	AGI	Permanent	Qvi		X	X		X	X	X	X					
CR-MW6	04/06/94	AGI	Permanent	Qvi		X	X		X	X	X	X					
CR-MW7	04/06/94	AGI	Permanent	Qvi		X	X		X	X	X	X					
1997 Agreed Order Investigation																	
BL-GW1	08/26/98	URS	Temporary	Qvi		X	X	X	X	X	X	X					
BL-GW2	08/26/98	URS	Temporary	Qvi		X	X	X	X	X	X	X					
BL-GW3_TW1	09/14/99	URS	Temporary	Qvi					X	X	X	X					
BL-GW3_TW2	09/15/99	URS	Temporary	Qvi					X	X	X	X					
BL-GW5	09/14/99	URS	Temporary	Qvi					X	X	X	X					
BL-MW1	10/26/98	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW1	01/12/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW1	03/26/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW1	04/20/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW1	09/08/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW1	04/05/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW1	09/07/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW3	10/23/98	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW3	01/12/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW3	04/20/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW3	09/08/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW3	04/05/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW3	09/05/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW5	04/07/00	URS	Permanent	Qva		X	X	X	X	X	X	X					
BL-MW5	09/07/00	URS	Permanent	Qva		X	X	X	X	X	X	X					

Sample Location[1]	Sample Date	Sampled By	Monitoring Well Type[2]	Groundwater Unit	Schedule of Analysis[3]												
					Petroleum Hydrocarbons				VOCs								
					TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	Dissolved Gases	PAHs	SVOCs	Metals	PCBs
BL-MW5_TW1	03/20/00	URS	Temporary	Qvi					X	X	X						
BL-MW5_TW2	03/20/00	URS	Temporary	Qvi					X	X	X						
BL-MW5_TW3	03/20/00	URS	Temporary	Qvi					X	X	X						
BL-MW6	04/05/00	URS	Permanent	Qvi/Qva		X	X	X	X	X	X	X					
BL-MW6	09/05/00	URS	Permanent	Qvi/Qva		X	X	X	X	X	X	X					
BL-MW6_TW1	03/21/00	URS	Temporary	Qvi					X	X	X						
BL-MW6_TW2	03/21/00	URS	Temporary	Qvi					X	X	X						
CR-B6	09/21/00	URS	Temporary	Qvi					X	X	X	X					
CR-GW1	08/27/98	URS	Temporary	Qvi		X	X	X	X	X	X	X					
CR-GW2	08/26/98	URS	Temporary	Qvi		X	X	X	X	X	X	X					
CR-MW3	10/22/98	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW3	01/12/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW3	04/21/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW3	09/08/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW3	04/04/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW3	09/08/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW5	10/22/98	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW5	01/11/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW5	04/21/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW5	09/07/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW6	10/22/98	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW6	01/11/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW6	04/21/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW6	09/07/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW7	10/22/98	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW7	01/11/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW7	04/21/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW7	09/07/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW7	04/04/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW7	09/07/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	10/23/98	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	01/11/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	04/21/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	09/07/99	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	04/04/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	09/07/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW9	04/04/00	URS	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW9-TW1	03/26/99	URS	Temporary	Qvi		X	X	X	X	X	X	X					
CR-MW9-TW2	03/26/99	URS	Temporary	Qvi		X	X	X	X	X	X	X					
CR-MW10	10/22/98	URS	Permanent	Unconfirmed		X	X	X	X	X	X	X					

Sample Location[1]	Sample Date	Sampled By	Monitoring Well Type[2]	Groundwater Unit	Schedule of Analysis[3]												
					Petroleum Hydrocarbons				VOCs								
					TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	Dissolved Gases	PAHs	SVOCs	Metals	PCBs
CR-MW10	01/11/99	URS	Permanent	Unconfirmed		X	X	X	X	X	X	X					
CR-MW10	04/21/99	URS	Permanent	Unconfirmed		X	X	X	X	X	X	X					
CR-MW10	09/07/99	URS	Permanent	Unconfirmed		X	X	X	X	X	X	X					
CR-MW10	04/04/00	URS	Permanent	Unconfirmed		X	X	X	X	X	X	X					
CR-MW10	09/07/00	URS	Permanent	Unconfirmed		X	X	X	X	X	X	X					
Supplemental Investigations Under the 1997 Agreed Order																	
BL-MW1	07/09/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW3	09/11/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X		X		X	
BL-MW5	07/09/13	GeoEngineers	Permanent	Qva		X	X	X	X	X	X	X					
BL-MW6	07/11/13	GeoEngineers	Permanent	Qvi/Qva		X	X	X	X	X	X	X					
CR-MW3	07/09/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW5	07/09/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW6	07/09/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	07/02/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW9	07/08/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW15	09/05/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X		X		X	
PL-MW2	07/10/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
2016 Agreed Order Investigation																	
A11-MW30D	09/04/19	GeoEngineers	Permanent	Qva					X	X	X	X					
A11-MW30D	03/11/20	GeoEngineers	Permanent	Qva		X	X	X	X	X	X	X	X				
A11-MW30D	09/01/20	GeoEngineers	Permanent	Qva		X	X	X	X	X	X	X	X				
BL-MW1	12/21/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
BL-MW1	03/12/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
BL-MW1	09/04/19	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW1	03/11/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X	X				
BL-MW1	09/01/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X	X				
BL-MW3	12/22/16	GeoEngineers	Permanent	Qvi						X	X	X					
BL-MW3	03/13/19	GeoEngineers	Permanent	Qvi						X	X	X					
BL-MW3	09/04/19	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW3	03/13/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW3	09/02/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
BL-MW5	12/21/16	GeoEngineers	Permanent	Qva		X			X	X	X	X					
BL-MW5	03/25/19	GeoEngineers	Permanent	Qva		X			X	X	X	X					
BL-MW5	09/04/19	GeoEngineers	Permanent	Qva		X	X	X	X	X	X	X					
BL-MW5	03/11/20	GeoEngineers	Permanent	Qva		X	X	X	X	X	X	X	X				
BL-MW5	09/01/20	GeoEngineers	Permanent	Qva		X	X	X	X	X	X	X	X				
BL-MW6	12/22/16	GeoEngineers	Permanent	Qvi/Qva						X	X	X					
BL-MW6	03/13/19	GeoEngineers	Permanent	Qvi/Qva						X	X	X					
BL-MW6	09/04/19	GeoEngineers	Permanent	Qvi/Qva		X	X	X	X	X	X	X					
BL-MW6	03/13/20	GeoEngineers	Permanent	Qvi/Qva		X	X	X	X	X	X	X					

Sample Location[1]	Sample Date	Sampled By	Monitoring Well Type[2]	Groundwater Unit	Schedule of Analysis[3]												
					Petroleum Hydrocarbons				VOCs								
					TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	Dissolved Gases	PAHs	SVOCs	Metals	PCBs
BL-MW6	09/02/20	GeoEngineers	Permanent	Qvi/Qva		X	X	X	X	X	X	X					
CR-MW3	12/20/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW3	03/12/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW3	09/04/19	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW3	03/13/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW3	09/01/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW5	12/22/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW5	03/25/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW5	09/04/19	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW5	03/13/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW5	09/01/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW6	12/22/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW6	03/25/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW6	09/04/19	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW6	03/13/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW6	09/01/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	12/21/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW8	03/25/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW8	09/04/19	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	03/13/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW8	09/01/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW9	12/21/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW9	03/25/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW9	09/04/19	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW9	03/19/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X	X				
CR-MW9	09/01/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X	X				
CR-MW15	12/28/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW15	03/14/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW15	09/04/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
CR-MW15	03/13/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
CR-MW15	09/01/20	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
PL-MW2	12/20/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X		X			
PL-MW2	03/25/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X		X			
PL-MW2	09/04/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X		X			
PL-MW2	03/13/20	GeoEngineers	Permanent	Qvi		X			X	X	X	X					X
PL-MW2	09/01/20	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
Prairie Line Trail Capital Project																	
PL-MW2	04/01/13	GeoEngineers	Permanent	Qvi		X	X	X	X		X	X					

Notes:

[1] Sample locations are shown on Figures 5-4 through 5-6. TW# was added to the end of select temporary wells where groundwater samples were collected at two depth intervals in the same location.

[2] Ground surface elevation is based on estimates from topographic surveys, Pierce County Light Detection and Range (LiDAR) 2010 Survey or individual surveys for a monitoring well. Select wells were modified over time during construction. The current elevation is shown. See surveys and summary of changes in Appendix K.

[3] Chemical analytical results associated with Cragle are summarized in Table 5-6. Chemical analytical results associated with other Areas of Concern and area-wide groundwater plumes are presented in other report sections as referenced in the text.

NGVD29 = National Geodetic Vertical Datum of 1929

AGI = AGI Technologies

BTEX = benzene, toluene, ethylbenzene and xylenes

CVOCs = chlorinated volatile organic compounds

PAHs = polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyl Aroclors

Qva = Vashon advance outwash

Qvi = Vashon ice-contact deposits

SVOCs = semi-volatile organic compounds

TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil

TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification

URS = United Research Services Corporation (formerly)

VOCs = volatile organic compounds

Table 5-3

Soil Vapor and Indoor/Outdoor Air Investigation Summary - Cragle

University of Washington - Tacoma Campus

Tacoma, Washington

Location Identification[1]	Sample Identification	General Location/Area	Sample Date	Sampled By	Sample Method	Schedule of Analysis[3]				
							VOCs			
						TPH	BTEX	Petroleum VOCs	CVOCs	Other VOCs
Milgard Hall Capital Project										
MIL-SSA1	MIL-SSA1-20221229	Milgard Hall	12/29/22	GeoEngineers	Sub-Slab	X	X	X	X	
MIL-IA1	MIL-IA1-20221229	Milgard Hall	12/29/22	GeoEngineers	Indoor Air	X	X	X	X	
MIL-IA2	MIL-IA2-20221229	Milgard Hall	12/29/22	GeoEngineers	Indoor Air	X	X	X	X	
MIL-OA1	MIL-OA1-20221229	Milgard Hall	12/29/22	GeoEngineers	Outdoor Air	X	X	X	X	
MIL-OA2	MIL-OA2-20221229	Milgard Hall	12/29/22	GeoEngineers	Outdoor Air	X	X	X	X	

Notes:

[1] Sample locations are shown on Figure 5-6.

[2] Chemical analytical results associated with Cragle are summarized in Table 5-7.

BTEX = benzene, toluene, ethylbenzene and xylenes

CVOCs = chlorinated volatile organic compounds

TPH = total petroleum hydrocarbons

VOCs = volatile organic compounds

Table 5-4

Well Construction Details - Cragle

University of Washington - Tacoma Campus

Tacoma, Washington

Well Identification[1]	Well Construction Date	Installed By	Ground Surface Elevation[2] (feet NGVD29)	Top of Casing Elevation (feet NGVD29)[2]	Top of Well Screen (feet bgs)	Bottom of Well Screen (feet bgs)	Top of Well Screen Elevation (feet NGVD29)	Bottom of Well Screen Elevation (feet NGVD29)	Lithology Across Well Screen Interval	Well Status	Well Type
Pre-1997 Agreed Order Investigation and Remedial Action											
BL-MW1	07/21/93	AGI	75	74.69	8	23	67	52	Qvi	Decommissioned	Permanent
BL-MW2	05/26/94	AGI	72	71.01	10	20	61	51	Qvi	Decommissioned	Permanent
CR-MW1	07/21/93	AGI	75	74.25	5	20	69	54	Qvi	Decommissioned	Permanent
CR-MW2	07/21/93	AGI	74	73.86	5	15	69	59	Qvi	Decommissioned	Permanent
CR-MW3	07/21/93	AGI	79	78.56	8	23	71	56	Qvi	Decommissioned	Permanent
CR-MW4	07/21/93	AGI	78	77.53	7	22	71	56	Qvi	Decommissioned	Permanent
CR-MW5	05/26/94	AGI	75	74.13	8	18	66	56	Qvi	Decommissioned	Permanent
CR-MW6	05/26/94	AGI	73	72.83	8	18	65	55	Qvi	Existing	Permanent
CR-MW7	05/26/94	AGI	73	72.16	7	17	65	55	Qvi	Decommissioned	Permanent
CR-MW8	12/07/94	AGI	77	76.28	5	18	71	58	Qvi	Existing	Permanent
CR-MW9	12/07/94	AGI	79	78.25	7	20	71	58	Qvi	Decommissioned	Permanent
1997 Agreed Order Investigation											
BL-GW1	08/26/98	URS	70	--	16	19	54	51	Qvi	Decommissioned	Temporary
BL-GW2	08/26/98	URS	69	--	19	22	50	47	Qvi	Decommissioned	Temporary
BL-GW3_TW1	09/14/99	URS	68	--	14	17	54	51	Qvi	Decommissioned	Temporary
BL-GW3_TW2	09/15/99	URS	68	--	20	22	48	46	Qvi	Decommissioned	Temporary
BL-GW5	03/20/00	URS	66	--	21	23	45	43	Qvi	Decommissioned	Temporary
BL-MW3	09/11/98	URS	67.59	66.74	10	25	57	42	Qvi	Existing	Permanent
BL-MW5	03/20/00	URS	75.13	74.71	38	43	37	32	Qva	Decommissioned	Permanent
BL-MW5_TW1	03/20/00	URS	77	--	21	25	56	52	Qvi	Decommissioned	Temporary
BL-MW5_TW2	03/20/00	URS	77	--	31	35	46	42	Qvi	Decommissioned	Temporary
BL-MW5_TW3	03/20/00	URS	77	--	41	45	36	32	Qvi	Decommissioned	Temporary
BL-MW6	03/21/00	URS	67.59	67.09	33	38	34	29	Qvi/Qva	Existing	Permanent
BL-MW6_TW1	03/21/00	URS	68	--	21	25	47	43	Qvi	Decommissioned	Temporary
BL-MW6_TW2	03/21/00	URS	68	--	34	38	34	30	Qvi	Decommissioned	Temporary
CR-B6	09/21/00	URS	75	--	13	16	62	59	Qvi	Decommissioned	Temporary
CR-GW1	08/27/98	URS	80	--	13	16	67	64	Qvi	Decommissioned	Temporary
CR-GW2	08/26/98	URS	77	--	13	16	64	61	Qvi	Decommissioned	Temporary
CR-MW9-TW1	03/26/99	URS	79	--	12	14	67	65	Qvi	Decommissioned	Temporary
CR-MW9-TW2	03/26/99	URS	79	--	27	29	52	50	Qvi	Decommissioned	Temporary
CR-MW10	09/25/98	URS	77	76.95	18	33	59	44	Unconfirmed	Decommissioned	Permanent
Supplemental Investigations Under the 1997 Agreed Order											
CR-MW15	08/28/13	GeoEngineers	79.84	79.45	15	30	64	49	Qvi	Existing	Permanent
2016 Agreed Order Investigation											
A11-MW30D	06/21/19	GeoEngineers	74.18	73.93	50	60	24	14	Qva	Decommissioned	Permanent
Prairie Line Trail Capital Project											
PL-MW2	03/28/13	GeoEngineers	83.19	82.92	6	26	77	57	Qvi	Existing	Permanent

Notes:

[1] Well locations are shown on Figures 5-4 through 5-6. TW# was added to the end of select temporary wells where groundwater samples were collected at two depth intervals in the same location.

[2] Ground surface elevation is based on estimates from topographic surveys, Pierce County Light Detection and Range (LiDAR) 2010 Survey or individual surveys for a monitoring well. Select wells were modified over time during construction. The current elevation is shown. See surveys and summary of changes in Appendix K.

AGI = AGI Technologies

bgs = below ground surface

NGVD29 = National Geodetic Vertical Datum of 1929

Qva = Vashon advance outwash

Qvi = Vashon ice-contact deposits

URS = United Research Services Corporation (formerly)

Table 5-5

Summary of Soil Chemical Analytical Results - Cragle

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																			
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	cVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Pre-1997 Agreed Order Investigation and Remedial Action																									
BL-10-19-B	10-19-B	10/19/93	Confirmation	8 - 8	Removed	G,D,O	1,800	22,000	24,000	*0.025 U*	1.6	0.025 U	6.2	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-10-19-N	10-19-N	10/19/93	Confirmation	7 - 7	Removed	G,D,O	21	1,500	1,000	*0.025 U*	0.025 U	0.025 U	0.025 U	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-10-19-S	10-19-S	10/20/93	Confirmation	7 - 7	Removed	ND	--	--	83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-MW1	BL-B1@3	05/28/93	Exploration	3 - 3	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-MW1	BL-B1@8	05/28/93	Exploration	8 - 8	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-MW2	BL-MW2	04/01/94	Exploration	7.5 - 7.5	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-S1	BL-S1	10/01/96	Confirmation	8 - 8	Present	--	--	15	48 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-S2	BL-S2	10/01/96	Confirmation	8 - 8	Present	--	--	20	48 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-S3	BL-S3	10/01/96	Confirmation	10 - 10	Present	--	--	12 U	48 U	*0.030 U*	0.030 U	0.030 U	0.030 U	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-S4	BL-S4	10/01/96	Confirmation	8 - 8	Present	--	--	12 U	47 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-S5	BL-S5	10/01/96	Confirmation	8 - 8	Present	--	--	19	47 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-TP2	SS-10	03/15/94	Exploration	8 - 8	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-UST-SS-11	SS-11	03/15/94	Confirmation	5 - 5	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-UST-SS-12	SS-12	03/15/94	Confirmation	5 - 5	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-10-15-East	10-15-EAST	10/15/93	Confirmation	6 - 6	Removed	--	--	10 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-10-15-North	10-15-NORTH	10/15/93	Confirmation	5 - 5	Removed	--	--	10 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-10-15-Tank 1	10-15-TANK 1	10/15/93	Confirmation	7 - 7	Removed	G,D,O	250	580	610	*0.025 U*	0.025 U	0.025 U	0.66	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-10-15-Tank 2	10-15-TANK 2	10/15/93	Confirmation	7 - 7	Removed	ND	--	--	--	*0.050 U*	0.050 U	0.11	0.53	--	--	--	*0.050 U*	--	--	ND	1.9	0.014 U	--	--	--	--
CR-10-15-Tank 3	10-15-TANK 3	10/15/93	Confirmation	7 - 7	Removed	G,D,O	2,100	700	2,200	*0.025 U*	23	13	94	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-10-15-West	10-15-WEST	10/15/93	Confirmation	4 - 4	Removed	--	--	910	660	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-B8	CR-B8	03/31/94	Exploration	17.5 - 17.5	Present	--	33	150	--	*0.050 U*	0.050 U	0.050 U	0.050 U	--	--	--	*0.050 U*	--	--	ND	0.083 U	0.014 U	1.7	0.25 U	4.4	0.10 U
CR-B9	CR-B9	03/31/94	Exploration	12.5 - 12.5	Present	--	5 U	10 U	--	*0.050 U*	0.050 U	0.050 U	0.050 U	--	--	--	*0.050 U*	--	--	ND	0.083 U	0.014 U	1.1	0.25 U	2.8	0.10 U
CR-MW1	CR-B1-2.5	05/26/93	Exploration	2.5 - 2.5	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW1	CR-B1-10	05/26/93	Exploration	10 - 10	Removed	G,D,O	62	390	--	*0.025 U*	0.025 U	0.036	0.075	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW1	CR-B5-2.5	05/26/93	Exploration	10 - 10	Removed	G,D,O	290	4,200	--	*0.025 U*	0.025 U	0.23	0.51	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW2	CR-B2 @5.5	05/27/93	Exploration	5.5 - 5.5	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW2	CR-B2 @7.5	05/27/93	Exploration	7.5 - 7.5	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW3	CR-B3 @5.5	05/27/93	Exploration	5.5 - 5.5	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW3	CR-B3 @8	05/27/93	Exploration	8 - 8	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW4	CR-B4 @8	05/27/93	Exploration	8 - 8	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW4	CR-B4 @10.5	05/27/93	Exploration	10.5 - 10.5	Removed	G	270	--	--	*0.025 U*	0.49	1.1	5.9	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW5	CR-MW5 @5	03/30/94	Exploration	5 - 5	Removed	--	5 U	10 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW5	CR-MW5 @7.5	03/30/94	Exploration	7.5 - 7.5	Removed	--	5 U	10 U	--	*0.050 U*	0.050 U	0.050 U	0.050 U	--	--	--	*0.050 U*	--	--	ND	0.083 U	0.014 U	1.5	0.25 U	2.3	--
CR-MW6	CR-MW6	03/30/94	Exploration	7.5 - 7.5	Present	ND	--	--	--	*0.050 U*	0.050 U	0.050 U	0.050 U	--	--	--	*0.050 U*	--	--	ND	0.083 U	0.014 U	1.3	0.25 U	1.5 U	--
CR-MW7	CR-MW7	03/31/94	Exploration	5 - 5	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-S1	CR-S1	10/12/94	Confirmation	8 - 8	Present	--	5 U	25 U	100 U	*0.050 U*	0.050 U	0.050 U	0.050 U	--	--	0.050 U	*0.050 U*	--	--	ND	0.083 U	0.014 U	--	--	2.3	--
CR-S2	CR-S2	10/12/94	Confirmation	11 - 11	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S3	CR-S3	10/12/94	Confirmation	12 - 12	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S4	CR-S4	10/12/94	Confirmation	13 - 13	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S5	CR-S5	10/13/94	Confirmation	9 - 9	Present	--	1,090	3,730	2,920	*0.05 U*	0.1 U	3.2	11.6	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S6	CR-S6	10/13/94	Confirmation	13 - 13	Present	--	16	72	100 U	*0.050 U*	0.050 U	0.050 U	0.050 U	--	--	0.050 U	*0.050 U*	--	--	ND	0.083 U	0.014 U	--	--	1.5 U	--
CR-S7	CR-S7	10/13/94	Confirmation	13 - 13	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S8	CR-S8	10/14/94	Confirmation	13 - 13	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S11	CR-S11	10/18/94	Confirmation	16 - 16	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S12A	CR-S12A	06/28/95	Confirmation	10 - 10	Present	--	5 U	25 U	100 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-S12	CR-S12	10/19/94	Confirmation	10 - 10	Removed	--	155	919	100 U	*0.050 U*	0.050 U	0.050 U	0.050 U	--	--	0.050 U	*0.050 U*	--	--	ND	0.083 U	0.014 U	--	--	1.5 U	--
CR-S13	CR-S13	10/19/94	Confirmation	10 - 10	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S14A	CR-S14A	06/28/95	Confirmation	15 - 15	Present	--	5 U	25 U	100 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-S14	CR-S14	10/19/94	Confirmation	13 - 13	Removed	--	141	1430	510	*0.05 U*	0.1 U	0.1 U	0.3	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S15A	CR-S15A	06/28/95	Confirmation	11 - 11	Present	--	5 U	25 U	100 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																				
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
CR-S15	CR-S15	10/20/94	Confirmation	10 - 10	Removed	--	79	245	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S16A	CR-S16A	06/28/95	Confirmation	15 - 15	Present	--	5 U	25 U	100 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-S16	CR-S16	10/20/94	Confirmation	13.5 - 13.5	Removed	--	213	2,640	240	*0.05 U*	0.1 U	0.3	1.4	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S17	CR-S17	10/20/94	Confirmation	11 - 11	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S18	CR-S18	10/20/94	Confirmation	11 - 11	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S19	CR-S19	10/25/94	Confirmation	14.5 - 14.5	Present	--	21	33	100 U	0.2	0.81	0.11	0.71	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S20	CR-S20	10/25/94	Confirmation	10 - 10	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S21	CR-S21	10/25/94	Confirmation	9 - 9	Present	--	1,020	30	100 U	1.5 J	37 J	19 J	110 J	--	--	--	*0.060 U*	--	--	ND	3.2	0.014 U	--	--	4.3	--
CR-S21	CR-S22	10/25/94	Confirmation	9 - 9	Present	--	1,030	34	100 U	0.37	13.5	11.8	54	--	--	--	*0.30 U*	--	--	ND	4.4	0.014 U	--	--	4.3	--
CR-S23	CR-S23	10/27/94	Confirmation	15 - 15	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S24	CR-S24	10/27/94	Confirmation	11 - 11	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S25	CR-S25	10/28/94	Confirmation	12 - 12	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S26	CR-S26	10/28/94	Confirmation	11 - 11	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S26	CR-S27	10/28/94	Confirmation	11 - 11	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S28	CR-S28	10/28/94	Confirmation	11 - 11	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S29	CR-S29	10/28/94	Confirmation	9 - 9	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-S30	CR-S30	10/28/94	Confirmation	9 - 9	Present	--	5 U	25 U	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	1.5 U	--
CR-TP-10	SS-20	03/16/94	Exploration	9 - 9	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP-11	SS-21	03/16/94	Exploration	9.5 - 9.5	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP-12	SS-22	03/16/94	Exploration	8 - 8	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP-13	SS-23	03/16/94	Exploration	8 - 8	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-W-East	W-EAST	10/13/93	Confirmation	9 - 9	Removed	G,D,O	1,200	5,300	8,100	*0.025 U*	0.39	2.1	12	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-W-North	W-NORTH	10/13/93	Confirmation	9 - 9	Removed	G,D	82	430	--	*0.025 U*	0.025 U	0.036	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-W-South	W-SOUTH	10/13/93	Confirmation	9 - 9	Removed	G,D	220	1,600	--	*0.025 U*	0.025 U	0.13	0.58	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-W-West	W-WEST	10/13/93	Confirmation	7 - 7	Removed	G,D,O	240	1,100	3,000	*0.025 U*	0.079	0.18	1.4	--	--	--	*0.050 U*	--	--	ND	0.083 U	0.014 U	--	--	--	--
1997 Agreed Order Investigation																										
BL-B1	BL-B1-12_20000921	09/21/00	Exploration	12 - 12	Present	--	--	--	--	*0.100 U*	0.100 U	0.100 U	0.200 U	--	--	--	--	--	--	ND	--	--	--	--	--	--
BL-MW5	BL-MW5-45_20000321	03/21/00	Exploration	45 - 45	Present	--	--	--	--	*0.100 U*	0.100 U	0.100 U	0.200 U	--	--	--	--	--	--	ND	--	--	--	--	--	--
BL-MW6	BL-MW6-30_20000321	03/21/00	Exploration	30 - 30	Present	--	--	--	--	*0.100 U*	0.100 U	0.100 U	0.200 U	--	--	--	--	--	--	ND	--	--	--	--	--	--
CR-B2	CR-B2-3_19980825	08/25/98	Exploration	3 - 3	Present	--	--	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	--	--	--	--	--	--	0.100 U	--	--	--	--	--
CR-B1	CR-B1-1.5_19980825	08/25/98	Exploration	1.5 - 1.5	Removed	--	--	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	--	--	--	--	--	--	0.100 U	--	--	--	--	--
CR-B5	CR-B5-6_19980825	08/25/98	Exploration	6 - 6	Present	--	5.0 U	35.5	86.8	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-B3	CR-B3-1.5_19980825	08/25/98	Exploration	1.5 - 1.5	Removed	--	--	10.0 U	64.5	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	--	--	--	--	--	--	0.100 U	--	--	--	--	--
CR-B4	CR-B4-1.5_19980825	08/25/98	Exploration	1.5 - 1.5	Removed	--	5.0 U	164	287	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-B4	CR-B4-4.5_19980825	08/25/98	Exploration	4.5 - 4.5	Removed	--	5.0 U	10.0 U	25.0 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-B6	CR-B6-12_20000921	09/21/00	Exploration	12 - 12	Present	--	--	--	--	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	--	--	--	--	--	--	0.100 U	--	--	--	--	--
CR-B7	CR-B7-12_20000921	09/21/00	Exploration	12 - 12	Present	--	--	--	--	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	--	--	--	--	--	--	0.100 U	--	--	--	--	--
CR-GW2	CR-GW2-2.5_19980826	08/26/98	Exploration	2.5 - 2.5	Present	--	5.0 U	18.5	71.6	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	--	--	--	--	--	--	0.100 U	--	--	--	--	--
CR-C-B1	CR-C-B1-0'	06/04/98	Exploration	0 - 0	Removed	--	--	--	--	0.0010 U	0.0010 U	0.0010 U	0.0031 U	--	--	--	--	--	--	ND	--	--	--	--	--	--
CR-C-B2	CR-C-B2-0'	06/04/98	Exploration	0 - 0	Removed	--	--	--	--	0.0011 U	0.0011 U	0.0011 U	0.0032 U	--	--	--	--	--	--	ND	--	--	--	--	--	--
CR-C-B2	CR-C-B2-2.5'	06/04/98	Exploration	2.5 - 2.5	Removed	--	--	--	--	0.0016	0.0012 U	0.0089	0.0237	--	--	--	--	--	--	ND	--	--	--	--	--	--
CR-C-B3	CR-C-B3-0'	06/04/98	Exploration	0 - 0	Removed	--	--	--	--	0.0011 U	0.0011 U	0.0011 U	0.0032 U	--	--	--	--	--	--	ND	--	--	--	--	--	--
CR-GW1	CR-GW1-7.5_19980827	08/27/98	Exploration	7.5 - 7.5	Removed	--	5.0 U	10.0 U	25.0 U	*0.0500 U*	0.0500 U	0.0500 U	0.100 U	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-GW1	CR-GW1-15_19980827	08/27/98	Exploration	15 - 15	Removed	--	5.0 U	10.0 U	25.0 U	*0.0500 U*	0.0500 U	0.0500 U	0.100 U	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-GW2	CR-GW2-10_19980826	08/26/98	Exploration	10 - 10	Present	--	5.0 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	--	--	--	--	--	--	0.100 U	--	--	--	--	--
CR-HPN-B	CR-NHP2-B	04/14/97	Confirmation	8 - 8	Present	--	--	250	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPN-B	CR-HPN-B	01/17/97	Confirmation	7 - 7	Removed	--	--	820	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-NHP2-E	CR-NHP2-E	04/14/97	Confirmation	4 - 5	Present	--	--	130	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPN-E	CR-HPN-E	01/17/97	Confirmation	4 - 5	Removed	--	--	4,900	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPN-N	CR-HPN-N2.5	01/17/97	Confirmation	2 - 3	Present	--	--	260	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPN-N	CR-HPN-N7.5	01/17/97	Confirmation	7 - 8	Present	--	--	18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPN-S	CR-HPN-S2.5	01/17/97	Confirmation	2 - 3	Present	--	--	320	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPN-S	CR-HPN-S7.5	01/17/97	Confirmation	7 - 8	Present	--	--	180	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPN-W	CR-HPN-W7.5	01/17/97	Confirmation	7 - 8	Present	--	--	73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPN-W	CR-HPN-W2.5	01/17/97	Confirmation	2 - 3	Removed	--	--	8,300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-NHP2-W	CR-NHP2-W	04/14/97	Confirmation	2.5 - 2.5	Present	--	--	290	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPS-B	CR-HPS-B	01/17/97	Confirmation	6 - 7	Present	--	--	280	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPS-E	CR-HPS-E	01/17/97	Confirmation	5 - 6	Present	--	--	380	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPS-N	CR-HPS-N	01/17/97	Confirmation	5 - 6	Present	--	--	99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																			
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
CR-HPS-S	CR-HPS-S	01/17/97	Confirmation	5 - 6	Present	--	--	**20**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-HPS-W	CR-HPS-W	01/17/97	Confirmation	5 - 6	Present	--	--	**32**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW9	CR-MW9-21_19990326	03/26/99	Exploration	21 - 21	Present	--	**201**	**25.5**	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	**0.273**	*0.100 U*	0.100 U	*0.100 U*	--	0.100 U	ND	**0.361**	--	--	--	--	--
CR-MW10	CR-MW10-20_19980925	09/25/98	Exploration	20 - 20	Present	--	5.0 U	**10.3**	25.0 U	*0.0500 U*	0.0500 U	0.0500 U	0.100 U	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW10	CR-MW10-25_19980925	09/25/98	Exploration	25 - 25	Present	--	5.0 U	10.0 U	25.0 U	*0.0500 U*	0.0500 U	0.0500 U	0.100 U	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP1	CR-TP1-D	12/22/97	Exploration	0 - 0	Present	--	2.4 U	--	--	*0.024 U*	0.024 U	0.024 U	0.024 U	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP1	CR-TP1-1	12/22/97	Exploration	0 - 1	Present	--	--	15 U	37 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP1	CR-TP1-2	12/22/97	Exploration	1 - 3	Present	--	--	16 U	41 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP1	CR-TP1-3	12/22/97	Exploration	3 - 6	Present	--	--	16 U	39 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP2	CR-TP2-D	12/22/97	Exploration	0 - 0	Present	--	2.3 U	--	--	*0.023 U*	0.023 U	0.023 U	0.047 U	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP2	CR-TP2-1	12/22/97	Exploration	0 - 1	Present	--	--	17 U	42 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP2	CR-TP2-2	12/22/97	Exploration	1 - 3	Present	--	--	15 U	38 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP2	CR-TP2-3	12/22/97	Exploration	3 - 6	Present	--	--	14 U	36 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP3	CR-TP3-1	12/22/97	Exploration	0 - 1	Present	--	--	17 U	**58**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP3	CR-TP3-D	12/22/97	Exploration	0 - 0	Present	--	2.6 U	--	--	*0.026 U*	0.026 U	0.026 U	0.026 U	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP3	CR-TP3-2	12/22/97	Exploration	1 - 3	Present	--	--	14 U	36 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP3	CR-TP3-3	12/22/97	Exploration	3 - 6	Present	--	--	13 U	33 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP4	CR-TP4-D	12/22/97	Exploration	0 - 0	Present	--	2.3 U	--	--	*0.023 U*	0.023 U	0.023 U	0.023 U	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP4	CR-TP4-1	12/22/97	Exploration	0 - 1	Present	--	--	**64**	**400**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP4	CR-TP4-2	12/22/97	Exploration	1 - 3	Present	--	--	14 U	34 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-TP4	CR-TP4-3	12/22/97	Exploration	3 - 6	Present	--	--	**46**	**220**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Supplemental Investigations Under the 1997 Agreed Order																										
CR-MW15	CR-MW15-10-11	08/28/13	Exploration	10 - 11	Present	ND	--	--	--	0.00079 U	0.0040 U	0.00079 U	0.0016 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	**DET**	0.00079 U	0.0057 U	11 U	0.56 U	5.6 U	--
CR-MW15	CR-MW15-12-13	08/28/13	Exploration	12 - 13	Present	ND	--	--	--	0.00079 U	0.0039 U	0.00079 U	0.0016 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	ND	0.00079 U	--	--	--	--	--
CR-MW15	CR-MW15-14-15	08/28/13	Exploration	14 - 15	Present	ND	--	--	--	0.00073 U	0.0037 U	0.00073 U	0.0015 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	0.00073 U	**DET**	0.00073 U	--	--	--	--	--
CR-MW15	CR-MW15-18-19	08/28/13	Exploration	18 - 19	Present	ND	--	--	--	0.00076 U	0.0038 U	0.00076 U	0.0015 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	**DET**	0.00076 U	--	--	--	--	--
CR-MW15	CR-MW15-19.5-20	08/28/13	Exploration	19.5 - 20	Present	**G**	**3,000**	--	--	*0.046 U*	0.23 U	0.23 U	0.46 U	**3.9**	**4.0**	0.046 U	*0.046 U*	0.046 U	**2.9**	ND	0.046 U	--	--	--	--	--
CR-MW15	CR-MW15-21-22	08/28/13	Exploration	21 - 22	Present	ND	--	--	--	0.00085 U	0.0042 U	0.00085 U	0.0017 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	**DET**	0.00085 U	--	--	--	--	--
CR-MW15	CR-MW15-23.5-24	08/28/13	Exploration	23.5 - 24	Present	ND	--	--	--	0.00093 U	0.0046 U	0.00093 U	0.0019 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	**DET**	0.00093 U	--	--	--	--	--
CR-MW15	CR-MW15-29-30	08/28/13	Exploration	29 - 30	Present	ND	--	--	--	0.00079 U	0.0039 U	0.00079 U	0.0016 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	0.00079 U	**DET**	0.00079 U	--	--	--	--	--
CR-MW15	CR-MW15-32-33	08/28/13	Exploration	32 - 33	Present	ND	--	--	--	0.00075 U	0.0037 U	0.00075 U	0.0015 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	**DET**	0.00075 U	--	--	--	--	--
CR-MW15	CR-MW15-34-35	08/28/13	Exploration	34 - 35	Present	ND	--	--	--	0.00084 U	0.0042 U	0.00084 U	0.0017 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	**DET**	0.00084 U	--	--	--	--	--
2016 Agreed Order Investigation																										
A11-MW30D	A11-MW30D-5-6	06/21/19	Exploration	5 - 6	Present	ND	--	--	--	0.00077 U	0.0039 U	0.00077 U	0.0015 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	**DET**	0.00077 U	0.0055 U	11 U	0.55 U	5.5 U	--
A11-MW30D	A11-MW30D-9-10	06/21/19	Exploration	9 - 10	Present	--	--	--	--	0.00083 U	0.0042 U	0.00083 U	0.0017 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	**DET**	0.00083 U	--	--	--	--	--
A11-MW30D	A11-MW30D-14-15	06/21/19	Exploration	14 - 15	Present	--	--	--	--	0.00092 U	0.0046 U	0.00092 U	0.0018 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	**DET**	0.00092 U	--	--	--	--	--
A11-MW30D	A11-MW30D-19-20	06/21/19	Exploration	19 - 20	Present	--	--	--	--	0.00088 U	0.0044 U	0.00088 U	0.0018 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	**DET**	0.00088 U	--	--	--	--	--
A11-MW30D	A11-MW30D-24-25	06/21/19	Exploration	24 - 25	Present	--	--	--	--	0.00098 U	0.0049 U	0.00098 U	0.0020 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	**DET**	0.00098 U	--	--	--	--	--
A11-MW30D	A11-MW30D-29-30	06/21/19	Exploration	29 - 30	Present	--	--	--	--	0.0011 U	0.0056 U	0.0011 U	0.0023 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	**DET**	0.0011 U	--	--	--	--	--
A11-MW30D	DUP-1-20190621	06/21/19	Exploration	29 - 30	Present	--	--	--	--	0.00091 U	0.0045 U	0.00091 U	0.0018 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	**DET**	0.00091 U	--	--	--	--	--
A11-MW30D	A11-MW30D-34-35	06/21/19	Exploration	34 - 35	Present	--	--	--	--	0.00082 U	0.0041 U	0.00082 U	0.0016 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	**DET**	0.00082 U	--	--	--	--	--
A11-MW30D	A11-MW30D-39-40	06/21/19	Exploration	39 - 40	Present	--	--	--	--	0.0011 U	0.0054 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	**DET**	0.0011 U	--	--	--	--	--
A11-MW30D	A11-MW30D-44-45	06/21/19	Exploration	44 - 45	Present	--	--	--	--	0.0011 U	0.0055 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	**DET**	0.0011 U	--	--	--	--	--
A11-MW30D	A11-MW30D-49-50	06/21/19	Exploration	49 - 50	Present	--	--	--	--	0.0011 U	0.0057 U	0.0011 U	0.0023 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	**DET**	0.0011 U	--	--	--	--	--
A11-MW30D	A11-MW30D-54-55	06/21/19	Exploration	54 - 55	Present	--	--	--	--	0.0010 U	0.0051 U	0.0010 U	0.0020 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	**DET**	0.0010 U	--	--	--	--	--
A11-MW30D	A11-MW30D-59-60	06/21/19	Exploration	59 - 60	Present	--	--	--	--	0.00098 U	0.0049 U	0.00098 U	0.0020 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	**DET**	0.00098 U	--	--	--	--	--
Phase IIB Utility Capital Project																										
Phase II B-2	PHASE II B-2-6	01/30/02	Exploration	6 - 6	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-3	PHASE II B-3-4	01/31/02	Exploration	4 - 4	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-4	PHASE II B-4-3	01/30/02	Exploration	3 - 3	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-5	PHASE II B-5-3	01/30/02	Exploration	3 - 3	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-6	PHASE II B-6-3	01/30/02	Exploration	3 - 3	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-7	PHASE II B-7-3	01/30/02	Exploration	3 - 3	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-8	PHASE II B-8-3	02/04/02	Exploration	3 - 3	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-9	PHASE II B-9-1	02/04/02	Exploration	1 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3.53	--	6.71	--
Phase II B-9	PHASE II B-9-3	02/04/02	Exploration	3 - 3	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-10	PHASE II B-10-3	02/04/02	Exploration	3 - 3	Removed	--	5.00 U	**171**	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																			
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
					Proposed Cleanup Level[9] (PCUL)	n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
					Soil Screening Level for Protection of Vapor Intrusion[10]	NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Phase II B-11	PHASE II B-11-3	02/04/02	Exploration	3 - 3	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-12	PHASE II B-12-1	02/04/02	Exploration	1 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	2.20	--	3.5	--
Phase II B-12	PHASE II B-12-3	02/04/02	Exploration	3 - 3	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	2.20	--	3.50	--
Phase II B-13	PHASE II B-13-1	01/31/02	Exploration	1 - 1	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-14	PHASE II B-14-3	01/31/02	Exploration	3 - 3	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-15	PHASE II B-15-11A	02/01/02	Exploration	11 - 11	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Phase II B-15	PHASE II B-15-21A	02/01/02	Exploration	21 - 21	Removed	--	5.00 U	10.0 U	25.0 U	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	*0.100 U*	--	--	--	0.100 U	ND	0.100 U	--	--	--	--	--
Prairie Line Trail Capital Project																									
PL-MW2	PLMW2-10-11	03/28/13	Exploration	10 - 11	Present	--	3.8 U	27 U	54 U	0.00070 U	0.0035 U	0.00070 U	0.0014 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	ND	0.00070 U	0.0054 U	11 U	0.54 U	5.4 U	--
PL-MW2	PLMW2-14-14.5	03/28/13	Exploration	14 - 14.5	Present	--	5.3 U	30 U	61 U	0.00092 U	0.0046 U	0.00092 U	0.0018 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	ND	0.00092 U	0.0061 U	12 U	0.61 U	6.1 U	--
PL-MW2	PLMW2-20-21	03/28/13	Exploration	20 - 21	Present	--	--	--	--	0.00085 U	0.0042 U	0.00085 U	0.0017 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	ND	0.00085 U	--	--	--	--	--
Milgard Hall Capital Project																									
MIL-A1-CONF-1	MIL-A1-CONF-1	08/12/21	Confirmation	4 - 4	Present	--	--	--	--	0.00099 U	0.0049 U	0.00099 U	0.002 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	0.00099 U	ND	0.0049 U	--	--	--	--	--
MIL-A1-CONF-2	MIL-A1-CONF-2	08/12/21	Confirmation	4 - 4	Present	--	--	--	--	0.00086 U	0.0043 U	0.00086 U	0.0017 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	ND	0.0043 U	--	--	--	--	--
MIL-A1-CONF-3	MIL-A1-CONF-3	08/12/21	Confirmation	3 - 3	Present	--	--	--	--	0.0014 U	0.0071 U	0.0014 U	0.0028 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	ND	0.0071 U	--	--	--	--	--
MIL-A1-CONF-4	MIL-A1-CONF-4	08/12/21	Confirmation	4 - 4	Present	--	--	--	--	0.0011 U	0.0053 U	0.0011 U	0.0021 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0053 U	--	--	--	--	--
MIL-A1-CONF-5	MIL-A1-CONF-5	08/12/21	Confirmation	3 - 3	Present	--	--	--	--	0.00084 U	0.0042 U	0.00084 U	0.0017 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	ND	0.0042 U	--	--	--	--	--
MIL-A1-CONF-6	MIL-A1-CONF-6	08/12/21	Confirmation	4 - 4	Present	--	--	--	--	0.0011 U	0.0055 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0055 U	--	--	--	--	--
MIL-A1-CONF-7	MIL-A1-CONF-7	08/12/21	Confirmation	3 - 3	Present	--	--	--	--	0.0011 U	0.0054 U	0.0011 U	0.0021 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0054 U	--	--	--	--	--
MIL-A2-CONF-1	CONF-A2-1	07/29/21	Confirmation	3 - 3	Present	--	--	26 U	**82**	0.0012 U	**0.012**	0.0012 U	0.0023 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	ND	0.0059 U	**0.031**	--	--	--	--
MIL-A2-CONF-2	CONF-A2-2	07/29/21	Confirmation	3 - 3	Present	--	--	26 U	51 U	0.0011 U	0.0054 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0054 U	0.0051 U	--	--	--	--
MIL-A2-CONF-3	CONF-A2-3	07/29/21	Confirmation	3 - 3	Present	--	--	**410**	**350**	0.001 U	0.0051 U	0.001 U	0.002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	ND	**0.061**	**0.025**	--	--	--	--
MIL-A2-CONF-4	CONF-A2-4	07/29/21	Confirmation	3 - 3	Present	--	--	26 U	**61**	0.00089 U	0.0044 U	0.00089 U	0.0018 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	ND	**0.023**	**0.059**	--	--	--	--
MIL-A3-CONF-B	CONF-A3-B-1-9	07/27/21	Confirmation	9 - 9	Present	--	--	--	--	0.00094 U	0.0047 U	0.00094 U	0.0019 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	ND	0.0047 U	--	--	--	--	--
MIL-A3-CONF-ESW	CONF-A3-ESLO-5	07/26/21	Confirmation	5 - 5	Present	--	--	--	--	0.001 U	0.0052 U	0.001 U	0.0021 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	ND	0.0052 U	--	--	--	--	--
MIL-A3-CONF-ESW	CONF-A3-ESW-8.5	08/03/21	Confirmation	8.5 - 8.5	Present	--	--	--	--	0.0012 U	0.0059 U	0.0012 U	0.0023 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	ND	0.0059 U	--	--	--	--	--
MIL-A3-CONF-NSW	CONF-A3-NSLO-5	07/26/21	Confirmation	5 - 5	Present	--	--	--	--	0.0009 U	0.0045 U	0.0009 U	0.0018 U	0.0009 U	0.0009 U	0.0009 U	0.0009 U	0.0009 U	0.0009 U	ND	0.0045 U	--	--	--	--	--
MIL-A3-CONF-NSW	CONF-A3-NSW-8.5	08/03/21	Confirmation	8.5 - 8.5	Present	--	--	--	--	0.00097 U	0.0049 U	0.00097 U	0.0019 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	ND	0.0049 U	--	--	--	--	--
MIL-A3-CONF-SSW	CONF-A3-SSW-5	07/26/21	Confirmation	5 - 5	Present	--	--	--	--	0.00076 U	0.0038 U	0.00076 U	0.0015 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	ND	0.0038 U	--	--	--	--	--
MIL-A3-CONF-SSW	CONF-A3-SSW-8.5	08/03/21	Confirmation	8.5 - 8.5	Present	--	--	--	--	0.0008 U	0.004 U	0.0008 U	0.0016 U	0.0008 U	0.0008 U	0.0008 U	0.0008 U	0.0008 U	0.0008 U	ND	0.004 U	--	--	--	--	--
MIL-A3-CONF-WSW	CONF-A3-WSCO-5	07/26/21	Confirmation	5 - 5	Present	--	--	--	--	0.0011 U	0.0057 U	0.0011 U	0.0023 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0057 U	--	--	--	--	--
MIL-A3-CONF-WSW	CONF-A3-WSW-8.5	08/03/21	Confirmation	8.5 - 8.5	Present	--	--	--	--	0.0012 U	0.0062 U	0.0012 U	0.0025 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	ND	0.0062 U	--	--	--	--	--
MIL-A4-CONF-Base	MIL-A4-CONF-BASE-15	09/15/21	Confirmation	15 - 15	Present	--	**67**	**45**	57 U	*0.027 U*	0.27 U	**0.062**	0.11 U	--	--	--	--	--	--	--	**0.032**	0.0057 U	--	--	--	--
MIL-A4-CONF-BaseR	MIL-A4-CONF-BASE-15-R	08/23/21	Confirmation	15 - 15	Present	--	4.7 U	27 U	55 U	*0.02 U*	**0.12**	**0.086**	**0.384**	--	--	--	--	--	--	--	**0.024**	0.0055 U	--	--	--	--
MIL-A4-CONF-ESW	MIL-A4-CONF-ESW-14	09/15/21	Confirmation	14 - 14	Present	--	**87**	**510**	55 U	*0.024 U*	0.24 U	**0.080**	0.095 U	--	--	--	--	--	--	--	**2.0**	0.0056 U	--	--	--	--
MIL-A4-CONF-ESWR	MIL-A4-CONF-ESW-14-R	08/23/21	Confirmation	14 - 14	Present	--	**1,100**	27 U	54 U	*0.02 U*	**10**	**17**	**85**	--	--	--	--	--	--	--	**5.2**	0.0054 U	--	--	--	--
MIL-A4-CONF-NSW	MIL-A4-CONF-NSW-14	08/23/21	Confirmation	14 - 14	Present	--	4.9 U	27 U	54 U	*0.02 U*	0.049 U	0.049 U	**0.061**	--	--	--	--	--	--	--	**0.041**	0.0054 U	--	--	--	--
MIL-A4-CONF-SSW	MIL-A4-CONF-SSW-11	09/15/21	Confirmation	11 - 11	Present	--	5.8 U	27 U	54 U	0.00052 U	0.0052 U	0.001 U	0.0021 U	--	--	--	--	--	--	--	0.0072 U	0.0054 U	--	--	--	--
MIL-A4-CONF-SSW	MIL-A4-CONF-SSW-14	09/15/21	Confirmation	14 - 14	Present	--	**1,400**	**230**	56 U	*0.026 U*	0.26 U	**1.1**	**0.45**	--	--	--	--	--	--	--	**1.2**	0.0057 U	--	--	--	--
MIL-A4-CONF-SSWR	MIL-A4-CONF-SSW-14-R	08/23/21	Confirmation	14 - 14	Removed	--	650	63 U	61 U	**0.031**	0.13 U	**8.6**	**19.1**	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-A4-CONF-WSW	MIL-A4-CONF-WSW-14	09/15/21	Confirmation	14 - 14	Present	--	**130**	**62**	57 U	*0.028 U*	*0.28 U*	**0.42**	**2.04**	--	--	--	--	--	--	--	**0.74**	0.0057 U	--	--	--	--
MIL-A4-CONF-WSWR	MIL-A4-CONF-WSW-14-R	08/23/21	Confirmation	14 - 14	Present	--	**8**	31 U	62 U	*0.02 U*	0.066 U	**0.11**	**0.65**	--	--	--	--	--	--	--	**0.034**	0.0063 U	--	--	--	--
MIL-A5-CONF-Base	MIL-A5-BASE-15	08/19/21	Confirmation	15 - 15	Present	--	6.1 U	29 U	58 U	*0.02 U*	0.061 U	0.061 U	0.061 U	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-A5-CONF-ESW	MIL-A5-ESW-14	08/19/21	Confirmation	14 - 14	Present	--	4.9 U	28 U	56 U	*0.02 U*	0.049 U	0.049 U	0.049 U	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-A5-CONF-NSW	MIL-A5-NSW-14	08/19/21	Confirmation	14 - 14	Present	--	5.8 U	**34**	58 U	*0.02 U*	0.058 U	0.058 U	0.058 U	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-A5-CONF-SSW	MIL-A5-SSW-14	08/19/21	Confirmation	14 - 14	Present	--	5.7 U	30 U	59 U	*0.02 U*	0.057 U	0.057 U	0.057 U	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-A5-CONF-WSW	MIL-A5-WSW-14	08/19/21	Confirmation	14 - 14	Present	--	5.1 U	29 U	57 U	*0.02 U*	0.051 U	0.051 U	0.051 U	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-B1	MIL-B1-5.0	08/12/20	Exploration	5 - 5	Present	--	5.1 U	**52**	**110**	0.00086 U	0.0043 U	0.00086 U	0.0017 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	ND	**0.036**	**0.063**	11 U	0.55 U	**15**	--
MIL-B2	MIL-B2-2.5	08/12/20	Exploration	2.5 - 2.5	Present	--	5.1 U	**150**	**260**	0.00096 U	0.0048 U	0.00096 U	0.0019 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	ND	**0.021**	**0.013**	11 U	0.54 U	**6.0**	--
MIL-B2	MIL-B2-7.5	08/12/20	Exploration	7.5 - 7.5	Present	--	9.4 U	**100**	**160**	0.00089 U	0.0045 U	0.00089 U	0.0018 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	ND	**0.027**	**0.049**	11 U	0.56 U	5.6 U	--
MIL-B3	MIL-B3-2.5	08/12/20	Exploration	2.5 - 2.5	Present	--	4.9 U	**120**	**330**	0.00094 U	0.0047 U	0.00094 U	0.0019 U	**0.00096**	0.00094 U	0.00094 U	0.00094 U	0.00094 U	**0.0011**	ND	**0.034**	**0.016**	11 U	0.55 U	5.5 U	--
MIL-B5	MIL-B5-0.0-7.0_COMP	03/23/21	Exploration	0 - 7	Removed	--	4.9 U	27 U	150	0.00081 U	0.0041 U	0.00081 U	0.0016 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	ND	0.039	0.086	11 U	0.55 U	11	--
MIL-B5	MIL-B5-7.0-8.0_DISC	03/23/21	Exploration	7 - 8	Present	--	6.9 U	**120**	**470**	**0.0047**	**0.0074**	0.0012 U	**0.0048**	0.065 U	0.065 U	0.0012 U	0.0012 U	0.0012 U	0.065 U	ND	**1.9**	**0.30**	12 U	0.59 U	**21**	--
MIL-B5	MIL-B5-8.0-10.0_COMP	03/23/21	Exploration	8 - 10	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	--	--	--	--
MIL-B6	MIL-B6-0.0-7.5_COMP	03/23/21	Exploration	0 - 7.5	Removed	--	4.0 U	180	360	--	--	--	--	--	--	--	--	--	--	--	**0.033**	0.020	11 U	0.53 U	6.7	--
MIL-B6	MIL-B6-5.0-6.0_DISC	03/23/21	Exploration	5 - 6	Removed	--	--	--	--	0.00076 U	0.0038 U	0.00076 U	0.0015 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	0.00076 U	ND	0.0038 U	--	--	--	--	--
MIL-B6	MIL-B6-8.0-9.0_DISC	03/23/21	Exploration	8 - 9	Removed	--	--	--	--	0.00095	0.0039 U	0.00078 U	0.0016 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	ND	0.0039 U	--	--	--	--	--
MIL-B7	MIL-B7-4.0-5.0_DISC	03/23/21	Exploration	4 - 5	Present	--	5.5 U	--	--	0.00078 U	0.0039 U	0.00078 U	0.0016 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	ND	0.0039 U	--	--	--	--	--
MIL-B7	MIL-B7-7.0-8.0_DISC	03/23/21	Exploration	7 - 8	Present	--	4.8 U	--	--	0.00075 U	0.0038 U	0.00075 U	0.0015 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	ND	0.0038 U	--	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																				
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs										Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
MIL-B8	MIL-B8-0.0-5.0_COMP	03/23/21	Exploration	0 - 5	Present	--	5.0 U	28 U	56 U	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	11 U	0.56 U	5.6 U	--
MIL-B8	MIL-B8-5.0-10.0_COMP	03/23/21	Exploration	5 - 10	Present	--	6.0 U	29 U	58 U	--	--	--	--	--	--	--	--	--	--	--	0.0077 U	0.0058 U	12 U	0.58 U	5.8 U	--
MIL-B8	MIL-B8-5.0-6.0_DISC	03/23/21	Exploration	5 - 6	Present	--	--	--	--	0.0010 U	0.0052 U	0.0010 U	0.0021 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0052 U	--	--	--	--	--
MIL-B8	MIL-B8-7.0-8.0_DISC	03/23/21	Exploration	7 - 8	Present	--	--	--	--	0.0010 U	0.0051 U	0.0010 U	0.0020 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0051 U	--	--	--	--	--
MIL-B9	MIL-B9-14.5-15.0_DISC	03/23/21	Exploration	14.5 - 15	Present	--	5.4 U	27 U	54 U	**0.0026**	0.0046 U	**0.0016**	0.0018 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	ND	0.0046 U	--	--	--	--	--
MIL-B9	MIL-B9-16.0-17.0_DISC	03/23/21	Exploration	16 - 17	Present	--	5.4 U	29 U	58 U	0.0011 U	0.0053 U	0.0011 U	0.0021 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0053 U	--	--	--	--	--
MIL-B10	MIL-B10-0.0-12.0_COMP	03/23/21	Exploration	0 - 12	Present	--	4.5 U	27 U	54 U	--	--	--	--	--	--	--	--	--	--	--	0.0071 U	0.0054 U	11 U	0.54 U	5.4 U	--
MIL-B10	MIL-B10-14.0-15.0_DISC	03/23/21	Exploration	14 - 15	Present	--	**1,700**	**430**	57 U	*0.046 U*	0.23 U	**0.62**	**0.29**	**5.4**	**0.53**	0.046 U	*0.046 U*	0.046 U	**4.4**	**DET**	**1.1**	--	--	--	--	--
MIL-B10	MIL-B10-23.5-24.5_DISC	03/23/21	Exploration	23.5 - 24.5	Present	--	5.9 U	31 U	61 U	0.00098 U	0.0049 U	0.00098 U	0.0020 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	ND	0.0049 U	--	--	--	--	--
MIL-B11	MIL-B11-0.0-15.0_COMP	03/23/21	Exploration	0 - 15	Removed	--	5.1 U	28 U	56 U	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	11 U	0.56 U	5.6 U	0.056 U
MIL-B11	MIL-B11-16.0-17.0_DISC	03/23/21	Exploration	16 - 17	Present	--	4.9 U	29 U	58 U	0.00078 U	0.0039 U	0.00078 U	0.0016 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	0.00078 U	ND	0.0039 U	--	--	--	--	--
MIL-B12	MIL-B12-4.0-5.0_DISC	03/23/21	Exploration	4 - 5	Present	--	--	--	--	0.0010 U	0.0050 U	0.0010 U	0.0020 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0050 U	--	--	--	--	--
MIL-B12	MIL-B12-6.0-7.0_DISC	03/23/21	Exploration	6 - 7	Present	--	--	--	--	0.00089 U	0.0045 U	0.00089 U	0.0018 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	ND	0.0045 U	--	--	--	--	--
MIL-B13	MIL-B13-0.0-12.0_COMP	03/23/21	Exploration	0 - 12	Removed	--	4.5 U	29 U	**120**	--	--	--	--	--	--	--	--	--	--	--	0.0076 U	0.0057 U	11 U	0.57 U	5.7 U	--
MIL-B13	MIL-B13-7.0-8.0_DISC	03/23/21	Exploration	7 - 8	Removed	--	--	--	--	0.00080 U	0.0040 U	0.00080 U	0.0016 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	ND	0.0040 U	--	--	--	--	--
MIL-B13	MIL-B13-10.0-11.0_DISC	03/23/21	Exploration	10 - 11	Removed	--	--	--	--	0.00085 U	0.0042 U	0.00085 U	0.0017 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	ND	0.0042 U	--	--	--	--	--
MIL-B13	MIL-B13-12.5-13.5_DISC	03/23/21	Exploration	12.5 - 13.5	Removed	--	*580 U*	**9,300**	**580**	*0.048 U*	0.24 U	0.048 U	0.097 U	0.048 U	0.048 U	0.048 U	*0.048 U*	0.048 U	**0.093**	ND	0.24 U	--	--	--	--	--
MIL-B13	MIL-B13-16.0-17.0_DISC	03/23/21	Exploration	16 - 17	Present	--	4.8 U	29 U	59 U	0.00086 U	0.0043 U	0.00086 U	0.0017 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	ND	0.0043 U	--	--	--	--	--
MIL-B14	MIL-B14-0.0-12.5_COMP	03/23/21	Exploration	0 - 12.5	Present	--	4.1 U	27 U	53 U	--	--	--	--	--	--	--	--	--	--	--	0.0071 U	**0.016**	11 U	0.53 U	5.3 U	--
MIL-B14	MIL-B14-6.0-7.0_DISC	03/23/21	Exploration	6 - 7	Present	--	--	--	--	0.00092 U	0.0046 U	0.00092 U	0.0018 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	ND	0.0046 U	--	--	--	--	--
MIL-B14	MIL-B14-9.0-10.0_DISC	03/23/21	Exploration	9 - 10	Present	--	--	--	--	0.00082 U	0.0041 U	0.00082 U	0.0016 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	ND	0.0041 U	--	--	--	--	--
MIL-GL13/F-3	MIL-GL13/F-3	11/02/21	Confirmation	3 - 3	Present	--	26 U	**290**	**860**	0.0012 U	0.0061 U	**0.0036**	**0.026**	**0.015**	**0.0062**	0.0012 U	0.0012 U	0.0012 U	**0.020**	**DET**	**0.013**	0.0069 U	--	--	--	--
MIL-GL15.5/FG-NSW	MIL-GL15.5/FG-NSW-5.5	10/14/21	Confirmation	5.5 - 5.5	Present	--	--	**66**	**210**	--	--	--	--	--	--	--	--	--	--	--	**0.030**	**0.037**	--	--	--	--
MIL-GL15.5/H-NSW	MIL-GL15.5/H-NSW-6.5	10/14/21	Confirmation	6.5 - 6.5	Present	--	--	27 U	55 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-GL15/A-CONF	MIL-GL15/A-CONF	09/13/21	Confirmation	5 - 5	Present	--	12 U	**54**	**58**	0.00098 U	0.0049 U	0.00098 U	0.002 U	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-GL16.5/FG-SSW	MIL-GL16.5/FG-SSW-5.5	10/14/21	Confirmation	5.5 - 5.5	Present	--	--	**77**	56 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-GL16.5/H-SSW	MIL-GL16.5/H-SSW-5	10/12/21	Confirmation	5 - 5	Present	--	--	30 U	59 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-GL16.5/H-SSW	MIL-GL16.5/H-SSW-6.5	10/14/21	Confirmation	6.5 - 6.5	Present	--	--	30 U	59 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-GL16/E-Base	MIL-GL16/E-BASE-4	10/07/21	Confirmation	4 - 4	Removed	--	*1,400 U*	**3,200**	**320**	*0.061 U*	*0.31 U*	0.061 U	0.12 U	**0.49**	0.061 U	0.061 U	*0.061 U*	0.061 U	**0.15**	ND	**1.3**	--	--	--	--	--
MIL-GL16/E-Base	MIL-GL16/E-BASE-6	10/12/21	Confirmation	6 - 6	Present	--	--	28 U	57 U	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	--	--	--	--
MIL-GL16/E-SSW	MIL-GL16.5/E-SSW-5	10/12/21	Confirmation	5 - 5	Present	--	--	28 U	56 U	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	--	--	--	--
MIL-GL16/FG-Base	MIL-GL16/FG-BASE-6	10/14/21	Confirmation	6 - 6	Present	--	--	28 U	55 U	--	--	--	--	--	--	--	--	--	--	--	0.0073 U	0.0055 U	--	--	--	--
MIL-GL16/H-Base	MIL-GL16/H-BASE-4	10/07/21	Confirmation	4 - 4	Removed	--	16 U	**130**	59 U	0.00092 U	0.0046 U	0.00092 U	0.0018 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	**0.0032**	ND	0.0046 U	--	--	--	--	--
MIL-GL16/H-Base	MIL-GL16/H-BASE-7	10/14/21	Confirmation	7 - 7	Present	--	--	30 U	59 U	--	--	--	--	--	--	--	--	--	--	--	0.0079 U	0.0060 U	--	--	--	--
MIL-GL16/H-ESW	MIL-GL16/H-ESW-3.75	10/07/21	Confirmation	3.75 - 3.75	Removed	--	14 U	**63**	57 U	0.00089 U	0.0045 U	0.00089 U	0.0018 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	ND	0.0045 U	--	--	--	--	--
MIL-GL16/H-SSW	MIL-GL16/H-SSW-3.75	10/07/21	Confirmation	3.75 - 3.75	Removed	--	*940 U*	**2,300**	**340**	*0.06 U*	*0.3 U*	0.06 U	0.12 U	0.06 U	0.06 U	0.06 U	*0.06 U*	0.06 U	**0.88**	ND	*0.3 U*	--	--	--	--	--
MIL-GL16/H-WSW	MIL-GL16/H-WSW-3.75	10/07/21	Confirmation	3.75 - 3.75	Removed	--	*800 U*	**670**	58 U	*0.055 U*	*0.28 U*	0.055 U	0.11 U	0.055 U	0.055 U	0.055 U	*0.055 U*	0.055 U	**0.76**	ND	*0.28 U*	--	--	--	--	--
MIL-GL16/H-WSW	MIL-GL16/H-WSW-5	10/12/21	Confirmation	5 - 5	Removed	--	--	**2,500**	300 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-GL16/H-WSW	MIL-GL16/H-WSW-6.5	10/14/21	Confirmation	6.5 - 6.5	Present	--	--	28 U	55 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MIL-SD-B1	MIL-B1-10	12/13/21	Confirmation	10 - 10	Present	--	--	27 U	54 U	--	--	--	--	--	--	--	--	--	--	--	**0.0099**	0.0054 U	--	--	--	--
MIL-SD-NSW1	MIL-NSW1-4-5	12/13/21	Confirmation	5 - 5	Present	--	--	27 U	55 U	--	--	--	--	--	--	--	--	--	--	--	0.0073 U	0.0055 U	--	--	--	--
MIL-SD-SSW1	MIL-SSW1-6-7	12/14/21	Confirmation	7 - 7	Present	--	--	27 U	54 U	--	--	--	--	--	--	--	--	--	--	--	0.0071 U	0.0054 U	--	--	--	--
MIL-SD-SSW2	MIL-SSW2-6-7	12/13/21	Confirmation	7 - 7	Present	--	--	28 U	56 U	--	--	--	--	--	--	--	--	--	--	--	**0.016**	0.0056 U	--	--	--	--
MIL-SD-WSW1	MIL-WSW1-5-6	12/13/21	Confirmation	6 - 6	Present	--	--	28 U	56 U	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	--	--	--	--
MIL-STORMDRAIN	MIL-STORMDRAIN-4	12/01/21	Confirmation	4 - 4	Removed	--	*300 U*	**4,100**	250 U	0.0010 U	0.0050 U	**0.0037**	**0.0055**	0.056 U	0.056 U	0.0010 U	0.0010 U	0.0010 U	0.056 U	ND	**0.19**	**0.0058**	--	--	--	--

Notes:

[1] Sample locations are shown on Figures 5-4 through 5-6.

[2] Chemical analytical results in this table include contaminants of concern (COCs) based on historical land use, potential source(s), and/or required analysis in accordance with Model Toxics Control Act (MTCA) Table 830-1 in which COCs were detected at a concentration greater than their respective PCUL. The full list of chemical analytical results is presented in Appendices D and H. Chemical analytical results associated with other Areas of Concern are presented in other sections of the Remedial Investigation.

[3] Value for gasoline-range petroleum hydrocarbons if benzene is present. If benzene is not present, screening level is 100 mg/kg.

[4] Benzene may have been analyzed as full VOC method and/or BTEX only. The lowest practical quantitation limit (PQL) or the greatest detected concentration is shown.

[5] Sum of m-,p- and o- xylenes. The highest reporting limit for non-detect results is listed.

[6] Naphthalene may have been analyzed as a volatile organic compound (VOC), polycyclic aromatic hydrocarbon (PAH), or semi-volatile organic compound (SVOC). The lowest practical quantitation limit (PQL) or the greatest detected concentration is shown.

[7] Total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) calculated using the toxicity equivalency quotient (TEQ) methodology in Washington Administrative Code (WAC) 173-340-708(8). Non-detections were assigned half the reporting limit for these calculations.

[8] Total polychlorinated biphenyl (PCB) Aroclors is the sum of PCB Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260. The highest reporting limit for non-detect results is listed.

[9] Soil PCUL is based on the lowest value for protection of direct contact and groundwater as drinking water within the saturated zone and adjusted for PQL and Natural Background (see Tables 3-1 and 3-2).

[10] Soil screening level based on Ecology's Vapor Intrusion Guidance (Publication No. 09-09-047; see Table 3-6).

-- = not tested

1,2,4-TMB = 1,2,4-trimethylbenzene

1,3,5-TMB = 1,3,5-trimethylbenzene

bgs = below ground surface

BTEX = benzene, toluene, ethylbenzene and xylenes

CVOCs = chlorinated volatile organic compounds

DET = detected

EDB = 1,2-dibromoethane

EDC = 1,2-dichloroethane

G, D, O = gasoline-range petroleum hydrocarbons, diesel-range petroleum hydrocarbons, and oil-range petroleum hydrocarbons

J = estimated value by laboratory

mg/kg = milligram per kilogram

MTBE = methyl tert-butyl ether

ND = not DET

NE = not established

PAHs = polycyclic aromatic hydrocarbons

TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil

TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification

U = analyte was ND at or greater than the listed reporting limit

VOCs = volatile organic compounds

Bold font type indicates that the analyte was DET at a concentration greater than the respective laboratory reporting limit.

Italic font type indicates the non-detect result is greater than the PCUL.

Gray text indicates that soil represented by the sample has been removed and that the sample result no longer represents current conditions.

Shading indicates that the DET concentration is greater than the PCUL.

Shading indicates that the DET concentration is greater than the screening level for vapor intrusion and/or the PCUL.

Table 5-6

Summary of Groundwater Chemical Analytical Results - Cragle

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Identification	Sample Date	Groundwater Unit	Monitoring Well Type	Depth to Water (feet below TOC)	Water Level Elevation (feet NGVD29)	Groundwater Chemical Analytical Results[2] (µg/L)																				
							Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals				
							TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Total Xylenes[4]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	cVOCs	Naphthalene[5]	Total cPAH TEQ[6]	Dissolved Metal - Arsenic	Total Metal - Arsenic	Dissolved Metal - Lead	Total Metal - Lead	Total PCB Aroclors[7]
Proposed Cleanup Level[8] (PCUL; µg/L)							n/a	800	500	500	5	640	700	1,600	80	80	0.05	4.8	24	800	Varies	160	0.2	8	8	15	15	0.22
Groundwater Screening Level for Protection of Vapor Intrusion[9] (µg/L)							n/a	30,000	30,000	NE	2.4	15,000	2,800	320	240	170	0.3	3.5	860	2,300	Varies	8.9	NE	NE	NE	NE	NE	NE
Pre-1997 Agreed Order Investigation and Remedial Action																											
BL-MW1	BL-MW1 6/93	06/11/93	Qvi	Permanent	n/a	n/a	--	*1,000 U*	*1,000 U*	--	0.5 U	**0.9**	0.5 U	**2.4**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-MW1	BL-MW1	04/07/94	Qvi	Permanent	n/a	n/a	--	*1,000 U*	*1,000 U*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
BL-MW2	BL-MW2-19940401	04/01/94	Qvi	Permanent	n/a	n/a	--	*1,000 U*	*1,000 U*	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW1	CR-MW1 6/93	06/11/93	Qvi	Permanent	n/a	n/a	--	**111,000**	**550,000**	--	**4.6**	**0.8**	**2.6**	**4.9**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW1	CR-MW1-4/94	04/07/94	Qvi	Permanent	n/a	n/a	--	**67,000**	**290,000**	--	**2**	1 U	1 U	1 U	--	--	--	1 U	--	--	DET	--	--	--	--	--	--	--
CR-MW2	CR-MW2 6/93	06/11/93	Qvi	Permanent	n/a	n/a	--	*1,000 U*	*1,000 U*	--	**1.4**	**0.9**	0.5 U	**0.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW3	CR-MW3 6/93	06/11/93	Qvi	Permanent	n/a	n/a	--	*1,000 U*	*1,000 U*	--	0.5 U	**0.9**	0.5 U	**0.5**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW3	CR-MW3-4/94	04/07/94	Qvi	Permanent	n/a	n/a	--	*1,000 U*	*1,000 U*	--	1 U	1 U	1 U	1 U	--	--	--	1 U	--	--	ND	--	--	--	--	--	--	--
CR-MW4	CR-MW4 6/93	06/11/93	Qvi	Permanent	n/a	n/a	--	**11,000**	*1,000 U*	--	**16**	**1,400**	**680**	**3,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CR-MW4	CR-MW4-4/94	04/07/94	Qvi	Permanent	n/a	n/a	--	**25,000**	**2,000**	--	**73**	**750**	**650**	**2,600**	--	--	--	1 U	--	--	DET	--	--	--	--	--	--	--
CR-MW5	CR-MW5-4/94	04/06/94	Qvi	Permanent	n/a	n/a	--	**16,000**	**74,000**	--	**11**	**1**	1 U	**6**	--	--	--	1 U	--	--	DET	--	--	--	--	--	--	--
CR-MW5	CR-MW8-4/94	04/06/94	Qvi	Permanent	n/a	n/a	--	**16,000**	**73,000**	--	**10**	1 U	1 U	**3**	--	--	--	1 U	--	--	DET	--	--	--	--	--	--	--
CR-MW6	CR-MW6-4/94	04/06/94	Qvi	Permanent	n/a	n/a	--	*1,000 U*	*1,000 U*	--	1 U	1 U	1 U	1 U	--	--	--	**6**	--	--	DET	--	--	--	--	--	--	--
CR-MW7	CR-MW7-4/94	04/06/94	Qvi	Permanent	n/a	n/a	--	*1,000 U*	*1,000 U*	--	1 U	1 U	1 U	1 U	--	--	--	1 U	--	--	DET	--	--	--	--	--	--	--
1997 Agreed Order Investigation																												
BL-GW1	BL-GW1_19980826	08/26/98	Qvi	Temporary	n/a	n/a	--	50 U	**1,040**	500 U	**1.14**	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-GW2	BL-GW2_19980826	08/26/98	Qvi	Temporary	n/a	n/a	--	**93.8**	**292**	500 U	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-GW3_TW1	BL-GW3-14 _19990914	09/14/99	Qvi	Temporary	n/a	n/a	--	--	--	--	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-GW3_TW2	BL-GW3-20 _19990915	09/15/99	Qvi	Temporary	n/a	n/a	--	--	--	--	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-GW5	BL-GW5-21_19990914	09/14/99	Qvi	Temporary	n/a	n/a	--	--	--	--	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW1	BL-MW1_19981026	10/26/98	Qvi	Permanent	11.97	65.45	--	**59.3**	**393**	500 U	*10.0 U*	10.0 U	10.0 U	20.0 U	10.0 U	10.0 U	--	--	--	10.0 U	DET	10.0 U	--	--	--	--	--	--
BL-MW1	BL-MW1_19990112	01/12/99	Qvi	Permanent	9.79	67.63	--	50 U	**1,540**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW1	BL-MW1-22_19990326	03/26/99	Qvi	Permanent	n/a	n/a	--	**309**	**524**	500 U	1.00 U	**2.42**	**1.76**	**9.61**	**8.37**	**2.27**	--	--	--	**1.17**	DET	**1.32**	--	--	--	--	--	--
BL-MW1	BL-MW1_19990420	04/20/99	Qvi	Permanent	10.75	66.67	--	50 U	**309**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW1	BL-MW1_19990908	09/08/99	Qvi	Permanent	12.42	65.00	--	**50.8**	**373**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW1	BL-MW1_20000405	04/05/00	Qvi	Permanent	10.31	67.11	--	250 U	**519**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW1	BL-MW1_20000907	09/07/00	Qvi	Permanent	12.46	64.96	--	**57.7**	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW3	BL-MW3_19981023	10/23/98	Qvi	Permanent	n/a	n/a	--	50 U	**770**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW3	BL-MW3_19990112	01/12/99	Qvi	Permanent	n/a	n/a	--	50 U	**790**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW3	BL-MW3_19990420	04/20/99	Qvi	Permanent	n/a	n/a	--	50 U	**317**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	**2.93**	--	--	--	--	--	--
BL-MW3	BL-MW3_19990908	09/08/99	Qvi	Permanent	n/a	n/a	--	**105**	**765**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW3	BL-MW3_20000405	04/05/00	Qvi	Permanent	n/a	n/a	--	250 U	**706**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW3	BL-MW3_20000905	09/05/00	Qvi	Permanent	n/a	n/a	--	**55.6 J**	**622**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW5	BL-MW5_20000407	04/07/00	Qva	Permanent	13.25	63.07	--	**449**	250 U	500 U	**4.54**	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW5	BL-MW5_20000907	09/07/00	Qva	Permanent	14.77	61.55	--	**623**	250 U	500 U	**4.59**	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW5_TW1	BL-MW5-25_20000320	03/20/00	Qvi	Temporary	n/a	n/a	--	--	--	--	*10 U*	10 U	10 U	10 U	--	--	--	*10 U*	--	--	DET	--	--	--	--	--	--	--
BL-MW5_TW2	BL-MW5-35_20000320	03/20/00	Qvi	Temporary	n/a	n/a	--	--	--	--	*10 U*	10 U	10 U	10 U	--	--	--	*10 U*	--	--	DET	--	--	--	--	--	--	--
BL-MW5_TW3	BL-MW5-45_20000320	03/20/00	Qvi	Temporary	n/a	n/a	--	--	--	--	*10 U*	10 U	10 U	10 U	--	--	--	*10 U*	--	--	DET	--	--	--	--	--	--	--
BL-MW6	BL-MW6_20000405	04/05/00	Qvi/Qva	Permanent	15.67	51.44	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW6	BL-MW6-DUP_20000405	04/05/00	Qvi/Qva	Permanent	n/a	n/a	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW6	BL-MW6_20000905	09/05/00	Qvi/Qva	Permanent	16.49	50.62	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	--	--	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
BL-MW6_TW1	BL-MW6-25_20000321	03/21/00	Qvi	Temporary	n/a	n/a	--	--	--	--	*10 U*	10 U	10 U	10 U	--	--	--	*10 U*	--	--	DET	--	--	--	--	--	--	--
BL-MW6_TW2	BL-MW6-38_20000321	03/21/00	Qvi	Temporary	n/a	n/a	--	--	--	--	*10 U*	10 U	10 U	10 U	--	--	--	*10 U*	--	--	DET	--	--	--	--	--	--	--
CR-B6	CR-B6-13_20000921	09/21/00	Qvi	Temporary	n/a	n/a	--	--	--	--	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
CR-GW1	CR-GW1_19980827	08/27/98	Qvi	Temporary	n/a	n/a	--	**6,740**	**5,010**	**9,970**	**199**	**179**	**378**	**539.1**	**187**	**69.0**	*1.00 U*	**9.12**	--	**42.8**	DET	**98.3**	--	--	--	--	--	--
CR-GW2	CR-GW2_19980826	08/26/98	Qvi	Temporary	n/a	n/a	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
CR-MW3	CR-MW3_19981022	10/22/98	Qvi	Permanent	n/a	n/a	--	50 U	**289**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW3	CR-MW3_19990112	01/12/99	Qvi	Permanent	6.15	72.47	--	50 U	**707**	**531**	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW3	CR-MW3_19990421	04/21/99	Qvi	Permanent	6.85	71.77	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW3	CR-MW3_19990908	09/08/99	Qvi	Permanent	8.65	69.97	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW3	CR-MW3_20000404	04/04/00	Qvi	Permanent	6.22	72.40	--	50 U	**264**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW3	CR-MW3_20000908	09/08/00	Qvi	Permanent	9.07	69.55	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW5	CR-MW5_19981022	10/22/98	Qvi	Permanent	10.37	63.76	--	**72.2**	**1,290**	**651**	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
CR-MW5	CR-MW5_19990111	01/11/99	Qvi	Permanent	7.12	67.01	--	50 U	**769**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW5	CR-MW5_19990421	04/21/99	Qvi	Permanent	8.34	65.79	--	50 U	**309**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW5	CR-MW5_19990907	09/07/99	Qvi	Permanent	10.28	63.85	--	**78.8**	**1,070**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
CR-MW6	CR-MW6_19981022	10/22/98	Qvi	Permanent	11.67	61.16	--	50 U	**886**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Groundwater Unit	Monitoring Well Type	Depth to Water (feet below TOC)	Water Level Elevation (feet NGVD29)	Groundwater Chemical Analytical Results[2] (µg/L)																				
							Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs							cVOCs	Naphthalene[5]	Total cPAH TEQ[6]	Metals				Total PCB Aroclors[7]
							TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Total Xylenes[4]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene				Dissolved Metal - Arsenic	Total Metal - Arsenic	Dissolved Metal - Lead	Total Metal - Lead	
Proposed Cleanup Level[8] (PCUL; µg/L)							n/a	800	500	500	5	640	700	1,600	80	80	0.05	4.8	24	800	Varies	160	0.2	8	8	15	15	0.22
Groundwater Screening Level for Protection of Vapor Intrusion[9] (µg/L)							n/a	30,000	30,000	NE	2.4	15,000	2,800	320	240	170	0.3	3.5	860	2,300	Varies	8.9	NE	NE	NE	NE	NE	NE
CR-MW6	CR-MW6_19990111	01/11/99	Qvi	Permanent	9.07	63.76	--	50 U	**282**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	**1.08**	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW6	CR-MW6_19990421	04/21/99	Qvi	Permanent	9.95	62.88	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	ND	1.00 U	--	--	--	--	--	--
CR-MW6	CR-MW6_19990907	09/07/99	Qvi	Permanent	11.55	61.28	--	50 U	**784**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	**DET**	1.00 U	--	--	--	--	--	--
CR-MW7	CR-MW7_19981022	10/22/98	Qvi	Permanent	n/a	n/a	--	50 U	**354**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	**DET**	1.00 U	--	--	--	--	--	--
CR-MW7	CR-MW7_19990111	01/11/99	Qvi	Permanent	n/a	n/a	--	50 U	**362**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	**DET**	1.00 U	--	--	--	--	--	--
CR-MW7	CR-MW7_19990421	04/21/99	Qvi	Permanent	n/a	n/a	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	**DET**	1.00 U	--	--	--	--	--	--
CR-MW7	CR-MW7_19990907	09/07/99	Qvi	Permanent	n/a	n/a	--	50 U	**338**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	**DET**	1.00 U	--	--	--	--	--	--
CR-MW7	CR-MW7_20000404	04/04/00	Qvi	Permanent	n/a	n/a	--	50 U	**320**	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	**DET**	1.00 U	--	--	--	--	--	--
CR-MW7	CR-MW7_20000907	09/07/00	Qvi	Permanent	n/a	n/a	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	**DET**	1.00 U	--	--	--	--	--	--
CR-MW8	CR-MW8_19981023	10/23/98	Qvi	Permanent	10.84	65.44	--	**3,030**	**2,080**	**518**	**90.4**	**504**	**188**	**281**	**149**	**55.2**	*10.0 U*	*10.0 U*	--	**35.8**	ND	**20.6**	--	--	--	--	--	--
CR-MW8	CR-MW8_19990111	01/11/99	Qvi	Permanent	7.61	68.67	--	**9,230**	**1,580**	500 U	**17.6**	**661**	**331**	**1,279**	520	**115**	*1.00 U*	1.00 U	--	**75.5**	**DET**	**85.9**	--	--	--	--	--	--
CR-MW8	CR-MW8_19990421	04/21/99	Qvi	Permanent	8.92	67.36	--	**3,180**	**675**	500 U	**26**	**103**	**185**	**291**	285	**15.2**	*10.0 U*	*10.0 U*	--	**59.2**	ND	**23.3**	--	--	--	--	--	--
CR-MW8	CR-MW8_19990907	09/07/99	Qvi	Permanent	10.54	65.74	--	**7,020**	**1,570**	500 U	**161**	**1,070**	**367**	**1,222**	**283**	**53.2**	*10.0 U*	*10.0 U*	--	**64.8**	**DET**	**76.1**	--	--	--	--	--	--
CR-MW8	CR-MW8_20000404	04/04/00	Qvi	Permanent	7.54	68.74	--	**6,830**	**1,240**	500 U	**7.87**	**422**	**286**	**1,245**	**616**	**658**	*1.00 U*	1.00 U	--	**87.5**	ND	**41.2**	--	--	--	--	--	--
CR-MW8	CR-MW8_20000907	09/07/00	Qvi	Permanent	10.38	65.90	--	**3,900**	**440**	500 U	**95.6**	**484**	**143**	**662**	**168**	33.6	*1.00 U*	1.00 U	--	**46.7**	**DET**	**34.4**	--	--	--	--	--	--
CR-MW9	CR-MW9_20000404	04/04/00	Qvi	Permanent	10.65	67.60	--	**18,200**	**2,650**	500 U	**3,410**	**4,100**	**1,650**	**5,713**	**4,000**	**5,490**	*1.00 U*	1.00 U	--	**803**	ND	**80.7**	--	--	--	--	--	--
CR-MW9-TW1	CR-MW9-12	03/26/99	Qvi	Temporary	n/a	n/a	--	**85,200**	**69,300**	*2,500 U*	**11,300**	**1,700**	5,290	**27,730**	**5,190**	**1,300**	**111**	*100 U*	--	**649**	ND	**1,110**	--	--	--	--	--	--
CR-MW9-TW2	CR-MW9-27	03/26/99	Qvi	Temporary	n/a	n/a	--	**24,800**	**2,910**	500 U	**132**	**958**	482	**2,584**	**1,220**	**337**	**1.91**	1.00 U	--	**171**	ND	**137**	--	--	--	--	--	--
CR-MW10	CR-MW10_19981022	10/22/98	Unconfirmed	Permanent	n/a	n/a	--	**2,140**	**1,100**	500 U	**365**	**74.7**	74.3	**159**	**58.9**	**18**	*1.00 U*	1.00 U	--	**11.1**	**DET**	**21.4**	--	--	--	--	--	--
CR-MW10	CR-MW10_19990111	01/11/99	Unconfirmed	Permanent	n/a	n/a	--	**1,580**	**1,020**	500 U	**461**	**48.2**	**57.4**	94.3	**31.6**	**11.9**	*1.00 U*	1.00 U	--	**9.49**	**DET**	**22.7**	--	--	--	--	--	--
CR-MW10	CR-MW10_19990421	04/21/99	Unconfirmed	Permanent	n/a	n/a	--	**976**	**379**	500 U	**306**	**38.9**	**32.8**	75.29	**26.4**	**7.47**	*1.00 U*	1.00 U	--	**4.64**	**DET**	**18.3**	--	--	--	--	--	--
CR-MW10	CR-MW10_19990907	09/07/99	Unconfirmed	Permanent	n/a	n/a	--	**664**	**686**	500 U	**191**	**23.8**	**33.5**	55.22	**17.4**	**6.64**	*1.00 U*	1.00 U	--	**4.19**	**DET**	**13.3**	--	--	--	--	--	--
CR-MW10	CR-MW10_20000404	04/04/00	Unconfirmed	Permanent	n/a	n/a	--	**437**	**453**	500 U	**129 J**	4.67 J	**4.44 J**	12.64 J	**4.69 J**	**3.55 J**	*1.00 U*	1.00 U	--	**1.84 J**	**DET**	**5.53 J**	--	--	--	--	--	--
CR-MW10	CR-MW10_20000907	09/07/00	Unconfirmed	Permanent	n/a	n/a	--	**332**	**263**	500 U	**102**	**6.17**	**7.43**	**11.42**	**5.0**	**1.07**	*1.00 U*	1.00 U	--	1.00 U	**DET**	**3.47**	--	--	--	--	--	--
Supplemental Investigations Under the 1997 Agreed Order																											
BL-MW1	BL-MW1-130709	07/09/13	Qvi	Permanent	8.53	66.16	--	100 U	280 U	450 U	1.0 U	5.0 U	1.0 U	2.0 U	1.0 U	1.0 U	*1.0 U*	1.0 U	1.0 U	1.0 U	**DET**	6.5 U	--	--	--	--	--	--
BL-MW3	BL-MW3-130911	09/11/13	Qvi	Permanent	12.55	54.21	--	100 U	260 U	420 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	0.10 U	0.00755 U	3.0 U	**8.6**	--	**7.4**	--
BL-MW5	BL-MW5-130709	07/09/13	Qva	Permanent	12.42	62.29	--	100 U	270 U	430 U	4.0 U	20 U	4.0 U	8.0 U	4.0 U	4.0 U	*4.0 U*	4.0 U	4.0 U	4.0 U	**DET**	26 U	--	--	--	--	--	--
BL-MW6	BL-MW6-130711	07/11/13	Qvi/Qva	Permanent	20.26	46.85	--	100 U	260 U	410 U	2.0 U	10 U	2.0 U	4.0 U	2.0 U	2.0 U	*2.0 U*	2.8 U	2.8 U	2.0 U	**DET**	10 U	--	--	--	--	--	--
CR-MW3	DUPE-130709-W-02	07/09/13	Qvi	Permanent	n/a	n/a	--	100 U	260 U	410 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.3 U	--	--	--	--	--	--
CR-MW3	CR-MW3-130709	07/09/13	Qvi	Permanent	9.10	69.46	--	100 U	260 U	410 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.3 U	--	--	--	--	--	--
CR-MW5	CR-MW5-130709	07/09/13	Qvi	Permanent	10.05	64.08	--	100 U	**320**	410 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	**0.29**	**DET**	1.3 U	--	--	--	--	--	--
CR-MW6	CR-MW6-130709	07/09/13	Qvi	Permanent	12.31	60.52	--	100 U	260 U	420 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.3 U	--	--	--	--	--	--
CR-MW8	CR-MW8-130702	07/02/13	Qvi	Permanent	10.32	65.96	--	100 U	270 U	440 U	**1.9**	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	**0.84**	ND	1.4 U	--	--	--	--	--	--
CR-MW9	CR-MW9-130708	07/08/13	Qvi	Permanent	8.52	69.73	--	**3,300**	*730 U*	410 U	**130**	**77**	**96**	**340**	**110**	**32**	*1.0 U*	1.0 U	1.0 U	**26**	ND	**22**	--	--	--	--	--	--
CR-MW15	CR-MW15S-130905	09/05/13	Qvi	Permanent	n/a	n/a	--	100 U	260 U	420 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	0.097 U	0.00732 U	--	3.3 U	--	1.1 U	--
PL-MW2	PL-MW2-130710	07/10/13	Qvi	Permanent	7.51	46.99	--	100 U	290 U	470 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
2016 Agreed Order Investigation																											
A11-MW30D	A11-MW30D-190904	09/04/19	Qva	Permanent	22.74	51.19	--	--	--	--	*10 U*	50 U	10 U	20 U	10 U	10 U	*10 U*	*10 U*	10 U	10 U	**DET**	50 U	--	--	--	--	--	--
A11-MW30D	A11-MW30D-200311	03/11/20	Qva	Permanent	21.32	52.61	--	**120 J**	200 U	200 U	*10 U*	50 U	10 U	20 U	10 U	10 U	*10 U*	*10 U*	10 U	10 U	**DET**	50 U	--	--	--	--	--	--
A11-MW30D	DUP-6-200311	03/11/20	Qva	Permanent	n/a	n/a	--	**130 J**	210 U	210 U	*10 U*	50 U	10 U	20 U	10 U	10 U	*10 U*	*10 U*	10 U	10 U	**DET**	50 U	--	--	--	--	--	--
A11-MW30D	A11-MW30D-200901	09/01/20	Qva	Permanent	22.78	51.15	--	**110 J**	210 U	210 U	*10 U*	50 U	10 U	20 U	10 U	10 U	*10 U*	*10 U*	10 U	10 U	**DET**	50 U	--	--	--	--	--	--
A11-MW30D	DUP-7-200901	09/01/20	Qva	Permanent	n/a	n/a	--	**110 J**	230 U	230 U	*10 U*	50 U	10 U	20 U	10 U	10 U	*10 U*	*10 U*	10 U	10 U	**DET**	50 U	--	--	--	--	--	--
BL-MW1	BL-MW1-161221	12/21/16	Qvi	Permanent	7.08	67.61	--	100 U	--	--	0.40 U	2.0 U	0.40 U	0.80 U	--	--	*0.40 U*	0.40 U	--	--	**DET**	--	--	--	--	--	--	--
BL-MW1	BL-MW1-20190312	03/12/19	Qvi	Permanent	7.69	67.00	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.0 U	--	--	--	--	--	--
BL-MW1	BL-MW1-190904	09/04/19	Qvi	Permanent	8.68	66.01	--	100 U	260 U	420 U	0.40 U	2.0 U	0.40 U	0.80 U	0.40 U	0.40 U	*0.40 U*	0.40 U	0.40 U	0.40 U	**DET**	2.0 U	--	--	--	--	--	--
BL-MW1	BL-MW1-200311	03/11/20	Qvi	Permanent	7.40	67.29	--	100 U	210 U	210 U	1.0 U	5.0 U	1.0 U	2.0 U	1.0 U	1.0 U	*1.0 U*	1.0 U	1.0 U	1.0 U	**DET**	5.0 U	--	--	--	--	--	--
BL-MW1	BL-MW1-200901	09/01/20	Qvi	Permanent	8.66	66.03	--	100 U	210 U	210 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.0 U	--	--	--	--	--	--
BL-MW3	BL-MW3-161222	12/22/16	Qvi	Permanent	12.23	54.53	--	--	--	--	--	--	--	--	--	--	*0.20 U*	0.20 U	--	--	**DET**	--	--	--	--	--	--	--
BL-MW3	DUP-161222	12/22/16	Qvi	Permanent	n/a	n/a	--	--	--	--	--	--	--	--	--	--	*0.20 U*	0.20 U	--	--	**DET**	--	--	--	--	--	--	--
BL-MW3	BL-MW3-20190313	03/13/19	Qvi	Permanent	12.44	54.65	--	--	--	--	--	--	--	--	--	--	*0.20 U*	0.20 U	--	--	**DET**	--	--	--	--	--	--	--
BL-MW3	BL-MW3-20190904	09/04/19	Qvi	Permanent	13.15	53.94	--	100 U	270 U	430 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.0 U	--	--	--	--	--	--
BL-MW3	BL-MW3-200313	03/13/20	Qvi	Permanent	12.41	54.68	--	100 U	210 U	210 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.0 U	--	--	--	--	--	--
BL-MW3	BL-MW3-200902	09/02/20	Qvi	Permanent	13.37	53.72	--	100 U	210 U	210 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.0 U	--	--	--	--	--	--
BL-MW5	BL-MW5-161221	12/21/16	Qva	Permanent	11.67	63.04	--	100 U	--	--	2.0 U	10 U	2.0 U	4.0 U	--	--	*2.0 U*	2.0 U	--	--	**DET**	--	--	--	--	--	--	--
BL-MW5	BL-MW5-20190325	03/25/19	Qva	Permanent	12.18	62.53	--	100 U	--	--	4.0 U	20 U	4.0 U	8.0 U	4.0 U	4.0 U	*4.0 U*	4.0 U	4.0 U	4.0 U	**DET**	20 U	--	--	--	--	--	--
BL-MW5	DUP-1-190904	09/04/19	Qva	Permanent	n/a	n/a	--	**130 J**	260 U	420 U	*10 U*	50 U	10 U	20 U	10 U	10 U	*10 U*	*10 U*	10 U	10 U	**DET**	50 U	--	--	--	--	--	--
BL-MW5	BL-MW5-190904	09/04/19	Qva	Permanent	13.22	61.49	--	**110 J**	260 U	420 U	*10 U*	50 U	10 U	20 U	10 U	10 U	*10 U*	*10 U*	10 U	10 U	**DET**	50 U	--	--	--	--	--	--
BL-MW5	BL-MW5-200311	03/11/20	Qva	Permanent	12.27	62.44	--	**110 J**	200 U	200 U	*10 U*	50 U	10 U	20 U	10 U	10 U	*10 U*	*10 U*	10 U	10 U	**DET**	50 U	--	--	--	--	--	--
BL-MW5	BL-MW5-200901	09/01/20	Qva	Permanent	13.16	61.55	--	100 U	230 U	230 U	*10 U*	50 U	10 U	20 U	10 U	10 U	*10 U*	*10 U*	10 U	10 U	**DET**	50 U	--	--	--	--	--	--
BL-MW6	BL-MW6-161222	12/22/16	Qvi/Qva	Permanent	19.85	47.26	--	--	--	--	--	--	--	--	--	--	*4.0 U*	4.0 U	--	--	**DET**	--	--	--	--	--	--	--
BL-MW6	BL-MW6-20190313	03/13/19	Qvi/Qva	Permanent	20.26	46.83	--	--	--	--	--	--	--	--	--	--	*4.0 U*	4.0 U	--	--	**DET**	--	--	--	--	--	--	--
BL-MW6	BL-MW6-20190904	09/04/19	Qvi/Qva	Permanent	20.43	46.66	--	100 U	270 U	430 U	4.0 U	20 U	4.0 U	8.0 U	4.0 U	4.0 U	*4.0 U*	4.0 U	4.0 U	4.0 U	**DET**	20 U	--	--	--	--	--	--
BL-MW6	BL-MW6-200313	03/13/20	Qvi/Qva	Permanent	20.19	46.90	--	100 U	200 U	200 U	4.0 U	20 U	4.0 U	8.0 U	4.0 U	4.0 U	*4.0 U*	4.0 U	4.0 U	4.0 U	**DET**	20 U	--	--	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Groundwater Unit	Monitoring Well Type	Depth to Water (feet below TOC)	Water Level Elevation (feet NGVD29)	Groundwater Chemical Analytical Results[2] (µg/L)																				
							Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs							cVOCs	Naphthalene[5]	Total cPAH TEQ[6]	Metals				
							TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Total Xylenes[4]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene				Dissolved Metal - Arsenic	Total Metal - Arsenic	Dissolved Metal - Lead	Total Metal - Lead	Total PCB Aroclors[7]
Proposed Cleanup Level[8] (PCUL; µg/L)							n/a	800	500	500	5	640	700	1,600	80	80	0.05	4.8	24	800	Varies	160	0.2	8	8	15	15	0.22
Groundwater Screening Level for Protection of Vapor Intrusion[9] (µg/L)							n/a	30,000	30,000	NE	2.4	15,000	2,800	320	240	170	0.3	3.5	860	2,300	Varies	8.9	NE	NE	NE	NE	NE	NE
BL-MW6	BL-MW6-200902	09/02/20	Qvi/Qva	Permanent	20.48	46.61	--	100 U	210 U	210 U	2.0 U	10 U	2.0 U	4.0 U	2.0 U	2.0 U	*2.0 U*	2.0 U	2.0 U	2.0 U	DET	10 U	--	--	--	--	--	--
CR-MW3	CR-MW3-161220	12/20/16	Qvi	Permanent	7.89	70.67	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	--	--	*0.20 U*	0.20 U	--	--	DET	--	--	--	--	--	--	--
CR-MW3	CR-MW3-20190312	03/12/19	Qvi	Permanent	8.46	70.10	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW3	CR-MW3-190904	09/04/19	Qvi	Permanent	9.51	69.05	--	100 U	270 U	430 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW3	CR-MW3-200313	03/13/20	Qvi	Permanent	8.48	70.08	--	100 U	200 U	200 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW3	CR-MW3-200901	09/01/20	Qvi	Permanent	9.51	69.05	--	100 U	210 U	210 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW5	CR-MW5-161222	12/22/16	Qvi	Permanent	8.95	65.18	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	--	--	*0.20 U*	0.20 U	--	--	ND	--	--	--	--	--	--	--
CR-MW5	CR-MW5-20190325	03/25/19	Qvi	Permanent	9.74	64.39	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW5	CR-MW5-190904	09/04/19	Qvi	Permanent	11.11	63.02	--	100 U	**280**	430 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW5	CR-MW5-200313	03/13/20	Qvi	Permanent	9.91	64.22	--	100 U	**710**	**300**	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	**1.5**	DET	1.0 U	--	--	--	--	--	--
CR-MW5	CR-MW5-200901	09/01/20	Qvi	Permanent	10.92	63.21	--	100 U	**230**	210 U	**0.21**	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW6	CR-MW6-161222	12/22/16	Qvi	Permanent	11.69	61.14	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	--	--	*0.20 U*	0.20 U	--	--	DET	--	--	--	--	--	--	--
CR-MW6	CR-MW6-20190325	03/25/19	Qvi	Permanent	12.20	60.63	--	**150 J**	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	**2.3**	DET	1.0 U	--	--	--	--	--	--
CR-MW6	CR-MW6-190904	09/04/19	Qvi	Permanent	12.80	60.03	--	100 U	280 U	450 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW6	CR-MW6-200313	03/13/20	Qvi	Permanent	12.04	60.79	--	100 U	200 U	**260**	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW6	CR-MW6-200901	09/01/20	Qvi	Permanent	12.57	60.26	--	100 U	210 U	**310**	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW8	CR-MW8-161221	12/21/16	Qvi	Permanent	7.72	68.56	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	--	--	*0.20 U*	0.20 U	--	--	ND	--	--	--	--	--	--	--
CR-MW8	CR-MW8-20190325	03/25/19	Qvi	Permanent	9.81	66.47	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
CR-MW8	CR-MW8-190904	09/04/19	Qvi	Permanent	11.06	65.22	--	100 U	260 U	410 U	**0.55**	1.0 U	**0.51**	**1.1**	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	**0.41**	DET	1.0 U	--	--	--	--	--	--
CR-MW8	CR-MW8-200313	03/13/20	Qvi	Permanent	9.56	66.72	--	100 U	210 U	210 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
CR-MW8	CR-MW8-200901	09/01/20	Qvi	Permanent	10.74	65.54	--	100 U	210 U	210 U	**0.94**	**1.7**	**0.83**	**3.15**	0.20 U	**0.26**	*0.20 U*	0.20 U	0.20 U	**1.4**	DET	1.0 U	--	--	--	--	--	--
CR-MW9	CR-MW9-161221	12/21/16	Qvi	Permanent	11.22	67.03	--	**650**	--	--	**11**	**7.7**	**9.0**	**16.8**	--	--	*0.20 U*	0.20 U	--	--	ND	--	--	--	--	--	--	--
CR-MW9	CR-MW9-20190325	03/25/19	Qvi	Permanent	12.64	65.61	--	**420**	--	--	**37**	**15**	**15**	**15.4**	**1.6**	**0.33**	*0.20 U*	0.20 U	0.20 U	**3.1**	ND	**1.5**	--	--	--	--	--	--
CR-MW9	CR-MW9-190904	09/04/19	Qvi	Permanent	12.63	65.62	--	**720**	**710 J**	410 U	**18**	**4.8**	**11**	**16.6**	**1.3**	**0.93**	*0.20 U*	0.20 U	0.20 U	**12**	ND	**2.7**	--	--	--	--	--	--
CR-MW9	CR-MW9-200319	03/19/20	Qvi	Permanent	11.71	66.54	--	**320**	210 U	210 U	**26**	**5.6**	**4.4**	**3.43**	0.20 U	**0.32**	*0.20 U*	0.20 U	0.20 U	**4.2**	ND	**1.1**	--	--	--	--	--	--
CR-MW9	CR-MW9-200901	09/01/20	Qvi	Permanent	12.62	65.63	--	**410**	**300 J**	220 U	**5.2**	**2.5**	**8.4**	**21.4**	**1.4**	**0.35**	*0.20 U*	0.20 U	0.20 U	**5.2**	ND	**4.4**	--	--	--	--	--	--
CR-MW15	CR-MW15-161228	12/28/16	Qvi	Permanent	16.63	62.82	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	--	--	*0.20 U*	0.20 U	--	--	DET	--	--	--	--	--	--	--
CR-MW15	CR-MW15-20190314	03/14/19	Qvi	Permanent	17.02	62.43	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW15	CR-MW15-190904	09/04/19	Qvi	Permanent	17.63	61.82	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW15	CR-MW15-200313	03/13/20	Qvi	Permanent	17.02	62.43	--	100 U	210 U	210 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
CR-MW15	CR-MW15-200901	09/01/20	Qvi	Permanent	17.71	61.74	--	100 U	210 U	210 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
PL-MW2	PL-MW2-161220	12/20/16	Qvi	Permanent	6.57	76.62	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	--	--	*0.20 U*	0.20 U	--	--	ND	0.097 U	0.00732 U	--	--	--	--	--
PL-MW2	PL-MW2-20190325	03/25/19	Qvi	Permanent	7.16	75.76	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	0.098 U	--	--	--	--	--	--
PL-MW2	PL-MW2-190904	09/04/19	Qvi	Permanent	8.84	74.08	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	0.10 U	0.00755 U	--	--	--	--	--
PL-MW2	PL-MW2-200313	03/13/20	Qvi	Permanent	7.43	75.49	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	0.048 U
PL-MW2	PL-MW2-200901	09/01/20	Qvi	Permanent	8.85	74.07	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
Prairie Line Trail Capital Project																											
PL-MW2	PL-MW2-130401	04/01/13	Qvi	Permanent	n/a	n/a	--	100 U	290 U	470 U	0.20 U	1.0 U	0.20 U	0.40 U	--	--	--	--	--	--	ND	0.10 U	--	--	--	--	--	--

Notes:

[1] Sample locations are shown on Figures 5-4 through 5-6. TW# was added to the end of select temporary wells where groundwater samples were collected at two depth intervals in the same location.

[2] Chemical analytical results in this table include COCs based on historical land use, potential source(s), and/or required analysis in accordance with Model Toxics Control Act Table 830-1 in which COCs were detected at a concentration greater than their respective PCUL. The full list of chemical analytical results is presented in Appendices D and H. Chemical analytical results associated with other Areas of Concern are presented in other sections of the Remedial Investigation.

[3] Value for gasoline-range petroleum hydrocarbons if benzene is present. If benzene is not present, screening level is 1,000 µg/L.

[4] Sum of m-,p- and o- xylenes. The highest reporting limit for non-detect results is listed.

[5] Naphthalene may have been analyzed as a volatile organic compound (VOC), polycyclic aromatic hydrocarbon (PAH), or semi-volatile organic compound (SVOC). The lowest practical quantitation limit (PQL) or the greatest detected concentration is shown.

[6] Total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) calculated using the toxicity equivalency quotient (TEQ) methodology in Washington Administrative Code (WAC) 173-340-708(8). Non-detections were assigned half the reporting limit for these calculations.

[7] Total polychlorniated biphenyl (PCB) Aroclors is the sum of PCB Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260. The highest reporting limit for non-detect results is listed.

[8] Groundwater PCUL is based on the lowest value for protection of groundwater as drinking water, adjusted for practical quantitation limit (PQL; see Table 3-3).

[9] Groundwater screening level referenced from Ecology's CLARC (Cleanup Levels and Risk Calculation) Table (Excel) dated January 2023 and Ecology's Vapor Intrusion Guidance (Publication No. 09-09-047; see Table 3-5 and 3-6).

-- = not tested

µg/L = microgram per liter

1,2,4-TMB = 1,2,4-trimethylbenzene

1,3,5-TMB = 1,3,5-trimethylbenzene

BTEX = benzene, toluene, ethylbenzene and xylenes

CVOCs = chlorinated volatile organic compounds

DET = detected

EDB = 1,2-dibromoethane

EDC = 1,2-dichloroethane

J = estimated value by laboratory

MTBE = methyl tert-butyl ether

n/a = not available

Qva = Vashon advance outwash

Qvi = Vashon ice-contact deposits

TOC = top of casing

TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil

TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification

U = analyte was ND at or greater than the listed reporting limit

VOCs = volatile organic compounds

G, D, O = gasoline-range petroleum hydrocarbons, diesel-range petroleum hydrocarbons, and oil-range petroleum hydrocarbons

Blue font indicates TPH-G detection is due to a single peak of chlorobenzene

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Italic font type indicates the non-detect result is greater than the PCUL.

Shading indicates that the detected concentration is greater than the PCUL.

Shading indicates that the detected concentration is greater than the screening level for vapor intrusion and/or the PCUL.

Table 5-7

Summary of Soil Vapor and Indoor/Outdoor Air Chemical Analytical Results – Cragle

University of Washington - Tacoma Campus

Tacoma, Washington

Location Identification[1]	Sample Identification	General Location/Area	Sample Date	Sample Method	Chemical Analytical Results[2] (µg/m^3)														
					TPH			BTEXN							Naphthalene		TPH BTEXN Sum		
					Aliphatic Hydrocarbons (EC5-8)	Aliphatic Hydrocarbons (EC9-12)	Aromatic Hydrocarbons (EC9-10)	Benzene	Ethylbenzene	Toluene	m,p-Xylene	o-Xylene	Total Xylenes	Naphthalene	Ambient Air Adjusted Napthalene[3]	Napthalene Concentration Due to Vapor Intrusion[4]	TPH BTEXN Sum	Ambient Air Adjusted TPH BTEXN Sum[3]	TPH BTEXN Sum Due to Vapor Intrusion[4]
Soil Vapor Screening Level (SL) for Unrestricted Use[5]					n/a	n/a	n/a	11	15,000	76,000	n/a	n/a	1,500	2.5			1,500		
Soil Vapor Screening Level (SL) for Commercial Worker[6]					n/a	n/a	n/a	50	130,000	650,000	n/a	n/a	13,000	11			13,000		
MIL-SSA1	MIL-SSA1-20221229	Sub-Slab	12/29/22	Sub-slab/Vent	**658**	**311**	**10.6**	**1.28**	1.95 U	**9.69**	6.44	**2.04**	**8.48**	**0.523**	--	--	**1,008**	--	--
Proposed Indoor Air Cleanup (PCUL) for Unrestricted Use[5]					n/a	n/a	n/a	0.3	457	2,286	n/a	n/a	46	0.074			46		
Indoor Air Screening Level (SL) for Commercial Worker[6]					n/a	n/a	n/a	1.5	3,893	19,467	n/a	n/a	389	0.34			390		
Range of Potential Background Concentrations[7]					n/a	n/a	n/a	<RL to 4.7	n/a	n/a	n/a	n/a	n/a	0.18 to 1.7 (average = 0.86)			116 to 594 (Average = 355)		
MIL-IA1	MIL-IA1-20221229	Classroom	12/29/22	Indoor Air	**114**	**330**	**18.8**	0.987	**3.24**	**8.04**	**11.3**	**3.69**	**15.0**	**0.657**	0.439	0	**506**	**293**	0
MIL-IA2	MIL-IA2-20221229	Combustion Lab	12/29/22	Indoor Air	**111**	**89.8**	**12.5**	**1.07**	**6.10**	**4.92**	**21.0**	**5.58**	**26.6**	**0.636**	0.418	0	**279**	**66**	0
MIL-OA1	MIL-OA1-20221229	Roof	12/29/22	Outdoor Air	**129**	**22.4**	**4.22**	**1.02**	1.95 U	**5.04**	**1.78**	0.773	**2.55**	**0.302**	--	--	**167**	--	--
MIL-OA2	MIL-OA2-20221229	South of Building	12/29/22	Outdoor Air	**45.5**	**202**	**3.33**	0.893	1.95 U	**3.43**	**1.26**	0.606	**1.87**	**0.135**	--	--	**259**	--	--

Notes:

[1] Sample locations are shown on Figures 5-6.

[2] Chemical analytical results in this table include contaminants of concern (COCs) based on historical land use, potential source(s), and/or required analysis in accordance with Model Toxics Control Act Table 830-1 in which COCs were detected at a concentration greater than their respective PCUL. The full list of chemical analytical result list is presented in Appendices D and H. Chemical analytical results associated with other Areas of Concern are presented in other sections of the Remedial Investigation.

[3] Adjusted for ambient air by subtracting the average ambient air concentration from the indoor air concentration per Ecology guidance.

[4] Adjusted for indoor air/commercial products by removing the average background concentration for the chemical obtained from Ecology guidance, Appendix E. "0" indicates the average background concentration is greater than the indoor air concentration.

[5] Proposed indoor air cleanup level and sub-slab screening level based on protection of unrestricted land use (see Table 3-4).

[6] Commercial Worker indoor air and soil vapor screening levels based on a commercial worker (see Table 3-4).

[7] Background concentrations obtained from Ecology guidance.

Ecology guidance = Guidance for Evaluating Vapor Intrusion in Washington State, Investigation and Remedial Action, Publication 09-09-047 dated March 2022

-- = not tested

µg/m^3 = microgram per cubic meter

TPH = total petroleum hydrocarbons

BTEXN = sum of TPH, benzene, toluene, ethylbenzene, xylenes and naphthalene

n/a = Not applicable

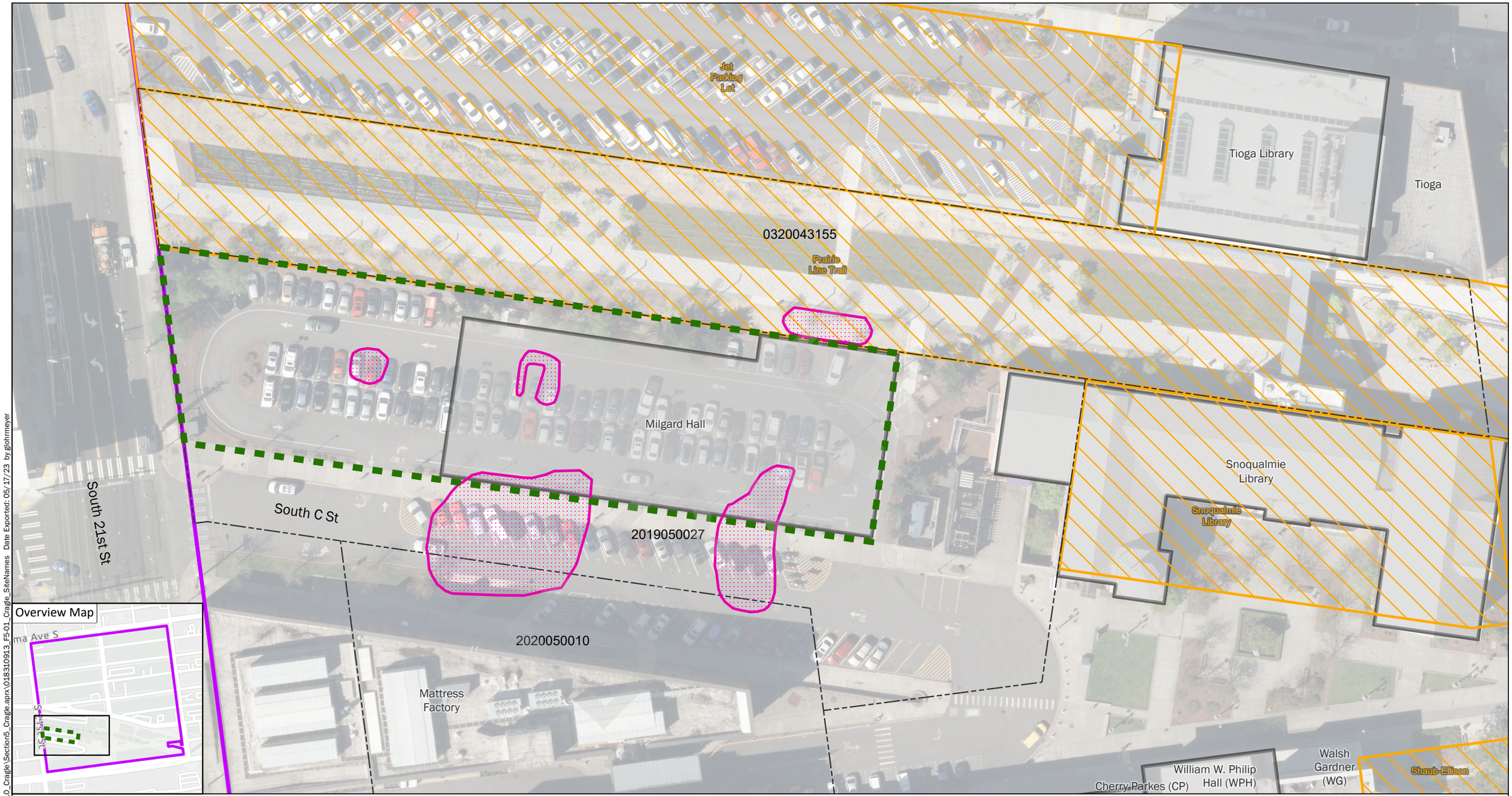
U = analyte was ND at or greater than the listed reporting limit

ND = not detected

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Shading indicates that the detected result exceeds the PCUL for Indoor Air or the MTCA Method B Soil Vapor Screening Level for unrestricted use.

Shading indicates that the detected or estimated concentrations is greater than the Commercial Worker Soil Vapor Screening Level or Indoor Air Screening Level.



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: Aerial provided by City of Tacoma, 2015

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Cragle Site - Area of Soil and/or Groundwater with One or More Contaminants of Concern Exceeding the Proposed Cleanup Level (PCUL)
- Other Identified Property-Specific Area of Concern
- Parcel Boundary and Number
- Existing Building Footprint

W N E S

50 0 50

Feet

Overview
Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-1

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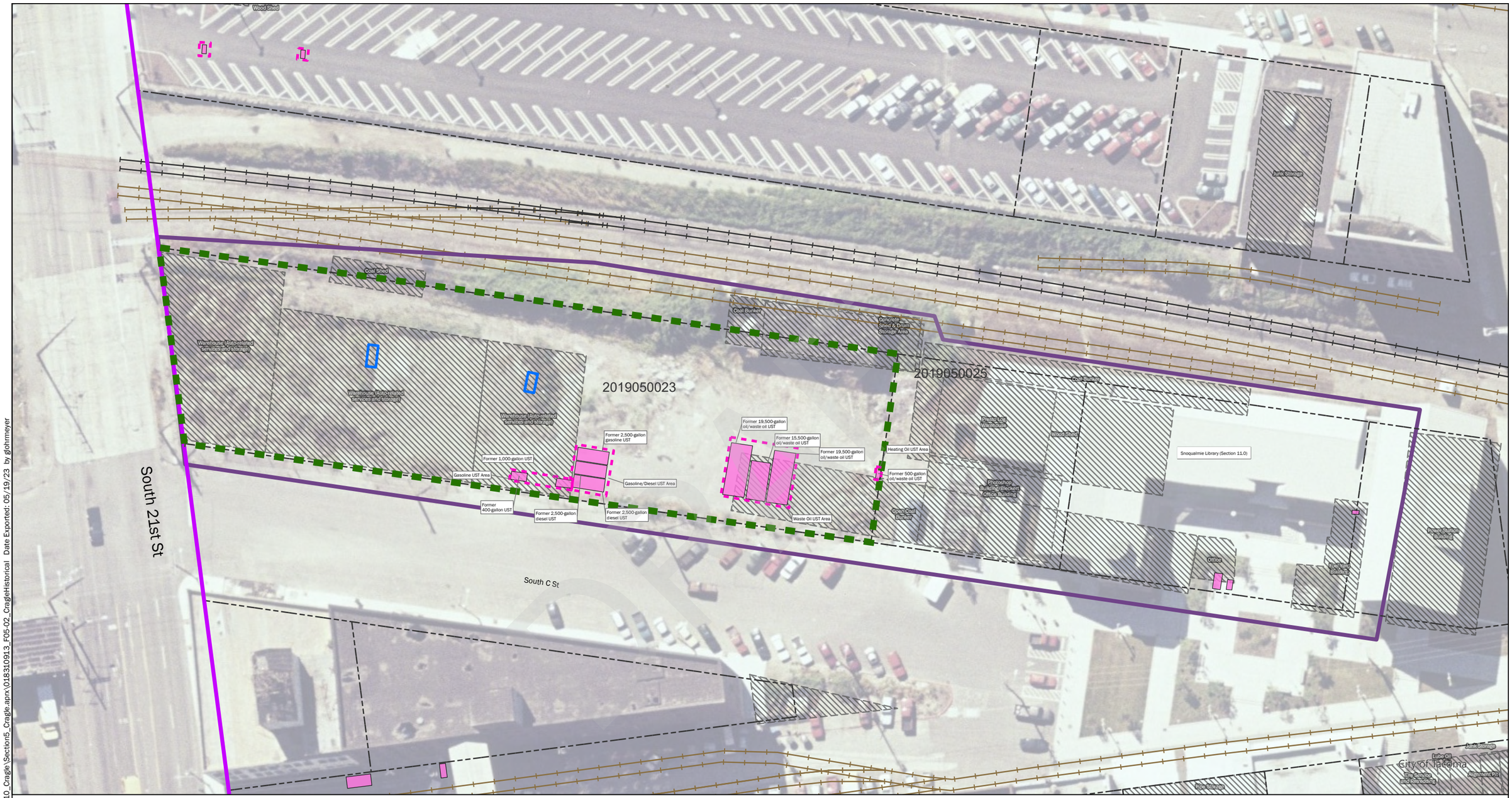


P:\O\0183109\GIS\MXDs\RI_working\Section10_Cragle\Section5_Cragle.aprx\0183109913_F05-02_CragleHistorical Date Exported: 05/19/23 by glohrmeyer

Notes:

UST = underground storage tank

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: Aerial imagery provided by City of Tacoma, 1998

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Parcel Boundary and Number (Historic)
- Historic Building Footprint/Feature
- Former UST Location
- UST Area
- Extent of Griffin and/or Pacific Fuel Operations
- Former Hydraulic Hoist
- Former Historic Rail Line
- Existing Historic Rail Line

W S N E

30 0 30

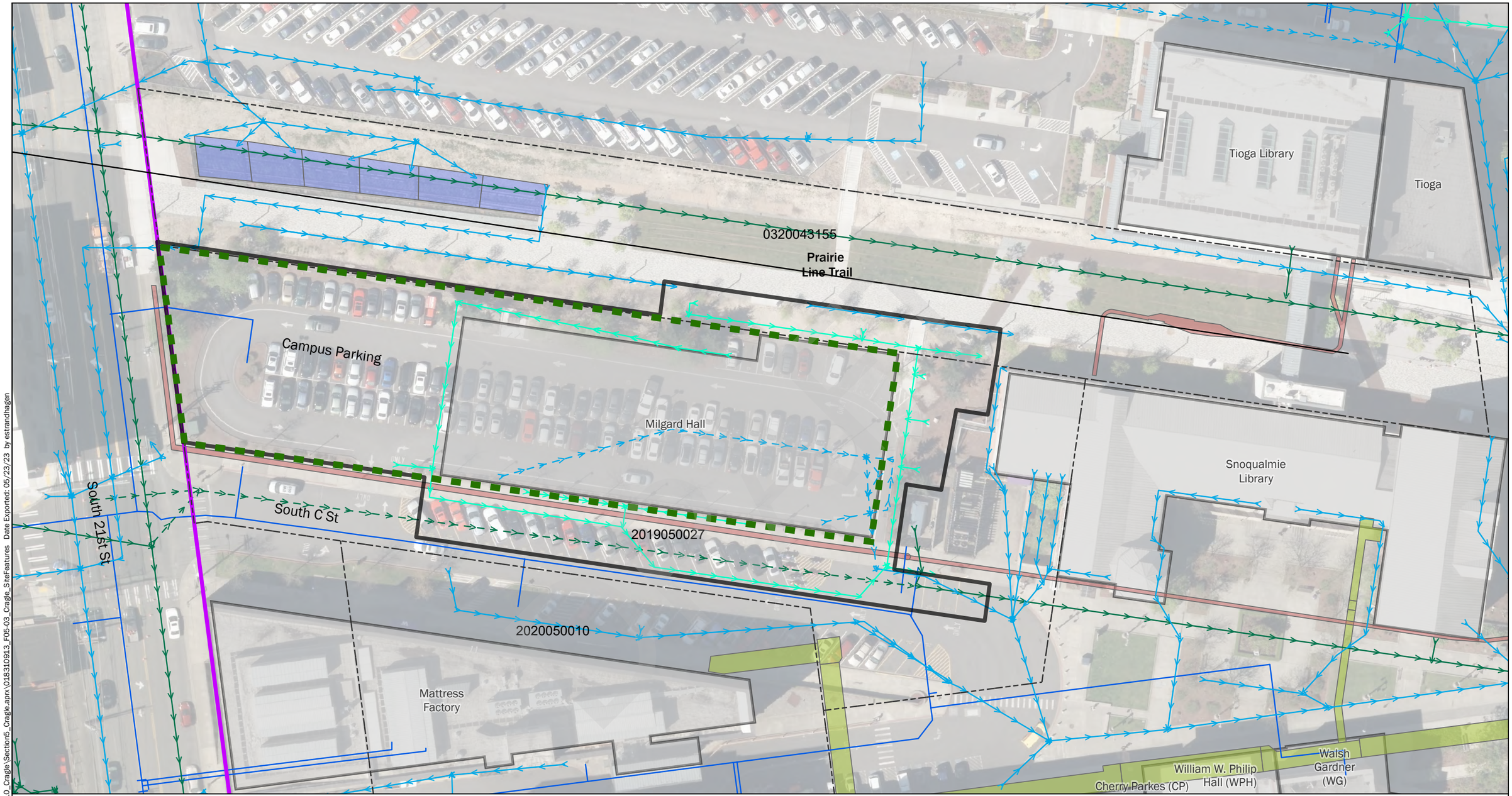
Feet

Historical Features and Land Use Cragle

University of Washington – Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-2



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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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.

Data Source: Aerial provided by City of Tacoma, 2015

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Water Utility
- Extent of Milgard Hall Capital Project Boundary
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Existing Building Footprint
- Parcel Boundary and Number
- Stormwater Treatment Facility
- Underground Electrical Duct
- Utilidor Footprint
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- New Sanitary Sewer Utility Installed after 2021
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021

W N E S

50 0 50

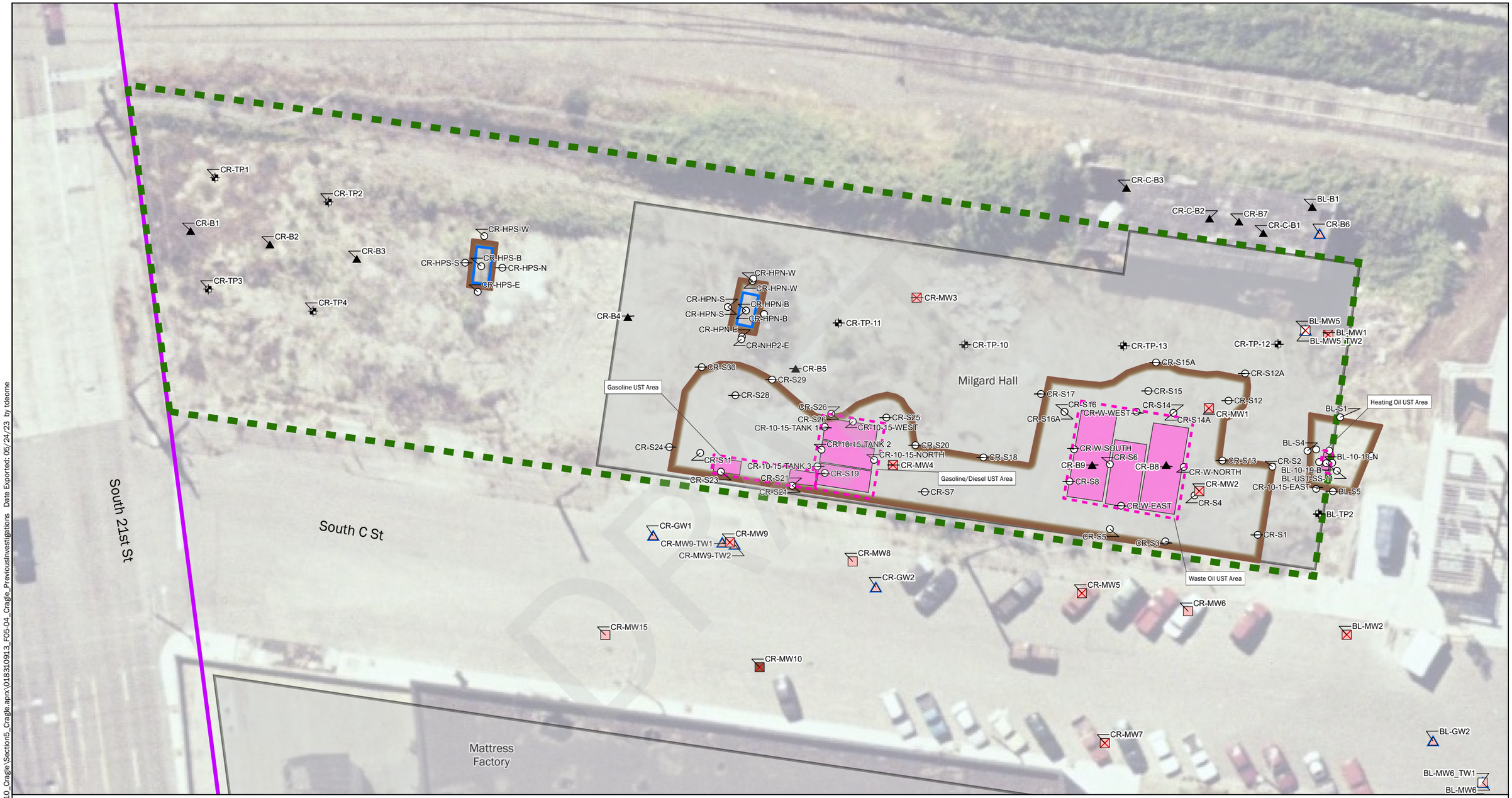
Feet

Current Features and Utility Infrastructure Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-3



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Notes:

UST = underground storage tank

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: Aerial provided by City of Tacoma, 1998

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Unconfirmed Aquifer Monitoring Well - Decommissioned
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Test Pit
- Confirmation Sample
- Boring
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Existing Building Footprint
- Former UST Location
- UST Area
- Former Hydraulic Hoist
- Approximate Lateral Extent of Remedial Excavation

N W E S

30 0 30

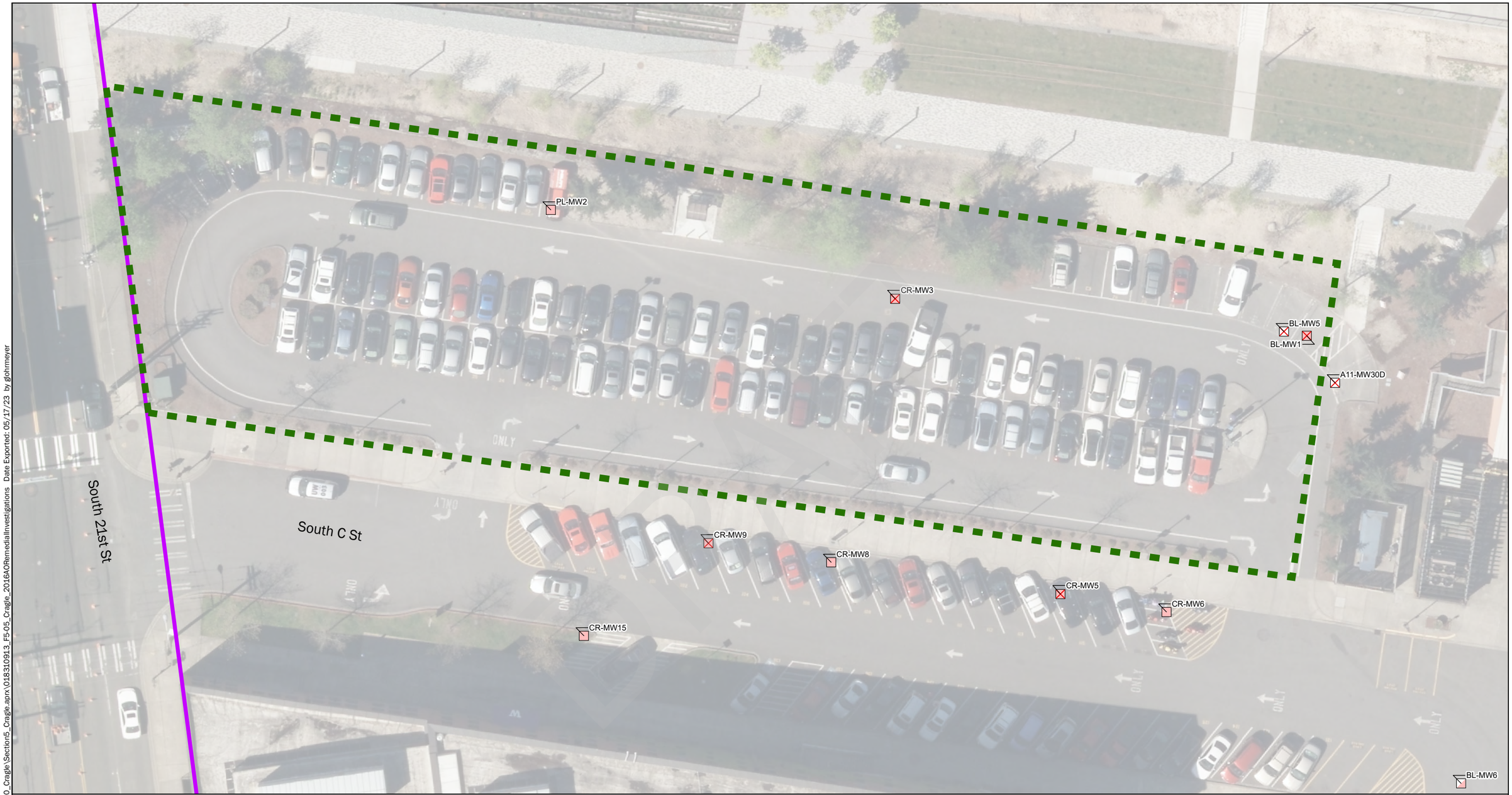
Feet

Previous Environmental Investigations and Remedial Actions
Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-4



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.

Legend

- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern

Data Source: Aerial provided by City of Tacoma, 2015

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

W E S N

30 0 30

Feet

2016 Agreed Order Remedial Investigation Locations Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-5

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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: Aerial provided by City of Tacoma, 2015

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Qvi Aquifer Monitoring Well
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Test Pit
- Confirmation Sample
- Boring
- Indoor Air
- Outdoor Air
- Subslab Vapor
- Extent of Milgard Hall Capital Project Boundary
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Existing Building Footprint
- Approximate Lateral Extent of Remedial Excavation

W S N E

30 0 30

Feet

Capital Projects and Remedial Actions
Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-6

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Soil Result Summary

Result shown is the maximum detected concentration throughout the soil column divided by the Proposed Cleanup Level (PCUL) or screening level for vapor intrusion (if applicable), whichever is lower.

Notes:

TPH-G = Gasoline-range petroleum hydrocarbons
PCUL = Proposed Cleanup Level (30 mg/kg), mg/kg = milligram per kilogram
UST = underground storage tank, ER = Exceedance Ratio
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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.

Data Source: Aerial provided by City of Tacoma, 2015 Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Boring
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Unconfirmed Aquifer Monitoring Well - Decommissioned
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Test Pit
- Confirmation Sample
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Cross Section
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Approximate Lateral Extent of Previous Excavation (1995)
- Existing Building Footprint
- UST Area

Summary of TPH-G in Soil
Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-7

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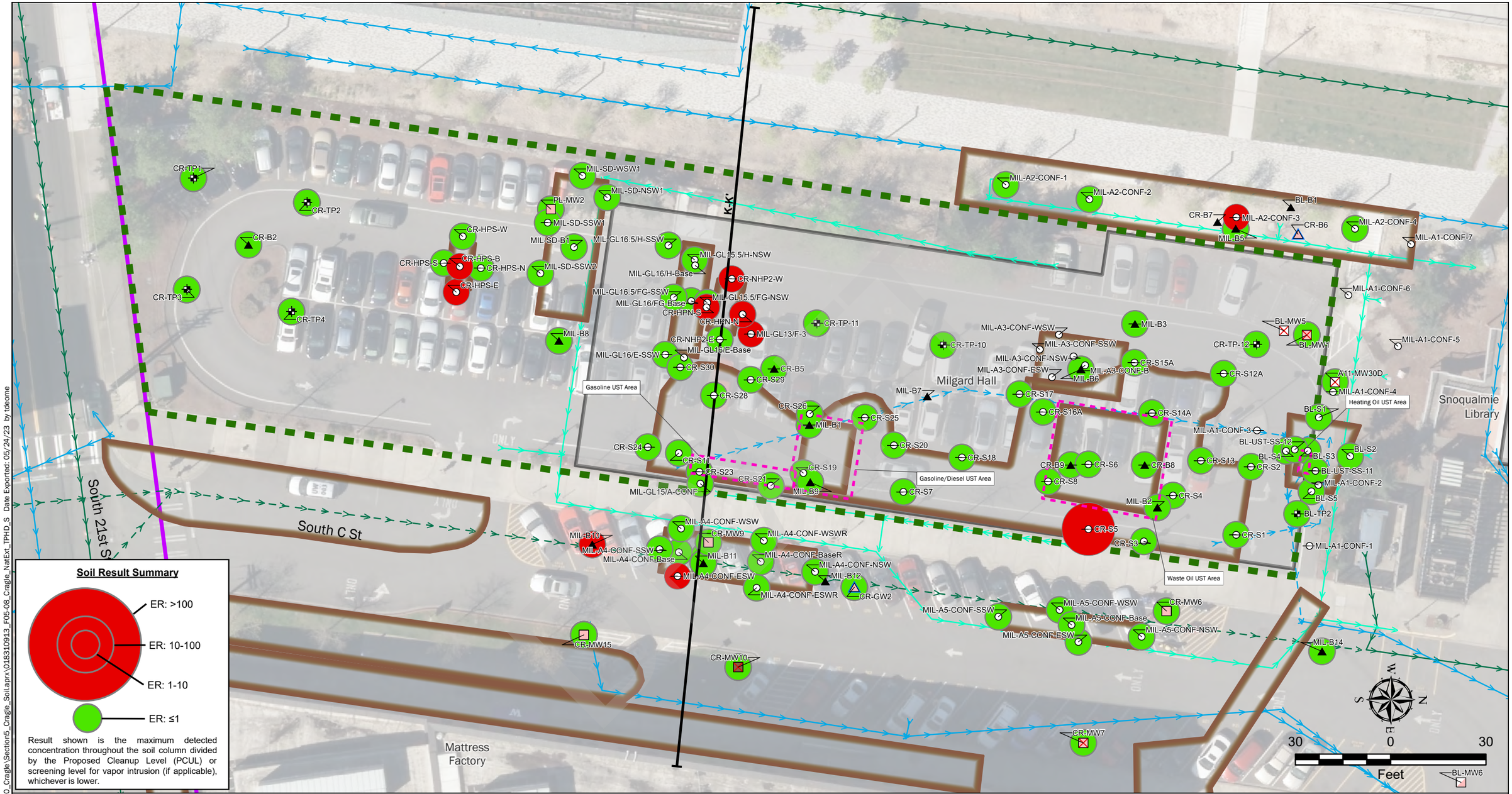


Soil Result Summary

Result shown is the maximum detected concentration throughout the soil column divided by the Proposed Cleanup Level (PCUL) or screening level for vapor intrusion (if applicable), whichever is lower.

Notes:

TPH-D = Diesel-range petroleum hydrocarbons
PCUL = Proposed Cleanup Level (250 mg/kg), mg/kg = milligram per kilogram
UST = underground storage tank, ER = Exceedance Ratio
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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.

Legend

- Boring
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Unconfirmed Aquifer Monitoring Well - Decommissioned
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Test Pit
- Confirmation Sample
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Cross Section
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Existing Building Footprint
- UST Area
- Approximate Lateral Extent of Previous Excavation

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 FeetData Source: Aerial provided by City of Tacoma, 2015

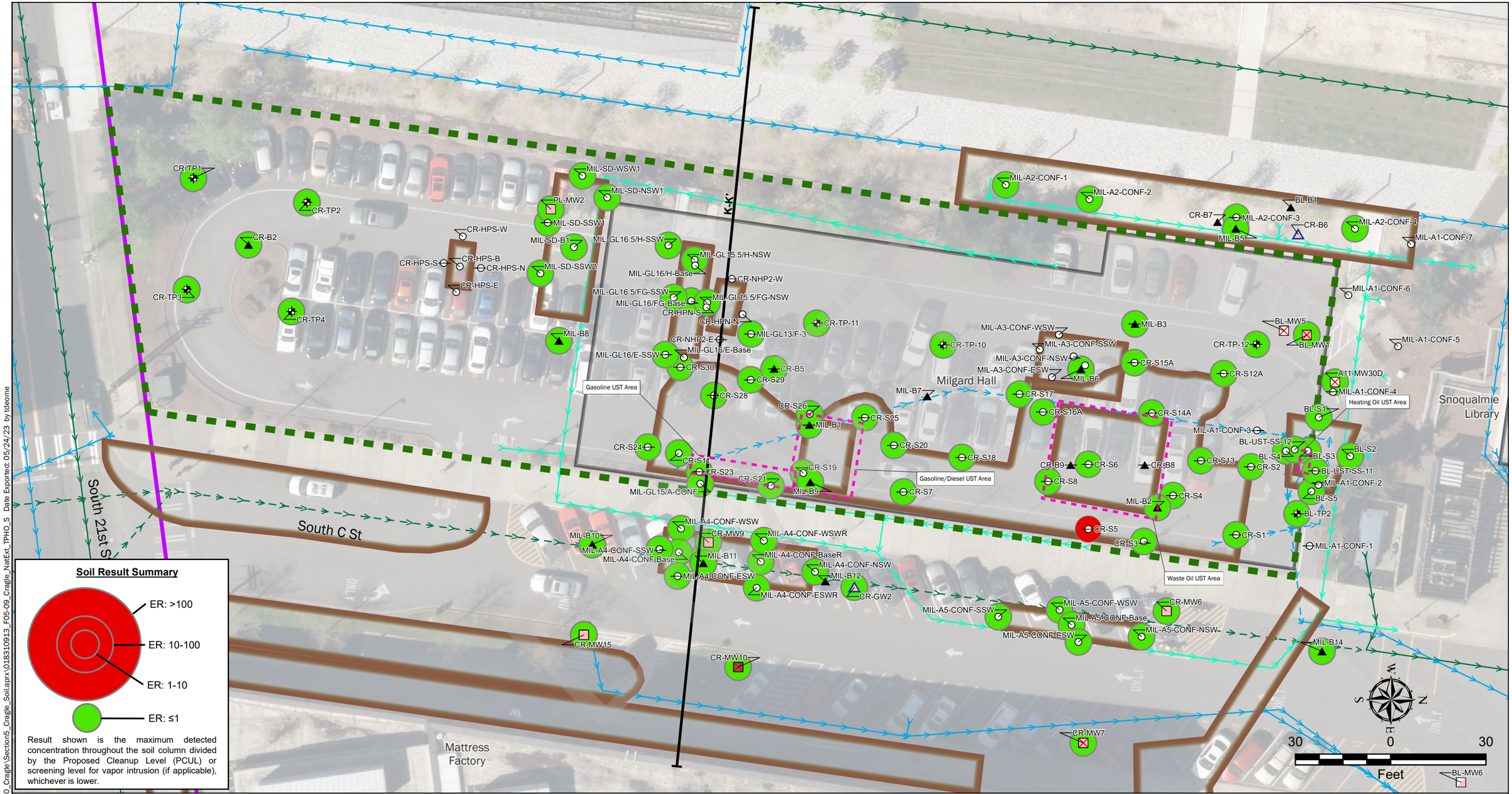
Summary of TPH-D in Soil Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-8

P:\0183109\GIS\MXDs\RI_working\Section10_Cragle\Section5_Cragle_Soil.aprx\0183109913_F05-08_Cragle_NatExt_TPHD_S Date Exported: 05/24/23 by tdeome



Soil Result Summary

Result shown is the maximum detected concentration throughout the soil column divided by the Proposed Cleanup Level (PCUL) or screening level for vapor intrusion (if applicable), whichever is lower.

Notes:

TPH-O = Oil-range petroleum hydrocarbons
PCUL = Proposed Cleanup Level (2000 mg/kg), mg/kg = milligram per kilogram
UST = underground storage tank, ER = Exceedance Ratio
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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.

Legend

- Boring with Discrete Chemical Analysis
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Unconfirmed Aquifer Monitoring Well - Decommissioned
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Test Pit with Discrete Chemical Analysis
- Confirmation Sample
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Cross Section
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Existing Building Footprint
- UST Area
- Approximate Lateral Extent of Previous Excavation

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet Data Source: Aerial provided by City of Tacoma, 2015

Summary of TPH-O in Soil Cragle

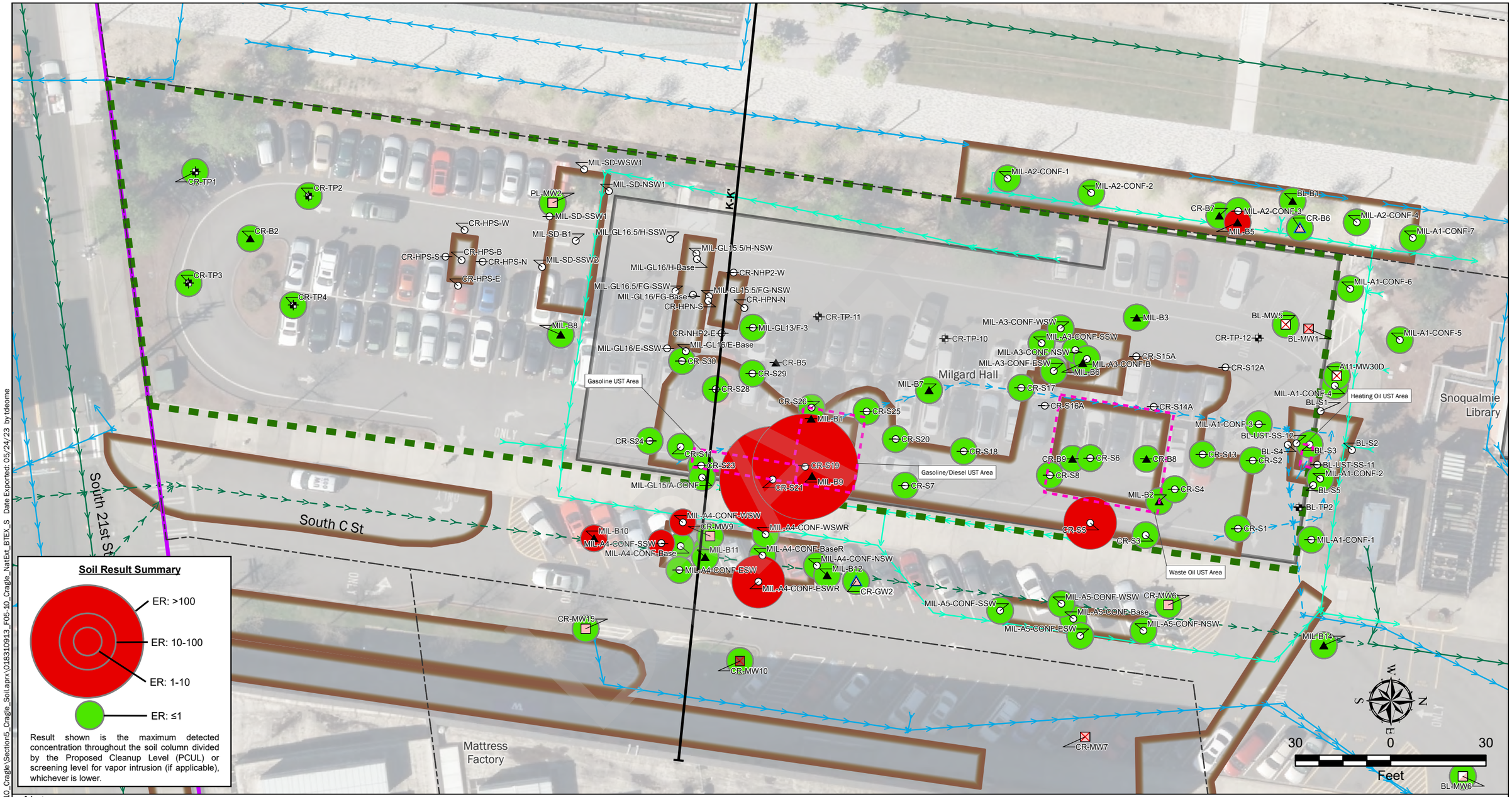
University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-9

P:\0\0183109\GIS\MXDs\R1_working\Section10_Cragle\Section5_Cragle_Soil.aprx\0183109913_F05-09_Cragle_NatExt_TPHO_S Date Exported: 05/24/23 by tdeome

P:\0\0183109\GIS\MXDs\RI_working\Section10_Cragle\Section5_Cragle_Soil.aprx\0183109_F05-10_Cragle_NatExt_BTEX_S Date Exported: 05/24/23 by tdeome



Soil Result Summary

Result shown is the maximum detected concentration throughout the soil column divided by the Proposed Cleanup Level (PCUL) or screening level for vapor intrusion (if applicable), whichever is lower.

Notes:

BTEX = Benzene (B), Toluene (T), Ethylbenzene (E), and Xylenes (X)
PCUL = Proposed Cleanup Level , mg/kg = milligram per kilogram
UST = underground storage tank, ER = Exceedance Ratio
B = (0.0017 mg/kg), T = (0.27 mg/kg),
E = (0.34 mg/kg), X = (0.81 mg/kg).

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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.

Legend

- Boring
- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Unconfirmed Aquifer Monitoring Well - Decommissioned
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Test Pit
- Confirmation Sample
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Cross Section
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Existing Building Footprint
- UST Area
- Approximate Lateral Extent of Remedial Excavation

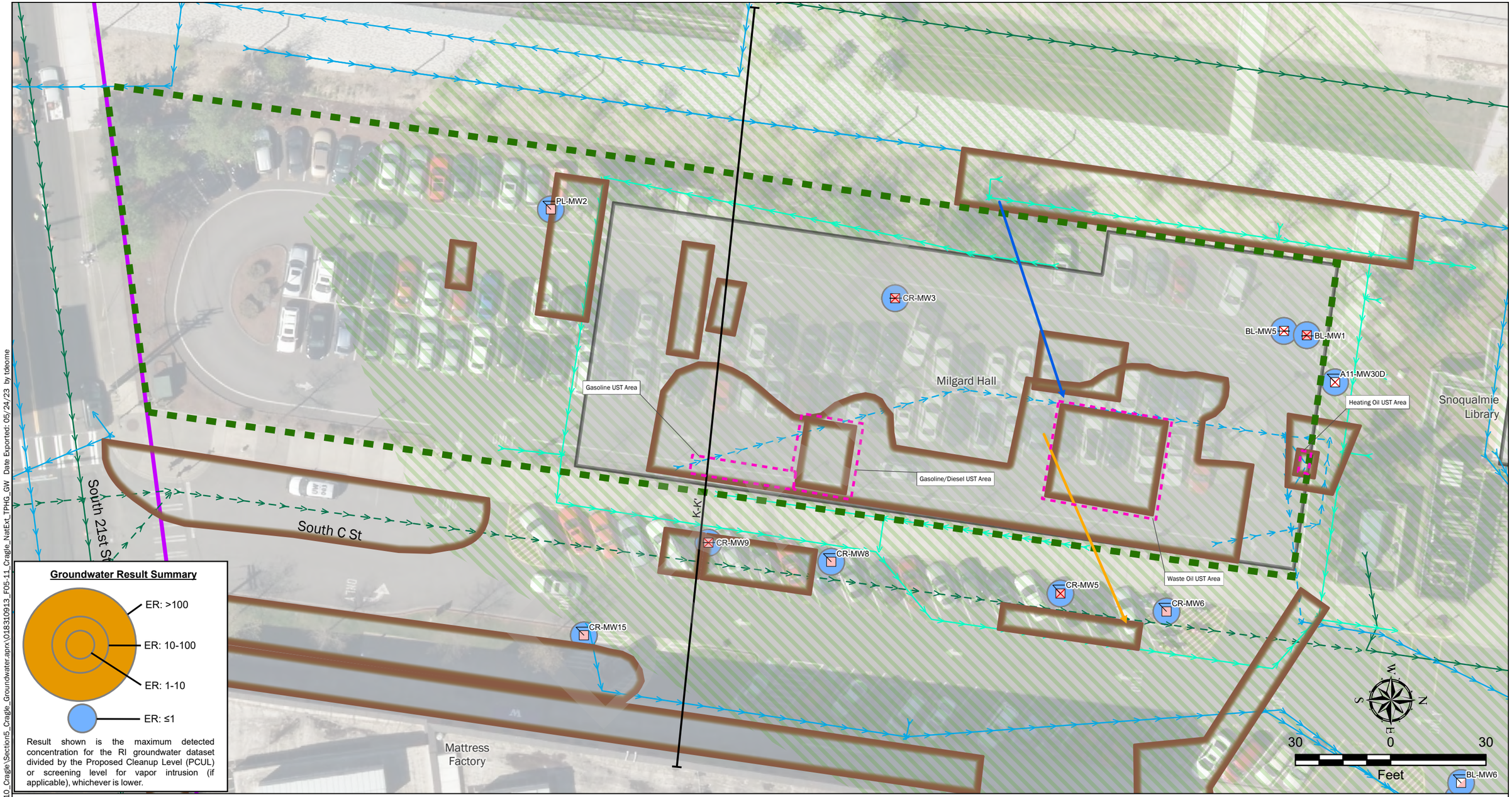
Data Source: Aerial provided by City of Tacoma, 2015
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Summary of BTEX in Soil
Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-10



Groundwater Result Summary

ER: >100

ER: 10-100

ER: 1-10

ER: ≤1

Result shown is the maximum detected concentration for the RI groundwater dataset divided by the Proposed Cleanup Level (PCUL) or screening level for vapor intrusion (if applicable), whichever is lower.

Notes:

TPH-G = Gasoline-range petroleum hydrocarbons
PCUL = Proposed Cleanup Level (800 µg/L), µg/L = microgram per liter
UST = underground storage tank, ER = Exceedance Ratio
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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.
Data Source: Aerial provided by City of Tacoma, 2015
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Cross Section
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Approximate Lateral Extent of Previous Excavation (1995)
- Existing Building Footprint
- UST Area
- Areas where Qvi and Qva Aquifers are Connected by Glacial Incision or Development

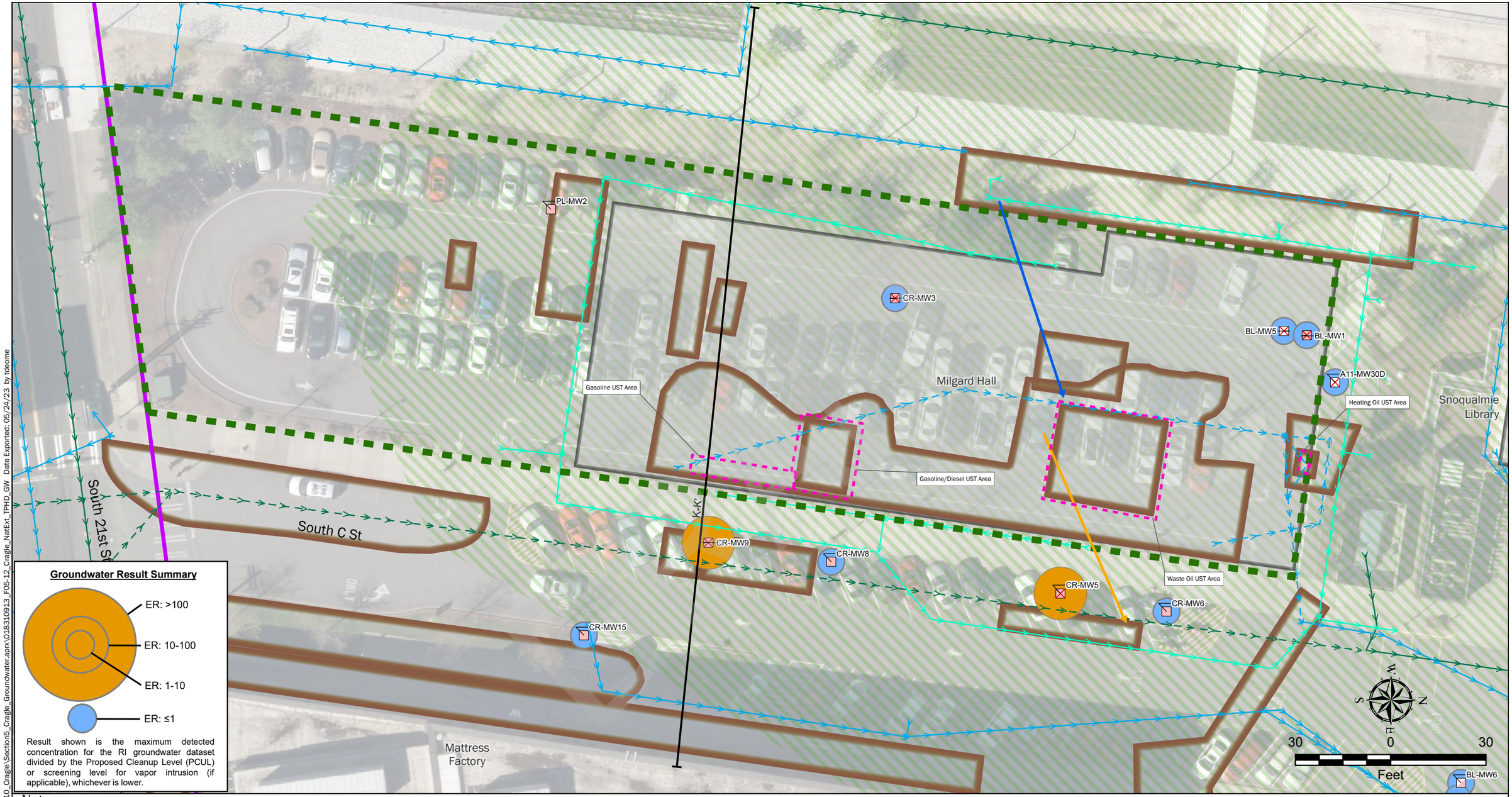
Summary of TPH-G in the Qvi/Qva Aquifer Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-11

P:\0183109\GIS\MXDs\RI_working\Section10_Cragle\Section5_Cragle_Groundwater.aprx\0183109913_F05-11_Cragle_NatExt_TPHG_GW Date Exported: 05/24/23 by tdeome



Groundwater Result Summary

ER: >100

ER: 10-100

ER: 1-10

ER: ≤1

Result shown is the maximum detected concentration for the RI groundwater dataset divided by the Proposed Cleanup Level (PCUL) or screening level for vapor intrusion (if applicable), whichever is lower.

Notes:

TPH-D = Diesel-range petroleum hydrocarbons
PCUL = Proposed Cleanup Level (500 µg/L), µg/L = microgram per liter
UST = underground storage tank, ER = Exceedance Ratio
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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.
Data Source: Aerial provided by City of Tacoma, 2015
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Cross Section
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Approximate Lateral Extent of Previous Excavation (1995)
- Existing Building Footprint
- UST Area
- Areas where Qvi and Qva Aquifers are Connected by Glacial Incision or Development

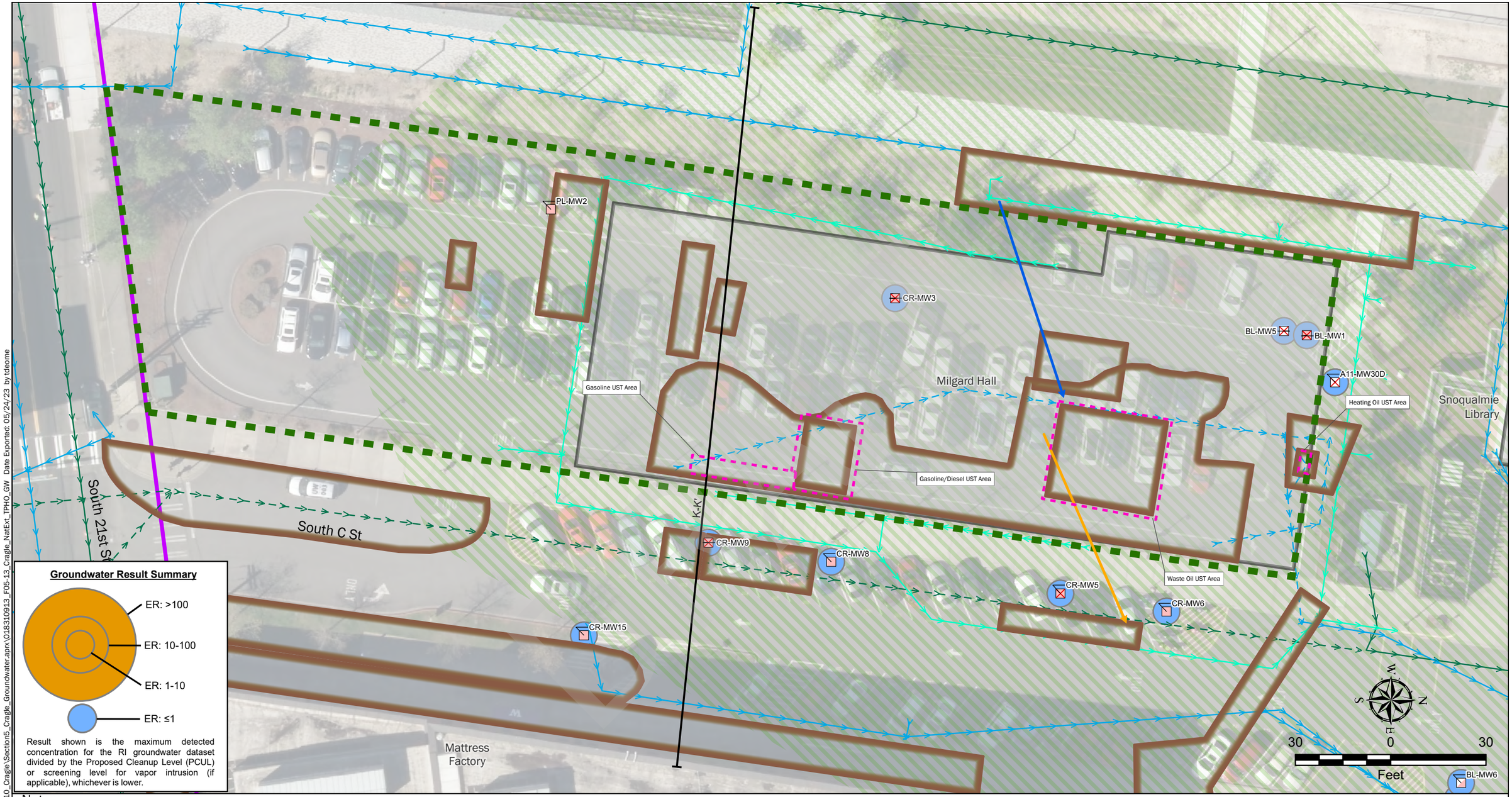
Summary of TPH-D in the Qvi/Qva Aquifer Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-12

P:\0183109\GIS\MXDs\RI_working\Section10_Cragle\Section5_Cragle_Groundwater.aprx\0183109913_F05-12_Cragle_NatExt_TPHD_GW Date Exported: 05/24/23 by tdeome



Groundwater Result Summary

ER: >100

ER: 10-100

ER: 1-10

ER: ≤1

Result shown is the maximum detected concentration for the RI groundwater dataset divided by the Proposed Cleanup Level (PCUL) or screening level for vapor intrusion (if applicable), whichever is lower.

Notes:

TPH-O = Oil-range petroleum hydrocarbons
PCUL = Proposed Cleanup Level (500 µg/L), µg/L = microgram per liter
UST = underground storage tank, ER = Exceedance Ratio
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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.
Data Source: Aerial provided by City of Tacoma, 2015
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Cross Section
- University of Washington - Tacoma Campus Master Plan Boundary
- Cragle Area of Concern
- Approximate Lateral Extent of Previous Excavation (1995)
- Existing Building Footprint
- UST Area
- Areas where Qvi and Qva Aquifers are Connected by Glacial Incision or Development

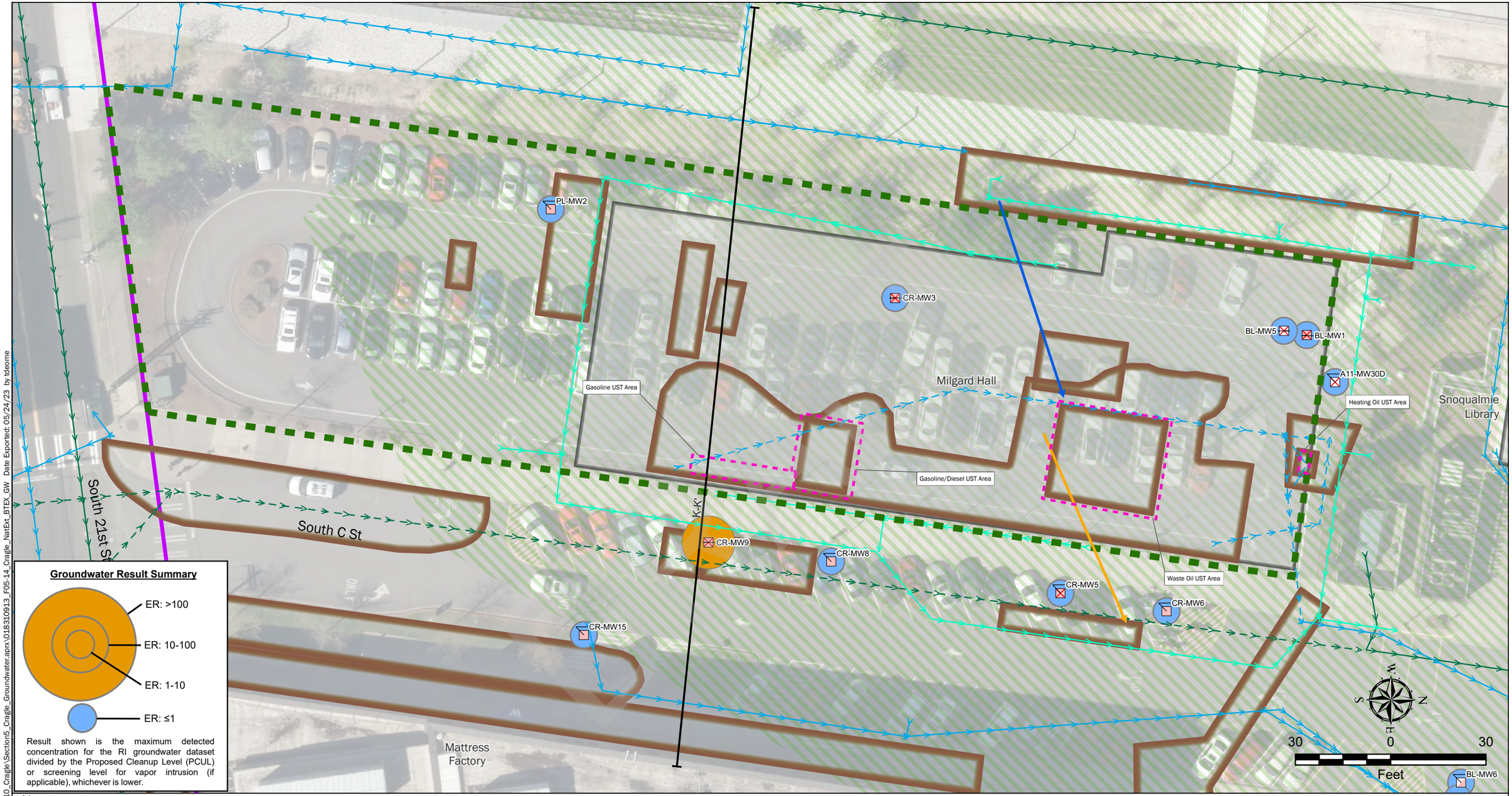
Summary of TPH-O in the Qvi/Qva Aquifer Cragle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-13

P:\0\0183109\GIS\MXDs\RI_working\Section10_Cragle\Section5_Cragle_Groundwater.aprx\0183109913_F05-13_Cragle_NatExt_TPHO_GW Date Exported: 05/24/23 by tdeome



Groundwater Result Summary

ER: >100

ER: 10-100

ER: 1-10

ER: ≤1

Result shown is the maximum detected concentration for the RI groundwater dataset divided by the Proposed Cleanup Level (PCUL) or screening level for vapor intrusion (if applicable), whichever is lower.

Notes:

PCUL = Proposed Cleanup Level (2.4 µg/L)
µg/L = microgram per liter
UST = underground storage tank, ER = Exceedance Ratio
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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.
Data Source: Aerial provided by City of Tacoma, 2015
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Qva Aquifer Monitoring Well - Decommissioned
- Qvi Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well - Decommissioned
- Qvi/Qva Aquifer Monitoring Well
- Qvi Aquifer Groundwater Flow Direction
- Qva Aquifer Groundwater Flow Direction
- Abandoned Sanitary Sewer Utility
- Active Sanitary Sewer Utility
- Abandoned Stormwater Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Cross Section
- University of Washington - Tacoma Campus Master Plan Boundary
- Cradle Area of Concern
- Approximate Lateral Extent of Previous Excavation (1995)
- Existing Building Footprint
- UST Area
- Areas where Qvi and Qva Aquifers are Connected by Glacial Incision or Development

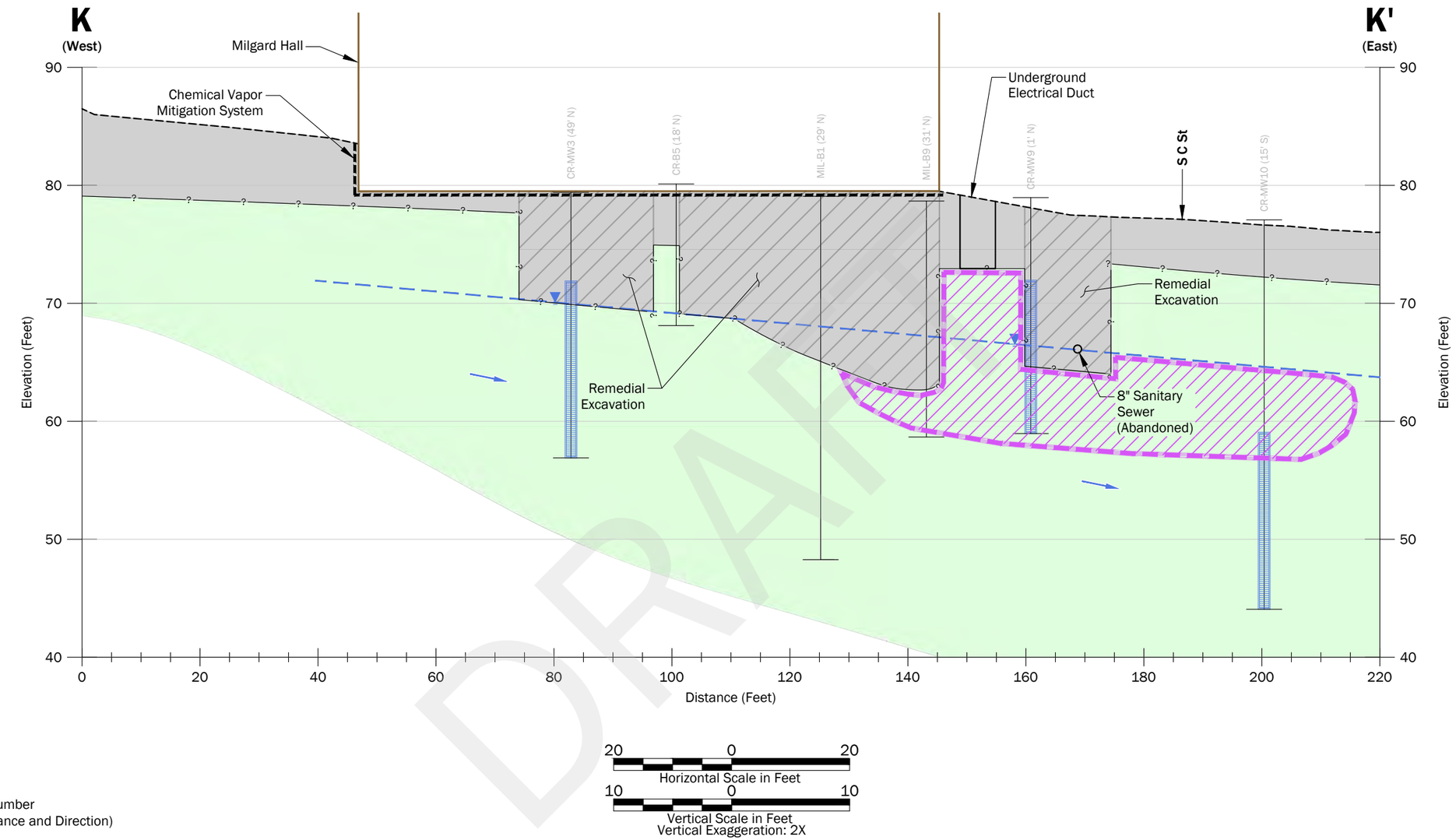
Summary of Benzene in the Qvi/Qva Aquifer Cradle

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-14

P:\0\0183109\GIS\MXDs\RI_working\Section10_Cradle\Section5_Cradle_Groundwater.aprx\0183109913_F05-14_Cradle_NatExt_BTEX_GW Date Exported: 05/24/23 by tdeome



Legend

- UG-MW31 (Offset 91' N) — Borehole Number (Offset Distance and Direction)
- Qvi Aquifer Water Level
- Qvi Aquifer Well Screen
- Inferred Soil Contact Line
- Contact Between Qvi and Qva Units
- Existing Ground Surface
- Building Location
- Qvi Aquifer Groundwater Flow Direction
- Qvi Aquifer Groundwater Surface (April 2021)
- Approximate Extent of Petroleum-Related Contaminated Soil and Groundwater Plume in Qvi

Stratigraphic Units

Recent Deposits (Qf)

- Fill (Qf)

Ice-Contact Deposits (Qvi)

- Oxidized Sand and Gravel (Qvi Central Channel Deposits)

Note

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.

Datum: NGVD29

Summary of Petroleum-Related Contamination in Soil and Groundwater Cross Section K-K'

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 5-15

Table 6-1

Soil Investigation Summary - Williams Oil Filter

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticide
1997 Agreed Order Investigation																				
WOF-W-B1	08/25/98	URS	Exploration	Direct Push	80	0.5											X			
Supplemental Investigations Under the 1997 Agreed Order																				
JS-MW4D	09/05/13	GeoEngineers	Exploration	Sonic	94.21	53					X	X	X	X						
Science Building Capital Project																				
WOF-B12-2	05/02/00	GeoEngineers	Confirmation	Grab	80	--		X	X	X					X					
WOF-B9.5-1	05/02/00	GeoEngineers	Confirmation	Grab	80	--		X	X	X										
WOF-CB-3	05/10/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-CB-7	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-ESW-19	05/17/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-EW-10	05/10/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-NEB-1	05/10/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-NEB-17	05/17/00	GeoEngineers	Confirmation	Grab	81	--			X	X										
WOF-NEB-2	05/10/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-NESW-18	05/17/00	GeoEngineers	Confirmation	Grab	73	--			X	X										
WOF-NW-13	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-NW-8	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-NWB-4	05/10/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-SB-6	05/10/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-SEW-20	05/17/00	GeoEngineers	Confirmation	Grab	79	--			X	X										
WOF-SP-1	05/04/00	GeoEngineers	Exploration	Direct Push	80	12			X	X										
WOF-SP-7	05/04/00	GeoEngineers	Exploration	Direct Push	80	18			X	X										
WOF-SP-8	05/04/00	GeoEngineers	Exploration	Direct Push	80	15			X	X										
WOF-SSW-10	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-SSW-5	05/10/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-SW-11	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-SWB-15	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-SWW-12	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-SWW-16	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-WB-14	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-WW-5	05/02/00	GeoEngineers	Confirmation	Grab	80	--		X	X	X										
WOF-WW-9	05/11/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
Prairie Line Trail Capital Project																				
PLT-B14	03/27/13	GeoEngineers	Exploration	Direct Push	73	15	X				X	X	X	X	X		X			
PLT-BA6-3	03/27/13	GeoEngineers	Exploration	Direct Push	74	13			X	X										
PLT-BA6-5	03/29/13	GeoEngineers	Exploration	Direct Push	74	10			X	X										
PLT-BA6-7	03/29/13	GeoEngineers	Exploration	Direct Push	75	10			X	X										
PLT-BA6-8	03/29/13	GeoEngineers	Exploration	Direct Push	75	10			X	X										

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticide
City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project																				
COT-MW5	12/18/17	GeoEngineers	Exploration	Sonic	95.27	30.75	X				X	X	X	X						

Notes:

[1] Sample locations are shown on Figures 6-4 through 6-6. Location identification nomenclature was added to select wells as necessary (for example WOF- was added to WOF-B12-2).

[2] Ground surface elevation is based on estimates from topographic surveys, Pierce County Light Detection and Range (LiDAR) 2010 Survey or individual surveys for a monitoring well. Select wells were modified over time during construction. The current elevation is shown. See surveys and summary of changes in Appendix K.

[3] Chemical analytical results associated with Williams Oil Filter are summarized in Table 6-4. Chemical analytical results associated with other Areas of Concern and area-wide groundwater plumes are presented in other report sections as referenced in the text. Analytical methods for chemical analytical schedule are presented in Appendix D and H.

BTEX = benzene, toluene, ethylbenzene and xylenes

CVOCs = chlorinated volatile organic compounds

NGVD29 = National Geodetic Vertical Datum of 1929

PAHs = polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyl Aroclors

SVOCs = semi-volatile organic compounds

TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil

TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification

URS = United Research Services Corporation (formerly)

VOCs = volatile organic compounds

Table 6-2

Groundwater Investigation Summary - Williams Oil Filter

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Date	Sampled By	Monitoring Well Type[2]	Groundwater Unit	Schedule of Analysis[3]												
					Petroleum Hydrocarbons				VOCs								
					TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	Dissolved Gases	PAHs	SVOCs	Metals	PCBs
Supplemental Investigations Under the 1997 Agreed Order																	
JS-MW4D	09/19/13	GeoEngineers	Permanent	Qva		X	X	X	X	X	X	X		X		X	
2016 Agreed Order Investigation																	
JS-MW4D	12/19/16	GeoEngineers	Permanent	Qva						X	X	X					
JS-MW4D	03/11/19	GeoEngineers	Permanent	Qva						X	X	X					
JS-MW4D	09/06/19	GeoEngineers	Permanent	Qva					X	X	X	X					
JS-MW4D	03/23/20	GeoEngineers	Permanent	Qva					X	X	X	X					
JS-MW4D	09/02/20	GeoEngineers	Permanent	Qva					X	X	X	X					
Prairie Line Trail Capital Project																	
PLT-B14	03/27/13	GeoEngineers	Temporary	Qvi		X	X	X	X	X	X	X		X		X	

Notes:

[1] Sample locations are shown on Figures 6-4 through 6-6. Location identification nomenclature was added to select wells as necessary (for example WOF- was added to WOF-B12-2).

[2] Ground surface elevation is based on estimates from topographic surveys, Pierce County Light Detection and Range (LiDAR) 2010 Survey or individual surveys for a monitoring well. Select wells were modified over time during construction. The current elevation is shown. See surveys and summary of changes in Appendix K.

[3] Chemical analytical results associated with Williams Oil Filter are summarized in Table 6-5. Chemical analytical results associated with other Areas of Concern and area-wide groundwater plumes are presented in other report sections as referenced in the text. Analytical methods for chemical analytical schedule are presented in Appendix D and H.

bgs = below ground surface

BTEX = benzene, toluene, ethylbenzene and xylenes

CVOCs = chlorinated volatile organic compounds

NGVD29 = National Geodetic Vertical Datum of 1929

PAHs = polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyl Aroclors

Qva = Vashon advance outwash

Qvi = Vashon ice-contact deposits

SVOCs = semi-volatile organic compounds

TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil

TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification

VOCs = volatile organic compounds

Table 6-3

Well Construction Details - Williams Oil Filter

University of Washington - Tacoma Campus

Tacoma, Washington

Well Identification[1]	Well Construction Date	Installed By	Ground Surface Elevation[2] (feet NGVD29)	Top of Casing Elevation (feet NGVD29)[2]	Top of Well Screen (feet bgs)	Bottom of Well Screen (feet bgs)	Top of Well Screen Elevation (feet NGVD29)	Bottom of Well Screen Elevation (feet NGVD29)	Lithology Across Well Screen Interval	Well Status	Well Type
Supplemental Investigations Under the 1997 Agreed Order											
JS-MW4D	09/05/13	GeoEngineers	94.21	93.66	43	53	51	41	Qva	Existing	Permanent
Prairie Line Trail Capital Project											
PLT-B14	03/27/13	GeoEngineers	73	--	10	15	63	58	Qvi	Decommissioned	Temporary
City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project											
COT-MW5	12/18/17	GeoEngineers	95.27	94.91	11	21	84	74	Qvi	Existing	Permanent

Notes:

[1] Well locations are shown on Figures 6-4 through 6-6. Location identification nomenclature was added to select wells as necessary (for example WOF- was added to WOF-B12-2).

[2] Ground surface elevation is based on estimates from topographic surveys, Pierce County Light Detection and Range (LiDAR) 2010 Survey or individual surveys for a monitoring well. Select wells were modified over time during construction. The current elevation is shown. See surveys and summary of changes in Appendix K.

bgs = below ground surface

NGVD29 = National Geodetic Vertical Datum of 1929

Qva = Vashon advance outwash

Qvi = Vashon ice-contact deposits

Table 6-4

Summary of Soil Chemical Analytical Results - Williams Oil Filter

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																				
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs										Metals			Total PCB Aroclors[8]
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
1997 Agreed Order Investigation																										
WOF-W-B1	W-B1	08/25/98	Exploration	0.5 - 0.5	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.500 U	**47.4**	--
Supplemental Investigations Under the 1997 Agreed Order																										
JS-MW4D	JS-MW4D-7-8	09/04/13	Exploration	7 - 8	Present	--	--	--	--	0.00084 U	0.0042 U	0.00084 U	0.0017 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	ND	0.00084 U	--	--	--	--	--
JS-MW4D	JS-MW4D-9-10	09/04/13	Exploration	9 - 10	Present	--	--	--	--	0.00084 U	0.0042 U	0.00084 U	0.0017 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	ND	0.00084 U	--	--	--	--	--
JS-MW4D	JS-MW4D-13-14	09/04/13	Exploration	13 - 14	Present	--	--	--	--	0.00080 U	0.0040 U	0.00080 U	0.0016 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	ND	0.00080 U	--	--	--	--	--
JS-MW4D	JS-MW4D-14-15	09/04/13	Exploration	14 - 15	Present	--	--	--	--	0.0010 U	0.0050 U	0.0010 U	0.0020 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0010 U	--	--	--	--	--
JS-MW4D	JS-MW4D-17-18	09/05/13	Exploration	17 - 18	Present	--	--	--	--	0.00080 U	0.0040 U	0.00080 U	0.0016 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	ND	0.00080 U	--	--	--	--	--
JS-MW4D	130905-S-1	09/05/13	Exploration	18 - 19	Present	--	--	--	--	0.00075 U	0.0038 U	0.00075 U	0.0015 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	0.00075 U	ND	0.00075 U	--	--	--	--	--
JS-MW4D	JS-MW4D-18-19	09/05/13	Exploration	18 - 19	Present	--	--	--	--	0.00092 U	0.0046 U	0.00092 U	0.0018 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	ND	0.00092 U	--	--	--	--	--
JS-MW4D	JS-MW4D-22-23	09/05/13	Exploration	22 - 23	Present	--	--	--	--	0.00090 U	0.0045 U	0.00090 U	0.0018 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	ND	0.00090 U	--	--	--	--	--
JS-MW4D	JS-MW4D-29-29.3	09/05/13	Exploration	29 - 29.3	Present	--	--	--	--	0.00095 U	0.0047 U	0.00095 U	0.0019 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	ND	0.00095 U	--	--	--	--	--
JS-MW4D	JS-MW4D-29.5-30	09/05/13	Exploration	29.5 - 30	Present	--	--	--	--	0.00094 U	0.0047 U	0.00094 U	0.0019 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	ND	0.00094 U	--	--	--	--	--
JS-MW4D	JS-MW4D-31-32	09/05/13	Exploration	31 - 32	Present	--	--	--	--	0.0012 U	0.0058 U	0.0012 U	0.0023 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	ND	0.0012 U	--	--	--	--	--
JS-MW4D	JS-MW4D-32-32.3	09/05/13	Exploration	32 - 32.3	Present	--	--	--	--	0.00096 U	0.0048 U	0.00096 U	0.0019 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	ND	0.00096 U	--	--	--	--	--
JS-MW4D	JS-MW4D-36-37	09/05/13	Exploration	36 - 37	Present	--	--	--	--	0.0011 U	0.0054 U	0.0011 U	0.0021 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0011 U	--	--	--	--	--
JS-MW4D	JS-MW4D-37-38	09/05/13	Exploration	37 - 38	Present	--	--	--	--	0.00087 U	0.0043 U	0.00087 U	0.0017 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	ND	0.00087 U	--	--	--	--	--
JS-MW4D	JS-MW4D-38.5-39.5	09/05/13	Exploration	38.5 - 39.5	Present	--	--	--	--	0.00081 U	0.0041 U	0.00081 U	0.0016 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	ND	0.00081 U	--	--	--	--	--
JS-MW4D	JS-MW4D-43-44	09/05/13	Exploration	43 - 44	Present	--	--	--	--	0.00096 U	0.0048 U	0.00096 U	0.0019 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	0.00096 U	ND	0.00096 U	--	--	--	--	--
JS-MW4D	JS-MW4D-45.5-46	09/05/13	Exploration	45.5 - 46	Present	--	--	--	--	0.0011 U	0.0053 U	0.0011 U	0.0021 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	**DET**	0.0011 U	--	--	--	--	--
JS-MW4D	JS-MW4D-49-50	09/05/13	Exploration	49 - 50	Present	--	--	--	--	0.00097 U	0.0048 U	0.00097 U	0.0019 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	0.00097 U	ND	0.00097 U	--	--	--	--	--
JS-MW4D	JS-MW4D-52-53	09/05/13	Exploration	52 - 53	Present	--	--	--	--	0.00094 U	0.0047 U	0.00094 U	0.0019 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	**DET**	0.00094 U	--	--	--	--	--
JS-MW4D	JS-MW4D-53-54	09/05/13	Exploration	53 - 54	Present	--	--	--	--	0.0010 U	0.0052 U	0.0010 U	0.0021 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0010 U	--	--	--	--	--
Science Building Capital Project																										
WOF-B9.5-1	B-9.5-1	05/02/00	Confirmation	9.5 - 9.5	Removed	--	20 U	50 U	100 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-B12-2	B-12-2	05/02/00	Confirmation	12 - 12	Removed	--	20 U	**3,600**	100 U	--	--	--	--	--	--	--	--	--	--	--	**37**	0.073	--	--	--	--
WOF-CB-3	CB-3-27	05/10/00	Confirmation	27 - 27	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CB-7	CB-7-18	05/11/00	Confirmation	18 - 18	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-ESW-19	ESW-19-13	05/17/00	Confirmation	13 - 13	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-EW-10	EW-10	05/10/00	Confirmation	10 - 10	Removed	--	--	**25,400**	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NEB-1	NEB-1-23	05/10/00	Confirmation	23 - 23	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NEB-2	NEB-2-22	05/10/00	Confirmation	22 - 22	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NEB-17	NEB-17-23	05/17/00	Confirmation	23 - 23	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NESW-18	NESW-18-15	05/17/00	Confirmation	15 - 15	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NW-8	NW-8-10	05/11/00	Confirmation	10 - 10	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NW-13	NW-13-4	05/11/00	Confirmation	4 - 4	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NWB-4	NWB-4-17	05/10/00	Confirmation	17 - 17	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SB-6	SB-6-15	05/10/00	Confirmation	15 - 15	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SEW-20	SEW-20-8	05/17/00	Confirmation	8 - 8	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SP-1	SP-1-10-12	05/04/00	Exploration	10 - 12	Removed	--	--	**1,300**	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SP-7	SP-7-3-6	05/04/00	Exploration	3 - 6	Removed	--	--	**6,700**	**1,500**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SP-8	SP-8-9-12	05/04/00	Exploration	9 - 12	Removed	--	--	**2,000**	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SSW-5	SSW-5-13	05/10/00	Confirmation	13 - 13	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SSW-10	SSW-10-6	05/11/00	Confirmation	6 - 6	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SW-11	SW-11-5	05/11/00	Confirmation	5 - 5	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SWB-15	SWB-15-10	05/11/00	Confirmation	10 - 10	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SWW-12	SWW-12-7	05/11/00	Confirmation	7 - 7	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SWW-16	SWW-16-6	05/11/00	Confirmation	6 - 6	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-WB-14	WB-14-12	05/11/00	Confirmation	12 - 12	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-WW-5	WW-5-1	05/02/00	Confirmation	5 - 5	Removed	--	20 U	50 U	100 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-WW-9	WW-9-6	05/11/00	Confirmation	6 - 6	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																		
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Prairie Line Trail Capital Project																										
PLT-B14	B14-0.5-5	03/27/13	Exploration	0.5 - 5	Present	--	--	--	--	0.00054 U	0.0027 U	0.056 U	0.11 U	0.056 U	0.056 U	0.056 U	0.00054 U	0.00054 U	0.056 U	**DET**	**0.11**	**0.31**	--	--	--	--
PLT-B14	B14-5-6	03/27/13	Exploration	5 - 6	Present	ND	--	--	--	0.00098 U	0.0049 U	0.00098 U	0.0020 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	ND	0.00098 U	0.0059 U	12 U	0.58 U	5.8 U	--
PLT-BA6-3	BA6-3-8-9	03/27/13	Exploration	8 - 9	Present	--	--	31 U	62 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-BA6-5	BA6-5-6-7	03/29/13	Exploration	6 - 7	Removed	--	--	*4,500 U*	16,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-BA6-5	BA6-5-9-10	03/29/13	Exploration	9 - 10	Removed	--	--	29 U	58 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-BA6-7	BA6-7-6-7	03/29/13	Exploration	6 - 7	Present	--	--	27 U	55 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-BA6-8	BA6-8-6-7	03/29/13	Exploration	6 - 7	Removed	--	--	28 U	56 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
City of Tacoma Jefferson and Hood Street Surface Water Interceptor Capital Project																										
COT-MW5	COT-MW5-0-4	12/18/17	Exploration	0 - 4	Present	ND	--	--	--	**0.039**	0.0040 U	0.00080 U	0.0016 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	ND	0.00080 U	--	--	--	--	--
COT-MW5	COT-MW5-4-10	12/18/17	Exploration	4 - 10	Present	--	--	--	--	**0.0033**	0.0038 U	0.00077 U	0.0015 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	ND	0.00077 U	--	--	--	--	--
COT-MW5	COT-MW5-10-15	12/18/17	Exploration	10 - 15	Present	ND	--	--	--	0.00093 U	0.0047 U	0.00093 U	0.0019 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	ND	0.00093 U	--	--	--	--	--
COT-MW5	COT-MW5-20-25	12/18/17	Exploration	20 - 25	Present	ND	--	--	--	0.00095 U	0.0047 U	0.00095 U	0.0019 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	ND	0.00095 U	--	--	--	--	--

Notes:

[1] Sample locations are shown on Figures 6-4 through 6-6. Location identification nomenclature was added to select wells as necessary (for example WOF- was added to WOF-B12-2).

[2] Chemical analytical results in this table include contaminants of concern (COCs) based on historical land use, potential source(s), and/or required analysis in accordance with Model Toxics Control Act Table 830-1 in which COCs were detected at a concentration greater than their respective PCUL. The full list of chemical analytical results is presented in Appendices D and H. Chemical analytical results associated with other Areas of Concern are presented in other sections of the Remedial Investigation.

[3] Value for gasoline-range petroleum hydrocarbons if benzene is present. If benzene is not present, screening level is 100 mg/kg.

[4] Benzene may have been analyzed as full VOC method and/or BTEX only. The lowest practical quantitation limit (PQL) or the greatest detected concentration is shown.

[5] Sum of m-,p- and o- xylenes. The highest reporting limit for non-detect results is listed.

[6] Naphthalene may have been analyzed as a volatile organic compound (VOC), polycyclic aromatic hydrocarbons (PAH), or semi-volatile organic compound (SVOC). The lowest practical quantitation limit (PQL) or the greatest detected concentration is shown.

[7] Total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) calculated using the toxicity equivalency quotient (TEQ) methodology in Washington Administrative Code (WAC) 173-340-708(8). Non-detections were assigned half the reporting limit for these calculations.

[8] Total polychlorinated biphenyl (PCB) Aroclors is the sum of PCB Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260. The highest reporting limit for non-detect results is listed.

[9] Soil PCUL is based on the lowest value for protection of direct contact and groundwater as drinking water within the saturated zone and adjusted for practical quantitation limit (PQL) and Natural Background (see Tables 3-1 and 3-2).

[10] Soil screening level based on Ecology's Vapor Intrusion Guidance (Publication No. 09-09-047; see Table 3-6).

-- = not tested
1,2,4-TMB = 1,2,4-trimethylbenzene
1,3,5-TMB = 1,3,5-trimethylbenzene
bgs = below ground surface
BTEX = benzene, toluene, ethylbenzene and xylenes
CVOCs = chlorinated volatile organic compounds
DET = detected
EDB = 1,2-dibromoethane
EDC = 1,2-dichloroethane
G, D, O = gasoline-range petroleum hydrocarbons, diesel-range petroleum hydrocarbons and oil-range petroleum hydrocarbons
J = estimated value by laboratory
mg/kg = milligram per kilogram
MTBE = methyl tert-butyl ether
ND = not DET
NE = not established
TPH-G, -D, -O = Total Petroleum Hydrocarbons -Gasoline, -Diesel, -Oil
TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification
U = analyte was ND at or greater than the listed reporting limit
VOCs = volatile organic compounds
Bold font type indicates that the analyte was DET at a concentration greater than the respective laboratory reporting limit.
Italic font type indicates the non-detect result is greater than the PCUL.
Gray text indicates that soil represented by the sample has been removed and that the sample result no longer represents current conditions.
Shading indicates that the DET concentration is greater than the PCUL.
Shading indicates that the DET concentration is greater than the screening level for vapor intrusion and/or the PCUL.

Table 6-5

Summary of Groundwater Chemical Analytical Results - Williams Oil Filter

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Identification	Sample Date	Groundwater Unit	Monitoring Well Type	Depth to Water (feet below TOC)	Water Level Elevation (feet NGVD29)	Groundwater Chemical Analytical Results[2] (µg/L)																					
							Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs										Metals				
							TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Total Xylenes[4]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[5]	Total cPAH TEQ[6]	Dissolved Metal - Arsenic	Total Metal - Arsenic	Dissolved Metal - Lead	Total Metal - Lead	Total PCB Aroclors[7]
Proposed Cleanup Level[8] (PCUL; µg/L)							n/a	800	500	500	5	640	700	1,600	80	80	0.05	4.8	24	800	Varies	160	0.2	8	8	15	15	0.22
Groundwater Screening Level for Protection of Vapor Intrusion[9] (µg/L)							n/a	30,000	30,000	NE	2.4	15,000	2,800	320	240	170	0.3	3.5	860	2,300	Varies	8.9	NE	NE	NE	NE	NE	NE
Supplemental Investigations Under the 1997 Agreed Order																												
JS-MW4D	JS-MW4D-130919	09/19/13	Qva	Permanent	n/a	n/a	--	100 U	260 U	420 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	0.095 U	0.00717 U	--	3.0 U	--	**1.3**	--
2016 Agreed Order Investigation																												
JS-MW4D	JS-MW4D-161219	12/19/16	Qva	Permanent	38.66	55.55	--	--	--	--	--	--	--	--	--	--	*0.20 U*	0.20 U	--	--	**DET**	--	--	--	--	--	--	--
JS-MW4D	JS-MW4-20190311	03/11/19	Qva	Permanent	39.25	54.96	--	--	--	--	--	--	--	--	--	--	*0.20 U*	0.20 U	--	--	**DET**	--	--	--	--	--	--	--
JS-MW4D	JS-MW4-190906	09/06/19	Qva	Permanent	n/a	n/a	--	--	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.0 U	--	--	--	--	--	--
JS-MW4D	JS-MW4D-200323	03/23/20	Qva	Permanent	39.14	55.07	--	--	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.0 U	--	--	--	--	--	--
JS-MW4D	JS-MW4-200902	09/02/20	Qva	Permanent	40.39	53.82	--	--	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	**DET**	1.0 U	--	--	--	--	--	--
Prairie Line Trail Capital Project																												
PLT-B14	B14-W	03/27/13	Qvi	Temporary	n/a	n/a	--	100 U	280 U	450 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	0.11 U	**0.02039**	3.0 U	--	1.0 U	--	--

Notes:

[1] Sample locations are shown on Figures 6-4 through 6-6. Location identification nomenclature was added to select wells as necessary (for example WOF- was added to WOF-B12-2).

[2] Chemical analytical results in this table include contaminants of concern (COCs) based on historical land use, potential source(s), and/or required analysis in accordance with Model Toxics Control Act Table 830-1 in which COCs were detected at a concentration greater than their respective PCUL. The full list of chemical analytical results is presented in Appendices D and H. Chemical analytical results associated with other Areas of Concern are presented in other sections of the Remedial Investigation.

[3] Value for gasoline-range petroleum hydrocarbons if benzene is present. If benzene is not present, screening level is 1,000 µg/L.

[4] Sum of m-,p- and o- xylenes. The highest reporting limit for non-detect results is listed.

[5] Naphthalene may have been analyzed as a volatile organic compound (VOC), polycyclic aromatic hydrocarbon (PAH), or semi-volatile organic compound (SVOC). The lowest practical quantitation limit (PQL) or the greatest detected concentration is shown.

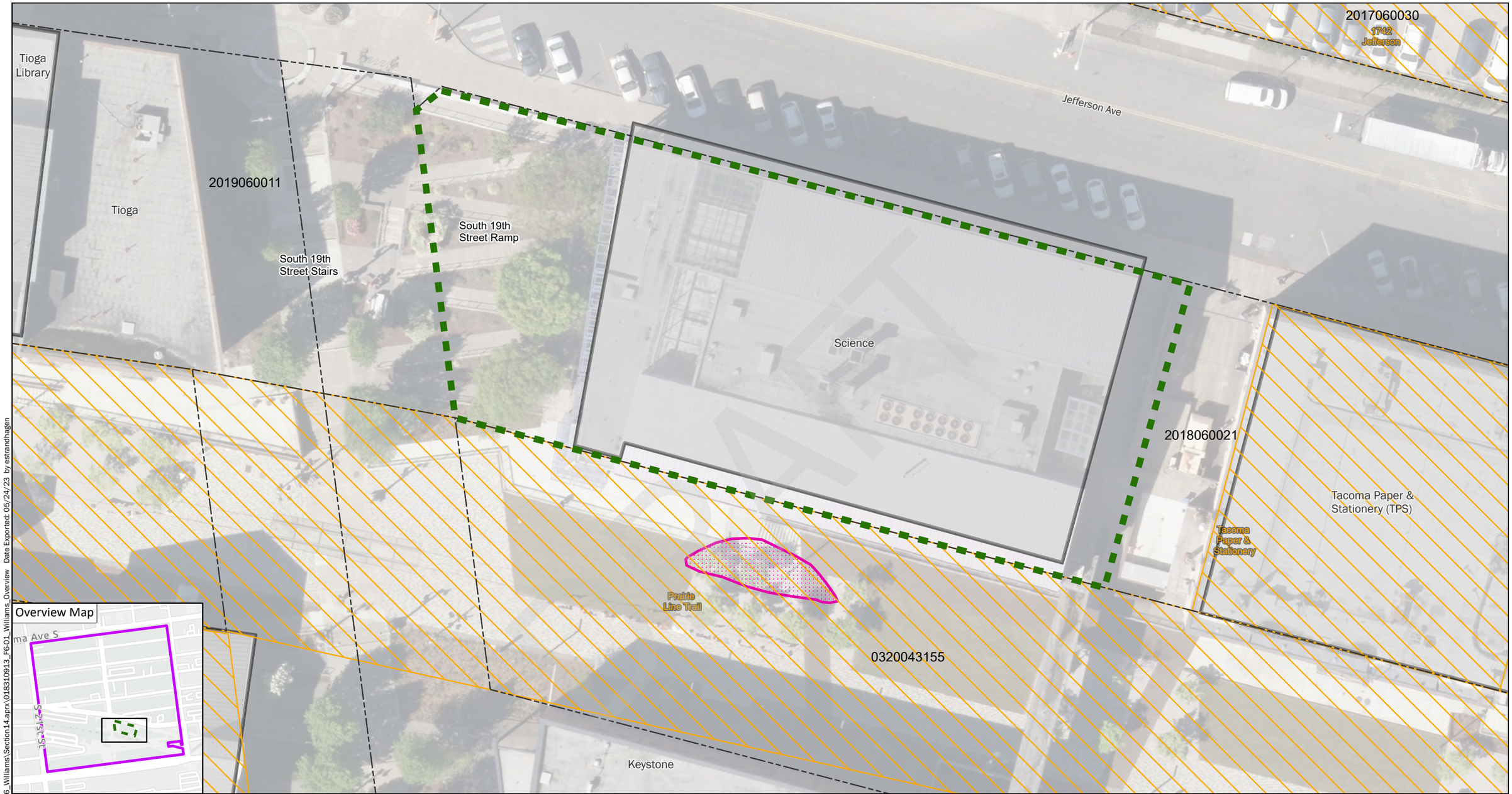
[6] Total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) calculated using the toxicity equivalency quotient (TEQ) methodology in WAC 173-340-708(8). Non-detections were assigned half the reporting limit for these calculations.

[7] Total polychlorinated biphenyl (PCB) Aroclors is the sum of PCB Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260. The highest reporting limit for non-detect results is listed.

[8] Groundwater PCUL is based on the lowest value for protection of groundwater as drinking water, adjusted for PQL (see Table 3-3).

[9] Groundwater screening level referenced from Ecology's CLARC (Cleanup Levels and Risk Calculation) Table (Excel) dated January 2023 and Ecology's Vapor Intrusion Guidance (Publication No. 09-09-047; see Table 3-5 and 3-6).

-- = not tested
µg/L = microgram per liter
1,2,4-TMB = 1,2,4-trimethylbenzene
1,3,5-TMB = 1,3,5-trimethylbenzene
BTEX = benzene, toluene, ethylbenzene and xylenes
CVOCs = chlorinated volatile organic compounds
DET = detected
EDB = 1,2-dibromoethane
EDC = 1,2-dichloroethane
G, D, O = gasoline-range petroleum hydrocarbons, diesel-range petroleum hydrocarbons, and oil-range petroleum hydrocarbons
Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.
Italic font type indicates the non-detect result is greater than the PCUL.
Shading indicates that the detected concentration is greater than the PCUL.
Shading indicates that the detected concentration is greater than the screening level for vapor intrusion and/or the PCUL.
J = estimated value by laboratory
MTBE = methyl tert-butyl ether
n/a = not available
Qva = Vashon advance outwash
Qvi = Vashon ice-contact deposits
TOC = top of casing
TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil
U = analyte was not DET at or greater than the listed reporting limit
TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification



Date Exported: 05/24/23 by estrandhagen

P:\0\0183109\GIS\MXDs\RI_working\Section16_Williams\Section14.aprx\0183109913_F6-01_Williams_Overview

Legend

- Williams Oil Filter Area of Concern
- Other Identified Property-Specific Area of Concern
- Parcel Boundary and Number
- Existing Building Footprint
- Williams Oil Filter Plume Site - Area of Soil and/or Groundwater with One or More Contaminants of Concern Exceeding the Proposed Cleanup Level (PCUL)

Data Source: Aerial provided by City of Tacoma, 2015

W N S E

0 30

Feet

Overview
Williams Oil Filter

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 6-1

P:\0\0183109\GIS\MXDs\RI_working\Section16_Williams\Section14.aprx\0183109913_F6-02_Williams_Historical Date Exported: 05/24/23 by tdeome

Notes:
UST = underground storage tank
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: Aerial provided by City of Tacoma, 1998

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Williams Oil Filter Area of Concern
- Parcel Boundary and Number (Historic)
- Historic Building Footprint/Feature
- Former UST Location
- Former Historic Rail Line
- Existing Historic Rail Line

W S N E

0 30

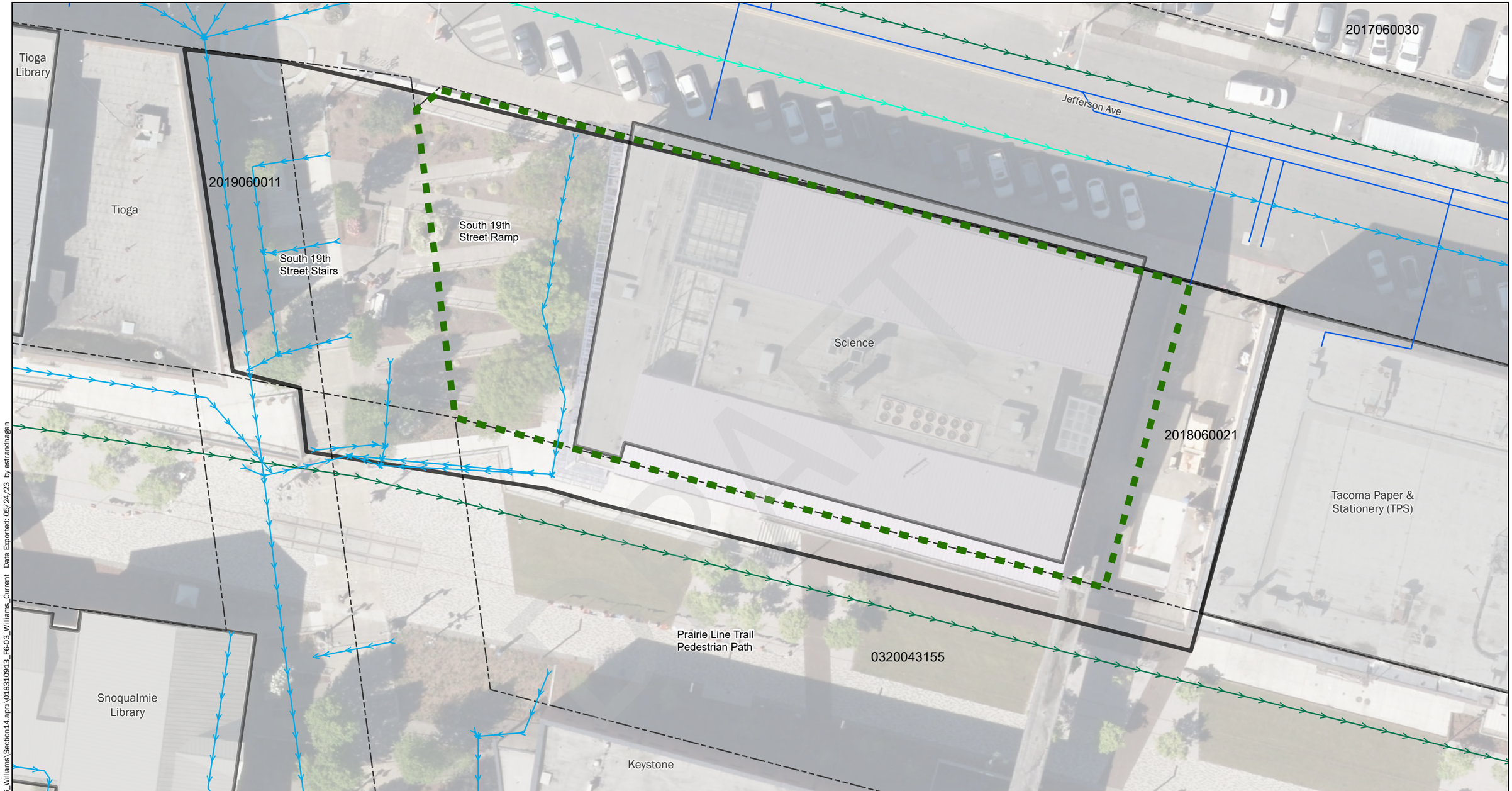
Feet

Historical Features and Land Use
Williams Oil Filter

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 6-2



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Legend

- Active Sanitary Sewer Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Water Utility
- Capital Project Boundary
- Williams Oil Filter Area of Concern
- Parcel Boundary and Number
- Existing Building Footprint

Data Source: Aerial provided by City of Tacoma, 2015

W N S E

0 30

Feet

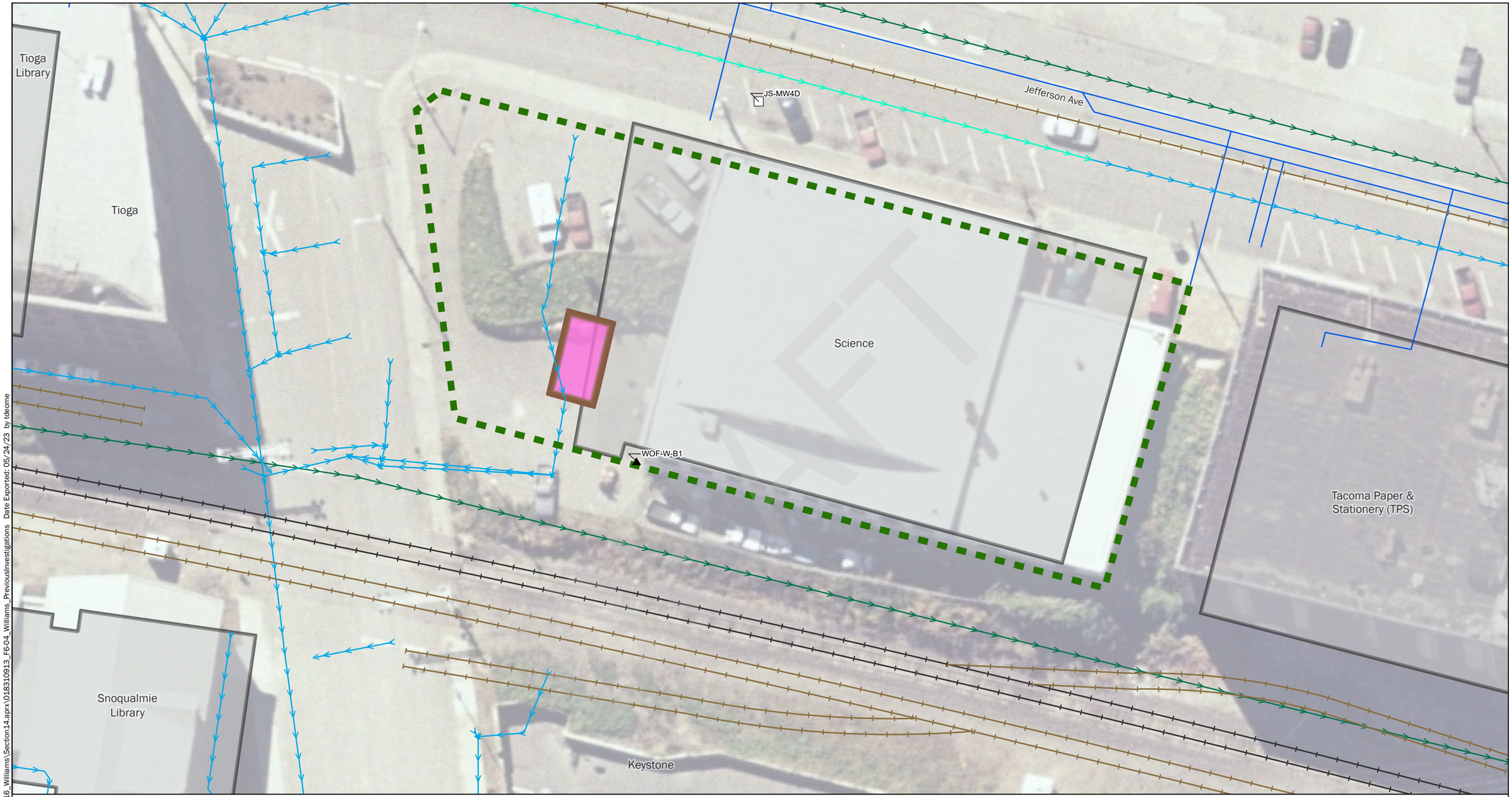
Current Features and Utility Infrastructure
Williams Oil Filter

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 6-3

Notes:



P:\0\0183109\GIS\MXDs\RI_working\Section16_Williams\Section14.aprx\0183109913_F6-04_Williams_PreviousInvestigations Date Exported: 05/24/23 by tdeome

Notes:

UST = underground storage tank

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: Aerial provided by City of Tacoma, 1998

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Qva Aquifer Monitoring Well
- Boring
- Active Sanitary Sewer Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Water Utility
- Former Historic Rail Line
- Existing Historic Rail Line
- Williams Oil Filter Area of Concern
- Existing Building Footprint
- Former UST Location
- Approximate Lateral Extent of Remedial Excavation

W E S N

0 30

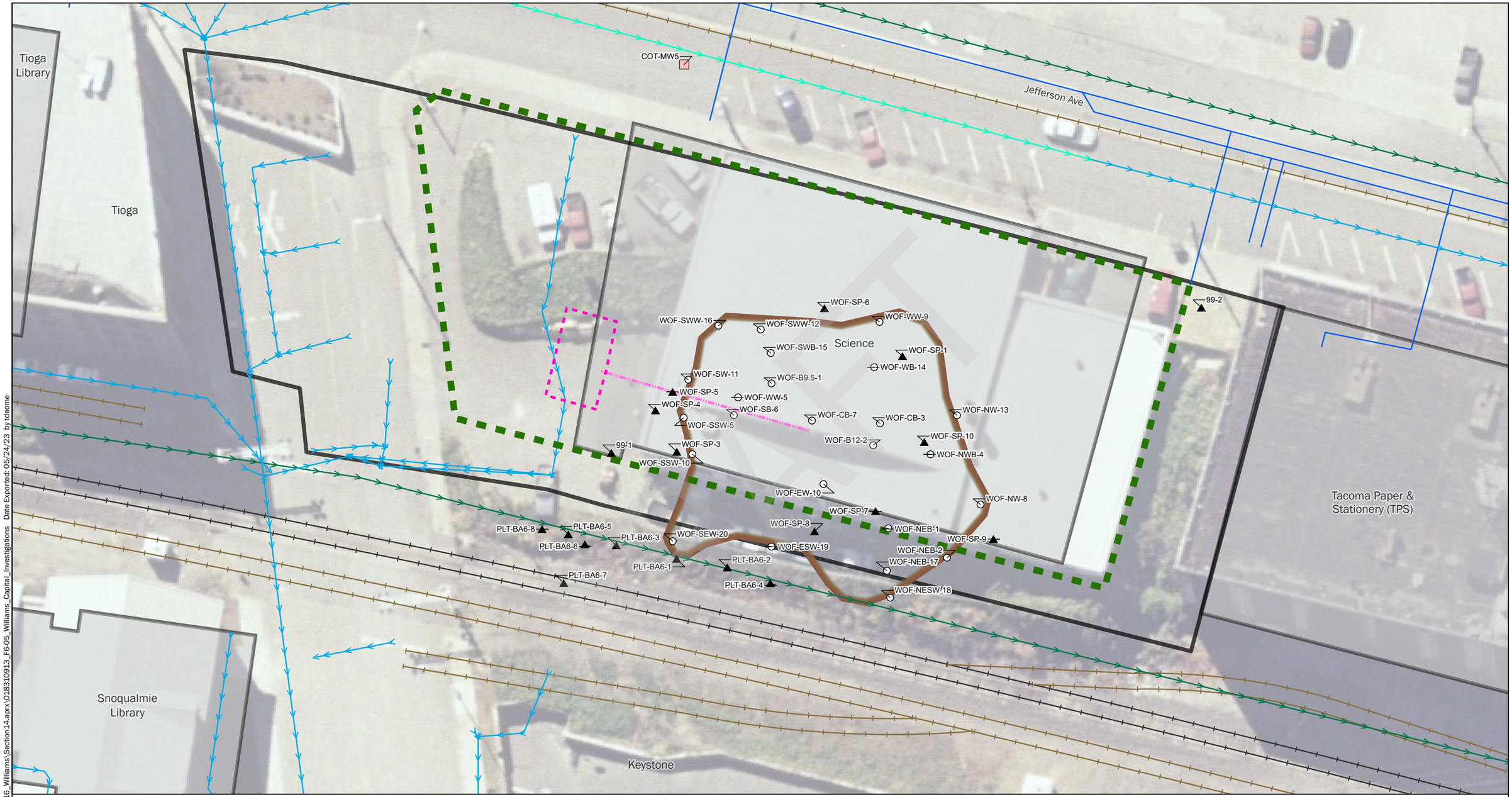
Feet

Previous Environmental Investigations and Remedial Actions
Williams Oil Filter

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 6-4



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Notes:

UST = underground storage tank

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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.

Data Source: Aerial provided by City of Tacoma, 1998

Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Qvi Aquifer Monitoring Well
- Boring
- Confirmation Sample
- Active Sanitary Sewer Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Active Sanitary Sewer Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Former Historic Rail Line
- Existing Historic Rail Line
- Capital Project Boundary
- Williams Oil Filter Area of Concern
- Product Line (Estimated Location)
- Heating Oil UST Area
- Approximate Lateral Extent of Remedial Excavation
- Existing Building Footprint

W N E S

0 30

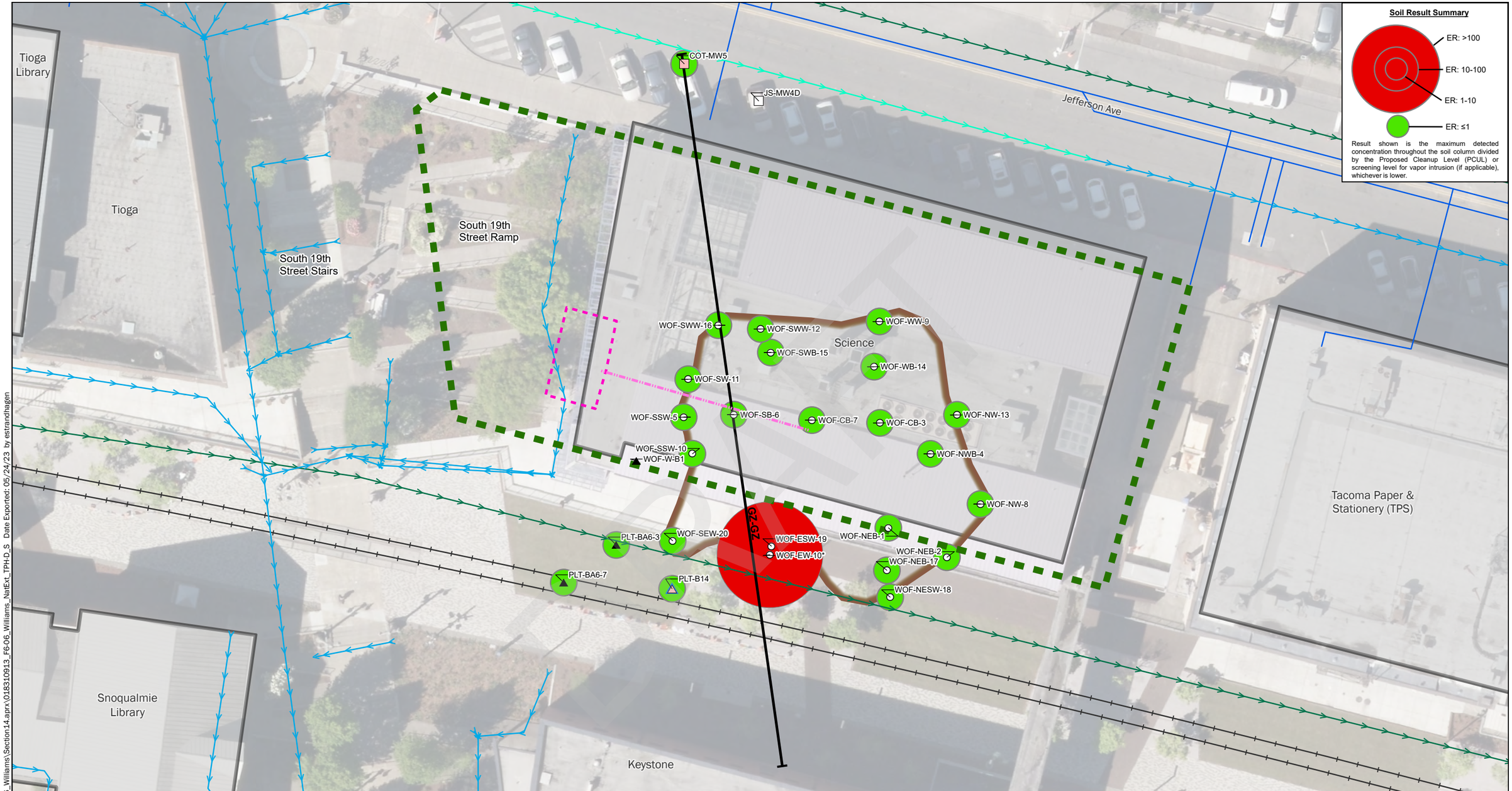
Feet

Capital Projects and Remedial Actions
Williams Oil Filter

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 6-5



Soil Result Summary

- ER: >100
- ER: 10-100
- ER: 1-10
- ER: ≤1

Result shown is the maximum detected concentration throughout the soil column divided by the Proposed Cleanup Level (PCUL) or screening level for vapor intrusion (if applicable), whichever is lower.

Legend

- Qva Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well
- Boring with Grab Groundwater Sample in Qvi Aquifer
- Boring
- Confirmation Sample
- Active Sanitary Sewer Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Water Utility
- Existing Historic Rail Line
- Cross Section
- Williams Oil Filter Area of Concern
- Existing Building Footprint
- Product Line (Estimated Location)
- Heating Oil UST Area
- Approximate Lateral Extent of Remedial Excavation

Data Source: Aerial provided by City of Tacoma, 2015

* = WOF-EW-10 was located within the excavation area and was removed. However, the 2000 remedial excavation report indicated that the WOF-EW-10 sample was representative of material left in place in the east sidewall and was not sampled.

0 30 Feet

Summary of TPH-D in Soil
Williams Oil Filter

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 6-6

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Notes:
UST = underground storage tank
TPH-D = Diesel-range petroleum hydrocarbons, ER = Exceedance Ratio
Basis for Screening = 500 micrograms per liter (µg/L) – See Section Tables
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.
3. New sanitary sewer and stormwater utilities based on proposed design layout provided by the City of Tacoma and UWT and installed in 2021. As-builts are pending.
Data Source: Aerial provided by City of Tacoma, 2015
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- Qva Aquifer Monitoring Well
- Qvi Aquifer Monitoring Well
- Active Sanitary Sewer Utility
- Active Stormwater Utility
- New Stormwater Utility Installed After 2021
- Water Utility
- Existing Historic Rail Line
- Cross Section
- Williams Oil Filter Area of Concern
- Parcel Boundary and Number
- Existing Building Footprint
- Product Line (Estimated Location)
- Heating Oil UST Area
- Approximate Lateral Extent of Remedial Excavation

W E S N

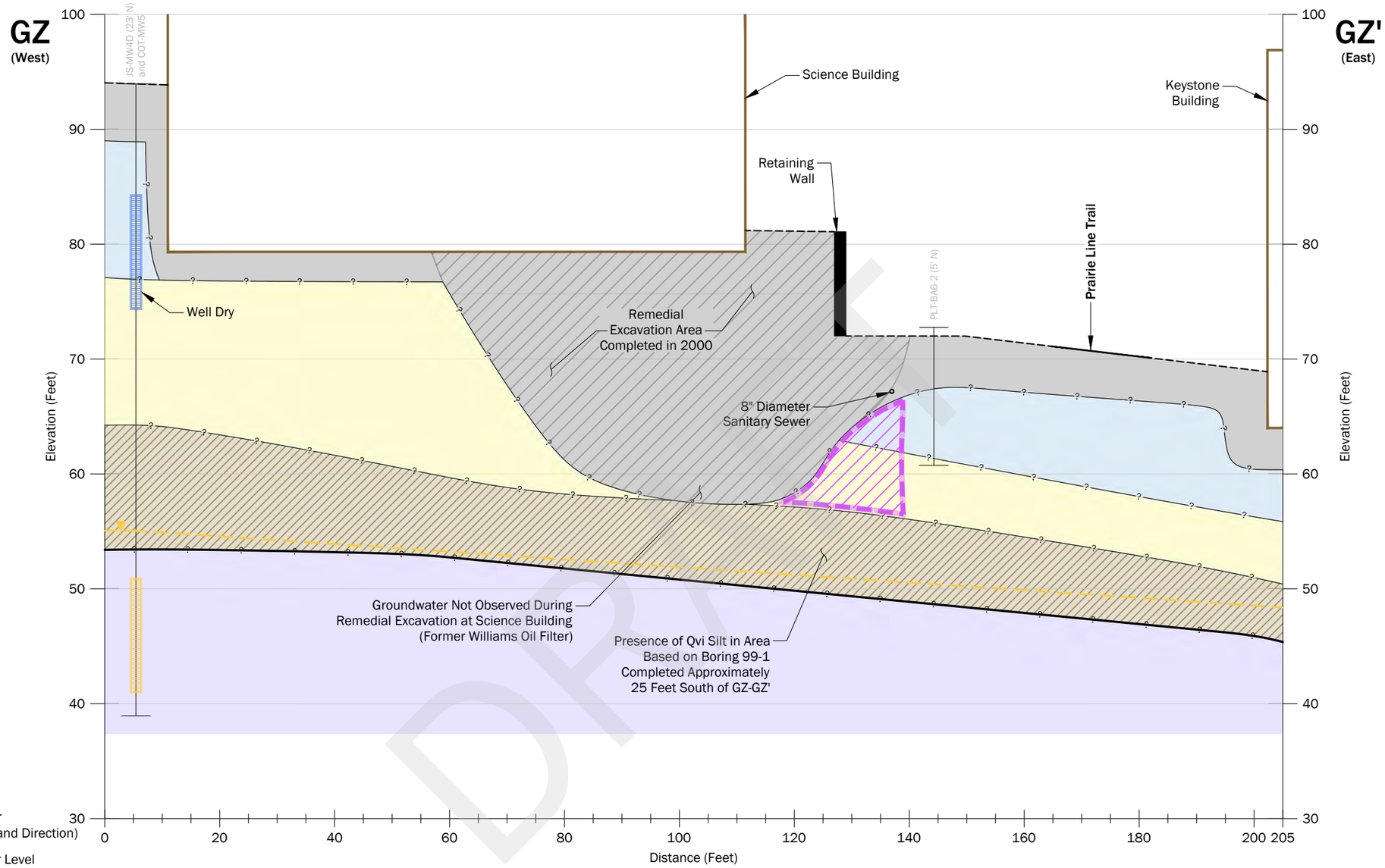
0 30
Feet

Summary of TPH-D in the Qvi/Qva Aquifer
Williams Oil Filter

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 6-7



Legend

- UG-MW31 (Offset 91' N) — Borehole Number (Offset Distance and Direction)
- Qvi Aquifer Water Level
- Qva Aquifer Water Level
- Qvi Aquifer Well Screen
- Qva Aquifer Well Screen
- Inferred Soil Contact Line
- Contact Between Qvi and Qva Units
- Existing Ground Surface
- Existing Building Location
- Qva Aquifer Potentiometric Groundwater Surface (April 2021)
- Approximate Extent of TPH-D Contaminated Soil

Stratigraphic Units

Recent Deposits (Qf)
- Fill (Qf)

Ice-Contact Deposits (Qvi)
- Silty Gravel with Sand (Qvi Till-Like Deposits)
- Oxidized Sand and Gravel (Qvi Channel Deposits)
- Silt and Silty Gravel (Qvi Silt Deposits)

Advance Outwash Deposits (Qva)
- Silt to Sandy Silt (Qva Silt Deposits)
- Sand and Gravel (Qva Sand and Gravel Deposits)

Note

1. The subsurface conditions shown are based on interpolation between widely spaced explorations and should be considered approximate; actual subsurface conditions may vary from those shown.

Datum: NGVD29

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.

20 0 20
Horizontal Scale in Feet

10 0 10
Vertical Scale in Feet
Vertical Exaggeration: 2X

Summary of Petroleum-Related Contamination in Soil
Cross Section GZ-GZ'
Williams Oil Filter

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 6-8

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Table 7-1

Soil Investigation Summary - Prairie Line Trail

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]														
							Petroleum Hydrocarbons				VOCs										
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticide
Pre-1997 Agreed Order Investigation and Remedial Action																					
JP-S7	08/23/96	AGI	Confirmation	Grab	96	--		X	X	X	X						X			
1997 Agreed Order Investigation																					
CR-B6	09/21/00	URS	Exploration	Direct Push	75	16					X	X		X						
CR-B7	09/21/00	URS	Exploration	Direct Push	75	12					X	X		X						
CR-C-B1	06/04/98	URS	Exploration	Boring	75	0					X		X	X						
CR-C-B2	06/04/98	URS	Exploration	Boring	75	2.5					X		X	X						
CR-C-B3	06/04/98	URS	Exploration	Boring	76	0					X		X	X						
DMB-5	03/23/99	URS	Exploration	Direct Push	65	9		X	X	X	X				X	X				
DMB-6	03/24/99	URS	Exploration	Direct Push	65	9		X	X	X	X				X	X				
DMB-7	03/24/99	URS	Exploration	Direct Push	66	9		X	X	X	X				X	X				
DMB-8	03/24/99	URS	Exploration	Direct Push	65	12		X	X	X	X				X	X				
JP-B1	08/24/98	URS	Exploration	Direct Push	96	14		X												
2016 Agreed Order Investigation																					
A7-MW3S	06/18/19	GeoEngineers	Exploration	Sonic	67.64	30	X				X	X	X	X	X		X			
Science Building Capital Project																					
WOF-ESW-19	05/17/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-NEB-17	05/17/00	GeoEngineers	Confirmation	Grab	81	--			X	X										
WOF-NEB-2	05/10/00	GeoEngineers	Confirmation	Grab	80	--			X	X										
WOF-NESW-18	05/17/00	GeoEngineers	Confirmation	Grab	73	--			X	X										
WOF-SEW-20	05/17/00	GeoEngineers	Confirmation	Grab	79	--			X	X										
WOF-SP-8	05/04/00	GeoEngineers	Exploration	Direct Push	80	15			X	X										
Tioga Library Building Capital Project																					
TLB-TP10	05/23/11	GeoEngineers	Exploration	Test Pit	84	9		X			X	X	X	X						
TLB-TP12	05/23/11	GeoEngineers	Exploration	Test Pit	77	5		X			X	X	X	X	X					
TLB-TP13	05/23/11	GeoEngineers	Exploration	Test Pit	77	5									X					
TLB-TP14	05/23/11	GeoEngineers	Exploration	Test Pit	78	5									X					
TLB-TP15	05/23/11	GeoEngineers	Exploration	Test Pit	79	9		X	X	X	X	X	X	X	X		X			
TLB-TP17	05/23/11	GeoEngineers	Exploration	Test Pit	80	9		X			X	X	X	X						
TLB-TP19	05/23/11	GeoEngineers	Exploration	Test Pit	80	7		X			X	X	X	X						
TLB-TP21	08/09/11	GeoEngineers	Exploration	Test Pit	77	5		X	X	X	X	X	X	X	X		X			
TLB-TP22	08/09/11	GeoEngineers	Exploration	Test Pit	77	10		X			X	X	X	X						
TLB-TP24	08/09/11	GeoEngineers	Exploration	Test Pit	77	5		X	X	X	X	X	X	X	X		X			
TLB-TP25	08/09/11	GeoEngineers	Exploration	Test Pit	77	5		X	X	X	X	X	X	X	X		X			
TLB-TP26	08/09/11	GeoEngineers	Exploration	Test Pit	77	5		X	X	X	X	X	X	X	X		X			

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticide
TLB-TP27	08/18/11	GeoEngineers	Exploration	Test Pit	82	11		X	X	X	X	X	X	X	X		X			
TLB-TP28	08/18/11	GeoEngineers	Exploration	Test Pit	84	6		X			X	X	X	X						
TLB-TP29	09/22/11	GeoEngineers	Exploration	Test Pit	82	7		X			X	X	X	X						
TLB-TP32	09/22/11	GeoEngineers	Exploration	Test Pit	88	7		X			X	X	X	X						
TLB-CpA_TP10,TP11	05/23/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
TLB-CpB_TP12TP13TP14	05/23/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
TLB-CpC_TP15	05/23/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
TLB-CpA_TP21,TP22	08/09/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
TLB-CpD_TP16TP17TP18	05/23/11	GeoEngineers	Exploration	Test Pit	--	--									X		X			
TLB-CpE_TP19,TP20	05/23/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
TLB-CpB_TP23,TP24	08/09/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
TLB-CpA_TP27,TP28	08/18/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
TLB-CpC_TP25,TP26	08/09/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
TLB-CpA_TP29,TP30	09/22/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
TLB-CpB_TP31,TP32	09/22/11	GeoEngineers	Exploration	Test Pit	--	--			X	X					X		X			
Prairie Line Trail Capital Project																				
JP-MW1R	03/28/13	GeoEngineers	Exploration	Sonic	101.96	50		X	X	X	X	X	X	X	X		X			
PL-MW1	03/29/13	GeoEngineers	Exploration	Sonic	101.32	28		X	X	X	X	X	X	X	X		X			
PL-MW2	03/28/13	GeoEngineers	Exploration	Sonic	83.19	26		X	X	X	X	X	X	X	X		X			
PLT-B1	03/29/13	GeoEngineers	Exploration	Direct Push	96	11					X	X	X	X						
PLT-B4	03/28/13	GeoEngineers	Exploration	Direct Push	69	2									X		X			
PLT-B5	03/28/13	GeoEngineers	Exploration	Direct Push	64	5					X	X	X	X	X		X			
PLT-B6	03/29/13	GeoEngineers	Exploration	Direct Push	61	3	X		X	X					X		X			
PLT-B7	03/26/13	GeoEngineers	Exploration	Direct Push	91	6	X				X	X	X	X	X		X			
PLT-B8	03/26/13	GeoEngineers	Exploration	Direct Push	90	5	X				X	X	X	X	X		X			
PLT-B9	03/26/13	GeoEngineers	Exploration	Direct Push	89	5	X				X	X	X	X	X		X			
PLT-B10	03/26/13	GeoEngineers	Exploration	Direct Push	89	15	X				X	X	X	X	X		X			
PLT-B11	03/27/13	GeoEngineers	Exploration	Direct Push	88	5	X				X	X	X	X	X		X			
PLT-B12	03/27/13	GeoEngineers	Exploration	Direct Push	88	15	X				X	X	X	X	X		X			
PLT-B13	03/27/13	GeoEngineers	Exploration	Direct Push	75	13	X				X	X	X	X	X		X			
PLT-B14	03/27/13	GeoEngineers	Exploration	Direct Push	73	15	X				X	X	X	X	X		X			
PLT-B15	03/29/13	GeoEngineers	Exploration	Direct Push	60	15	X				X	X	X	X	X		X			
PLT-B16	03/28/13	GeoEngineers	Exploration	Direct Push	59	5	X				X	X	X	X	X		X	X		
PLT-B17	03/26/13	GeoEngineers	Exploration	Direct Push	90	1			X	X					X					
PLT-B18	03/26/13	GeoEngineers	Exploration	Direct Push	86	1.5	X		X	X	X	X	X	X	X		X			
PLT-B20	03/28/13	GeoEngineers	Exploration	Direct Push	76	2												X		
PLT-B23	03/28/13	GeoEngineers	Exploration	Direct Push	68	2									X		X			
PLT-B24	03/28/13	GeoEngineers	Exploration	Direct Push	64	2					X	X	X	X	X		X			
PLT-B25	03/28/13	GeoEngineers	Exploration	Direct Push	60	1.5									X		X			
PLT-B26	03/29/13	GeoEngineers	Exploration	Direct Push	57	1.5									X					

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticide
PLT-B27	03/28/13	GeoEngineers	Exploration	Direct Push	85	2.5									X					
PLT-B28	03/28/13	GeoEngineers	Exploration	Direct Push	83	2					X	X	X	X	X					
PLT-B29	03/28/13	GeoEngineers	Exploration	Direct Push	80	9									X					
PLT-B30	03/27/13	GeoEngineers	Exploration	Direct Push	72	3									X					
PLT-B31	03/28/13	GeoEngineers	Exploration	Direct Push	67	2					X	X	X	X	X					
PLT-B33	03/28/13	GeoEngineers	Exploration	Direct Push	58	1.5					X	X	X	X						
PLT-B34	03/26/13	GeoEngineers	Exploration	Direct Push	95	4			X	X					X					
PLT-B35	03/26/13	GeoEngineers	Exploration	Direct Push	96	6			X	X					X					
PLT-B36	03/26/13	GeoEngineers	Exploration	Direct Push	96	7.5			X	X	X	X	X	X	X					
PLT-B37	03/26/13	GeoEngineers	Exploration	Direct Push	95	5			X	X					X					
PLT-B38	03/26/13	GeoEngineers	Exploration	Direct Push	94	5			X	X	X	X	X	X	X					
PLT-B39	03/26/13	GeoEngineers	Exploration	Direct Push	91	4			X	X					X					
PLT-COMP P B1	03/29/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-CpB2_B2,B3,et.al	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-CpJ1_B2B3B4B5	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-CpD_B7B8B9B10	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-CpL_B7-12_B27-29	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-CpC1_B4B5B23-25	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X		X	X					X		X			
PLT-CpC2_B6B15B16B26	03/29/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-CpC3_B4B23B24B25	03/29/13	GeoEngineers	Exploration	Direct Push	--	--	X								X					
PLT-Comp M B11, B12	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-Comp N B13, B14	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X		X	X					X		X			
PLT-Comp O B15, B16	03/29/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-CpA_B17B34-B39	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X		X	X					X		X			
PLT-Comp F B32, B33	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-Comp E B30, B31	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X		X	X					X		X			
PLT-CpH_B34-B39	03/27/13	GeoEngineers	Exploration	Direct Push	--	--	X								X		X			
PLT-BA2-1	03/29/13	GeoEngineers	Exploration	Direct Push	96	7.5		X			X	X	X	X						
PLT-BA2-2	03/29/13	GeoEngineers	Exploration	Direct Push	96	7.5		X	X	X	X	X	X	X						
PLT-BA2-4	03/29/13	GeoEngineers	Exploration	Direct Push	94	7		X			X	X	X	X						
PLT-BA2-5	03/29/13	GeoEngineers	Exploration	Direct Push	94	7		X			X	X	X	X						
PLT-BA6-3	03/27/13	GeoEngineers	Exploration	Direct Push	74	13			X	X										
PLT-BA6-5	03/29/13	GeoEngineers	Exploration	Direct Push	74	10			X	X										
PLT-BA6-7	03/29/13	GeoEngineers	Exploration	Direct Push	75	10			X	X										
PLT-BA6-8	03/29/13	GeoEngineers	Exploration	Direct Push	75	10			X	X										
PLT-TP1	04/02/13	GeoEngineers	Exploration	Test Pit	93	4					X	X	X	X	X					
PLT-TP2	04/02/13	GeoEngineers	Exploration	Test Pit	86	5					X	X	X	X	X					
PLT-TP3	04/02/13	GeoEngineers	Exploration	Test Pit	85	6									X					
PLT-TP4	04/02/13	GeoEngineers	Exploration	Test Pit	82	5									X					
PLT-TP5	04/02/13	GeoEngineers	Exploration	Test Pit	91	4	X								X		X			

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticide
PLT-TP6	04/02/13	GeoEngineers	Exploration	Test Pit	91	3											X			
PLT-TP8	04/02/13	GeoEngineers	Exploration	Test Pit	91	5	X				X	X	X	X	X		X			
PLT-TP9	08/23/13	GeoEngineers	Exploration	Test Pit	60	7	X				X	X	X	X	X		X			
PLT-TP10	08/23/13	GeoEngineers	Exploration	Test Pit	59	5	X								X		X			
PLT-TP11	08/23/13	GeoEngineers	Exploration	Test Pit	59	5					X	X	X	X	X					
PLT-CpB1_TP1-TP4	03/27/13	GeoEngineers	Exploration	Test Pit	--	--	X		X	X					X		X			
PLT-CpI_TP1TP2TP3TP4	04/02/13	GeoEngineers	Exploration	Test Pit	--	--	X		X	X					X		X			
PLT-CpK_TP5TP6TP7TP8	03/27/13	GeoEngineers	Exploration	Test Pit	--	--	X		X	X					X		X			
PLT-TP12-TP13-COMP	09/05/14	GeoEngineers	Exploration	Test Pit	--	--		X	X	X	X	X	X	X	X		X			
PLT-ROB-1	08/13/13	GeoEngineers	Stockpile	Grab	--	--		X	X	X	X	X	X	X	X		X			
PLT-ROB-2	08/13/13	GeoEngineers	Stockpile	Grab	--	--					X	X	X	X			X			
PLT-ROB-3	08/13/13	GeoEngineers	Stockpile	Grab	--	--					X	X	X	X			X			
PLT-ROB-4	08/13/13	GeoEngineers	Stockpile	Grab	--	--					X	X	X	X			X			
PLT-CONF-NS-1	08/30/13	GeoEngineers	Confirmation	Grab	62	--	X		X	X					X		X			
PLT-CONF-NS-2	08/30/13	GeoEngineers	Confirmation	Grab	59	--	X								X		X			
PLT-RAAA-CS-FG-3	10/07/14	GeoEngineers	Confirmation	Grab	96	--									X					
PLT-RAAA-CS-FG-4	10/07/14	GeoEngineers	Confirmation	Grab	95	--									X					
PLT-RAAA-CS-SG-1	04/28/14	GeoEngineers	Confirmation	Grab	90	--									X					
PLT-RAAA-CS-SG-2	04/28/14	GeoEngineers	Confirmation	Grab	87	--									X					
PLT-RAAB-CS-SG-1	09/04/14	GeoEngineers	Confirmation	Grab	90	--									X					
PLT-RAAC-BASE	03/18/14	GeoEngineers	Confirmation	Grab	96	--		X			X									
PLT-RAAC-SW-1	03/18/14	GeoEngineers	Confirmation	Grab	96	--		X			X									
PLT-RAAC-SW-2	03/18/14	GeoEngineers	Confirmation	Grab	96	--		X			X									
PLT-RAAC-SW-3	03/18/14	GeoEngineers	Confirmation	Grab	95	--		X			X									
PLT-RAAC-SW-4	03/18/14	GeoEngineers	Confirmation	Grab	95	--		X			X									
PLT-RAAD-FG-BL-1	03/03/14	GeoEngineers	Confirmation	Grab	84	--									X	X				
PLT-RAAD-FG-BR-1	03/03/14	GeoEngineers	Confirmation	Grab	86	--									X	X				
PLT-RAAD-FG-BR-2	03/11/14	GeoEngineers	Confirmation	Grab	88	--									X					
PLT-RAAD-FG-RED-1	03/03/14	GeoEngineers	Confirmation	Grab	89	--									X	X				
PLT-RAAE-BR-B-1	02/19/14	GeoEngineers	Confirmation	Grab	78	--									X					
PLT-RAAE-BR-B-2	02/20/14	GeoEngineers	Confirmation	Grab	78	--									X					
PLT-RAAE-BR-B-3	02/20/14	GeoEngineers	Confirmation	Grab	83	--									X					
PLT-RAAE-BR-B-4	02/21/14	GeoEngineers	Confirmation	Grab	80	--									X					
PLT-RAAE-BR-B-5	02/21/14	GeoEngineers	Confirmation	Grab	81	--									X					
PLT-RAAE-BR-B-8	02/26/14	GeoEngineers	Confirmation	Grab	82	--									X					
PLT-RAAE-BR-S-1	02/14/14	GeoEngineers	Confirmation	Grab	87	--									X					
PLT-RAAE-BR-S-2	02/14/14	GeoEngineers	Confirmation	Grab	87	--									X					
PLT-RAAE-BR-S-3	02/14/14	GeoEngineers	Confirmation	Grab	87	--									X					
PLT-RAAE-BR-S-4	02/21/14	GeoEngineers	Confirmation	Grab	88	--									X					
PLT-RAAE-BR-S-5	02/21/14	GeoEngineers	Confirmation	Grab	89	--									X					

Sample Location[1]	Sample Date	Sampled By	Sample Type	Sample Method	Ground Surface Elevation[2] (feet NGVD29)	Depth of Boring (feet)	Schedule of Soil Analysis[3]													
							Petroleum Hydrocarbons				VOCs									
							TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	PAHs	SVOCs	Metals	PCBs	Organophosphorus Compounds	Pesticide
PLT-RAAE-BR-S-6	02/22/14	GeoEngineers	Confirmation	Grab	84	--									X					
PLT-RAAE-BR-S-7	02/22/14	GeoEngineers	Confirmation	Grab	83	--									X					
PLT-RAAE-FG-1	02/26/14	GeoEngineers	Confirmation	Grab	88	--									X					
PLT-RAAE-FG-2	02/26/14	GeoEngineers	Confirmation	Grab	89	--									X					
PLT-RAAE-TP	02/19/14	GeoEngineers	Exploration	Test Pit	83	0.5									X					
PLT-RAAF-SG-1	03/13/14	GeoEngineers	Confirmation	Grab	94	--									X		X			
PLT-RAAH-1	02/12/14	GeoEngineers	Confirmation	Grab	74	--	X								X					
PLT-RAAH-2	02/12/14	GeoEngineers	Confirmation	Grab	73	--	X								X					
PLT-RAAI-SG-1	05/13/14	GeoEngineers	Confirmation	Grab	64	--									X		X			
PLT-RAAJ-SG-1	03/13/14	GeoEngineers	Confirmation	Grab	60	--									X					
PLT-RAAJ-SG-2	03/13/14	GeoEngineers	Confirmation	Grab	59	--									X					
PLT-RAAK-SG-1	03/17/14	GeoEngineers	Confirmation	Grab	71	--									X					
PLT-RAAK-SG-2	03/17/14	GeoEngineers	Confirmation	Grab	68	--									X					
WOF-CSB-9.5	08/26/13	GeoEngineers	Confirmation	Grab	74	--			X	X										
WOF-CSE	08/26/13	GeoEngineers	Confirmation	Grab	74	--			X	X										
WOF-CSN-5	08/26/13	GeoEngineers	Confirmation	Grab	73	--			X	X										
WOF-CSS-6	08/26/13	GeoEngineers	Confirmation	Grab	74	--			X	X										
WOF-CSW	08/26/13	GeoEngineers	Confirmation	Grab	75	--			X	X										
Tacoma Paper and Stationery Building Capital Project																				
USC-MW1D	10/20/14	GeoEngineers	Exploration	HSA	70.55	56					X	X	X	X			X			
Milgard Hall Capital Project																				
MIL-B5	03/23/21	GeoEngineers	Exploration	Direct Push	80	10		X	X	X	X	X	X	X	X		X			
MIL-A1-CONF-7	08/12/21	GeoEngineers	Confirmation	Grab	80	--					X	X	X	X						
MIL-A2-CONF-1	07/29/21	GeoEngineers	Confirmation	Grab	87	--			X	X	X	X	X	X	X					
MIL-A2-CONF-2	07/29/21	GeoEngineers	Confirmation	Grab	82	--			X	X	X	X	X	X	X					
MIL-A2-CONF-3	07/29/21	GeoEngineers	Confirmation	Grab	82	--			X	X	X	X	X	X	X					
MIL-A2-CONF-4	07/29/21	GeoEngineers	Confirmation	Grab	82	--			X	X	X	X	X	X	X					

Notes:

[1] Sample locations are shown on Figures 7-4 through 7-4. Location identification nomenclature was added to select wells as necessary (for example PLT- was added to PLT-B10).

[2] Ground surface elevation is based on estimates from topographic surveys, Pierce County Light Detection and Range (LiDAR) 2010 Survey or individual surveys for a monitoring well. Select wells were modified over time during construction. The current elevation is shown. See surveys and summary of changes in Appendix K.

[3] Chemical analytical results associated with Prairie Line Trail are summarized in Table 7-4. Chemical analytical results associated with other Areas of Concern and area-wide groundwater plumes are presented in other report sections as referenced in the text. Analytical methods for chemical analytical schedule are presented in Appendices D and H.

BTEX = benzene, toluene, ethylbenzene and xylenes

CVOCs = chlorinated volatile organic compounds

HSA = hollow stem auger

NGVD29 = National Geodetic Vertical Datum of 1929

PAHs = polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyl Aroclors

SVOCs = semi-volatile organic compounds

TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil

TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification

URS = United Research Services Corporation (formerly)

VOCs = volatile organic compounds

Table 7-2

Groundwater Investigation Summary - Prairie Line Trail

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Date	Sampled By	Monitoring Well Type[2]	Groundwater Unit	Schedule of Analysis[3]												
					Petroleum Hydrocarbons				VOCs								
					TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	Dissolved Gases	PAHs	SVOCs	Metals	PCBs
1997 Agreed Order Investigation																	
CR-B6	09/21/00	URS	Temporary	Qvi					X	X	X	X					
JP-GW1	08/27/98	URS	Temporary	Qvi		X	X	X	X								
JP-GW2	09/14/99	URS	Temporary	Qvi					X	X	X	X					
JP-MW1	10/23/98	URS	Permanent	Qvi		X	X	X	X								
JP-MW1	01/11/99	URS	Permanent	Qvi		X	X	X	X								
JP-MW1	04/19/99	URS	Permanent	Qvi		X	X	X	X								
JP-MW1	09/09/99	URS	Permanent	Qvi		X	X	X	X		X						
Supplemental Investigations Under the 1997 Agreed Order																	
JP-MW1	07/12/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
JP-MW1R	07/12/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
PL-MW1	07/12/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
PL-MW2	07/10/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X					
2016 Agreed Order Investigation																	
A7-MW3S	09/11/19	GeoEngineers	Permanent	Qvi					X	X	X	X					
A7-MW3S	03/18/20	GeoEngineers	Permanent	Qvi					X	X	X	X					
A7-MW3S	09/02/20	GeoEngineers	Permanent	Qvi					X	X	X	X					
JP-MW1R	12/14/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
JP-MW1R	03/25/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
JP-MW1R	09/05/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
JP-MW1R	03/10/20	GeoEngineers	Permanent	Qvi		X			X	X	X	X	X				
JP-MW1R	08/31/20	GeoEngineers	Permanent	Qvi		X			X	X	X	X	X				
PL-MW1	12/19/16	GeoEngineers	Permanent	Qvi					X	X	X	X					
PL-MW1	03/25/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
PL-MW1	09/05/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
PL-MW1	03/11/20	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
PL-MW1	08/31/20	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
PL-MW2	12/20/16	GeoEngineers	Permanent	Qvi		X			X	X	X	X		X			
PL-MW2	03/25/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X		X			
PL-MW2	09/04/19	GeoEngineers	Permanent	Qvi		X			X	X	X	X		X			
PL-MW2	03/13/20	GeoEngineers	Permanent	Qvi		X			X	X	X	X					X
PL-MW2	09/01/20	GeoEngineers	Permanent	Qvi		X			X	X	X	X					
USC-MW1D	12/19/16	GeoEngineers	Permanent	Qva						X	X	X					
USC-MW1D	09/20/18	GeoEngineers	Permanent	Qva						X	X	X					
USC-MW1D	03/14/19	GeoEngineers	Permanent	Qva						X	X	X					
USC-MW1D	09/12/19	GeoEngineers	Permanent	Qva					X	X	X	X					
USC-MW1D	03/25/20	GeoEngineers	Permanent	Qva					X	X	X	X					
USC-MW1D	09/02/20	GeoEngineers	Permanent	Qva					X	X	X	X					

Sample Location[1]	Sample Date	Sampled By	Monitoring Well Type[2]	Groundwater Unit	Schedule of Analysis[3]												
					Petroleum Hydrocarbons				VOCs								
					TPH-HCID	TPH-G	TPH-D	TPH-O	BTEX	Petroleum VOCs	CVOCs	Other VOCs	Dissolved Gases	PAHs	SVOCs	Metals	PCBs
Prairie Line Trail Capital Project																	
JP-MW1	04/02/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X				X	
JP-MW1R	04/03/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X				X	
PL-MW1	04/01/13	GeoEngineers	Permanent	Qvi		X	X	X	X	X	X	X				X	
PL-MW2	04/01/13	GeoEngineers	Permanent	Qvi		X	X	X	X		X	X					
PLT-B10	03/26/13	GeoEngineers	Temporary	Qvi		X	X	X	X	X	X	X		X		X	
PLT-B12	03/27/13	GeoEngineers	Temporary	Qvi		X	X	X	X	X	X	X		X		X	
PLT-B14	03/27/13	GeoEngineers	Temporary	Qvi		X	X	X	X	X	X	X		X		X	
PLT-B15	03/29/13	GeoEngineers	Temporary	Qvi		X	X	X	X	X	X	X		X		X	
PLT-B29	03/29/13	GeoEngineers	Temporary	Qvi		X	X	X	X	X	X	X		X		X	
PLT-B29	03/29/13	GeoEngineers	Temporary	Qvi		X	X	X	X	X	X	X				X	
Tacoma Paper and Stationery Building Capital Project																	
USC-MW1D	10/27/14	GeoEngineers	Permanent	Qva					X	X	X	X					

Notes:

[1] Sample locations are shown on Figures 7-4 through 7-4. Location identification nomenclature was added to select wells as necessary (for example PLT- was added to PLT-B10).

[2] Ground surface elevation is based on estimates from topographic surveys, Pierce County Light Detection and Range (LiDAR) 2010 Survey or individual surveys for a monitoring well. Select wells were modified over time during construction. The current elevation is shown. See surveys and summary of changes in Appendix K.

[3] Chemical analytical results associated with Prairie Line Trail are summarized in Table 7-5. Chemical analytical results associated with other Areas of Concern and area-wide groundwater plumes are presented in other report sections as referenced in the text. Analytical methods for chemical analytical schedule are presented in Appendices D and H.

bgs = below ground surface

BTEX = benzene, toluene, ethylbenzene and xylenes

CVOCs = chlorinated volatile organic compounds

NGVD29 = National Geodetic Vertical Datum of 1929

PAHs = polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyl Aroclors

Qva = Vashon advance outwash

Qvi = Vashon ice-contact deposits

SVOCs = semi-volatile organic compounds

TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil

TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification

URS = United Research Services Corporation (formerly)

VOCs = volatile organic compounds

Table 7-3

Well Construction Details - Prairie Line Trail

University of Washington - Tacoma Campus

Tacoma, Washington

Well Identification[1]	Well Construction Date	Installed By	Ground Surface Elevation[2] (feet NGVD29)	Top of Casing Elevation (feet NGVD29)[2]	Top of Well Screen (feet bgs)	Bottom of Well Screen (feet bgs)	Top of Well Screen Elevation (feet NGVD29)	Bottom of Well Screen Elevation (feet NGVD29)	Lithology Across Well Screen Interval	Well Status	Well Type
1997 Agreed Order Investigation											
CR-B6	09/21/00	URS	75	--	13	16	62	59	Qvi	Decommissioned	Temporary
JP-GW1	08/27/98	URS	96	--	16	23	80	73	Qvi	Decommissioned	Temporary
JP-GW2	09/14/99	URS	97	--	18	20	79	77	Qvi	Decommissioned	Temporary
JP-MW1	09/14/98	URS	96	95.77	15	30	81	66	Qvi	Decommissioned	Permanent
2016 Agreed Order Investigation											
A7-MW3S	06/18/19	GeoEngineers	67.64	67.34	20	30	47	37	Qvi	Existing	Permanent
Prairie Line Trail Capital Project											
JP-MW1R	03/28/13	GeoEngineers	101.96	101.64	15	25	87	77	Qvi	Existing	Permanent
PL-MW1	03/29/13	GeoEngineers	101.32	101.02	13	28	88	73	Qvi	Existing	Permanent
PL-MW2	03/28/13	GeoEngineers	83.19	82.92	6	26	77	57	Qvi	Existing	Permanent
PLT-B10	03/26/13	GeoEngineers	89	--	10	15	79	74	Qvi	Decommissioned	Temporary
PLT-B12	03/27/13	GeoEngineers	88	--	10	15	78	73	Qvi	Decommissioned	Temporary
PLT-B14	03/27/13	GeoEngineers	73	--	10	15	63	58	Qvi	Decommissioned	Temporary
PLT-B15	03/29/13	GeoEngineers	60	--	10	15	50	45	Qvi	Decommissioned	Temporary
PLT-B29	03/28/13	GeoEngineers	80	--	4	9	76	71	Qvi	Decommissioned	Temporary
Tacoma Paper and Stationery Building Capital Project											
USC-MW1D	10/20/14	GeoEngineers	70.55	69.88	45	55	25	15	Qva	Existing	Permanent

Notes:

[1] Well locations are shown on Figures 7-4 through 7-4. Location identification nomenclature was added to select wells as necessary (for example PLT- was added to PLT-B10).

[2] Ground surface elevation is based on estimates from topographic surveys, Pierce County Light Detection and Range (LiDAR) 2010 Survey or individual surveys for a monitoring well. Select wells were modified over time during construction. The current elevation is shown. See surveys and summary of changes in Appendix K.

bgs = below ground surface

NGVD29 = National Geodetic Vertical Datum of 1929

Qvi = Vashon ice-contact deposits

Qva = Vashon advance outwash

URS = United Research Services Corporation (formerly)

Table 7-4

Summary of Soil Chemical Analytical Results - Prairie Line Trail

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																				
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs										Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Pre-1997 Agreed Order Investigation and Remedial Action																										
JP-S7	JP-S7	08/23/96	Confirmation	9 - 9	Removed	--	1,930 J	65 J	100 U	*0.05 U*	0.1 U	0.1 U	0.1 U	--	--	--	--	--	--	--	--	--	--	--	20 U	--
1997 Agreed Order Investigation																										
CR-B6	CR-B6-12_20000921	09/21/00	Exploration	12 - 12	Present	--	--	--	--	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	--	--	--	--	--	--	0.100 U	--	--	--	--	--
CR-B7	CR-B7-12_20000921	09/21/00	Exploration	12 - 12	Present	--	--	--	--	*0.100 U*	0.100 U	0.100 U	0.200 U	*0.100 U*	--	--	--	--	--	--	0.100 U	--	--	--	--	--
CR-C-B1	CR-C-B1-0'	06/04/98	Exploration	0 - 0	Removed	--	--	--	--	0.0010 U	0.0010 U	0.0010 U	0.0031 U	--	--	--	--	--	--	ND	--	--	--	--	--	--
CR-C-B2	CR-C-B2-0'	06/04/98	Exploration	0 - 0	Removed	--	--	--	--	0.0011 U	0.0011 U	0.0011 U	0.0032 U	--	--	--	--	--	--	ND	--	--	--	--	--	--
CR-C-B2	CR-C-B2-2.5'	06/04/98	Exploration	2.5 - 2.5	Removed	--	--	--	--	**0.0016**	0.0012 U	**0.0089**	**0.0237**	--	--	--	--	--	--	ND	--	--	--	--	--	--
CR-C-B3	CR-C-B3-0'	06/04/98	Exploration	0 - 0	Removed	--	--	--	--	0.0011 U	0.0011 U	0.0011 U	0.0032 U	--	--	--	--	--	--	ND	--	--	--	--	--	--
DMB-5	DMB-5-6	03/23/99	Exploration	6 - 6	Present	--	5.00 U	10.0 U	25.0 U	*0.050 U*	0.050 U	0.050 U	0.100 U	--	--	--	--	--	--	--	0.100 U	0.051 U	--	--	--	--
DMB-6	DMB-6-6	03/24/99	Exploration	6 - 6	Present	--	5.00 U	**15.5**	25.0 U	*0.050 U*	0.050 U	0.050 U	0.100 U	--	--	--	--	--	--	--	0.100 U	0.051 U	--	--	--	--
DMB-7	DMB-7-6	03/24/99	Exploration	6 - 6	Present	--	5.00 U	10.0 U	25.0 U	*0.050 U*	0.050 U	0.050 U	0.100 U	--	--	--	--	--	--	--	0.100 U	0.051 U	--	--	--	--
DMB-8	DMB-8-9	03/24/99	Exploration	9 - 9	Present	--	5.00 U	10.0 U	25.0 U	*0.050 U*	0.050 U	0.050 U	0.100 U	--	--	--	--	--	--	--	**0.637**	0.051 U	--	--	--	--
JP-B1	JP-B1-4_19980824	08/24/98	Exploration	4 - 4	Present	--	5.0 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JP-B1	JP-B1-10_19980824	08/24/98	Exploration	10 - 10	Present	--	5.0 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2016 Agreed Order Investigation																										
A7-MW3S	A7-MW3S-5-6	06/18/19	Exploration	5 - 6	Present	ND	--	--	--	0.00098 U	0.0049 U	0.00098 U	0.0020 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	ND	0.00098 U	0.0056 U	11 U	0.55 U	5.5 U	--
A7-MW3S	A7-MW3S-9-10	06/18/19	Exploration	9 - 10	Present	--	--	--	--	--	--	--	--	--	--	0.0010 U	0.0010 U	--	--	**DET**	--	--	--	--	--	--
A7-MW3S	A7-MW3S-12-13	06/18/19	Exploration	12 - 13	Present	--	--	--	--	--	--	--	--	--	--	0.00093 U	0.00093 U	--	--	**DET**	--	--	--	--	--	--
A7-MW3S	A7-MW3S-15-16	06/18/19	Exploration	15 - 16	Present	--	--	--	--	--	--	--	--	--	--	0.0011 U	0.0011 U	--	--	**DET**	--	--	--	--	--	--
A7-MW3S	A7-MW3S-19-20	06/18/19	Exploration	19 - 20	Present	--	--	--	--	--	--	--	--	--	--	0.00092 U	0.00092 U	--	--	**DET**	--	--	--	--	--	--
A7-MW3S	A7-MW3S-25-26	06/18/19	Exploration	25 - 26	Present	--	--	--	--	--	--	--	--	--	--	0.00093 U	0.00093 U	--	--	**DET**	--	--	--	--	--	--
A7-MW3S	A7-MW3S-29-30	06/18/19	Exploration	29 - 30	Present	--	--	--	--	--	--	--	--	--	--	0.00097 U	0.00097 U	--	--	**DET**	--	--	--	--	--	--
A7-MW3S	DUP-1-20190618	06/18/19	Exploration	29 - 30	Present	--	--	--	--	--	--	--	--	--	--	0.0011 U	0.0011 U	--	--	**DET**	--	--	--	--	--	--
Science Building Capital Project																										
WOF-ESW-19	ESW-19-13	05/17/00	Confirmation	13 - 13	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NEB-2	NEB-2-22	05/10/00	Confirmation	22 - 22	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NEB-17	NEB-17-23	05/17/00	Confirmation	23 - 23	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-NESW-18	NESW-18-15	05/17/00	Confirmation	15 - 15	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SEW-20	SEW-20-8	05/17/00	Confirmation	8 - 8	Present	--	--	20 U	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-SP-8	SP-8-9-12	05/04/00	Exploration	9 - 12	Removed	--	--	2,000	40 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tioga Library Building Capital Project																										
TLB-TP10	TP10-0-4	05/23/11	Exploration	0 - 4	Removed	--	5.9 U	--	--	0.0010 U	0.0051 U	0.0010 U	0.0020 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0010 U	--	--	--	--	--
TLB-TP10	TP10-0.5-3	08/23/13	Exploration	0.5 - 3	Removed	--	--	--	--	0.00097 U	0.0049 U	0.00097 U	0.0019 U	0.066 U	0.066 U	0.00097 U	0.00097 U	0.00097 U	0.066 U	DET	0.066 U	--	--	--	--	--
TLB-TP12	TP12-0-5	05/23/11	Exploration	0 - 5	Removed	--	6.6 U	--	--	0.0011 U	0.0056 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	**0.089**	**0.095**	--	--	--	--
TLB-TP13	TP13-0-5	05/23/11	Exploration	0 - 5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.049**	**0.050**	--	--	--	--
TLB-TP14	TP14-0-5	05/23/11	Exploration	0 - 5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.14**	**0.15**	--	--	--	--
TLB-TP15	TP15-0-1.5	05/23/11	Exploration	0 - 1.5	Removed	--	7.3 U	31 U	**220**	0.0013 U	0.0065 U	0.0013 U	0.0026 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	ND	**0.38**	**0.46**	12 U	**0.70**	**130**	--
TLB-TP15	TP15-4-9	05/23/11	Exploration	4 - 9	Removed	--	4.9 U	--	--	0.00085 U	0.0043 U	0.00085 U	0.0017 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	ND	0.00085 U	--	--	--	--	--
TLB-TP17	TP17-0-4	05/23/11	Exploration	0 - 4	Removed	--	6.1 U	--	--	0.0011 U	0.0054 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0011 U	--	--	--	--	--
TLB-TP19	TP19-0-4	05/23/11	Exploration	0 - 4	Removed	--	5.9 U	--	--	0.0010 U	0.0052 U	0.0010 U	0.0021 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0010 U	--	--	--	--	--
TLB-TP21	TP21-110809-2-4	08/09/11	Exploration	2 - 4	Removed	--	5.0 U	26 U	52 U	0.00091 U	0.0045 U	0.00091 U	0.0018 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	0.00091 U	ND	0.00091 U	0.0053 U	10 U	0.52 U	5.2 U	--
TLB-TP22	TP22-110809-0-10	08/09/11	Exploration	0 - 10	Removed	--	4.8 U	--	--	0.00081 U	0.0041 U	0.00081 U	0.0016 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	ND	0.00081 U	--	--	--	--	--
TLB-TP24	TP24-110809-0-5	08/09/11	Exploration	0 - 5	Removed	--	4.4 U	--	--	0.00072 U	0.0036 U	0.00072 U	0.0014 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	0.00072 U	ND	0.00072 U	--	--	--	--	--
TLB-TP24	TP24-110809-3-3.5	08/09/11	Exploration	3 - 3.5	Removed	--	4.9 U	27 U	54 U	0.00090 U	0.0045 U	0.00090 U	0.0018 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	0.00090 U	ND	0.00090 U	0.0054 U	11 U	0.54 U	5.4 U	--
TLB-TP25	TP25-110809-3-4	08/09/11	Exploration	3 - 4	Removed	--	5.0 U	27 U	53 U	0.00095 U	0.0047 U	0.00095 U	0.0019 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	ND	0.00095 U	0.0054 U	11 U	0.53 U	5.3 U	--
TLB-TP26	TP26-110809-0-2	08/09/11	Exploration	0 - 2	Removed	--	5.0 U	27 U	**80**	0.00087 U	0.0043 U	0.00087 U	0.0017 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	ND	**0.047**	**0.037**	11 U	0.54 U	**19**	--
TLB-TP26	TP26-110809-0-5	08/09/11	Exploration	0 - 5	Removed	--	4.2 U	--	--	0.00077 U	0.0039 U	0.00077 U	0.0015 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	ND	0.00077 U	--	--	--	--	--
TLB-TP27	TP27-110818-2-3	08/18/11	Exploration	2 - 3	Removed	--	8.8 U	160 U	**600**	0.0015 U	0.0074 U	0.0015 U	0.0030 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	0.0015 U	DET	**0.29**	**1.8**	**110**	**3.9**	**760**	--
TLB-TP28	TP28-110818-0-6	08/18/11	Exploration	0 - 6	Removed	--	4.6 U	--	--	0.00085 U	0.0043 U	0.00085 U	0.0017 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	ND	0.00085 U	--	--	--	--	--
TLB-TP29	TP29	09/22/11	Exploration	0 - 7	Removed	--	6.2 U	--	--	0.0011 U	0.0056 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0011 U	--	--	--	--	--
TLB-TP32	TP32	09/22/11	Exploration	0 - 7	Removed	--	5.6 U	--	--	0.0012 U	0.0059 U	0.0012 U	0.0024 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	ND	0.0012 U	--	--	--	--	--
TLB-CpA_TP10,TP11	TLB-1105-192-Comp A	05/23/11	Exploration	0 - 9	Removed	--	--	29 U	58 U	--	--	--	--	--	--	--	--	--	--	--	0.0077 U	**0.020**	12 U	0.58 U	**26**	--

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																			
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
TLB-CpB_TP12TP13TP14	TLB-1105-192-Comp B	05/23/11	Exploration	0 - 5	Removed	--	--	29 U	59 U	--	--	--	--	--	--	--	--	--	--	--	0.072	0.17	12 U	0.59 U	87	--
TLB-CpC_TP15	TLB-1105-192-Comp C	05/23/11	Exploration	0 - 9	Removed	--	--	28 U	56 U	--	--	--	--	--	--	--	--	--	--	--	0.015	0.026	11 U	0.56 U	15	--
TLB-CpA_TP21,TP22	TLB-1108-077-Comp A	08/09/11	Exploration	0 - 10	Removed	--	--	27 U	54 U	--	--	--	--	--	--	--	--	--	--	--	0.0071 U	0.0054 U	11 U	0.54 U	5.4 U	--
TLB-CpD_TP16TP17TP18	TLB-1105-192-Comp D	05/23/11	Exploration	0 - 9	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.026	0.039	11 U	0.57 U	19	--
TLB-CpE_TP19,TP20	TLB-1105-192-Comp E	05/23/11	Exploration	0 - 7	Removed	--	--	28 U	56 U	--	--	--	--	--	--	--	--	--	--	--	0.010	0.021	11 U	0.56 U	5.6 U	--
TLB-CpB_TP23,TP24	TLB-1108-077-Comp B	08/09/11	Exploration	0 - 5	Removed	--	--	27 U	54 U	--	--	--	--	--	--	--	--	--	--	--	0.012	0.018	11 U	0.54 U	7.9	--
TLB-CpA_TP27,TP28	TLB-1108-161-Comp A	08/18/11	Exploration	0 - 11	Removed	--	--	28 U	57 U	--	--	--	--	--	--	--	--	--	--	--	0.011	0.022	11 U	0.57 U	21	--
TLB-CpC_TP25,TP26	TLB-1108-077-Comp C	08/09/11	Exploration	0 - 5	Removed	--	--	27 U	53 U	--	--	--	--	--	--	--	--	--	--	--	0.0071 U	0.0054 U	11 U	0.53 U	5.3 U	--
TLB-CpA_TP29,TP30	TLB-1109-142-Comp A	09/22/11	Exploration	0 - 7	Removed	--	--	29 U	280	--	--	--	--	--	--	--	--	--	--	--	0.0077 U	0.036	12 U	0.58 U	12	--
TLB-CpB_TP31,TP32	TLB-1109-142-Comp B	09/22/11	Exploration	0 - 7	Removed	--	--	29 U	320	--	--	--	--	--	--	--	--	--	--	--	0.033	0.16	14	1.9	98	--
Prairie Line Trail Capital Project																									
JP-MW1R	JPMW1R-20-21	03/28/13	Exploration	20 - 21	Present	--	4.7 U	28 U	56 U	0.00082 U	0.0041 U	0.00082 U	0.0016 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	ND	0.00082 U	0.0057 U	11 U	0.56 U	5.6 U	--
JP-MW1R	JPMW1R-25-25.5	03/28/13	Exploration	25 - 25.5	Present	--	--	--	--	0.00077 U	0.0039 U	0.00077 U	0.0015 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	ND	0.00077 U	--	--	--	--	--
PL-MW1	PLMW1-18.5-19	03/29/13	Exploration	18.5 - 19	Present	--	5.1 U	30 U	59 U	0.00082 U	0.0041 U	0.00082 U	0.0016 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	DET	0.00082 U	0.0060 U	12 U	0.59 U	5.9 U	--
PL-MW1	PLMW1-DUPE	03/29/13	Exploration	18.5 - 19	Present	--	5.1 U	30 U	59 U	0.00080 U	0.0040 U	0.00080 U	0.0016 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	0.00080 U	DET	0.00080 U	0.0060 U	12 U	0.59 U	5.9 U	--
PL-MW1	PLMW1-27-27.3	03/29/13	Exploration	27 - 27.3	Present	--	4.5 U	28 U	57 U	0.00074 U	0.0037 U	0.00074 U	0.0015 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	0.00074 U	DET	0.00074 U	0.0057 U	11 U	0.57 U	5.7 U	--
PL-MW2	PLMW2-10-11	03/28/13	Exploration	10 - 11	Present	--	3.8 U	27 U	54 U	0.00070 U	0.0035 U	0.00070 U	0.0014 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	0.00070 U	ND	0.00070 U	0.0054 U	11 U	0.54 U	5.4 U	--
PL-MW2	PLMW2-14-14.5	03/28/13	Exploration	14 - 14.5	Present	--	5.3 U	30 U	61 U	0.00092 U	0.0046 U	0.00092 U	0.0018 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	ND	0.00092 U	0.0061 U	12 U	0.61 U	6.1 U	--
PL-MW2	PLMW2-20-21	03/28/13	Exploration	20 - 21	Present	--	--	--	--	0.00085 U	0.0042 U	0.00085 U	0.0017 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	0.00085 U	ND	0.00085 U	--	--	--	--	--
PLT-B1	B1-0.5-10	03/29/13	Exploration	0.5 - 10	Present	--	--	--	--	0.0010 U	0.0050 U	0.0010 U	0.0020 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0010 U	--	--	--	--	--
PLT-B4	B4-0-0.5	03/28/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0077 U	0.0058 U	13 U	0.64 U	20	--
PLT-B5	B5-0.5-4	03/28/13	Exploration	0.5 - 4	Present	--	--	--	--	0.00084 U	0.0042 U	0.00084 U	0.0017 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	ND	0.00084 U	0.0061 U	--	--	6.0 U	--
PLT-B5	B5-0-0.5	03/28/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.081	0.40	11 U	1.2	14,000	--
PLT-B5	B5-4-5	03/28/13	Exploration	4 - 5	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.080	0.35	--	--	130	--
PLT-B6	B6-0.5-2	03/29/13	Exploration	0.5 - 2	Removed	0	--	28 U	140	--	--	--	--	--	--	--	--	--	--	--	0.080	0.50	11 U	0.75	410	--
PLT-B6	B6-0-0.5	03/29/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.053	0.43	--	--	--	--
PLT-B6	B6-2-3	03/29/13	Exploration	2 - 3	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.083	0.84	--	--	370	--
PLT-B7	B7-0-1	03/26/13	Exploration	0 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.083	0.082	--	--	--	--
PLT-B7	B7-5-6	03/26/13	Exploration	5 - 6	Present	ND	--	--	--	0.00082 U	0.0041 U	0.00082 U	0.0016 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	0.00082 U	ND	0.00082 U	0.0055 U	11 U	0.55 U	5.5 U	--
PLT-B8	B8-0-1	03/26/13	Exploration	0 - 1	Removed	--	--	--	--	0.00097 U	0.0049 U	0.00097 U	0.0019 U	0.052 U	0.052 U	0.00097 U	0.00097 U	0.00097 U	0.052 U	ND	0.066	0.12	--	--	--	--
PLT-B8	B8-4-5	03/26/13	Exploration	4 - 5	Present	ND	--	--	--	0.00081 U	0.0041 U	0.00081 U	0.0016 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	ND	0.00081 U	0.0056 U	11 U	0.55 U	5.5 U	--
PLT-B9	B9-0-1	03/26/13	Exploration	0 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.13	0.053	--	--	--	--
PLT-B9	B9-1-4	03/26/13	Exploration	1 - 4	Present	--	--	--	--	0.00088 U	0.0044 U	0.00088 U	0.0018 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	0.00088 U	ND	0.00088 U	--	--	--	--	--
PLT-B9	B9-4-5	03/26/13	Exploration	4 - 5	Present	ND	--	--	--	0.00083 U	0.0042 U	0.00083 U	0.0017 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	ND	0.00083 U	0.0057 U	11 U	0.57 U	5.7 U	--
PLT-B10	B10-0-1	03/26/13	Exploration	0 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.49	1.3	--	--	--	--
PLT-B10	B10-4-5	03/26/13	Exploration	4 - 5	Present	ND	--	--	--	0.00083 U	0.0041 U	0.00083 U	0.0017 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	0.00083 U	ND	0.00083 U	0.0054 U	11 U	0.54 U	5.4 U	--
PLT-B10	B10-10-11	03/26/13	Exploration	10 - 11	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0078 U	0.0059 U	--	--	--	--
PLT-B11	B11-0-1	03/27/13	Exploration	0 - 1	Removed	--	--	--	--	0.00096 U	0.0048 U	0.00096 U	0.0019 U	0.052 U	0.052 U	0.00096 U	0.00096 U	0.00096 U	0.052 U	ND	0.23	0.095	--	--	--	--
PLT-B11	B11-1-4	03/27/13	Exploration	1 - 4	Present	--	--	--	--	0.0011 U	0.0056 U	0.0011 U	0.0023 U	0.052 U	0.052 U	0.0011 U	0.0011 U	0.0011 U	0.052 U	ND	0.052 U	--	--	--	--	--
PLT-B11	B11-4-5	03/27/13	Exploration	4 - 5	Present	ND	--	--	--	0.00081 U	0.0040 U	0.00081 U	0.0016 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	ND	0.00081 U	0.0057 U	11 U	0.57 U	5.7 U	--
PLT-B12	B12-0-1	03/27/13	Exploration	0 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.047	0.20	--	--	--	--
PLT-B12	B12-4-5	03/27/13	Exploration	4 - 5	Present	ND	--	--	--	0.00094 U	0.0047 U	0.00094 U	0.0019 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	ND	0.00094 U	0.059	11 U	0.56 U	5.6 U	--
PLT-B12	B12-10-11	03/27/13	Exploration	10 - 11	Present	--	--	--	--	0.00086 U	0.0043 U	0.00086 U	0.0017 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	0.00086 U	DET	0.00086 U	--	--	--	--	--
PLT-B13	B13-0-0.5	03/27/13	Exploration	0 - 0.5	Removed	--	--	--	--	0.0013 U	0.0064 U	0.0013 U	0.0025 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	ND	0.0013 U	--	--	--	--	--
PLT-B13	B13-0.5-4	03/27/13	Exploration	0.5 - 4	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.13	0.14	--	--	--	--
PLT-B13	B13-4-5	03/27/13	Exploration	4 - 5	Present	ND	--	--	--	0.0010 U	0.0051 U	0.0010 U	0.0020 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0010 U	0.0062 U	12 U	0.61 U	6.1 U	--
PLT-B14	B14-0.5-5	03/27/13	Exploration	0.5 - 5	Present	--	--	--	--	0.00054 U	0.0027 U	0.056 U	0.11 U	0.056 U	0.056 U	0.056 U	0.00054 U	0.00054 U	0.056 U	DET	0.11	0.31	--	--	--	--
PLT-B14	B14-5-6	03/27/13	Exploration	5 - 6	Present	ND	--	--	--	0.00098 U	0.0049 U	0.00098 U	0.0020 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	0.00098 U	ND	0.00098 U	0.0059 U	12 U	0.58 U	5.8 U	--
PLT-B15	B15-0-0.5	03/29/13	Exploration	0 - 0.5	Removed	--	--	--	--	0.0011 U	0.0054 U	0.0011 U	0.0021 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	DET	0.017	0.087	--	--	--	--
PLT-B15	B15-0.5-4	03/29/13	Exploration	0.5 - 4	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.38	0.46	--	--	--	--
PLT-B15	B15-4-5	03/29/13	Exploration	4 - 5	Present	ND	--	--	--	0.00095 U	0.0047 U	0.00095 U	0.0019 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	ND	0.023	0.0069	11 U	0.57 U	85	--
PLT-B16	B16-0-0.5	03/28/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.45	0.18	--	--	--	0.060 U
PLT-B16	B16-0.5-4	03/28/13	Exploration	0.5 - 4	Present	--	--	--	--	0.0013 U	0.0063 U	0.0013 U	0.0025 U	0.065 U	0.065 U	0.0013 U	0.0013 U	0.0013 U	0.065 U	ND	0.39	0.57	--	--	--	--
PLT-B16	B16-4-5	03/28/13	Exploration	4 - 5	Present	ND	--	--	--	0.00095 U	0.0047 U	0.00095 U	0.0019 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	ND	0.00095 U	0.0062 U	35	0.61 U	6.1 U	--
PLT-B17	B17-0-0.5	03/26/13	Exploration	0 - 0.5	Removed	--	--	150 U	650	--	--	--	--	--	--	--	--	--	--	--	0.12	0.19	--	--	--	--
PLT-B17	B17-0.5-1	04/23/13	Exploration	0.5 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.63	0.23	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																				
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
PLT-B18	B18-0-0.5	03/28/13	Exploration	0 - 0.5	Removed	ND	--	--	--	0.0012 U	0.0058 U	0.0012 U	0.0023 U	*0.077 U*	*0.077 U*	0.0012 U	0.0012 U	0.0012 U	0.077 U	ND	**0.22**	**0.065**	**15**	0.66 U	**150**	--
PLT-B18	DUP-1	03/26/13	Exploration	0 - 0.5	Removed	**0**	--	**41**	**160**	--	--	--	--	--	--	--	--	--	--	--	**0.37**	**0.083**	**16**	0.64 U	**97**	--
PLT-B20	B20-0-0.5	03/28/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.060 U
PLT-B23	B23-0-0.5	03/28/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0073 U	**0.0070**	12 U	0.60 U	**6.4**	--
PLT-B24	B24-0-0.5	03/28/13	Exploration	0.5 - 0.5	Removed	--	--	--	--	0.00093 U	0.0047 U	0.00093 U	0.0019 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	ND	**0.026**	**0.096**	11 U	0.54 U	**33**	--
PLT-B25	B25-0-0.5	03/28/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.007 U	**0.0061**	11 U	0.53 U	**6.5**	--
PLT-B26	B26-0-0.5	03/29/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.067**	**0.090**	--	--	--	--
PLT-B27	B27-0-1	03/28/13	Exploration	0 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.0072**	**0.025**	--	--	--	--
PLT-B28	B28-0-1	03/28/13	Exploration	0 - 1	Removed	--	--	--	--	0.0011 U	0.0056 U	0.0011 U	0.0022 U	0.066 U	0.066 U	0.0011 U	0.0011 U	0.0011 U	0.066 U	ND	**3.4**	**0.76**	--	--	--	--
PLT-B28	B28-1-2	03/28/13	Exploration	1 - 2	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.17**	**0.11**	--	--	--	--
PLT-B29	B29-0-1	03/28/13	Exploration	0 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.007 U	**0.15**	--	--	--	--
PLT-B29	B29-1-2	03/28/13	Exploration	1 - 2	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.29**	**0.23**	--	--	--	--
PLT-B30	B30-0-1	03/27/13	Exploration	0 - 1	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.063**	**0.15**	--	--	--	--
PLT-B30	B30-1-2	03/27/13	Exploration	1 - 2	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	--	--	--	--
PLT-B31	B31-0-1	03/28/13	Exploration	0 - 1	Removed	--	--	--	--	0.00094 U	0.0047 U	0.00094 U	0.0019 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	0.00094 U	ND	0.00094 U	**0.016**	--	--	--	--
PLT-B33	B33-0-1	03/28/13	Exploration	0 - 1	Removed	--	--	--	--	0.0010 U	0.0050 U	0.0010 U	0.0020 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	0.0010 U	ND	0.0010 U	--	--	--	--	--
PLT-B34	B34-0-0.5	03/26/13	Exploration	0 - 0.5	Removed	--	--	**1,800**	**12,000**	--	--	--	--	--	--	--	--	--	--	--	0.034 U	**0.087**	--	--	--	--
PLT-B34	B34-0.5-3	03/26/13	Exploration	0.5 - 3	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0073 U	0.0055 U	--	--	--	--
PLT-B35	B35-0-0.5	03/26/13	Exploration	0 - 0.5	Removed	--	--	1,000 U	**10,000**	--	--	--	--	--	--	--	--	--	--	--	0.035 U	**0.10**	--	--	--	--
PLT-B35	**B35-0.5-5**	**03/26/13**	**Exploration**	**0.5 - 5**	**Present**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.0093**	**0.0068**	--	--	--	--
PLT-B36	B36-0-0.5	03/26/13	Exploration	0 - 0.5	Removed	--	--	320 U	**3,900**	--	--	--	--	--	--	--	--	--	--	--	0.036 U	**0.064**	--	--	--	--
PLT-B36	**B36-0.5-6**	**03/26/13**	**Exploration**	**0.5 - 6**	**Present**	--	--	--	--	0.0012 U	0.0062 U	0.0012 U	0.0025 U	*0.075 U*	*0.075 U*	0.0012 U	0.0012 U	0.0012 U	0.075 U	ND	**0.092**	**0.24**	--	--	--	--
PLT-B36	**B36-6-7**	**03/26/13**	**Exploration**	**6 - 7**	**Present**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0076 U	0.0057 U	--	--	--	--
PLT-B37	B37-0-0.5	03/26/13	Exploration	0 - 0.5	Removed	--	--	250 U	**2,700**	--	--	--	--	--	--	--	--	--	--	--	0.035 U	**0.055**	--	--	--	--
PLT-B37	**B37-0.5-4**	**03/26/13**	**Exploration**	**0.5 - 4**	**Present**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.078**	**0.11**	--	--	--	--
PLT-B37	**B37-4-5**	**03/26/13**	**Exploration**	**4 - 5**	**Present**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0084 U	0.0063 U	--	--	--	--
PLT-B38	B38-0-0.5	03/26/13	Exploration	0 - 0.5	Removed	--	--	28 U	**390**	0.00092 U	0.0046 U	0.00092 U	0.0018 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	ND	0.00092 U	**0.11**	--	--	--	--
PLT-B38	**B38-0.5-4**	**03/26/13**	**Exploration**	**0.5 - 4**	**Present**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.026**	**0.053**	--	--	--	--
PLT-B39	B39-0-0.5	03/26/13	Exploration	0 - 0.5	Removed	--	--	**120**	**350**	--	--	--	--	--	--	--	--	--	--	--	**0.014**	**0.33**	--	--	--	--
PLT-B39	B39-0.5-3	03/26/13	Exploration	0.5 - 3	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.053**	**0.37**	--	--	--	--
PLT-B39	**B39-3-4**	**03/26/13**	**Exploration**	**3 - 4**	**Present**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0082 U	**0.017**	--	--	--	--
PLT-COMP P B1	COMPOSITE P	03/29/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.017**	**0.014**	11 U	0.55 U	**610**	--
PLT-CpB2_B2,B3,et.al	COMPOSITE B2	03/27/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.25**	**0.061**	12 U	0.61 U	**39**	--
PLT-CpJ1_B2B3B4B5	COMPOSITE J1	03/27/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.012**	**0.025**	11 U	0.57 U	**54**	--
PLT-CpD_B7B8B9B10	COMPOSITE D	03/27/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	11 U	0.56 U	**7.3**	--
PLT-CpL_B7-12_B27-29	COMPOSITE L	03/27/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.58**	**0.46**	11 U	0.55 U	**79**	--
PLT-CpC1_B4B5B23-25	COMPOSITE C1	03/27/13	Exploration	0 - 0	Removed	**0**	--	32 U	**92**	--	--	--	--	--	--	--	--	--	--	--	0.020	**0.26**	13 U	0.63 U	**640**	--
PLT-CpC2_B6B15B16B2	COMPOSITE C2	03/29/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.050**	**0.20**	12 U	0.61 U	**160**	--
PLT-CpC3_B4B23B24B2	COMPOSITE C3	03/29/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.0073**	**0.027**	--	--	--	--
PLT-Comp M B11, B12	COMPOSITE M	03/27/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.030**	**0.015**	12 U	0.58 U	**14**	--
PLT-Comp N B13, B14	COMPOSITE N	03/27/13	Exploration	0 - 0	Removed	**0**	--	30 U	**180**	--	--	--	--	--	--	--	--	--	--	--	**0.13**	**0.12**	12 U	**0.63**	**110**	--
PLT-Comp O B15, B16	COMPOSITE O	03/29/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.30**	**0.59**	12 U	0.62 U	**100**	--
PLT-CpA_B17B34-B39	COMPOSITE A	03/27/13	Exploration	0 - 0	Removed	**0**	--	330 U	**2,900**	--	--	--	--	--	--	--	--	--	--	--	**0.027**	**0.33**	11 U	0.54 U	**41**	--
PLT-Comp F B32, B33	COMPOSITE F	03/27/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.013**	**0.021**	11 U	0.55 U	5.5 U	--
PLT-Comp E B30, B31	COMPOSITE E	03/27/13	Exploration	0 - 0	Removed	**0**	--	26 U	**110**	--	--	--	--	--	--	--	--	--	--	--	**0.045**	**0.14**	11 U	0.53 U	**21**	--
PLT-CpH_B34-B39	COMPOSITE H	03/27/13	Exploration	0 - 0	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.059**	**0.35**	12 U	0.61 U	**76**	--
PLT-BA2-1	**BA2-1-6-7**	**03/29/13**	**Exploration**	**6 - 7**	**Present**	--	6.3 U	--	--	0.00084 U	0.0042 U	0.00084 U	0.0017 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	0.00084 U	ND	0.00084 U	--	--	--	--	--
PLT-BA2-2	BA2-2-6-7	03/29/13	Exploration	6 - 7	Removed	--	**4,000**	*2,500 U*	60 U	*0.055 U*	0.27 U	0.055 U	0.11 U	0.055 U	0.055 U	0.055 U	*0.055 U*	0.055 U	**0.62**	ND	0.055 U	--	--	--	--	--
PLT-BA2-4	**BA2-4-6-7**	**03/29/13**	**Exploration**	**6 - 7**	**Present**	--	5.5 U	--	--	0.00092 U	0.0046 U	0.00092 U	0.0018 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	0.00092 U	ND	0.00092 U	--	--	--	--	--
PLT-BA2-4	**DUP-4**	**03/29/13**	**Exploration**	**6 - 7**	**Present**	--	4.9 U	--	--	0.00087 U	0.0043 U	0.00087 U	0.0017 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	ND	0.00087 U	--	--	--	--	--
PLT-BA2-5	**BA2-5-6-7**	**03/29/13**	**Exploration**	**6 - 7**	**Present**	--	4.2 U	--	--	0.00077 U	0.0038 U	0.00077 U	0.0015 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	0.00077 U	ND	0.00077 U	--	--	--	--	--
PLT-BA6-3	**BA6-3-8-9**	**03/27/13**	**Exploration**	**8 - 9**	**Present**	--	--	31 U	62 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-BA6-5	BA6-5-6-7	03/29/13	Exploration	6 - 7	Removed	--	--	*4,500 U*	**16,000**	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-BA6-5	BA6-5-9-10	03/29/13	Exploration	9 - 10	Removed	--	--	29 U	58 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-BA6-7	**BA6-7-6-7**	**03/29/13**	**Exploration**	**6 - 7**	**Present**	--	--	27 U	55 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-BA6-8	BA6-8-6-7	03/29/13	Exploration	6 - 7	Removed	--	--	28 U	56 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																			
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
PLT-TP1	TP1-0-0.5	03/27/13	Exploration	0 - 0.5	Removed	--	--	--	--	0.0011 U	0.0054 U	0.0011 U	0.0021 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.015	0.064	--	--	--	--
PLT-TP1	TP1-0.5-3	04/02/13	Exploration	0.5 - 3	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0085 U	0.0064 U	--	--	--	--
PLT-TP2	TP2-0-0.5	03/27/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.038	0.14	--	--	--	--
PLT-TP2	TP2-0.5-5	04/02/13	Exploration	0.5 - 5	Present	--	--	--	--	0.0014 U	0.0071 U	0.0014 U	0.0028 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	ND	0.37	0.22	--	--	--	--
PLT-TP2	TP2-5-6	04/02/13	Exploration	5 - 6	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.017	0.012	--	--	--	--
PLT-TP3	TP3-0-0.5	03/27/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.74	0.86	--	--	--	--
PLT-TP3	TP3-0.5-5	04/02/13	Exploration	0.5 - 5	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0094	0.0055 U	--	--	--	--
PLT-TP4	TP4-0-0.5	03/27/13	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.007 U	0.049	--	--	--	--
PLT-TP4	TP4-0.5-5	04/02/13	Exploration	0.5 - 5	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.22	0.45	--	--	--	--
PLT-TP4	TP4-5-6	04/02/13	Exploration	5 - 6	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.032	0.045	--	--	--	--
PLT-TP5	TP5-3-4	04/02/13	Exploration	3 - 4	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.027	0.0057 U	11 U	0.56 U	5.6 U	--
PLT-TP6	TP6-2-3	04/02/13	Exploration	2 - 3	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12 U	0.62 U	6.2 U	--
PLT-TP8	TP8-0-5	04/02/13	Exploration	0 - 5	Present	--	--	--	--	*0.0018 U*	0.0092 U	0.0018 U	0.0037 U	0.0018 U	0.0018 U	0.0018 U	*0.0018 U*	0.0018 U	0.0018 U	ND	0.0018 U	--	--	--	--	--
PLT-TP8	TP8-5-6	04/02/13	Exploration	5 - 6	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0085 U	0.0064 U	13 U	0.64 U	7.4	--
PLT-TP9	TP9-0-1	08/23/13	Exploration	0 - 1	Removed	--	--	--	--	0.00068 U	0.0034 U	0.00068 U	0.0014 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	0.00068 U	DET	0.00068 U	--	--	--	--	--
PLT-TP9	TP9-1-3	08/23/13	Exploration	1 - 3	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.11	0.31	--	--	--	--
PLT-TP9	TP9-5-7	08/23/13	Exploration	5 - 7	Present	ND	--	--	--	0.00093 U	0.0046 U	0.00093 U	0.0019 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	0.00093 U	DET	0.012	0.0066	11 U	0.56 U	5.8	--
PLT-TP10	TP9-0-1,TP10-0-0.5,TP11-0-0.5 COMP.	08/23/13	Exploration	0 - 1	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.018	0.027	11 U	0.53 U	13	--
PLT-TP10	TP9-1-3TP10-0.5-3TP11-0.5-2TP11-2-3 COMP	08/23/13	Exploration	0.5 - 3	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.38	0.17	12 U	0.58 U	86	--
PLT-TP10	TP9-3-5,TP10-3-5,TP11-3-5 COMP.	08/23/13	Exploration	3 - 5	Removed	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.071	0.013	12 U	0.58 U	24	--
PLT-TP11	TP11-0.5-2	08/23/13	Exploration	0.5 - 2	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.18	0.13	--	--	--	--
PLT-TP11	TP11-2-3	08/23/13	Exploration	2 - 3	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.016	0.0066	--	--	--	--
PLT-TP11	TP11-3-5	08/23/13	Exploration	3 - 5	Present	--	--	--	--	0.00087 U	0.0044 U	0.00087 U	0.0017 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	DET	0.00087 U	--	--	--	--	--
PLT-CpB1_TP1-TP4	COMPOSITE B1	03/27/13	Exploration	0 - 0	Removed	0	--	52 U	610	--	--	--	--	--	--	--	--	--	--	--	0.54	0.53	11 U	0.55 U	160	--
PLT-CpI_TP1TP2TP3TP4	COMPOSITE I	04/02/13	Exploration	0 - 0	Removed	D,0	--	31 U	91	--	--	--	--	--	--	--	--	--	--	--	0.15	0.21	12 U	0.62 U	68	--
PLT-CpK_TP5TP6TP7TP8	COMPOSITE K	03/27/13	Exploration	0 - 0	Removed	D,0	--	37	62 U	--	--	--	--	--	--	--	--	--	--	--	0.24	0.041	12 U	0.62 U	65	--
PLT-TP12-TP13-COMP	PLT-TP12-TP13-COMP	09/05/14	Exploration	0 - 0	Removed	--	4.9 U	28 U	61	0.00087 U	0.0043 U	0.00087 U	0.0017 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	0.00087 U	ND	0.00087 U	0.0056 U	11 U	0.55 U	5.5 U	--
PLT-ROB-1	ROB-1-130813-TREES	08/13/13	Stockpile	0 - 0	Removed	--	5.2 U	29 U	140	0.0011 U	0.0054 U	0.0011 U	0.0021 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.31	0.19	12 U	0.61	130	--
PLT-ROB-2	ROB-2-130813-SOIL	08/13/13	Stockpile	0 - 0	Removed	--	--	--	--	0.0012 U	0.0059 U	0.0012 U	0.0023 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	ND	0.0012 U	--	11 U	0.82	350	--
PLT-ROB-3	ROB-3-130813-SOIL	08/13/13	Stockpile	0 - 0	Removed	--	--	--	--	0.0012 U	0.0062 U	0.0012 U	0.0025 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	ND	0.0012 U	--	12 U	0.59 U	140	--
PLT-ROB-4	ROB-4-130813-SOIL	08/13/13	Stockpile	0 - 0	Removed	--	--	--	--	0.0012 U	0.0058 U	0.0012 U	0.0023 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	ND	0.0012 U	--	11 U	0.57 U	180	--
PLT-CONF-NS-1	CONF-NS-1	08/30/13	Confirmation	0 - 0	Present	0	--	95	420	--	--	--	--	--	--	--	--	--	--	--	0.45	0.31	11 U	0.54 U	160	--
PLT-CONF-NS-2	CONF-NS-2	08/30/13	Confirmation	0 - 0	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.11	0.099	11 U	0.57 U	42	--
PLT-RAAA-CS-FG-3	RAAA-CS-FG-3	10/07/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.16	0.11	--	--	--	--
PLT-RAAA-CS-FG-4	RAAA-CS-FG-4	10/07/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.049	0.11	--	--	--	--
PLT-RAAA-CS-SG-1	RAAA-CS-SG-1	04/28/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0076 U	0.0057 U	--	--	--	--
PLT-RAAA-CS-SG-2	RAAA-CS-SG-2	04/28/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	--	--	--	--
PLT-RAAB-CS-SG-1	RAAB-CS-SG-1	09/04/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.15	0.16	--	--	--	--
PLT-RAAC-BASE	PLT-RAAC-BASE	03/18/14	Confirmation	8 - 8	Present	--	3.6 U	--	--	*0.02 U*	0.036 U	0.036 U	0.036 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-RAAC-SW-1	PLT-RAAC-SW-1	03/18/14	Confirmation	7 - 7	Present	--	5.4 U	--	--	*0.02 U*	0.054 U	0.054 U	0.054 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-RAAC-SW-2	PLT-RAAC-SW-2	03/18/14	Confirmation	7 - 7	Present	--	29	--	--	*0.02 U*	0.071 U	0.071 U	0.071 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-RAAC-SW-3	PLT-RAAC-SW-3	03/18/14	Confirmation	6.5 - 6.5	Present	--	5.6 U	--	--	*0.02 U*	0.056 U	0.056 U	0.056 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-RAAC-SW-4	PLT-RAAC-SW-4	03/18/14	Confirmation	4.5 - 4.5	Present	--	5.2 U	--	--	*0.02 U*	0.052 U	0.052 U	0.052 U	--	--	--	--	--	--	--	--	--	--	--	--	--
PLT-RAAD-FG-BL-1	PLT-RAAD-FG-BL-1	03/03/14	Confirmation	0 - 0	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.25	0.73	--	--	--	--
PLT-RAAD-FG-BR-1	PLT-RAAD-FG-BR-1	03/03/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0085 U	0.0064 U	--	--	--	--
PLT-RAAD-FG-BR-2	PLT-RAAD-FG-BR-2	03/11/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0089 U	0.0067 U	--	--	--	--
PLT-RAAD-FG-RED-1	PLT-RAAD-FG-RED-1	03/03/14	Confirmation	0 - 0	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0095 U	0.0072 U	--	--	--	--
PLT-RAAE-BR-B-1	PLT-RAAE-BR-B-1	02/19/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0087 U	0.0066 U	--	--	--	--
PLT-RAAE-BR-B-2	PLT-RAAE-BR-B-2-1-1.5	02/20/14	Confirmation	1 - 1.5	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.37	0.12	--	--	--	--
PLT-RAAE-BR-B-3	PLT-RAAE-BR-B-3-0-0.5	02/20/14	Confirmation	0 - 0.5	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	--	--	--	--
PLT-RAAE-BR-B-4	PLT-RAAE-BR-B-4	02/21/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0073 U	0.0055 U	--	--	--	--
PLT-RAAE-BR-B-5	PLT-RAAE-BR-B-5	02/21/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.24	0.074	--	--	--	--
PLT-RAAE-BR-B-8	PLT-RAAE-BR-B-8	02/26/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.008 U	0.0060 U	--	--	--	--

Sample Location[1]	Sample Identification	Sample Date	Sample Type	Sample Interval (feet bgs)	Sample Status	Soil Analytical Results (mg/kg)[2]																				
						Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs									Metals			
						TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene[4]	Toluene	Ethylbenzene	Total Xylenes[5]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[6]	Total cPAH TEQ[7]	Arsenic	Cadmium	Lead	Total PCB Aroclors[8]
Proposed Cleanup Level[9] (PCUL)						n/a	30	2,000	2,000	0.0017	0.27	0.34	0.83	0.072	0.071	0.5	0.0016	560	8,000	Varies	0.24	0.19	20	80	250	0.5
Soil Screening Level for Protection of Vapor Intrusion[10]						NE	100	250	NE	10	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
PLT-RAAE-BR-S-1	PLT-RAAE-BR-S-1	02/14/14	Confirmation	0 - 0	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.22	0.13	--	--	--	--
PLT-RAAE-BR-S-2	PLT-RAAE-BR-S-2	02/14/14	Confirmation	0 - 0	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.041	0.22	--	--	--	--
PLT-RAAE-BR-S-3	PLT-RAAE-BR-S-3	02/14/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0083 U	0.0063 U	--	--	--	--
PLT-RAAE-BR-S-4	PLT-RAAE-BR-S-4	02/21/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0079 U	0.0056 U	--	--	--	--
PLT-RAAE-BR-S-5	PLT-RAAE-BR-S-5	02/21/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.007 U	0.0053 U	--	--	--	--
PLT-RAAE-BR-S-6	PLT-RAAE-BR-S-6	02/22/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	5.7	9.0	--	--	--	--
PLT-RAAE-BR-S-7	PLT-RAAE-BR-S-7	02/22/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.085	0.19	--	--	--	--
PLT-RAAE-FG-1	PLT-RAAE-FG-1	02/26/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0093 U	0.0070 U	--	--	--	--
PLT-RAAE-FG-2	PLT-RAAE-FG-2	02/26/14	Confirmation	0 - 0	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0076 U	0.056	--	--	--	--
PLT-RAAE-TP	PLT-RAAE-TP-0-0.5-BLACK	02/19/14	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.13	0.041	--	--	--	--
PLT-RAAE-TP	PLT-RAAE-TP-0-0.5-BROWN	02/19/14	Exploration	0 - 0.5	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0078 U	0.0059 U	--	--	--	--
PLT-RAAF-SG-1	PLT-RAAF-SG-1	03/13/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.11	0.40	--	--	260	--
PLT-RAAH-1	PLT-RAAH-1	02/12/14	Confirmation	0 - 0	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0077 U	0.0058 U	--	--	--	--
PLT-RAAH-2	PLT-RAAH-2	02/12/14	Confirmation	0 - 0	Present	ND	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0076 U	0.0057 U	--	--	--	--
PLT-RAAI-SG-1	PLT-RAAI-SG-1	05/13/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0080 U	0.0060 U	--	--	6.0 U	--
PLT-RAAJ-SG-1	PLT-RAAJ-SG-1	03/13/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.25	0.25	--	--	--	--
PLT-RAAJ-SG-2	PLT-RAAJ-SG-2	03/13/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.081	0.62	--	--	--	--
PLT-RAAK-SG-1	PLT-RAAK-SG-1	03/17/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.18	0.098	--	--	--	--
PLT-RAAK-SG-2	PLT-RAAK-SG-2	03/17/14	Confirmation	0 - 0	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.14	0.077	--	--	--	--
WOF-CSB-9.5	WOF-CSB-9.5	08/26/13	Confirmation	9.5 - 9.5	Present	--	--	30 U	60 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CSE	WOF-CSE-3.5	08/26/13	Confirmation	3.5 - 3.5	Present	--	--	36 U	150	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CSE	WOF-CSE-6.5	08/26/13	Confirmation	6.5 - 6.5	Present	--	--	*5,300 U*	18,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CSE	WOF-CSE-8.5	08/26/13	Confirmation	8.5 - 8.5	Present	--	--	30 U	65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CSN-5	WOF-CSN-5	08/26/13	Confirmation	5 - 5	Present	--	--	31 U	61 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CSS-6	WOF-CSS-6	08/26/13	Confirmation	6 - 6	Present	--	--	31 U	61 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CSW	WOF-CSW-3.5	08/29/13	Confirmation	3.5 - 3.5	Present	--	--	28 U	74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CSW	WOF-CSW-4.5	08/26/13	Confirmation	4.5 - 4.5	Present	--	--	540 U	2,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CSW	WOF-CSW-6.5	08/26/13	Confirmation	6.5 - 6.5	Present	--	--	*5,100 U*	16,000	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WOF-CSW	WOF-CSW-8	08/26/13	Confirmation	8 - 8	Present	--	--	31 U	62 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Tacoma Paper and Stationery Building Capital Project																										
USC-MW1D	USC-MW1D COMP. A	10/20/14	Exploration	0 - 0	Removed	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	12 U	0.59 U	5.9 U	--
USC-MW1D	USC-MW1D-10-11.5	10/20/14	Exploration	10 - 11.5	Present	--	--	--	--	0.0013 U	0.0064 U	0.0013 U	0.0025 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	DET	0.0013 U	--	--	--	--	--
USC-MW1D	USC-MW1D-11.5-13	10/20/14	Exploration	11.5 - 13	Present	--	--	--	--	0.0016 U	0.0079 U	0.0016 U	0.0031 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	0.0016 U	DET	0.0016 U	--	--	--	--	--
USC-MW1D	USC-MW1D-16.5-18	10/20/14	Exploration	16.5 - 18	Present	--	--	--	--	0.0012 U	0.0061 U	0.0012 U	0.0024 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	DET	0.0012 U	--	--	--	--	--
USC-MW1D	USC-MW1D-20-21.5	10/20/14	Exploration	20 - 21.5	Present	--	--	--	--	0.0011 U	0.0056 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	DET	0.0011 U	--	--	--	--	--
USC-MW1D	USC-MW1D-21.5-22	10/20/14	Exploration	21.5 - 22	Present	--	--	--	--	0.0013 U	0.0063 U	0.0013 U	0.0025 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	0.0013 U	DET	0.0013 U	--	--	--	--	--
USC-MW1D	USC-MW1D-27.5-28	10/20/14	Exploration	27.5 - 28	Present	--	--	--	--	0.00095 U	0.0048 U	0.00095 U	0.0019 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	0.00095 U	DET	0.00095 U	--	--	--	--	--
USC-MW1D	USC-MW1D-40-40.5	10/20/14	Exploration	40 - 40.5	Present	--	--	--	--	0.0014 U	0.0070 U	0.0014 U	0.0028 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	0.0014 U	DET	0.0014 U	--	--	--	--	--
USC-MW1D	USC-MW1D-51-52	10/20/14	Exploration	51 - 52	Present	--	--	--	--	0.0011 U	0.0055 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0011 U	--	--	--	--	--
Milgard Hall Capital Project																										
MIL-A1-CONF-7	MIL-A1-CONF-7	08/12/21	Confirmation	3 - 3	Present	--	--	--	--	0.0011 U	0.0054 U	0.0011 U	0.0021 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0054 U	--	--	--	--	--
MIL-A2-CONF-1	CONF-A2-1	07/29/21	Confirmation	3 - 3	Present	--	--	26 U	82	0.0012 U	0.012	0.0012 U	0.0023 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	0.0012 U	ND	0.0059 U	0.031	--	--	--	--
MIL-A2-CONF-2	CONF-A2-2	07/29/21	Confirmation	3 - 3	Present	--	--	26 U	51 U	0.0011 U	0.0054 U	0.0011 U	0.0022 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	0.0011 U	ND	0.0054 U	0.0051 U	--	--	--	--
MIL-A2-CONF-3	CONF-A2-3	07/29/21	Confirmation	3 - 3	Present	--	--	410	350	0.001 U	0.0051 U	0.001 U	0.002 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	ND	0.061	0.025	--	--	--	--
MIL-A2-CONF-4	CONF-A2-4	07/29/21	Confirmation	3 - 3	Present	--	--	26 U	61	0.00089 U	0.0044 U	0.00089 U	0.0018 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	0.00089 U	ND	0.023	0.059	--	--	--	--
MIL-B5	MIL-B5-0.0-7.0_COMP	03/23/21	Exploration	0 - 7	Removed	--	4.9 U	27 U	150	0.00081 U	0.0041 U	0.00081 U	0.0016 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	0.00081 U	ND	0.039	0.086	11 U	0.55 U	11	--
MIL-B5	MIL-B5-7.0-8.0_DISC	03/23/21	Exploration	7 - 8	Present	--	6.9 U	120	470	0.0047	0.0074	0.0012 U	0.0048	0.065 U	0.065 U	0.0012 U	0.0012 U	0.0012 U	0.065 U	ND	1.9	0.30	12 U	0.59 U	21	--
MIL-B5	MIL-B5-8.0-10.0_COMP	03/23/21	Exploration	8 - 10	Present	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	0.0075 U	0.0057 U	--	--	--	--

Notes:

[1] Sample locations are shown on Figures 7-4 through 7-4. Location identification nomenclature was added to select wells as necessary (for example PLT- was added to PLT-B10).

[2] Chemical analytical results in this table include contaminants of concern (COCs) based on historical land use, potential source(s), and/or required analysis in accordance with Model Toxics Control Act Table 830-1 in which COCs were detected at a concentration greater than their respective PCUL. The full list of chemical analytical results is presented in Appendices D and H. Chemical analytical results associated with other Areas of Concern are presented in other sections of the Remedial Investigation.

[3] Value for gasoline-range petroleum hydrocarbons if benzene is present. If benzene is not present, screening level is 100 mg/kg.

[4] Benzene may have been analyzed as full volatile organic compound (VOC) method and/or BTEX only. The lowest practical quantitation limit (PQL) or the greatest detected concentration is shown.

[5] Sum of m-,p- and o- xylenes. The highest reporting limit for non-detect results is listed.

[6] Naphthalene may have been analyzed as a VOC, polycyclic aromatic hydrocarbon (PAH) and/or semi-volatile organic compound (SVOC). The lowest PQL or the greatest detected concentration is shown.

[7] Total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) calculated using the toxicity equivalency quotient (TEQ) methodology in Washington Administrative Code 173-340-708(8). Non-detections were assigned half the reporting limit for these calculations.

[8] Total polychlorinated biphenyl (PCB) Aroclors is the sum of PCB Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260. The highest reporting limit for non-detect results is listed.

[9] Soil PCUL is based on the lowest value for protection of direct contact and groundwater as drinking water within the saturated zone and adjusted for PQL and Natural Background (see Tables 3-1 and 3-2).

[10] Soil screening level based on Ecology's Vapor Intrusion Guidance (Publication No. 09-09-047; see Table 3-6).

-- = not tested
1,2,4-TMB = 1,2,4-trimethylbenzene
1,3,5-TMB = 1,3,5-trimethylbenzene
bgs = below ground surface
BTEX = benzene, toluene, ethylbenzene and xylenes
CVOCs = chlorinated volatile organic compounds
DET = detected
EDB = 1,2-dibromoethane
EDC = 1,2-dichloroethane
G, D, O = gasoline-range petroleum hydrocarbons, diesel-range petroleum hydrocarbons and oil-range petroleum hydrocarbons
J = estimated value by laboratory
mg/kg = milligram per kilogram
MTBE = methyl tert-butyl ether
ND = not DET
NE = not established
TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil
TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification
U = analyte was ND at or greater than the listed reporting limit
Bold font type indicates that the analyte was DET at a concentration greater than the respective laboratory reporting limit.
Italic font type indicates the non-detect result is greater than the PCUL.
Gray text indicates that soil represented by the sample has been removed and that the sample result no longer represents current conditions.
Shading indicates that the DET concentration is greater than the PCUL.
Shading indicates that the DET concentration is greater than the screening level for vapor intrusion and/or the PCUL.

Table 7-5

Summary of Groundwater Chemical Analytical Results - Prairie Line Trail

University of Washington - Tacoma Campus

Tacoma, Washington

Sample Location[1]	Sample Identification	Sample Date	Groundwater Unit	Monitoring Well Type	Depth to Water (feet below TOC)	Water Level Elevation (feet NGVD29)	Groundwater Chemical Analytical Results[2] (µg/L)																				
							Petroleum Hydrocarbons				BTEX Compounds				Petroleum-Related VOCs										Metals		
							TPH-HCID	TPH-G[3]	TPH-D	TPH-O	Benzene	Toluene	Ethylbenzene	Total Xylenes[4]	1,2,4-TMB	1,3,5-TMB	EDB	EDC	MTBE	n-Propylbenzene	CVOCs	Naphthalene[5]	Total cPAH TEQ[6]	Dissolved Metal - Arsenic	Total Metal - Arsenic	Dissolved Metal - Lead	Total Metal - Lead	Total PCB Aroclors[7]
Proposed Cleanup Level[8] (PCUL; µg/L)							n/a	800	500	500	5	640	700	1,600	80	80	0.05	4.8	24	800	Varies	160	0.2	8	8	15	15	0.22
Groundwater Screening Level for Protection of Vapor Intrusion[9] (µg/L)							n/a	30,000	30,000	NE	2.4	15,000	2,800	320	240	170	0.3	3.5	860	2,300	Varies	8.9	NE	NE	NE	NE	NE	NE
1997 Agreed Order Investigation																											
CR-B6	CR-B6-13_20000921	09/21/00	Qvi	Temporary	n/a	n/a	--	--	--	--	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
JP-GW1	JP-GW1_19980827	08/27/98	Qvi	Temporary	n/a	n/a	--	50 U	250 U	500 U	0.500 U	0.500 U	0.500 U	1.00 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JP-GW2	JP-GW2_19990914	09/14/99	Qvi	Temporary	n/a	n/a	--	--	--	--	1.00 U	1.00 U	1.00 U	3.00 U	1.00 U	1.00 U	*1.00 U*	1.00 U	--	1.00 U	DET	1.00 U	--	--	--	--	--	--
JP-MW1	JP-MW1_19981023	10/23/98	Qvi	Permanent	13.61	82.16	--	50 U	250 U	500 U	0.500 U	0.500 U	0.500 U	1.00 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JP-MW1	JP-MW1_19990111	01/11/99	Qvi	Permanent	11.69	84.08	--	50 U	250 U	500 U	0.500 U	0.500 U	0.500 U	1.00 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JP-MW1	JP-MW1_19990419	04/19/99	Qvi	Permanent	12.20	83.57	--	50 U	250 U	500 U	0.500 U	0.500 U	0.500 U	1.00 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--
JP-MW1	JP-MW1_19990909	09/09/99	Qvi	Permanent	13.45	82.32	--	50 U	250 U	500 U	1.00 U	1.00 U	1.00 U	2.00 U	--	--	--	--	--	--	ND	--	--	--	--	--	--	--
Supplemental Investigations Under the 1997 Agreed Order																											
JP-MW1	JP-MW1-130712	07/12/13	Qvi	Permanent	12.20	83.57	--	100 U	280 U	450 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	*0.20 U*	*0.20 U*	0.28 U	0.28 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
JP-MW1R	JP-MW1R-130712	07/12/13	Qvi	Permanent	18.09	83.55	--	100 U	270 U	430 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	*0.20 U*	*0.20 U*	0.28 U	0.28 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
PL-MW1	PL-MW1-130712	07/12/13	Qvi	Permanent	17.80	82.70	--	100 U	0.26 U	410 U	**0.94**	1.0 U	0.20 U	0.40 U	0.20 U	*0.20 U*	*0.20 U*	0.28 U	0.28 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
PL-MW2	PL-MW2-130710	07/10/13	Qvi	Permanent	7.51	46.99	--	100 U	290 U	470 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	*0.20 U*	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
2016 Agreed Order Investigation																											
A7-MW3S	A7-MW3S-190911	09/11/19	Qvi	Permanent	26.01	41.33	--	--	--	--	1.0 U	5.0 U	1.0 U	2.0 U	1.0 U	1.0 U	*1.0 U*	1.0 U	1.0 U	1.0 U	DET	5.0 U	--	--	--	--	--	--
A7-MW3S	A7-MW3S-200318	03/18/20	Qvi	Permanent	24.84	42.50	--	--	--	--	1.0 U	5.0 U	1.0 U	2.0 U	1.0 U	1.0 U	*1.0 U*	1.0 U	1.0 U	1.0 U	DET	5.0 U	--	--	--	--	--	--
A7-MW3S	A7-MW3S-200902	09/02/20	Qvi	Permanent	25.71	41.63	--	--	--	--	1.0 U	5.0 U	1.0 U	2.0 U	1.0 U	1.0 U	*1.0 U*	1.0 U	1.0 U	1.0 U	DET	5.0 U	--	--	--	--	--	--
JP-MW1R	JP-MW1R-161214	12/14/16	Qvi	Permanent	16.94	84.70	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	--	--	*0.20 U*	0.20 U	--	--	DET	--	--	--	--	--	--	--
JP-MW1R	JP-MW1R-20190325	03/25/19	Qvi	Permanent	17.48	84.16	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
JP-MW1R	JP-MW1R-190905	09/05/19	Qvi	Permanent	18.57	83.07	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
JP-MW1R	JP-MW1R-200310	03/10/20	Qvi	Permanent	17.45	84.19	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
JP-MW1R	JP-MW1R-200831	08/31/20	Qvi	Permanent	18.57	83.07	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
PL-MW1	PL-MW1-161219	12/19/16	Qvi	Permanent	16.41	84.91	--	--	--	--	0.2 U	1 U	0.2 U	0.4 U	--	--	*0.20 U*	0.20 U	--	--	ND	--	--	--	--	--	--	--
PL-MW1	PL-MW1-20190325	03/25/19	Qvi	Permanent	17.12	83.90	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
PL-MW1	PL-MW1-190905	09/05/19	Qvi	Permanent	19.64	81.38	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
PL-MW1	PL-MW1-200311	03/11/20	Qvi	Permanent	18.61	82.41	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
PL-MW1	PL-MW1-200831	08/31/20	Qvi	Permanent	18.50	82.52	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
PL-MW2	PL-MW2-161220	12/20/16	Qvi	Permanent	6.57	76.62	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	--	--	*0.20 U*	0.20 U	--	--	ND	0.097 U	0.00732 U	--	--	--	--	--
PL-MW2	PL-MW2-20190325	03/25/19	Qvi	Permanent	7.16	75.76	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	0.098 U	--	--	--	--	--	--
PL-MW2	PL-MW2-190904	09/04/19	Qvi	Permanent	8.84	74.08	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	0.10 U	0.00755 U	--	--	--	--	--
PL-MW2	PL-MW2-200313	03/13/20	Qvi	Permanent	7.43	75.49	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	0.048 U
PL-MW2	PL-MW2-200901	09/01/20	Qvi	Permanent	8.85	74.07	--	100 U	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
USC-MW1D	USC-MW1D-161219	12/19/16	Qva	Permanent	22.48	47.40	--	--	--	--	--	--	--	--	--	--	*0.20 U*	0.20 U	--	--	ND	--	--	--	--	--	--	--
USC-MW1D	USC-MW1D-180920	09/20/18	Qva	Permanent	24.19	45.69	--	--	--	--	--	--	--	--	--	--	*0.20 U*	0.20 U	--	--	DET	--	--	--	--	--	--	--
USC-MW1D	USC-MW1D-20190314	03/14/19	Qva	Permanent	23.06	46.82	--	--	--	--	--	--	--	--	--	--	*0.20 U*	0.20 U	--	--	ND	--	--	--	--	--	--	--
USC-MW1D	USC-MW1D-190912	09/12/19	Qva	Permanent	23.91	45.97	--	--	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
USC-MW1D	USC-MW1D-200325	03/25/20	Qva	Permanent	22.91	46.97	--	--	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--
USC-MW1D	USC-MW1D-200902	09/02/20	Qva	Permanent	24.09	45.79	--	--	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	--	--	--	--	--
Prairie Line Trail Capital Project																											
JP-MW1	JP-MW1	04/02/13	Qvi	Permanent	n/a	n/a	--	100 U	260 U	410 U	0.2 U	1 U	0.2 U	0.4 U	0.2 U	0.2 U	*0.2 U*	0.2 U	0.2 U	0.2 U	ND	1 U	--	--	3.3 U	--	1.1 U	--
JP-MW1R	JP-MW1R	04/03/13	Qvi	Permanent	n/a	n/a	--	100 U	260 U	410 U	0.2 U	1 U	0.2 U	0.4 U	0.2 U	0.2 U	*0.2 U*	0.2 U	0.2 U	0.2 U	ND	1 U	--	--	3.3 U	--	1.1 U	--
PL-MW1	PL-MW-1	04/01/13	Qvi	Permanent	n/a	n/a	--	100 U	260 U	420 U	**1.2**	2 U	0.4 U	0.8 U	0.4 U	0.4 U	*0.4 U*	0.4 U	0.4 U	0.4 U	DET	2 U	--	--	3.3 U	--	**1.7**	--
PL-MW2	PL-MW2-130401	04/01/13	Qvi	Permanent	n/a	n/a	--	100 U	290 U	470 U	0.20 U	1.0 U	0.20 U	0.40 U	--	--	--	--	--	--	ND	0.10 U	--	--	--	--	--	--
PLT-B10	B10-W	03/26/13	Qvi	Temporary	n/a	n/a	--	100 U	260 U	420 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	**2.2**	**0.8316**	3.0 U	--	1.0 U	--	--
PLT-B12	B12-W_20130327	03/27/13	Qvi	Temporary	n/a	n/a	--	100 U	270 U	420 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	0.098 U	0.0074 U	3.0 U	--	1.0 U	--	--
PLT-B14	B14-W	03/27/13	Qvi	Temporary	n/a	n/a	--	100 U	280 U	450 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	0.11 U	**0.02039**	3.0 U	--	1.0 U	--	--
PLT-B15	B15-W	03/29/13	Qvi	Temporary	n/a	n/a	--	100 U	260 U	420 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	0.097 U	0.00732 U	3.0 U	--	1.0 U	--	--
PLT-B29	B29-W	03/29/13	Qvi	Temporary	n/a	n/a	--	100 U	270 U	430 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	0.097 U	0.00732 U	3.0 U	--	1.0 U	--	--
PLT-B29	DUP-W-1	03/29/13	Qvi	Temporary	n/a	n/a	--	100 U	260 U	410 U	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	ND	1.0 U	--	3.0 U	--	1.0 U	--	--
Tacoma Paper and Stationery Building Capital Project																											
USC-MW1D	USC-MW1D-141027	10/27/14	Qva	Permanent	n/a	n/a	--	--	--	--	0.20 U	1.0 U	0.20 U	0.40 U	0.20 U	0.20 U	*0.20 U*	0.20 U	0.20 U	0.20 U	DET	1.0 U	--	--	--	--	--	--

Notes:

[1] Sample locations are shown on Figures 7-4 through 7-4. Location identification nomenclature was added to select wells as necessary (for example PLT- was added to PLT-B10).

[2] Chemical analytical results in this table include contaminatnts of concern (COCs) based on historical land use, potential source(s), and/or required analysis in accordance with Model Toxics Control Act Table 830-1 in which COCs were detected at a concentration greater than their respective PCUL. The full list of chemical analytical result list is presented in Appendices D and H. Chemical analytical results associated with other Areas of Concern are presented in other sections of the Remedial Design.

[3] Value for gasoline-range petroleum hydrocarbons if benzene is present. If benzene is not present, screening level is 1,000 µg/L.

[4] Sum of m-,p- and o- xylenes. The highest reporting limit for non-detect results is listed.

[5] Naphthalene may have been analyzed as a volatile organic compound (VOC), polycyclic aromatic hydrocarbon (PAH) and/or semi-volatile organic compound (SVOC). The lowest practical quantitation limit (PQL) or the greatest detected concentration is shown.

[6] Total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) calculated using the toxicity equivalency quotient (TEQ) methodology in Washington Administrative Code 173-340-708(8). Non-detections were assigned half the reporting limit for these calculations.

[7] Total polychlorinated biphenyl (PCB) Aroclors is the sum of PCB Aroclors 1016, 1221, 1232, 1242, 1248, 1254, and 1260. The highest reporting limit for non-detect results is listed.

[8] Groundwater PCUL is based on the lowest value for protection of groundwater as drinking water adjusted for PQL (see Table 3-3).

[9] Groundwater screening level referenced from Ecology's CLARC (Cleanup Levels and Risk Calculation) Table (Excel) dated January 2023 and Ecology's Vapor Intrusion Guidance (Publication No. 09-09-047; see Table 3-5 and 3-6).

-- = not tested

µg/L = microgram per liter

1,2,4-TMB = 1,2,4-trimethylbenzene

1,3,5-TMB = 1,3,5-trimethylbenzene

BTEX = benzene, toluene, ethylbenzene and xylenes

CVOCs = chlorinated volatile organic compounds

DET = detected

EDB = 1,2-dibromoethane

EDC = 1,2-dichloroethane

G, D, O = gasoline-range petroleum hydrocarbons, diesel-range petroleum hydrocarbons and oil-range petroleum hydrocarbons

J = estimated value by laboratory

MTBE = methyl tert-butyl ether

n/a = not available

Qva = Vashon advance outwash

Qvi = Vashon ice-contact deposits

TOC = top of casing

TPH-G, -D, -O = total petroleum hydrocarbons -gasoline, -diesel, -oil

TPH-HCID = total petroleum hydrocarbons - hydrocarbon identification

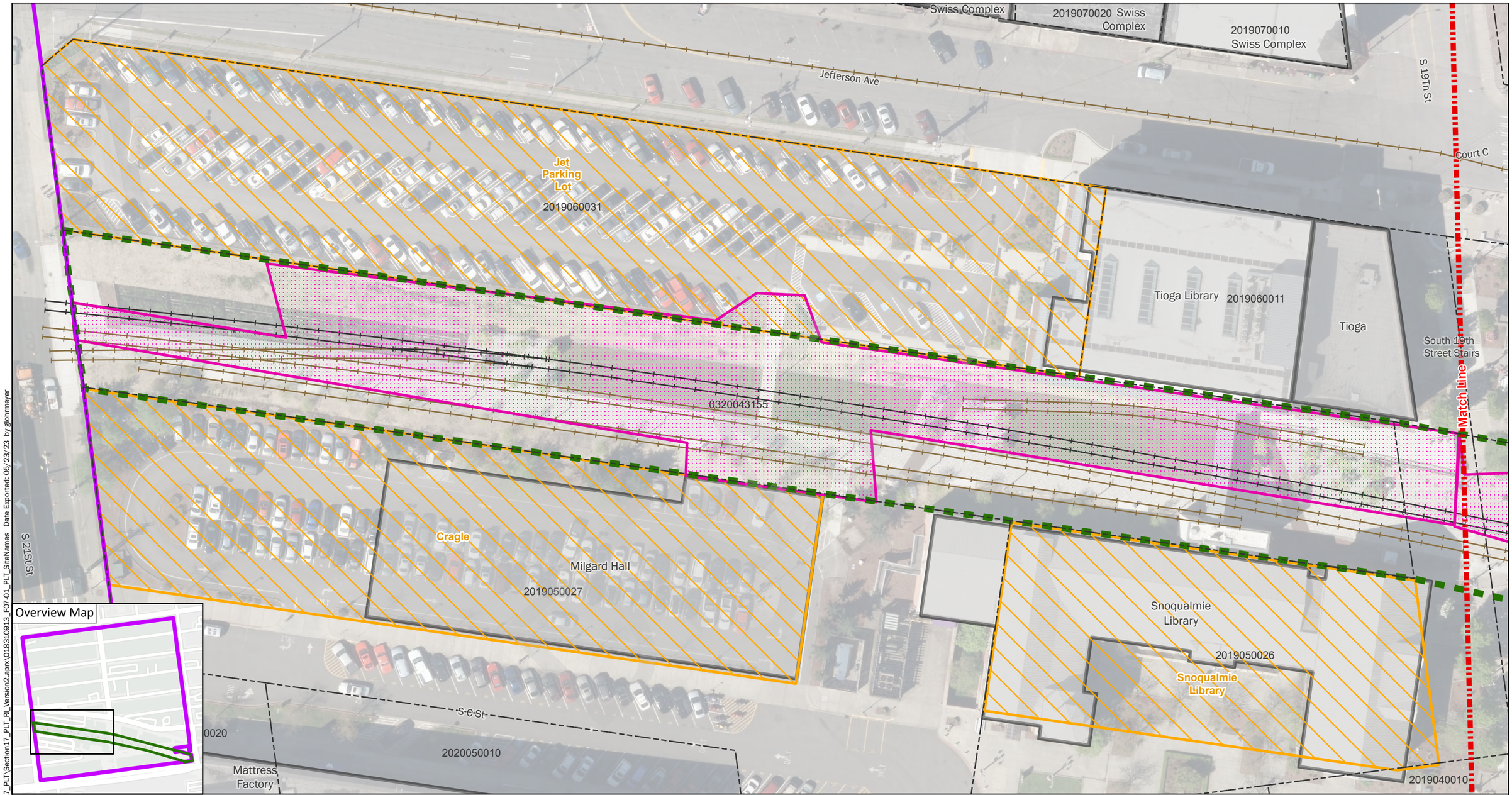
U = analyte was ND at or greater than the listed reporting limit

Bold font type indicates that the analyte was detected at a concentration greater than the respective laboratory reporting limit.

Italic font type indicates the non-detect result is greater than the PCUL.

Shading indicates that the detected concentration is greater than the PCUL.

Shading indicates that the detected concentration is greater than the screening level for vapor intrusion and/or the PCUL.



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: Aerial provided by City of Tacoma, 2015
Projection: NAD 1983 HARN StatePlane Washington South FIPS 4602 Feet

Legend

- University of Washington - Tacoma Campus Master Plan Boundary
- Parcel Boundary and Number
- Prairie Line Trail Area of Concern
- Prairie Line Trail Site - Area of Soil and/or Groundwater with One or More Contaminants of Concern Exceeding the Proposed Cleanup Level (PCUL)
- Other Identified Property-Specific Area of Concern
- Former Historic Rail Line
- Existing Historic Rail Line
- Existing Building Footprint

W N E S

50 0 50
Feet

Overview
Prairie Line Trail South

University of Washington - Tacoma Campus
Tacoma, Washington

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Figure 7-1A

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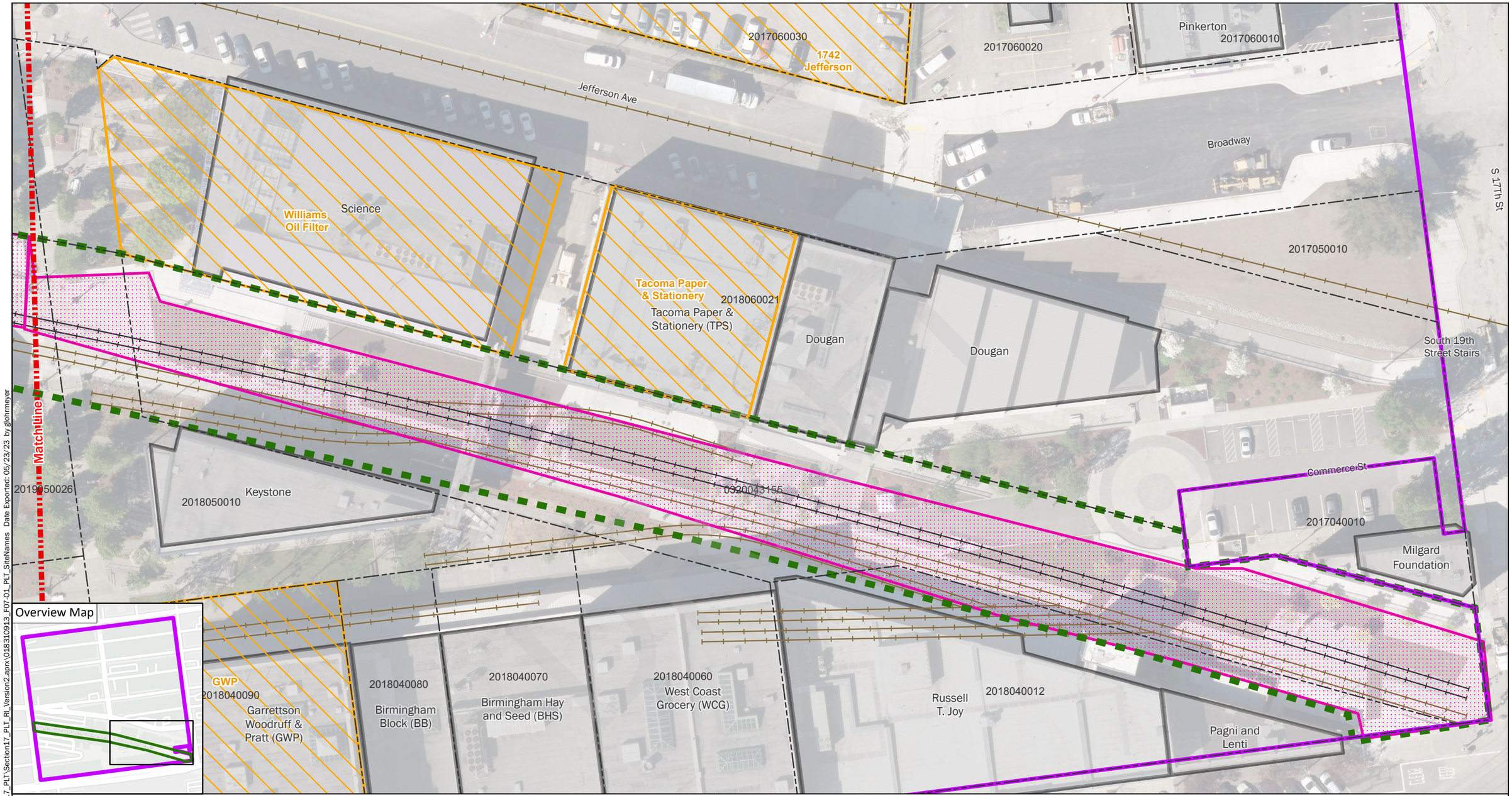

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- Existing Historic Rail Line
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W N S E

50 0 50
Feet

Overview
Prairie Line Trail North

University of Washington - Tacoma Campus
Tacoma, Washington

GeoEngineers

Figure 7-1B