August 12, 2014

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3190 160th Avenue SE
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Re: Site Investigation Work Plan – Classic Cleaners – Cascade Plaza
7601 Evergreen Way, Everett, Washington
Cleanup Site ID: 4690
Facility/Site No.: 1382746
VCP Project No.: NW2745

Ms. Escobedo:

This Work Plan has been prepared by Apex Companies, LLC (Apex) on behalf of Columbia Cascade Plaza, LLC (the current facility owner) for the former Classic Cleaners facility located at tenant space (unit) B004, 7601 Evergreen Way, Everett, Washington (Figure 1). In 2002, the Site (consisting of unit B004 and surrounding impacted areas) was enrolled in the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP) due to release(s) from historical dry cleaning operations. Soil and groundwater investigations and groundwater monitoring activities were completed at the Site from 1997 through 2002. Reports describing these site investigation activities were included in the 2002 VCP application package. No investigation was performed for several years following enrollment in the VCP. Consequently, the VCP enrollment was suspended.

The Site was re-enrolled in the VCP on June 24, 2013 and Ecology issued an opinion letter for the Site on September 18, 2013. A progress report for the Site was submitted by Apex to Ecology on June 9, 2014. The progress report: 1) presented the Site owner's response to Ecology's request for information in the opinion letter; 2) summarized the results of historical soil and groundwater investigation activities performed at the Site prior to the 2013 re-enrollment in the VCP; 3) described soil gas and air sampling completed as part of a Tier I/II vapor intrusion evaluation that was performed in October, November, and December 2013, and groundwater monitoring completed at the Site on July 16, 2013 and March 27, 2014; and 4) presented a proposed a scope of work and schedule for additional investigation activities to further define the nature and extent of hazardous substance impacts at the Site.

Apex met with Ecology on June 20, 2014 to review the progress report and discuss whether the planned additional investigation activities and contingent outcomes would be sufficient to obtain a no further action (NFA) opinion for the Site. This Work Plan has been prepared as a result of the meeting and presents additional information requested by Ecology and a refined scope of work for the additional investigation activities.

The Work Plan is divided into the following sections:

- Site Description and History;
- Site Investigation Summary;
- Conceptual Site Model – Geology, hydrogeology, land and water use, contaminant sources and contaminated media, transport pathways, potential receptors, and relevant exposure scenarios;
- Site Investigation Plan – The goals, objectives, and procedures for the additional investigation activities; and

- Supporting Documents – Apex Standard Operating Procedures (SOPs) for the investigation activities are included as attachments to this Work Plan.

Collectively, the proposed scope of work and site investigation data (historical and recent) are intended to meet MTCA requirements for site characterization.

SITE DESCRIPTION AND HISTORY

The Site is located at Cascade Plaza, which is a single-story shopping mall constructed on two parcels, totaling approximately 19.26 acres, within the City of Everett. The two parcels that comprise Cascade Plaza were a woodland that was first developed in the 1940s as residential properties, and in the 1950s as a drive-in movie theater. The current shopping mall was constructed in the 1980s. The entirety of Cascade Plaza is covered with five retail/office buildings, a retail gas station, Portland cement concrete (PCC) or asphalt concrete (AC) pavement, and small landscaped areas. The five buildings have historically housed various retail stores, offices, restaurants, an automobile rental agency, and a dry cleaning facility. Classic Cleaners operated in unit B004 from the early 1980s through 1999. Unit B004 is currently occupied by a Domino's Pizza franchise. The current layout of unit B004 is Figure 2. The Site vicinity is developed for commercial and residential use.

SITE INVESTIGATION SUMMARY

Soil and groundwater investigations and groundwater monitoring were completed at the Site from 1997 through 2002 by ATC Associates (ATC) and Whitman Environmental Services (WES). Additional groundwater monitoring and a soil vapor intrusion investigation were completed by Apex in 2013 and 2014. These activities are summarized below. Sampling locations are shown on Figure 2. Soil sampling data and corresponding Model Toxics Control Act (MTCA) Cleanup Levels (CULs) are listed in Table 1. Groundwater elevation data are listed in Table 2. Groundwater sampling data and corresponding CULs and Ground Water Screening Levels (SLs) for soil vapor intrusion (VI)[1] are listed in Table 3.

1997 Soil and Groundwater Investigation

Three borings (HB-1 through HB-3) were advanced inside unit B004 near the dry cleaning equipment, and three borings (B-1 through B-3) were advanced in the parking areas east and west of unit B004. Borings HB-1 through HB-3 were completed through the concrete slab using a core drill and a hand auger. The borings were terminated when dense soils were encountered; therefore, the borings were not completed to the depth of groundwater. Soil samples were collected from borings HB-1 and HB-2 at a depth of approximately 8 inches below the Portland Cement Concrete (PCC) slab, and from HB-3 at depths of 8 inches and 3 feet below the PCC slab. Borings B-1 through B-3 were completed to a depth of 15 feet below ground surface (bgs) using a drilling rig equipped with a hollow stem auger. Soil samples were collected at depths of 5, 7.5, and 10 feet bgs in each boring and groundwater was first encountered at depths between 10 and 11 feet bgs. Groundwater samples were collected from borings B-2 and B-3. Soil and groundwater samples were analyzed for halogenated volatile organic compounds (HVOCs). Tetrachloroethene (PCE) was detected in the 8-inch-deep soil samples collected from borings HB-1 and HB-3 (0.32 and 0.13 milligrams per kilogram [mg/kg]) at concentrations that exceed the MTCA Method A CUL of 0.05 mg/kg. PCE was detected in groundwater samples collected from borings B-2 and B-3 at concentrations that were below the MTCA Method A CUL and SL. HVOCs were not detected in the other soil and groundwater samples.

[1] Listed in *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* (VI Guidance; Ecology, 2009).

1997 Monitoring Well Installation and Groundwater Sampling

Three monitoring wells (MW-1, MW-2, and MW-3) were installed and sampled to evaluate the extent of HVOC impacts in groundwater at the Site. Well MW-1 was installed in the parking area west of unit B004. Wells MW-2 and MW-3 were installed in the parking area east of unit B004. The wells were constructed to a depth of 20 feet bgs. One soil sample was collected from each boring at a depth of 10 feet bgs, which was approximately one to two feet below the depth of groundwater. HVOCs were not detected in any of the soil samples. PCE was detected in the groundwater samples collected from wells MW-2 and MW-3 at concentrations that exceed the SL, but were below the CUL. HVOCs were not detected in the other groundwater samples.

1999 Monitoring Well Installation, Groundwater Sampling, and Soil Sampling

Monitoring well MW-4 was installed in the parking area northeast of unit B004 to further evaluate HVOC impacts in groundwater downgradient of the unit B004. The well was constructed to a depth of approximately 18 feet. Soil samples were collected at 5-foot intervals and field screened for HVOCs. A soil sample collected at a depth of 12.5 feet bgs, which was approximately 0.5 foot below the groundwater surface, was submitted for laboratory analysis of HVOCs. HVOCs were not detected in the soil sample. PCE was detected in the groundwater sample collected from well MW-4 at concentrations below the CUL.

The 1999 site investigation activities also included advancing three borings (Core 1 through Core 3) inside unit B003, which is located adjacent north of unit B004. The borings were completed through the PCC slab using a core drill and a hand auger. One soil sample was collected from each boring at a depth of one foot. HVOCs were not detected in the soil samples.

1998-2000 Groundwater Monitoring

Groundwater in wells MW-1 through MW-3 was monitored approximately semi-annually from February 1998 through August 2000 (7 events) to evaluate HVOC concentration trends over time. Well MW-4 was monitored approximately semi-annually in 1999 and 2000 (5 events). The depth to groundwater at the Site ranged from approximately 7.8 to 10.5 feet. The inferred groundwater flow direction was towards the northeast. The average flow gradient was 0.008 foot per foot (ft/ft). Historical groundwater elevation maps are included in Attachment A. PCE, chloroform, and 1,1,1-trichloroethane (TCA) were detected in one or more wells (MW-2 through MW-4) during at least one sampling event. The detected concentrations were below CULs, but concentrations of PCE and chloroform in wells MW-2 and MW-3 occasionally exceeded the SLs. No other HVOCs were detected in the groundwater samples.

2002 Supplemental Soil and Groundwater Sampling

A supplemental investigation was completed in December 2002 to provide additional information regarding soil and groundwater concentrations at and near unit B004. Two borings (HB-4 and HB-5) were advanced inside the building where the dry cleaning equipment had been located[2]. A third boring (HB-6) was advanced outside the building near the sanitary sewer lines that convey waste from the building. Borings HB-4 and HB-5 were completed to depths of 12 and 15 feet below the PCC slab, respectively, which were the approximate depths at which groundwater was first encountered. Boring HB-6 was terminated at 5 feet bgs, which, reportedly, is approximately the depth of the sanitary sewer pipe. Soil samples were collected over the entire depth of each of the borings and field screened for HVOCs. Two samples collected from borings HB-4 and HB-5, at a depth of approximately one to two feet beneath the PCC slab, and one soil sample, collected from HB-6 at a depth of 3 feet bgs, were submitted for laboratory analysis of HVOCs based on the results of field screening. The soil samples collected from borings HB-4 through HB-6 contained PCE at concentrations below the CUL. No other HVOCs were detected in the soil samples. Groundwater

[2] The dry cleaning equipment was removed from the facility in approximately 2006. The facility has not been used for dry cleaning since that time.

samples were collected from borings HB-4 and HB-5 and submitted for laboratory analysis of HVOCs. The PCE concentration (9.36 micrograms per liter [μg/L]) in the groundwater sample collected from boring HB-4 exceeded the CUL.

2013 and 2014 Groundwater Monitoring and Soil Vapor Intrusion Assessment Sampling

Groundwater monitoring and a soil vapor intrusion investigation were completed by Apex in 2013 and 2014. These activities were performed to obtain information about current groundwater conditions, evaluate potential vapor intrusion using the Tier I/II screening method described in the Ecology VI Guidance, and determine what, if any, additional investigation and/or remedial activities could be required to obtain a NFA opinion from Ecology. These activities are summarized below. With the exception of data obtained from groundwater monitoring on June 26, 2014, the data obtained from these investigation activities was presented in the progress report.

Groundwater Monitoring. Monitoring wells MW-1 through MW-4 were redeveloped on July 15, 2013 using a peristaltic pump. The wells were allowed to equilibrate for approximately 24 hours following redevelopment. Groundwater levels were measured in, and samples were collected from, wells MW-1 through MW-4 on July 16, 2013, March 27, 2014, and June 26, 2014. Groundwater level measurement was performed following Apex Standard SOP 2.14 (Attachment B). Groundwater was approximately 7.6 to 10.1 feet bgs, which is within the historical range. The inferred groundwater flow direction was to the northeast at a gradient of approximately 0.008 ft/ft, which is consistent with historical measurements. Groundwater elevation data are listed in Table 2 and groundwater elevations and elevation contours for July 16, 2013, March 27, 2014, and June 26, 2014 are shown on Figures 4, 5, and 6 respectively. Groundwater samples were collected using low-flow methods following Apex SOP 2.5 (Attachment B), placed into laboratory-provided containers, and submitted to TestAmerica in Tacoma, Washington under chain-of-custody procedures. Samples were analyzed for HVOCs by U.S. Environmental Protection Agency (EPA) Method 8260B. HVOCs were not detected in the groundwater samples. Groundwater sampling data and corresponding CULs and SLs are listed in Table 3.

Tier I Vapor Intrusion Assessment Sampling. Soil gas sampling was performed by Apex on October 4, 2013 to complete the Tier I vapor intrusion evaluation for unit B004. The first part of the Tier I evaluation process was completed using the July 2013 groundwater sampling data, which indicate that there is no vapor intrusion risk from current groundwater conditions beneath unit B004. Soil gas sampling activities included installation of soil gas probes VS-1 and VS-2 within unit B004 in the vicinity of historical boring HB-1. Sampling locations are shown on Figure 2. Soil gas in the vicinity of boring HB-1 was targeted because soil collected at a depth of eight inches in that boring historically exhibited the highest PCE soil concentration (0.32 micrograms per cubic meter [$\mu g/m^3$]) detected at the Site. Soil gas probes VS-1 and VS-2 were installed at a depth of approximately 3 inches below the base of the PCC slab using hand tools (e.g., slide hammer probe/roto-hammer). Each soil gas probe was leak tested to ensure probe integrity, using helium gas as a tracer with a shroud, and a real-time helium gas monitor. After leak testing, a soil gas sample was collected from each probe at a rate of approximately 200 milliliters per minute, using one-liter Summa canisters. Each soil gas sample was analyzed for HVOCs by EPA method TO-15. PCE was detected in the samples collected from soil gas probes VS-1 (2,500 $\mu g/m^3$) and VS-2 (3,600 $\mu g/m^3$) at concentrations that exceed the SL.[3] No other HVOCs were detected in the soil gas samples. Soil gas data and soil gas SLs are listed in Table 4.

[3] EPA released new toxicity factors for PCE in 2011, following release of *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action.* The MTCA Method B CUL for indoor air (unrestricted land use) for PCE, based on the new toxicity factors, is 9.6 $\mu g/m^3$. Using the attenuation factors presented in *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action*, the corresponding modified soil gas SLs for shallow and deep intervals are 96 and 960 $\mu g/m^3$.

Tier II Vapor Intrusion Assessment Sampling at Unit B004. The soil gas results from the Tier I assessment indicated that a Tier II assessment would be necessary to further evaluate potential vapor intrusion risks. Apex collected soil gas samples, indoor air samples, and outdoor air samples for the Tier II assessment on November 20, 2013 and December 6, 2013.

Soil gas sampling activities were completed on November 20, 2013 and included installation of soil gas probes VS-3 and VS-4 in unit B004 near probes VS-1 and VS-2 (Figures 2 and 6). The probes were installed approximately 3 inches below the base of the PCC slab and leak tested using the same methods that were used for sampling during the Tier I evaluation. A soil gas sample was collected from each probe at a rate of approximately 200 milliliters per minute using one-liter Summa canisters and each sample was analyzed for HVOCs by EPA method TO-15. PCE was detected in the samples collected from soil gas probes VS-3 (2,400 $\mu g/m^3$) and VS-4 (990 $\mu g/m^3$) at concentrations that exceed the SL. No other HVOCs were detected in the soil gas samples.

Two indoor air samples (AA-2 and AA-3) were collected from within unit B004 on November 20, 2013 concurrent with the soil gas samples. One outdoor (background) air sample (AA-1) was collected from the parking area east and upwind of unit B004 on December 6, 2013. Soil gas and air sampling locations are shown on Figures 2 and 5. The outdoor sample was collected approximately six feet above the ground surface, and away from trees, airflow obstructions, and potential point sources of volatile organic compound emissions, such as exhaust fans and vehicles. The air samples were collected during an 8-hour interval in 6-liter Summa canisters. The air samples were collected when indoor air temperatures were significantly higher than outdoor temperatures. Each air sample was analyzed for HVOCs by EPA method TO-15. HVOCs were not detected in the air samples. Soil gas and air sampling data, soil gas SLs and air CULs are listed in Table 4.

Additional Tier I Vapor Intrusion Assessment Sampling. Eleven additional soil probes (VS-5 through VS-15) were installed at the Site on December 6 and 19, 2013 to evaluate potential vapor intrusion risks at other units resulting from conditions beneath unit B004. Probes VS-5, VS-6, and VS-7 were installed in units B003, B005A, and B006 to a depth of approximately 3 inches below the base of the PCC slab using hand methods. Probes VS-8 through VS-15 were installed, using a Geoprobe®, in the parking areas east and west of unit B004 and in close proximity to nearby retail spaces B001, B002, B005, B006, and B007 to a depth of five feet below the PCC slab (which is below the presumed depth of the building foundation system). The probes were leak tested and samples were collected using the same methods used for the Tier I evaluation sampling. Sampling locations are shown on Figures 2 and 6. The soil gas samples were analyzed for HVOCs by EPA method TO-15. PCE was detected in the sample collected from soil gas probe VS-6 at a concentration below the SL. VS-6 was constructed in unit B005A, which is the vacant space adjacent south of unit B004. Trichloroethene (TCE) was detected in the sample collected from soil gas probe VS-14 at a concentration (10 $\mu g/m^3$) that exceeds the SL. No other HVOCs were detected in the soil gas samples. Soil gas and air sampling data and soil gas SLs are listed in Table 4.

CONCEPTUAL SITE MODEL

The conceptual site model synthesizes the current understanding of the geology, hydrogeology, land use, water use, contaminant sources, transport pathways, receptors, and exposure pathways to prepare a preliminary assessment of site risk. This information is used to develop the scope of the planned investigation activities.

Regional and Site-Specific Geology

The Site is in the Puget Sound Basin, which lies between the Cascade Range to the east and the Olympic Mountains to the west. The regional geology is a consequence of multiple Pleistocene glaciations resulting in a series of north-trending elongated ridges separated by deep troughs, which are now occupied by marine and fresh water. More recent erosion processes deposited glacial till and alluvial sand in the Puget Sound Basin. These unconsolidated

deposits are found to depths of 1,500 feet in the vicinity of the Site.[4] The unconsolidated deposits are underlain by Vashon Glacial Till, which is very dense and consists of a non-sorted and non-stratified mixture of clay, silt, and gravel. The depths and thicknesses of the Vashon Glacial Till in the Puget Sound Basin varies by location.

Explorations at the Site have been limited to the upper 20 feet of soil. Within this interval, sandy-silt and gravel have been encountered.[5,6] Figure 7 shows a geologic cross section through the Site.

Regional and Site-Specific Hydrogeology

The regional water-bearing units are generally consistent with the regional geological units discussed above. These units are described below, from shallowest to deepest.

Surficial Glacial Deposits. The primary regional water-bearing unit is located within the uppermost (surficial) deposits of glacial origin, which consist predominantly of the glacial till and alluvial sand deposited while the glaciers were retreating during the last glaciation. These deposits are discontinuous within the Puget Sound Basin, but are generally considered an aquifer unit.[7]

Holocene Glacial Deposits. The Holocene glacial deposits are separated by broad alluvial valleys; therefore they are considered a geological unit separate from the surficial glacial deposits. The lithology of the Holocene deposits varies from fine to coarse grained. Areas consisting mostly of coarse grained deposits can function as aquifers, and areas consisting mostly of fine grained deposits can function as semi-confining units.

Vashon Glacial Till. The Vashon Glacial Till underlying the surficial and Holocene deposits are generally classified as a non-aquifer (semi-confining) unit.

Groundwater monitoring wells at the Site are screened in the Surficial Glacial Deposits unit. Historical groundwater levels at the Site are listed in Table 2. Groundwater levels typically range from 8 to 10 feet bgs. The inferred groundwater flow direction at the Site is to the northeast, at a gradient of approximately 0.008 ft/ft. Using typical soil properties for sandy-silty the estimated horizontal groundwater velocity is about 10 to 20 feet per year.

Land and Water Use

The following summary of land and water use in the vicinity of the Site was developed based on information provided by Snohomish County, the City of Everett, and a reconnaissance of the Site. A land use map from the City of Everett is included as Attachment C. The map summarizes land use information for the Site and near vicinity. From the analysis of current and future land uses, the following conclusions were drawn:

- The Site is zoned Evergreen Way Zone (E-1; commercial use);
- Land within at least approximately 1,000 feet of the Site is zoned for commercial (E-1) or residential use [R-1 (Single Family Detached Low Density) or R-3 (Multiple Family Medium Density)];
- Current land uses on and in vicinity of the Site are consistent with this zoning designation.
- The Site is not within the 100-year or 500-year flood plains;

[4] Geologic Map of Everett 7.5-minute Quadrangle, USGS Map MF-1785, 1985;
[5] WES Phase II Site Investigation 1999.
[6] Geotechnical Engineering Study, Proposed Cascade Shopping Center, Earth Consultants, Inc., May 30, 1986.
[7] Hydrogeology of the Puget Sound Aquifer System, Washington and British Columbia. United States Geological Survey, 1998.

- Drinking water at the Site is supplied by the City of Everett municipal system and sourced at Spada Lake Reservoir, located about 30 miles east of Everett;
- There is no surface water present at the Site;
- The nearest surface water body to the Site is Beverly Lake, which is located approximately 800 feet northwest of the Site; and
- Utility services (sanitary, stormwater, electrical, and natural gas) at the Site are supplied by private and public entities.

Contaminant Sources and Contaminated Media

The contaminant source at the Site is the former drycleaning operations in unit B004. The following description of the nature and extent of contaminated media is based on groundwater, soil, soil gas, and air sampling data collected between 1997 and 2014.

Groundwater. HVOCs have not been detected in groundwater at concentrations exceeding CULs in any of the permanent groundwater monitoring wells at the Site. PCE has historically been detected in groundwater samples collected from borings and monitoring wells downgradient of unit B004; however, the concentrations have been below the CUL and have generally decreased over time. Furthermore, PCE was not detected in groundwater samples from any site wells in 2013 or 2014. These data indicate that groundwater conditions at the Site are stable and HVOCs are likely no longer present in Site groundwater.

Soil. HVOCs have not been detected in soil at concentrations exceeding the CULs, with the exception of PCE in samples collected from borings HB-1 and HB-3 at a depth of approximately 8 inches below the floor. These data indicate that the areal extent of PCE impacted is limited to within the footprint of unit B004. A deeper sample collected from boring HB-3 at a depth of approximately 36 inches below the floor contained no PCE; however, soil samples were not collected from boring HB-1 at depths greater than 8 inches, therefore the vertical extent of PCE impacted soil within the footprint of unit B004 has not been delineated.

Soil Gas and Air. HVOCs were not detected at concentrations exceeding the respective SLs in any of the soil gas samples collected at the Site in October and December 2013, with the exception of PCE in the samples collected from borings VS-1 through VS-4, and TCE in sample the sample collected from boring VS-14. Probes VS-1 through VS-4 were advanced inside unit B004 in close proximity to the former location of the dry cleaning equipment. The apparent source of PCE in soil gas is residual PCE in soil, as PCE was not detected in the groundwater samples collected at the Site in July 2013 and March 2014. PCE was not detected in the indoor air samples (AA-2 and AA-3) collected concurrent with soil gas samples VS-3 and VS-4. TCE was not detected in the soil, groundwater, and soil gas samples collected near the former dry cleaning equipment, or at any other locations at the Site, with the exception of the soil gas sample collected from upgradient boring VS-14.

Potential Contaminated Media Transport Pathways

Potential contaminant transport mechanisms at the Site are discussed below.

Soil Particle Transport. Soil particles can be transported by erosion or wind. This pathway is not applicable to the Site because PCE impacted soil is covered with PCC or AC pavement.

Flow of Separate-Phase Liquid. SPL has not been encountered in soil or groundwater and detected concentrations in soil and groundwater are not consistent with a nearby SPL source; therefore this pathway is not applicable to the Site.

Dissolved-Phase Constituents in Groundwater in the Vadose Zone. Stormwater infiltrating impacted soil can dissolve chemicals present in soil and carry the chemicals downward. This pathway is not applicable to the Site because the areal extent of PCE impacted soil is covered with PCC or AC pavement.

Flow of Dissolved-Phase Constituents in Groundwater in the Saturated Zone. Groundwater at the Site moves laterally and vertically in response to the driving gradients. Monitoring data indicate that groundwater conditions at the Site are stable and HVOCs are likely no longer present in Site groundwater, therefore, this pathway is not applicable to the Site.

Volatilization and Migration through Air. Based on data collected for the Tier II vapor intrusion, PCE impacted soil gas is present beneath unit B004. Vertical migration of PCE vapors from the impacted soil gas is possible. Subsurface utility corridors are absent between unit B004 and other units; therefore, preferential migration of PCE vapors along utility corridors is unlikely.

Potential Receptors and Exposure Scenarios

Potential receptors and exposure scenarios at the Site and in the near vicinity are described below.

Ecological. There is no habitat, no terrestrial ecological receptors, and no aquatic ecological receptors present at the Site or within at least 500 feet of the Site. An aerial photograph depicting land features within 500 feet of the Site is included as Attachment D. The HVOC-impacted soil at the Site currently meets exclusion criteria number 2 for MTCA Terrestrial Ecological Evaluations (TEE); specifically, the soil contamination is covered with buildings, paved roads, pavement, or other physical barriers that will prevent plants or wildlife from being exposed; therefore, the Site is exempt from the MTCA requirements to complete a site-specific TEE.

Human. The PCE impacted soil is covered with PCC; however, the following potential current and future exposure scenarios exist at the Site.

- Occupational workers could be exposed to PCE via inhalation of vapors migrating from soil gas to air in unit B004.
- Construction workers who maintain and repair subsurface utilities and other features could be exposed to PCE via inhalation of vapors migrating from soil gas to air and incidental ingestion/dermal contact with PCE impacted soil. Construction workers would only be exposed to PCE if the PCC is disturbed.

Historical data indicate that the minimum depth to groundwater at the Site is approximately 7.6 feet, which is within the typical range of depths at which subsurface utilities may be located. Recent monitoring data indicate that Site groundwater is not impacted with HVOCs; therefore construction workers who maintain and repair subsurface utilities and other features at the Site would not be exposed to HVOCs via incidental ingestion of groundwater or inhalation of vapors migrating from groundwater. Groundwater at the Site is not used for drinking water.

A conceptual site exposure model summarizing the applicable exposure pathways is shown on Figure 8.

PROPOSED SITE INVESTIGATION ACTIVITIES

The following investigation work is planned to further define the nature and extent of hazardous substance impacts at the Site and evaluate the risks to potential receptors from exposure to PCE. The scope of work was developed based on our understanding of MTCA requirements and the Opinion Letter issued by the Ecology on September 18, 2013, and the meeting with Ecology on June 22, 2014. We anticipate that these activities will meet the MTCA

requirements for site characterization. The planned scope of work includes investigation activities that will be performed following Apex SOPs. These SOPs are referenced below and included in Attachment B.

Groundwater Monitoring

MTCA requires four consecutive quarters of groundwater monitoring to demonstrate compliance with CULs. During semi-annual monitoring events completed between 1997 and 2000, HVOCs were not detected at concentrations exceeding CULs in groundwater monitoring wells at the Site. Similarly, during quarterly groundwater monitoring that was performed in the third quarter of 2013 and in the first and second quarters of 2014, HVOCs were not detected at concentrations exceeding CULs in groundwater monitoring wells at the Site. To comply with the requirement for four consecutive quarters of monitoring, an additional groundwater monitoring event will be performed in the third quarter of 2014. The third quarter 2014 monitoring event will include:

- Measurement of groundwater levels in monitoring wells MW-1 through MW-4 following the procedures described in Apex SOP 2.5;
- Collection of samples from monitoring wells MW-1 through MW-4 using a peristaltic pump, following the low-flow sampling method approved by Ecology (Ecology, 2011) and as described in Apex SOP 2.14;
- Collection of a field duplicate sample from one well for quality assurance; and
- Submittal of the samples to an environmental laboratory accredited by the State of Washington for analysis of VOCs by EPA Method 8260B.

Soil Sampling

The following proposed soil sampling activities will be completed to evaluate the current extent of PCE impacts in soil beneath unit B004.

- Borings will be advanced at three locations inside unit B004: 1) near boring HB-1, which is the location that historically exhibited the highest concentration of HVOCs in soil; 2) near the boring for soil gas sample VS-2, which is the location that exhibited the highest concentration of HVOCs in soil gas; and 3) near the sanitary drain piping. The planned sample locations are shown on Figure 5. The borings will be advanced by coring through the flooring and concrete slab and advancing a direct-push (Geoprobe™) sampler, using limited-access drilling equipment, to the depth just above the capillary fringe/water table interface or until practical refusal.
- Soil samples will be collected at one-foot intervals from each boring following Apex SOPs 2.2 and 2.4.
- Soil samples will be field screened by measuring headspace vapor using a photoionization detector (PID) following Apex SOP 2.1.
- The soil sample from each boring with the greatest apparent impact will be selected for analysis of HVOCs by EPA Method 5035/8260. If no apparent VOC impacts are indicated by field screening, then the sample collected at the depth just above the capillary fringe will be submitted for laboratory analysis. If no apparent VOC impacts are indicated by field screening and refusal is encountered before groundwater, then the soil sample will be collected at the depth of refusal.
- The borings will be backfilled with hydrated bentonite and the concrete floor will be patched.

Supplemental Tier II Vapor Intrusion Evaluation

Data collected during the Tier I and Tier II vapor intrusion (i.e., indoor air) evaluation indicate that HVOCs in the subsurface do not pose an unacceptable vapor intrusion risk. In accordance with the Ecology VI guidance, a limited

amount of additional characterization is necessary to refine the understanding of potential vapor intrusion exposure pathways at the Site and to confirm the results of the previous vapor intrusion assessment. The supplemental Tier II evaluation will include: 1) preparation of a Conceptual Site Model (CSM) for the building; 2) additional air and soil gas sampling; and 3) screening of the air and soil gas data to confirm that HVOC concentrations in soil gas do not pose an unacceptable vapor intrusion risk and mitigation measures will not be necessary to ensure protection of workers. The tasks for completion of the supplemental Tier II vapor intrusion evaluation are described below.

- Preparation of a Conceptual Site Model. The CSM will provide a summary of potential indoor vapor exposure scenarios based on the sources of contamination, the transport media, and possible vapor intrusion routes. The CSM will include: 1) a plan view drawing of unit B004 and adjacent retail units, showing their spatial relationship to the HVOC source area and how air moves within the building; 2) a cross-sectional view of the building depicting the building foundation, approximate depth of the source area, and depth to the shallowest groundwater; and 3) a narrative section describing the drawings and explaining any critical assumptions made in depicting site conditions.

- Air and Soil Gas Sampling at Unit B004. Tier II sampling indicate that the PCE concentrations in soil gas do not pose a vapor intrusion risk at unit B004. However, soil gas and indoor air concentrations can be affected by a number of factors, including atmospheric pressure, HVAC system operations, soil moisture, etc. Samples for the Tier II evaluation were collected on November 20, 2013 and December 6, 2013 when indoor air temperatures were significantly higher than outdoor temperatures. Additional soil gas and ambient air sampling will be completed to evaluate vapor intrusion risk for unit B004 when indoor air temperatures are lower than or similar to outdoor temperatures. Two soil gas samples will be collected from two soil gas probes (one sample per probe) that will be installed in space B004. One probe will be installed in close proximity to the sanitary sewer line, if practicable. The second probe will be installed near historical boring VS-2, which exhibited the highest concentrations of PCE. The planned sample locations are shown on Figure 2. The soil gas probes will be installed approximately three inches below the base of the PCC slab using hand methods. Soil gas samples will be collected using 1-liter Summa canisters. Concurrent with soil gas sampling, two indoor air samples will be collected from space B004 and one outdoor air sample will be collected upwind of and close to unit B004. The outdoor sample will be collected at least five feet above the ground surface, and away from trees, airflow obstructions, and potential point sources of volatile organic compound emissions, such as exhaust fans and vehicles. The indoor/outdoor air samples will be collected during an 8-hour interval in a 6-liter Summa canister. Each air sample will be analyzed for the HVOCs of concern (PCE, TCE, cis-DCE, and vinyl chloride) by EPA Method TO-15.

- Soil Gas Sampling at Unit B005A. Soil gas sampling completed at unit B005A on December 6, 2013 indicated that PCE concentrations in soil gas do not pose a vapor intrusion risk at unit B005A. However, the PCE concentration in the soil gas sample collected from unit B005A was 8.4 $\mu g/m^3$, which is only slightly below the SL of 9.6 $\mu g/m^3$. To confirm the absence of an unacceptable vapor intrusion risk at unit B0005A, an additional soil gas sample will be collected from unit B005A when indoor air temperatures are lower than or similar to outdoor temperatures. The sample will be collected from a probe installed in close proximity to the north wall of the facility, which adjoins unit B004. The soil gas probe will be installed approximately three inches below the base of the PCC slab using hand methods. Soil gas samples will be collected using 1-liter Summa canisters. Each air sample will be analyzed for the HVOCs (PCE, TCE, cis-DCE, and vinyl chloride) by EPA method TO-15.

- Data Screening. Ambient air and soil gas sampling data will be evaluated using the Tier II decision matrices presented in the Ecology VI Guidance, Appendix E.

  Based on the decision matrices, there are three potential outcomes for unit B004:

  1) If HVOCs are not detected in indoor air samples at concentrations above the MTCA CUL, then the data will indicate no significant vapor intrusion risk, and additional sampling or mitigation will not be necessary;

2) If HVOCs are detected in indoor air samples at concentrations less than 10 times the corresponding MTCA CUL, then additional sampling may be required to complete the Tier II evaluation (if HVOC concentrations in multiple follow-up air samples exceed SLs, then mitigation may be necessary); or

3) If HVOCs are detected in indoor air samples at concentrations 10 times the corresponding CUL or greater, then mitigation may be necessary.

Based on the decision matrices, there two potential outcomes for unit B005A:

1) If HVOCs are not detected in soil gas at a concentration at or above the SL, then HVOC concentrations in soil gas do not pose a vapor intrusion risk at unit B005A and no additional sampling is necessary; or

2) If HVOCs are detected in soil gas at a concentration above the SL, additional Tier II evaluation steps are necessary (e.g., further soil gas sampling or indoor air sampling).

Site Investigation Report and NFA Request

Following the activities outlined above, a site investigation report will be prepared and submitted to Ecology. The report will document the investigation activities and include the following:

- An updated Site map showing historical sampling locations, floor drains, and sewer lines, as well as the locations of historical and new soil, soil gas, and air samples;
- A laboratory data quality review and laboratory analytical reports for the new soil gas and air samples;
- Updated analytical data tables (analytical data will be uploaded to the Ecology Electronic Information Management System [EIM]);
- A Tier II vapor intrusion evaluation for unit B004 and a Tier I vapor intrusion evaluation for unit B005A;
- Updated figures that delineate the approximate extents of hazardous substances in soil, groundwater, and soil gas that exceed CULs and SLs; and
- A careful evaluation of the current and future risks to human health and the environment.

Assuming that the conditions are appropriate, this report would include a request for an NFA opinion.

SCHEDULE

The proposed site investigation activities will be completed in September 2014. On behalf of Columbia Cascade Plaza, LLC, Apex requests an advisory opinion of the proposed site investigation activities by August 31, 2014.

Please contact me if you have any questions.

Sincerely,

Mark Havighorst, P.E.
Associate Engineer

ATTACHMENTS

Table 1 – Soil Sampling Analytical Results
Table 2 – Groundwater Elevations
Table 3 – Groundwater Sampling Analytical Results
Table 4 – Vapor Intrusion Evaluation Sampling Analytical Results

Figure 1 – Site Location Map
Figure 2 – Site Layout
Figure 3 – Groundwater Elevations – July 16, 2013
Figure 4 – Groundwater Elevations – March 27, 2014
Figure 5 – Groundwater Elevations – June 25, 2014
Figure 6 – Unit B004 Layout
Figure 7 – Cross–Section A-A'
Figure 8 – Conceptual Site Exposure Model

Attachment A – Historical Groundwater Elevation Maps
Attachment B – Apex Standard Operating Procedures
Attachment C – City of Everett Land Use Map
Attachment D – Aerial Photograph of the Site Vicinity

REFERENCES

Apex, 2014. *Progress Report – Classic Cleaners, Cascade Plaza*. June 9, 2014.

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WES, 1999. *Phase II Site Investigation Report*. May 26, 1999.

Table 1 - Soil Sampling Analytical Results
Classic Cleaners
Everett, Washington

Sample Location (Depth)	Sample Date	HVOC concentrations (mg/kg)					
		PCE	TCE	cis-1,2-DCE	Vinyl Chloride	Chloroform	1,1,1 -TCA
	MTCA CUL (mg/kg)	0.05[a]	0.03[a]	160[b]	240[b]	800[b]	2[a]
HB-1 (8")	6/9/1997	**0.32**	<0.05	<0.05	<0.05	<0.05	<0.05
HB-2 (8")	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
HB-3 (8")	6/9/1997	**0.13**	<0.05	<0.05	<0.05	<0.05	<0.05
HB-3 (3')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B-1 (5')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B-1 (7.5')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B-1 (10')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B-2 (5')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B-2 (7.5')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B-2 (10')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B-3 (5')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B-3 (7.5')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
B-3 (10')	6/9/1997	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
MW-1 (10')	7/30/1997	ND*	ND*	ND*	ND*	ND*	ND*
MW-2 (10')	7/30/1997	ND*	ND*	ND*	ND*	ND*	ND*
MW-3 (10')	7/30/1997	ND*	ND*	ND*	ND*	ND*	ND*
Core 1 (1')	5/6/1999	<0.0094	<0.0094	<0.0094	<0.0094	<0.0094	<0.0094
Core 2 (1')	5/6/1999	<0.0092	<0.0092	<0.0092	<0.0092	<0.0092	<0.0092
Core 3 (1')	5/6/1999	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009
MW-4/S-3 (12.5')	5/7/1999	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
HB-4 (1')	12/10/2002	0.0013	<1.28	<1.28	<1.28	<1.28	<1.28
HB-5 (1')	12/10/2002	0.00919	<1.12	<1.12	<1.12	<1.12	<1.12
HB-6 (3')	12/10/2002	0.00514	<1.21	<1.21	<1.21	<1.21	<1.21

Notes:

1. HVOC = Halogenated volatile organic compound.
2. PCE = Tetrachloroethene.
3. TCE = Trichloroethene.
4. DCE = Dichloroethene.
5. TCA = Trichloroethane.
6. MTCA CUL = Model Toxics Control Act Cleanup Level.
7. mg/kg = milligram per kilogram.
8. a = MTCA Method A Unrestricted Land Use Table Value.
9. b = MTCA Method B Non-Carcinogen CUL Standard Formula Value (Unrestricted Land Use).
10. ND* = Not detected at a concentration above the method detection limit, which is not available for this report.
11. < = Not detected at a concentration above the method reporting limit or practical quantitation limit.
12. Bold = analyte was detected at a concentration above the method detection limit.
13. Shaded = concentration exceeds the CUL.

Table 2 - Groundwater Elevations
Classic Cleaners
Everett, Washington

Well ID	Date	Reference Elevation (feet)[1]	Depth To Groundwater (feet)	Groundwater Elevation (feet)
MW-1	7/31/1997	505.14	7.91	497.23
	2/11/1998	505.14	7.91	497.23
	11/9/1998	505.14	8.73	496.41
	5/6/1999	505.14	7.8	497.34
	5/7/1999	505.14	7.87	497.27
	8/11/1999	505.14	8.25	496.89
	12/29/1999	505.14	7.94	497.2
	3/30/2000	505.14	7.92	497.22
	8/2/2000	505.14	8.59	496.55
	7/16/2013	505.14	8.21	496.93
	3/27/2014	505.14	7.62	497.52
	6/25/2014	505.14	8.2	496.94
MW-2	7/31/1997	505.93	8.81	497.12
	2/11/1998	505.93	8.98	496.95
	11/9/1998	505.93	10.05	495.88
	5/6/1999	505.93	8.94	496.99
	5/7/1999	505.93	9.04	496.89
	8/11/1999	505.93	9.62	496.31
	12/29/1999	505.93	9.31	496.62
	3/30/2000	505.93	9.11	496.82
	8/2/2000	505.93	10.23	495.7
	7/16/2013	505.93	9.7	496.23
	3/27/2014	505.93	8.79	497.14
	6/25/2014	505.93	9.5	496.43
MW-3	7/31/1997	505.9	8.99	496.91
	2/11/1998	505.9	9.07	496.83
	11/9/1998	505.9	10.14	495.76
	5/6/1999	505.9	9.06	496.84
	5/7/1999	505.9	9.1	496.8
	8/11/1999	505.9	9.65	496.25
	12/28/1999	505.9	9.23	496.67
	3/30/2000	505.9	9.18	496.72
	8/2/2000	505.9	10.27	495.63
	7/16/2013	505.9	9.77	496.13
	3/27/2014	505.9	8.9	497
	6/25/2014	505.9	9.6	496.3
MW-4	5/6/1999	505.65	8.93	496.72
	8/11/1999	505.65	9.93	495.72
	12/28/1999	505.65	9.6	496.05
	3/30/2000	505.65	9.43	496.22
	8/2/2000	505.65	10.52	495.13
	7/16/2013	505.65	10.07	495.58
	3/27/2014	505.65	9.27	496.38
	6/25/2014	505.65	9.9	495.75

Notes:

1. Reference elevation (i.e., top of casing) relative to City of Everett Datum, survey conducted in July 1997 by Hallin & Associates.

Table 3 - Groundwater Sampling Analytical Results
Classic Cleaners
Everett, Washington

Sample Location	Sample Date	HVOC concentration (ug/L)					
		PCE	TCE	cis-1,2-DCE	Vinyl Chloride	Chloroform	1,1,1-TCA
	MTCA CUL (ug/L)	5[a]	5[a]	16[b]	0.2[a]	80[b]	200[a]
	SL for Vapor Intrusion (ug/L)	*9.6*	*0.42*	*160*	*0.35*	*1.2*	*11,000*
B-2-W	6/6/1997	*1.3*	<0.5	<0.5	<0.5	*5.3*	<0.5
B-3-W	6/6/1997	*3.6*	<0.5	<0.5	<0.5	*16*	<0.5
MW-1	7/31/1997	<0.5	<0.5	<0.5	<0.5	0.9	<0.5
	2/11/1998	<10	<10	<10	<10	<10	<10
	11/9/1998	<2	<2	<2	<2	<2	<2
	5/6/1999	<0.4	<0.4	<0.4	<0.2	<0.4	<0.4
	8/11/1999	<0.4	<0.4	<0.4	<0.2	<0.4	<0.4
	12/28/1999	<0.4	<0.4	<0.4	<0.2	<0.4	<0.4
	3/30/2000	<0.4	<0.4	<0.4	<0.2	<0.4	<0.4
	8/2/2000	<0.4	<0.4	<0.4	<0.2	<0.4	<0.4
	7/16/2013	<1	<1	<1	<1	<1	<1
	3/27/2014	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/25/2014						
MW-2	7/31/1997	*3.8*	<0.5	<0.5	<0.5	*15*	<0.5
	2/11/1998	<2	<2	<2	<2	<2	<2
	11/9/1998	*3*	<0.4	<0.4	<0.2	*3*	8
	5/6/1999	*1.1*	<0.4	<0.4	<0.2	<0.4	<0.4
	8/11/1999	*1.2*	<0.4	<0.4	<0.2	0.37	<0.4
	12/28/1999	1	<0.4	<0.4	<0.2	0.71	<0.4
	3/30/2000	0.62	<0.4	<0.4	<0.2	<0.4	<0.4
	8/2/2000	0.82	<0.4	<0.4	<0.2	<0.4	<0.4
	7/16/2013	<1	<1	<1	<1	<1	<1
	7/16/2013 DUP	<1	<1	<1	<1	<1	<1
	3/27/2014	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/25/2014						
MW-3	7/31/1997	*3.9*	<0.5	<0.5	<0.5	*15*	<0.5
	2/11/1998	<2	<2	<2	<2	*5.2*	<2
	11/9/1998	*3*	<0.4	<0.4	<0.2	*8*	<0.4
	5/6/1999	*1.3*	<0.4	<0.4	<0.2	0.51	<0.4
	8/11/1999	*1.4*	<0.4	<0.4	<0.2	0.64	3
	12/28/1999	*1.4*	<0.4	<0.4	<0.2	<0.4	<0.4
	3/30/2000	*1.2*	<0.4	<0.4	<0.2	<0.4	<0.4
	8/2/2000	*1.2*	<0.4	<0.4	<0.2	<0.4	<0.4
	7/16/2013	<1	<1	<1	<1	<1	<1
	3/27/2014	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/25/2014						
MW-4	5/6/1999	0.41	<0.4	<0.4	<0.2	*2.1*	<0.5
	8/11/1999	0.16	<0.4	<0.4	<0.2	0.99	<0.4
	12/28/1999	0.11	<0.4	<0.4	<0.2	0.46	<0.4
	3/30/2000	<0.4	<0.4	<0.4	<0.2	<0.4	<0.4
	8/2/2000	<0.4	<0.4	<0.4	<0.2	0.4	<0.4
	7/16/2013	<1	<1	<1	<1	<1	<1
	3/27/2014	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
	6/25/2014						
HB-4 GW	12/10/2002	9.36	<1	<1	<0.4	*3.08*	<1
HB-5 GW	12/10/2002	4.92	<1	<1	<0.4	<1	<1

Notes:

1. HVOC = Halogenated volatile organic compound.
2. PCE = Tetrachloroethene.
3. TCE = Trichloroethene.
4. DCE = Dichloroethene.
5. TCA = Trichloroethane.
6. MTCA CUL = Model Toxics Control Act Cleanup Level.
7. Soil Gas Screening Level (SL) for vapor intrusion included in Table B-1 of Ecology's 2009 *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action.*
8. ug/L = microgram per liter.
9. a = MTCA Method A Table Value.
10. b = MTCA Method B Non-Carcinogen CUL Standard Formula Value (Unrestricted Land Use).
11. < = Not detected at a concentration above the method reporting limit or practical quantitation limit.
12. Bold = analyte was detected at a concentration above the method detection limit.
13. Shaded concentration exceeds the groudnwater CUL.
14. Italicized concentration exceeds the vapor intrusion SL.

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Table 4 - Vapor Intrusion Evaluation Sampling Analytical Results
Classic Cleaners
Everett, Washington

Sample Location (Depth)	Sample Date	HVOC concentrations (ug/m^3)			
		PCE	TCE	cis-1,2-DCE	Vinyl Chloride
	Soil Gas SL (ug/m^3)	96	3.7	160	460
VS-1 (3")	10/4/2013	**2500**	<1.3	<6.5	<4.2
VS-2 (3")	10/4/2013	**3600**	<2.7	<9.9	<6.4
VS-3 (3")	11/20/2013	**2400**	<5.2	<3.8	<2.4
VS-4 (3")	11/20/2013	**990**	<5.1	<3.8	<2.4
VS-5 (3")	12/6/2013	<8.1	<6.4	<4.7	<3.0
VS-6 (3")	12/6/2013	**8.4**	<5.7	<4.2	<2.7
VS-7 (3")	12/6/2013	<7.1	<5.6	<4.1	<2.7
VS-8 (5')	12/19/2013	<8.3	<6.6	<4.9	<3.1
VS-9 (5')	12/19/2013	<7.1	<5.6	<4.1	<2.7
VS-10 (5')	12/19/2013	<7.0	<5.6	<4.1	<2.6
VS-11 (5')	12/19/2013	<6.8	<5.4	<4.0	<2.6
VS-12 (5')	12/19/2013	<7.1	<5.6	<4.1	<2.7
VS-13 (5')	12/19/2013	<6.8	<5.4	<4.0	<2.6
VS-14 (5')	12/19/2013	<7.0	**10**	<4.1	<2.6
VS-15 (5')	12/19/2013	<7.0	<5.5	<4.2	<2.6
	Method B Cleanup Level (ug/m^3)	9.6	0.37	16	46
AA-1 (Backgound)	12/6/2013	<0.21	<0.16	<0.12	<0.039
AA-2 (Indoors)	11/20/2013	<5.6	<4.5	<3.3	<2.1
AA-3 (Indoors)	11/20/2013	<5.6	<4.5	<3.3	<2.1

Notes:

1. HVOC = Halogenated Volatile Organic Compound.
2. PCE = Tetrachloroethene.
3. TCE = Trichloroethene.
4. DCE = Dichloroethene.
5. ug/m^3 = microgram per cubic meter.
6. Soil Gas Screening Level (SL) for vapor intrusion included in Table B-1 of Ecology's *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action.*
7. MTCA CUL = Model Toxics Control Act Cleanup Level (Unrestricted Land Use).
8. Bold = analyte was detected at a concentration above the method detection limit.
9. Shaded = concentration exceeds the SL.
13. The soil gas SLs for PCE and 1,2-DCE presented in the 2009 *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action* are not valid because they are not based on the most recent toxicity factors, which were issued by EPA in 2011. The SL for soil gas was calculated as 10/100x the current MTCA Method B CULs for indoor air.

Note: Base map prepared from USGS 7.5-minute quadrangle of Everett, WA, dated 2014 as provided by USGS.gov.

0 2,000 4,000

Approximate Scale in Feet

N

Site Location Map

Site Investigation Work Plan
Cascade Plaza
Everett, Washington

Apex Companies, LLC 3015 SW First Avenue Portland, Oregon 97201	Project Number	11277-199	Figure 1
	July 2014		

Legend:

- **MW-1** Monitoring Well Location
- **VS-3** Soil Gas Sample Location (2013)
- **AA-2** Indoor Ambient Air Sample Location (2013)
- **AA-1** Outdoor Ambient Air Sample Location (2013)
- **HB-1** Soil Sample Location (2002)
- **Core 1** Soil Sample Location (1999)
- **B-1** Soil Sample Location (1997)
- **B-2** Soil and Groundwater Sample Location (1997)
- Planned Soil Gas Sample Location

A — A' Cross-Section Location (see Figure 7)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

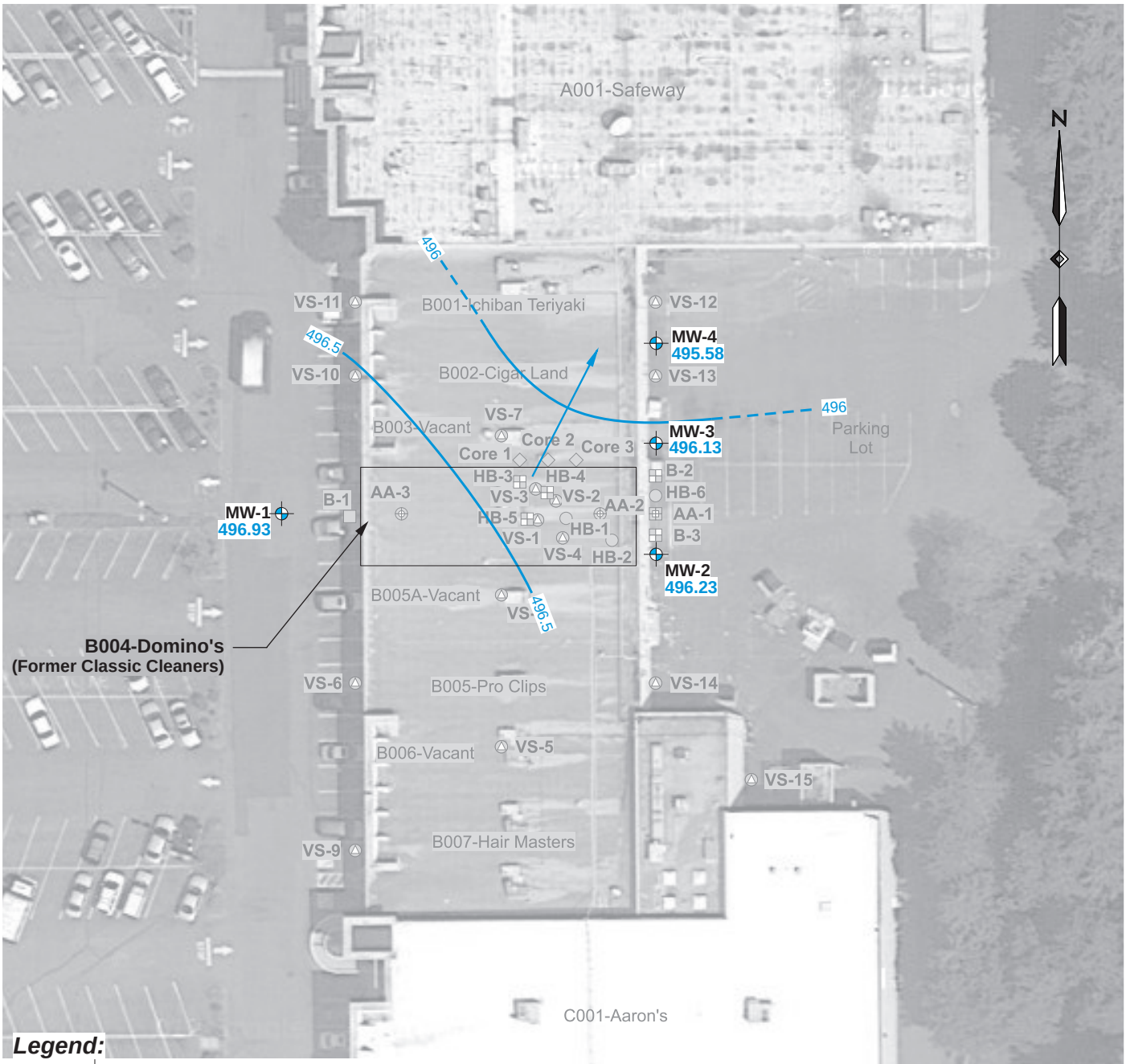
Approximate Scale in Feet

Site Layout

Site Investigation Work Plan
Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
July 2014		2



Legend:

MW-1 496.93 — Monitoring Well Location, Groundwater Elevation in Feet

496 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

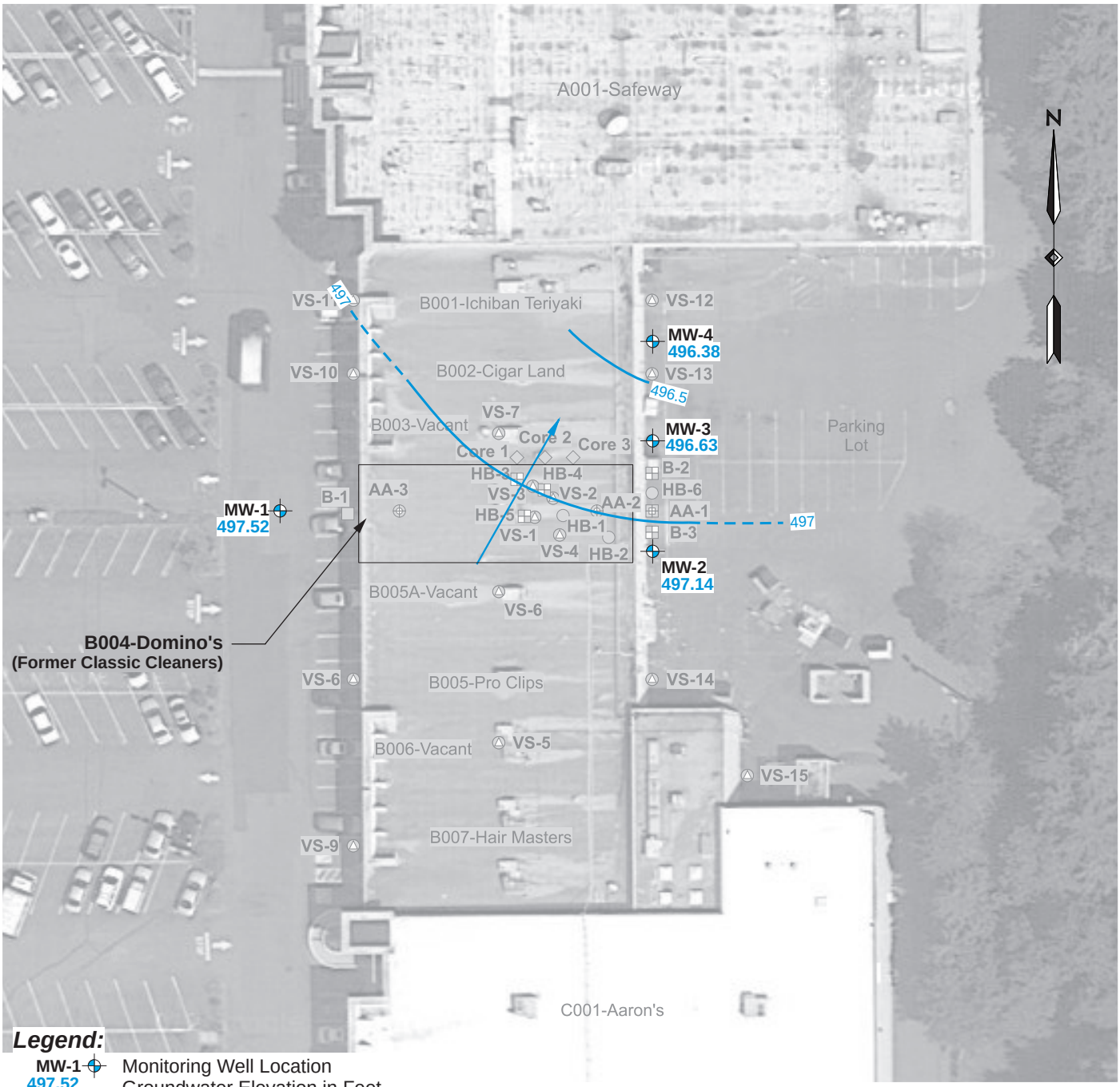
Approximate Scale in Feet

Groundwater Elevations - July 16, 2013

Site Investigation Work Plan
Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
July 2014		3



Legend:

MW-1 497.52 — Monitoring Well Location Groundwater Elevation in Feet

497 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

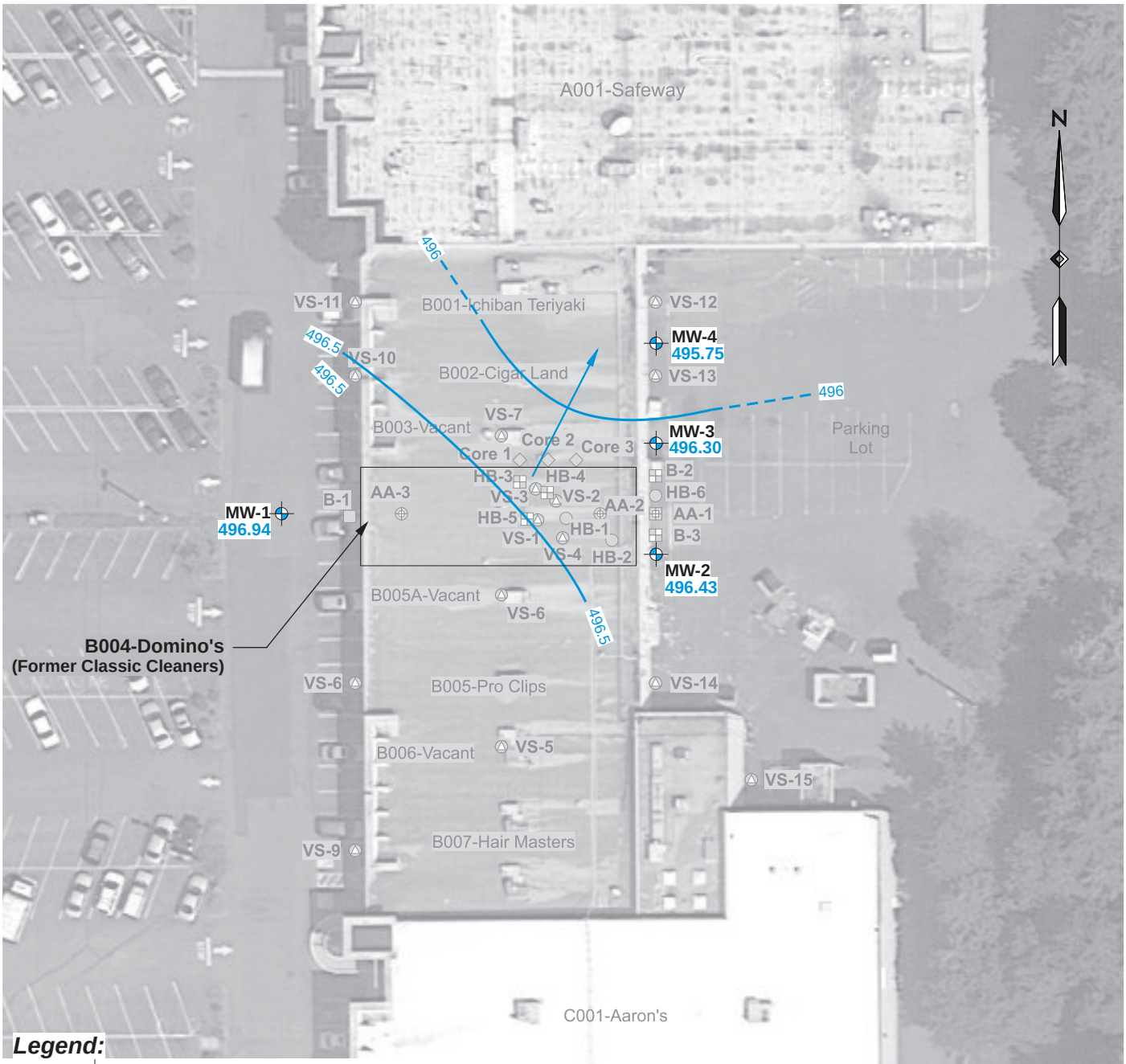
Approximate Scale in Feet

Groundwater Elevations - March 27, 2014

Site Investigation Work Plan
Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
July 2014		4



Legend:

MW-1 496.94 — Monitoring Well Location, Groundwater Elevation in Feet

496 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

Approximate Scale in Feet

Groundwater Elevations - June 25, 2014

Site Investigation Work Plan
Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
July 2014		5

Legend:

- 1.56 (4.5') — Soil Gas Tetrachloroethene Concentration in µg/m³ and (Sample Depth BGS)
- *0.13* (8") — Soil Tetrachloroethene Concentration in mg/kg and (Sample Depth BGS)
- MW-1 — Monitoring Well Location
- VS-3 — Soil Gas Sample Location (2013)
- AA-2 — Indoor Ambient Air Sample Location (2013)
- AA-1 — Outdoor Ambient Air Sample Location (2013)
- HB-1 — Soil Sample Location (2002)
- Core 1 — Soil Sample Location (1999)
- B-1 — Soil Sample Location (1997)
- B-2 — Soil and Groundwater Sample Location (1997)
- Planned Soil Sample Location
- Planned Soil Gas Sample Location
- A A' — Cross section location (Figure 7)

NOTE: B004 = Unit Number

0 20 40
Approximate Scale in Feet

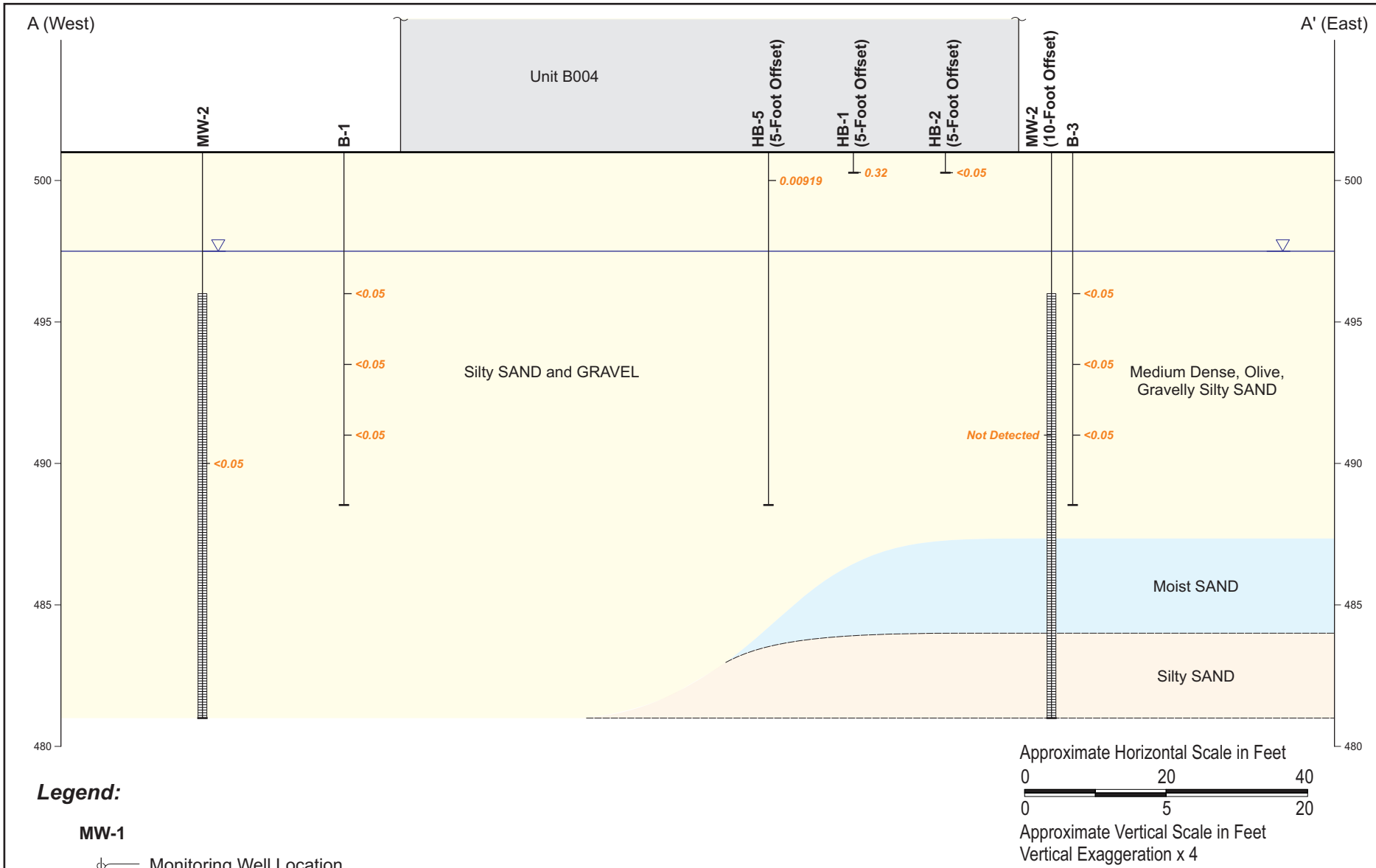
N

Unit B004 Layout

Site Investigation Work Plan
Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
July 2014		6



Approximate Horizontal Scale in Feet
0 20 40
0 5 20
Approximate Vertical Scale in Feet
Vertical Exaggeration x 4

Legend:

MW-1 Monitoring Well Location

Typical Groundwater Level Gauged 3/27/2014

0.2 Soil Tetrachloroethene Concentration in mg/kg

Screen Interval

SAND

Gravelly SAND/SILT

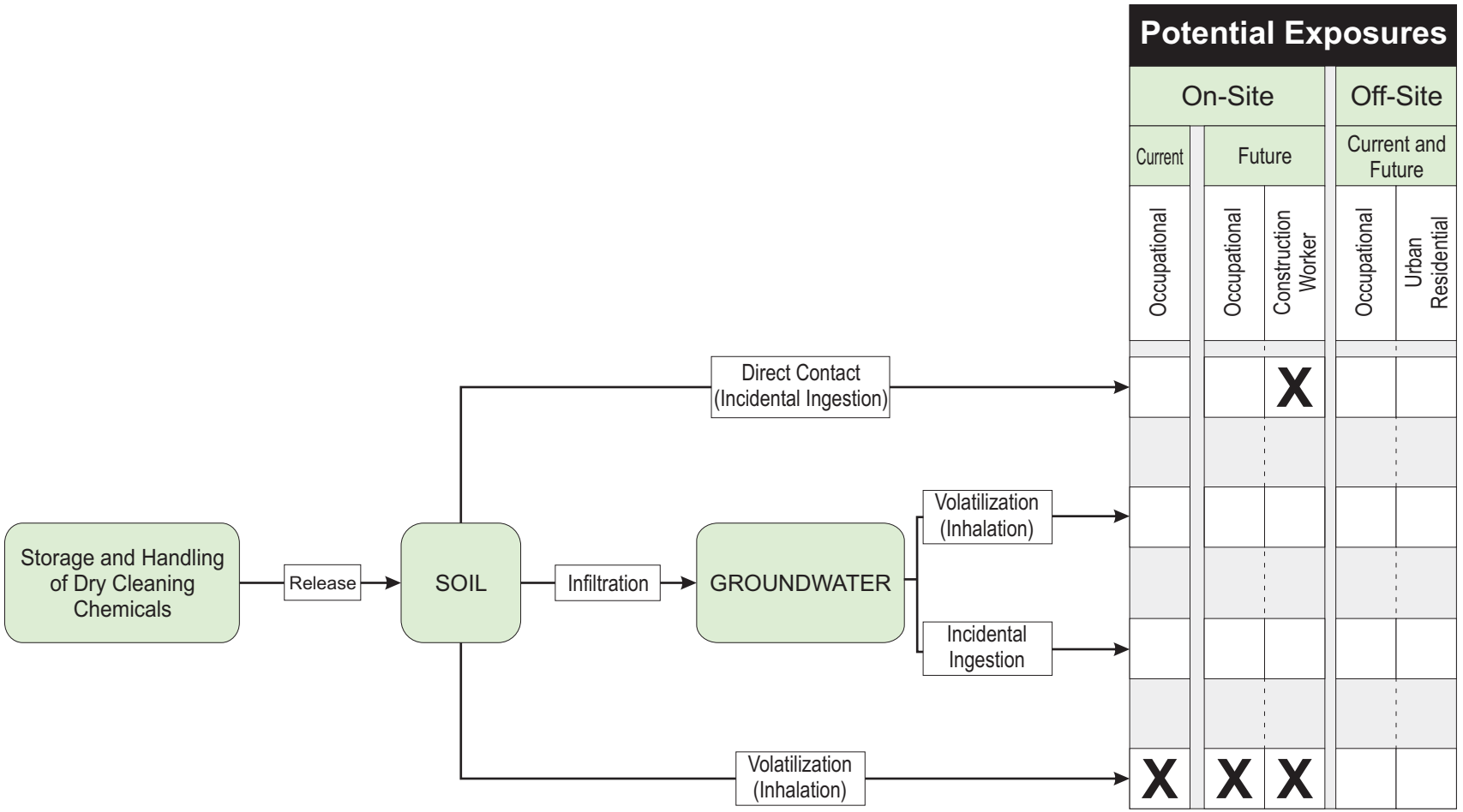
Silty SAND

Cross-Section A-A'

Site Investigation Work Plan
Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
July 2014		7



Conceptual Site Exposure Model

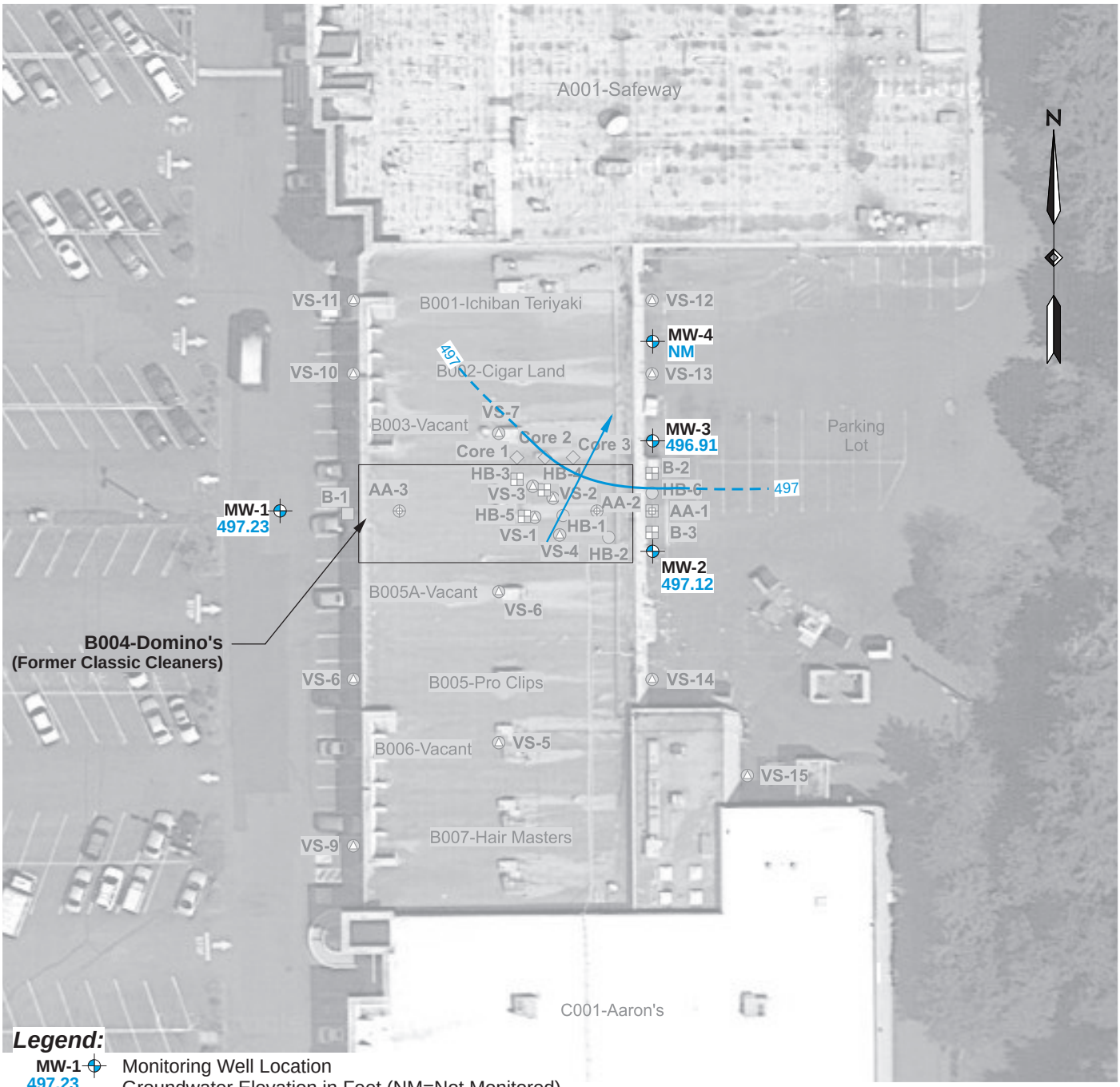
Site Investigation Work Plan
Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
July 2014		8

Attachment A

Historical Groundwater Elevation Maps



Legend:

MW-1 497.23 — Monitoring Well Location; Groundwater Elevation in Feet (NM=Not Monitored)

497 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

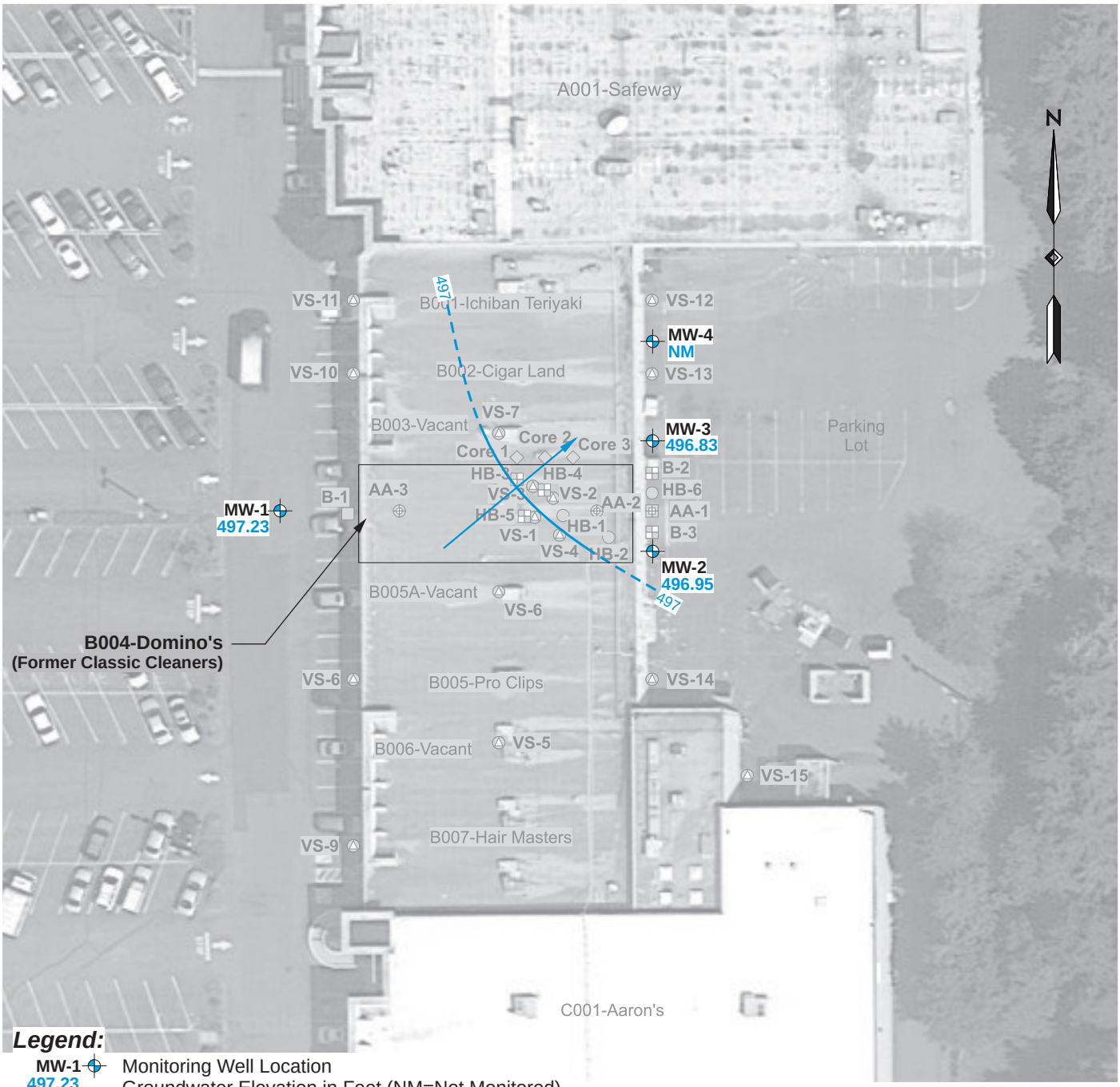
Approximate Scale in Feet

Groundwater Elevations - July 31, 1997

Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
May 2014		A-1



Legend:

MW-1 497.23 — Monitoring Well Location; Groundwater Elevation in Feet (NM=Not Monitored)

497 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

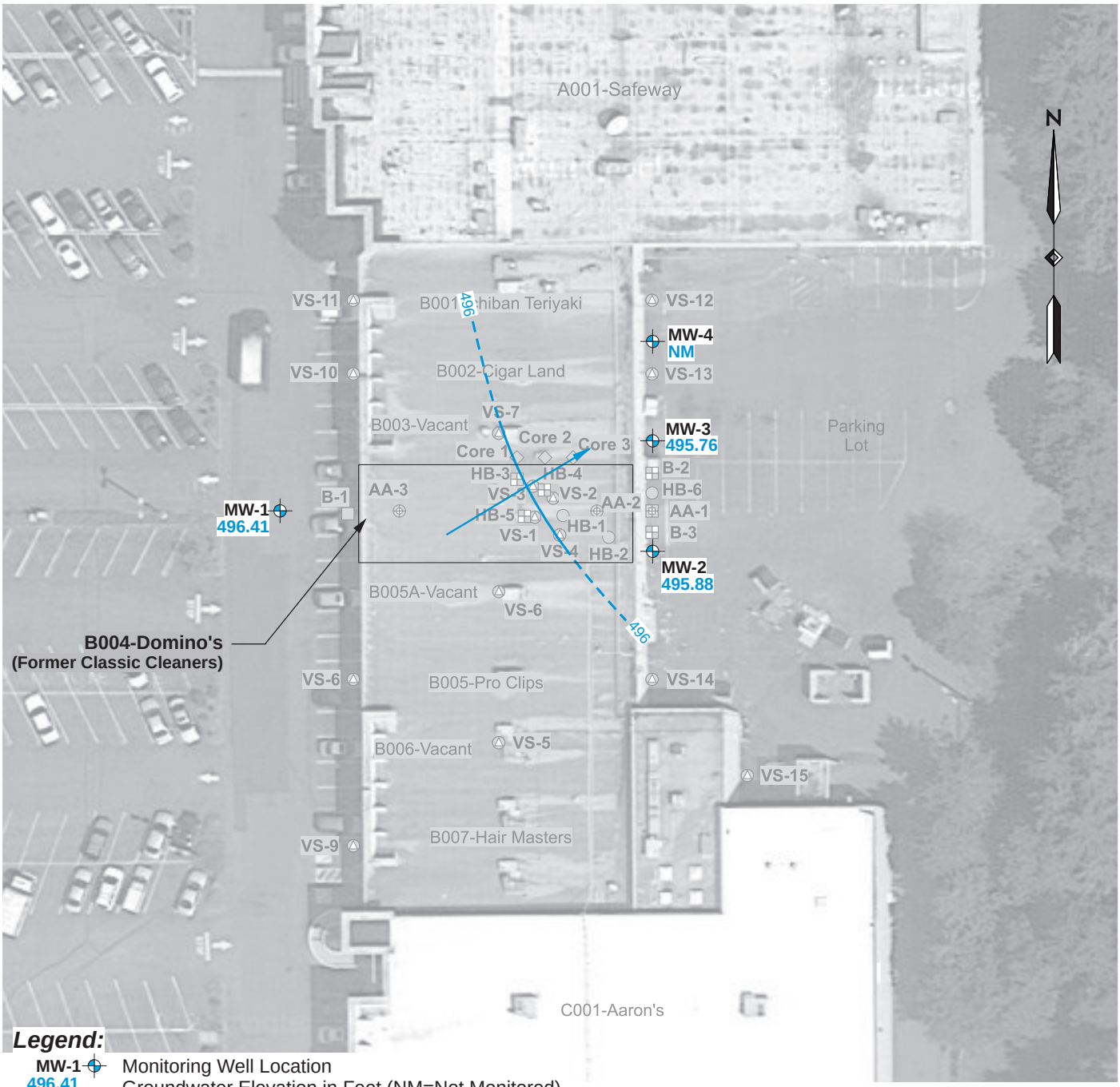
Approximate Scale in Feet

Groundwater Elevations - February 11, 1998

Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
May 2014		A-2



Legend:

MW-1 496.41 — Monitoring Well Location; Groundwater Elevation in Feet (NM=Not Monitored)

496 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

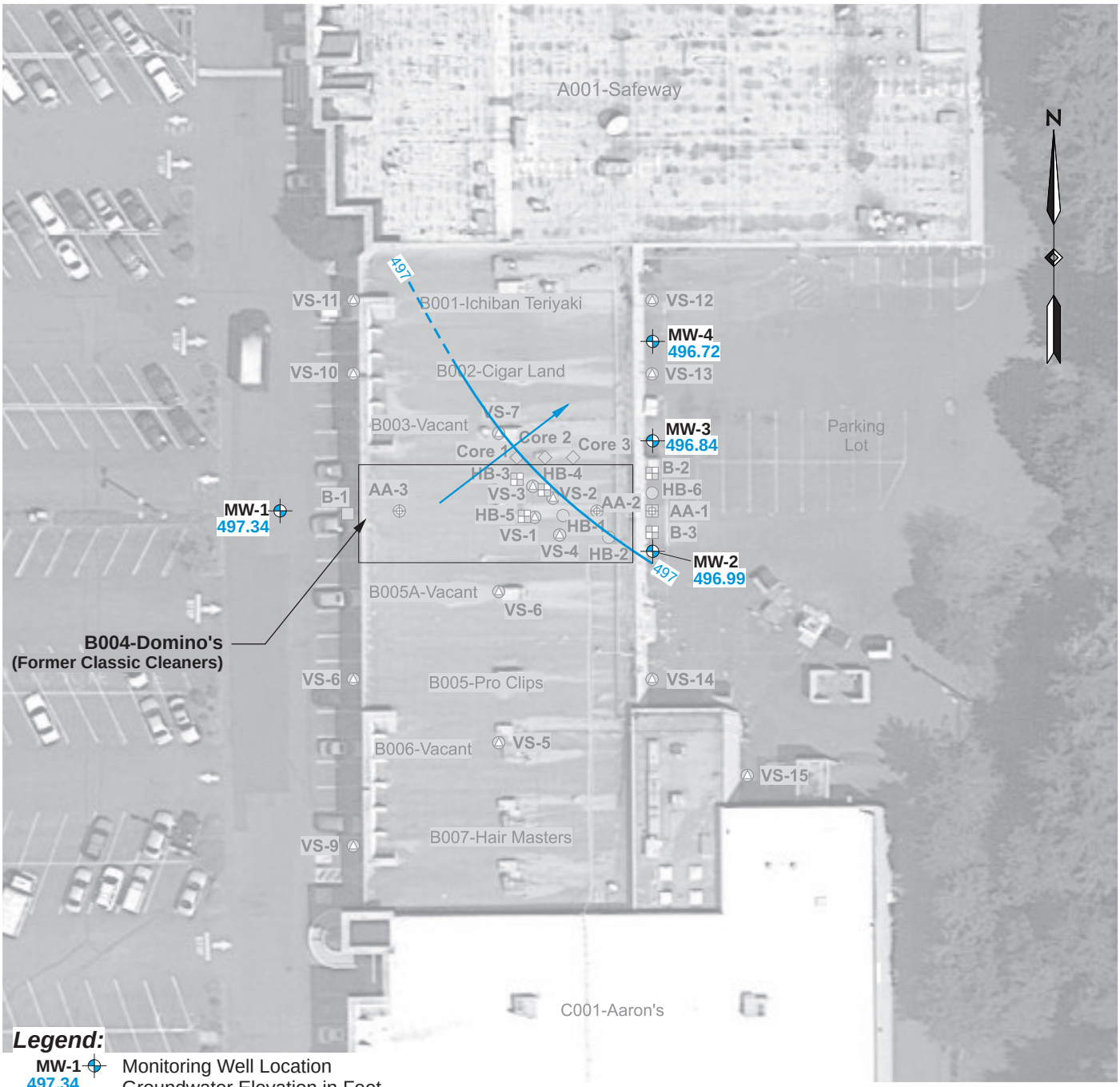
0 50 100

Approximate Scale in Feet

Groundwater Elevations - November 9, 1998

Cascade Plaza
Everett, Washington

Apex Companies, LLC 3015 SW First Avenue Portland, Oregon 97201	Project Number	11277-199	Figure A-3
	May 2014		



Legend:

MW-1 497.34 — Monitoring Well Location, Groundwater Elevation in Feet

497 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

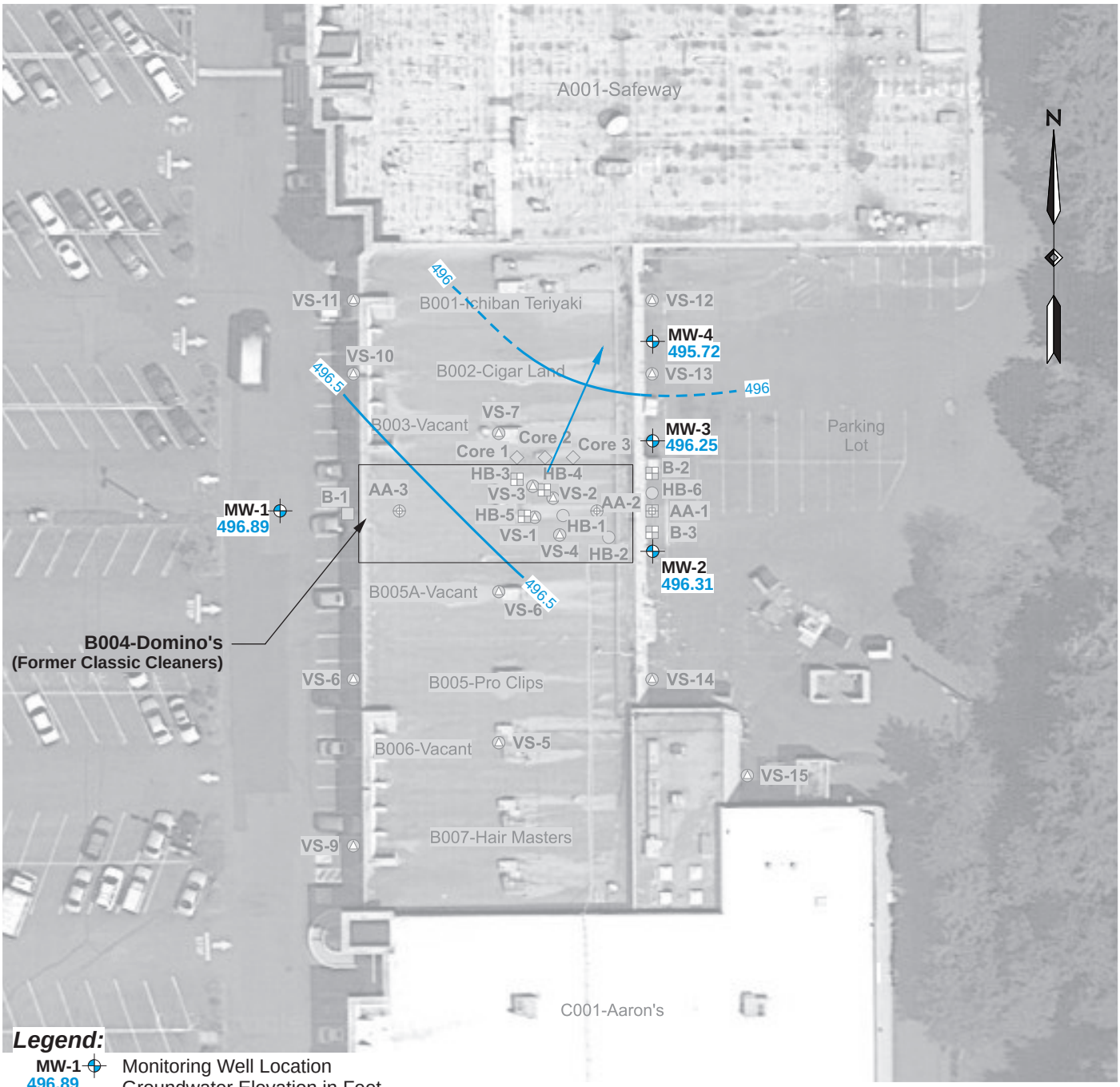
Approximate Scale in Feet

Groundwater Elevations - May 6, 1999

Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
May 2014		A-4



Legend:

MW-1 / 496.89 — Monitoring Well Location, Groundwater Elevation in Feet

496 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

Approximate Scale in Feet

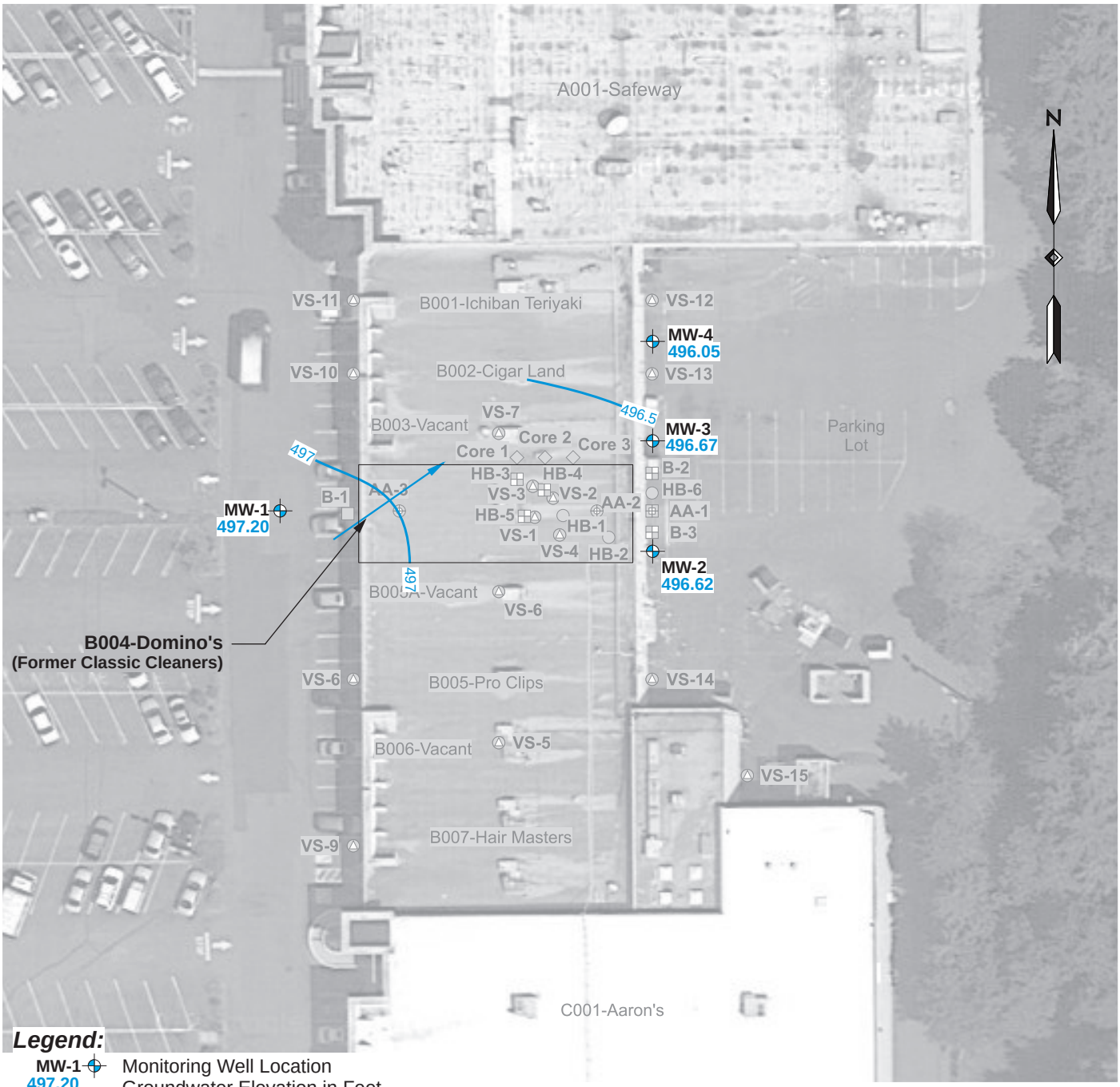
Groundwater Elevations - November 11, 1999

Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199
May 2014	

Figure A-5



Legend:

MW-1 / 497.20 — Monitoring Well Location, Groundwater Elevation in Feet

497 — Groundwater Elevation Contour in Feet

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

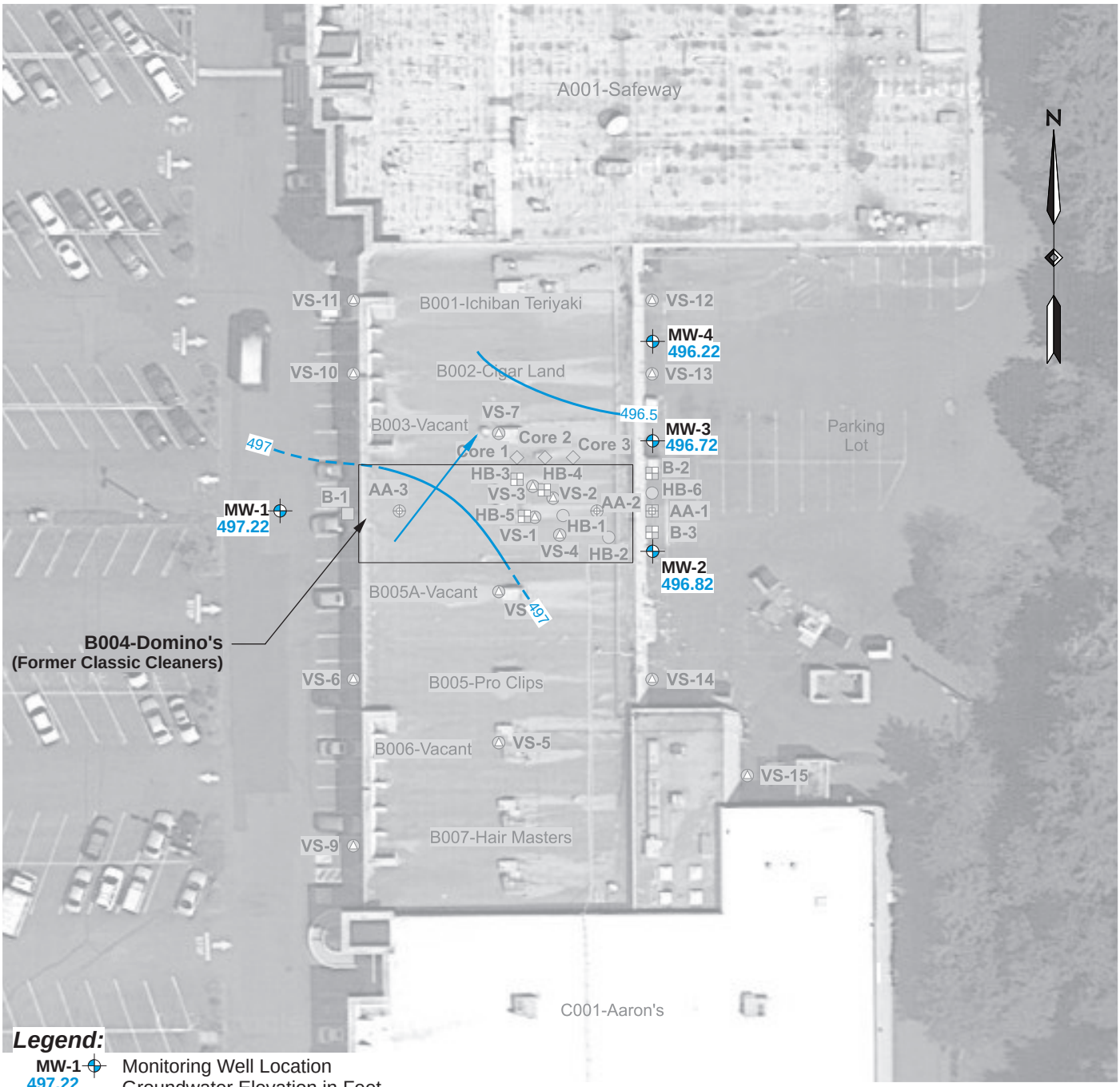
Approximate Scale in Feet

Groundwater Elevations - December 29, 1999

Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
May 2014		A-6



Legend:

MW-1 497.22 — Monitoring Well Location, Groundwater Elevation in Feet

497 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

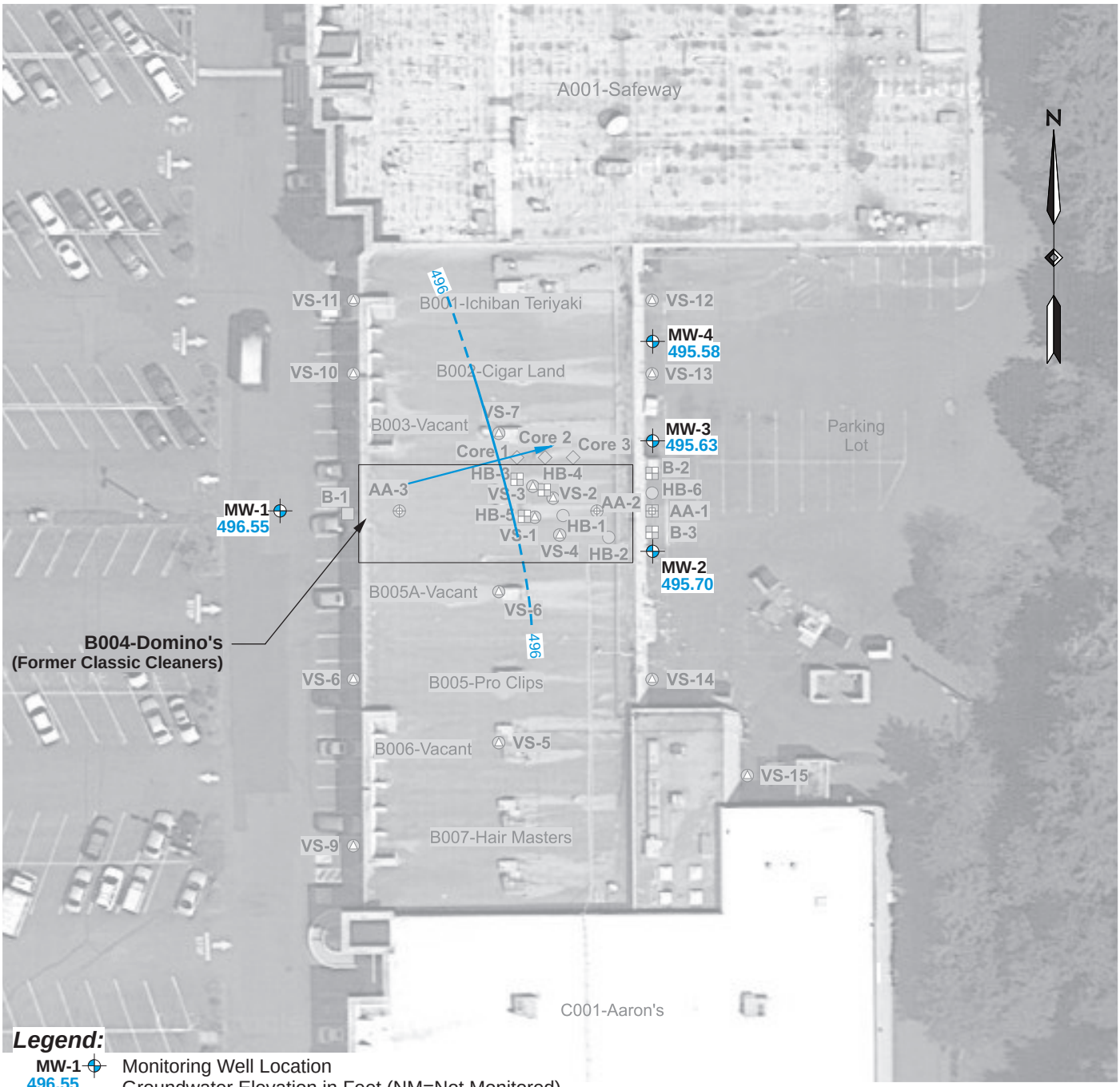
Approximate Scale in Feet

Groundwater Elevations - March 30, 2000

Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
May 2014		A-7



Legend:

MW-1 496.55 — Monitoring Well Location; Groundwater Elevation in Feet (NM=Not Monitored)

496 — Groundwater Elevation Contour in Feet (Dashed Where Inferred)

Apparent Groundwater Flow Direction

VS-3 — Soil Gas Sample Location (2013)

AA-2 — Indoor Ambient Air Sample Location (2013)

AA-1 — Outdoor Ambient Air Sample Location (2013)

HB-1 — Soil Sample Location (2002)

Core 1 — Soil Sample Location (1999)

B-1 — Soil Sample Location (1997)

B-2 — Soil and Groundwater Sample Location (1997)

NOTES: Base map prepared from 2013 - Google Imagery. Aerial dated July 5, 2012.

B004 = Unit Number

0 50 100

Approximate Scale in Feet

Groundwater Elevations - August 2, 2000

Cascade Plaza
Everett, Washington

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

Project Number	11277-199	Figure
May 2014		A-8

Attachment B

Apex Standard Operating Procedures

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) provides instructions for standard field screening. Field screening results are used to aid in the selection of soil samples for chemical analysis. This procedure is applicable during all Apex Companies, LLC (Apex) soil sampling operations.

Standard field screening techniques include the use of a photoionization detector (PID) to assess for volatile organic compounds (VOCs), for the presence of petroleum hydrocarbons using a sheen test, and for non-aqueous phase liquids (NAPLs) using dyes and UV light. These methods will not detect all potential contaminants, so selection of screening techniques shall be based on an understanding of the site history. The PID is not compound or concentration-specific, but it can provide a qualitative indication of the presence of VOCs. PID measurements are affected by other field parameters such as temperature and soil moisture.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- PID with calibration gas (record daily calibration/calibration check in field notes)
- Glass jars (with aluminum foil) or resealable bags
- NAPL Dye (such as OilScreen DNAPL-Lens) if needed for NAPL screening
- UV Light Box (if needed for NAPL screening)

3. METHODOLOGY

Each soil sample will be field screened for VOCs using a PID (with a 10.2 eV probe) and for the presence of petroleum hydrocarbons using a sheen test. If the presence of NAPLs is suspected, then screening using dye and UV light is also to be completed. The PID used on site will be calibrated on a daily basis according to the manufacturer's specifications. The PID is also used as a safety tool. The PID can be used to monitor air during activities where vapors may be present in the breathing space. Document all calibration activities and field observations. The field screening procedures are summarized below.

PID Calibration Procedure:

- Zero the PID using ambient air from the general area where the work will be done.
- A standard gas of 100 ppm isobutylene gas is then used to calibrate the PID. If questionable readings are encountered, the PID will be recalibrated using new 100 ppm isobutylene gas.

PID Screening Procedure:

- Place a representative portion (approximately one ounce) of freshly exposed, uncompacted soil into a clean resealable plastic bag or glass jar.
- Seal the bag or jar (with aluminum foil) and shake to expose vapors from the soil matrix.
- Allow the bag to sit to reach ambient temperature.
- Carefully insert the intake port of the PID into the plastic bag or jar.
- Record the sample concentration in the field notes.

Sheen Test Procedure:

- Following the PID screen, add enough water to the bag/jar to cover the sample.
- Observe the water surface for signs of discoloration/sheen and characterize.

No Sheen (NS)	No visible sheen on the water surface
Slight Sheen (SS)	Light, colorless, dull sheen, irregular spread, not rapid. Biological content may produce a slight sheen (typically platy/blocky).
Moderate Sheen (MS)	Light to heavy coverage, may have some color/iridescence, spread is irregular to flowing, few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen coverage with color/iridescence, spread is rapid, entire water surface may be covered with sheen.

NAPL Dye Procedure:

- Dye can be either liquid form, dissolvable tablet, or spray applied.
- Follow manufacturers instructions for specific product used.
- NAPL testing is completed after other field screening and sample collection is complete.
- For OilScreen DNAPL-Lens dye, the remaining soil sample is sprayed along its length so the soil surface is visibly wetted. A royal blue color of the dye about one minute after spraying would be considered a positive indication of NAPL.

UV Light Screening Procedure:

- UV Light Screening involves placement of a portion of the soil sample into a resealable plastic bag (which can be the same as used for PID screening, but before sheen test is performed).
- The sample is then examined in a dark space under UV light using a small, portable UV light box.
- The plastic bag is manipulated during examination to squeeze fluid against the bag beneath the lamp.
- Fluorescence (glowing color) indicates presence of NAPLs.

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes procedures for the collection of groundwater level measurements and separate phase hydrocarbon (SPH) measurements. Measurements may be collected as an independent event or in conjunction with groundwater sampling or SPH removal. This SOP is applicable for all Apex Companies, LLC (Apex) sites and projects.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Water level or oil/water interface probe (as appropriate);
- Field documentation materials;
- Decontamination materials;
- Bailers or tape/paste (to confirm unusual SPH detections) and
- Personal protective equipment (PPE; as required by project Health and Safety Plan).

3. METHODOLOGY

Preparation. Obtain and review table of well construction details and historical groundwater and SPH levels/thicknesses. Bring tables into the field for ready reference.

Field Procedure. Water level and SPH measurements should be collected upon arrival at the site. Appropriate PPE (as required by the project-specific Health and Safety Plan) should be worn during measurement activities. During groundwater sampling events, measurements should be collected (1) prior to, during, and after purging and sampling. Water level measurements during low-flow sampling are conducted to ensure that drawdown is not occurring during purging/sampling. Low-flow sampling methods are described in SOP 2.5. The following procedures should be followed when collecting groundwater level and SPH measurements from wells:

No SPH in monitoring well

1. The electronic probe should be tested to ensure proper instrument response. If response is inadequate, replace batteries or repair probe as needed.
2. Well covers and caps will be opened and the water level allowed to equilibrate under atmospheric conditions. Observe for indications that water levels may not be at equilibrium such as:
    a. Escaping air upon loosening of well cap; or
    b. Water level above the top of the well screen.

    For either of these conditions, equilibrium should be verified by repeating water level measurements over five-minute intervals until successive equal measurements are obtained. Otherwise allow water levels to equilibrate for a minimum of five minutes before measurements are taken. Unless otherwise indicated in the work scope of site-specific sampling plan, water level measurements should be taken from the most contaminated wells first to avoid cross-contamination.
3. Locate the reference point on the well riser pipe.
4. Slowly lower the probe until the probe signal indicates that water has been contacted.
5. Record the depth-to-water (DTW) probe reading at the reference point. Measurements should be collected to the nearest 0.01 foot.
6. Withdraw the probe and repeat steps 5 and 6. Measurements should agree within a precision of 0.01 feet. Repeat if needed until a precision of 0.01 feet is obtained.
7. If the work scope or site specific sampling plan requires that the depth-to-bottom (DTB) of monitoring wells is measured, then the probe should be lowered to the bottom of the well and the DTB reading at the reference point should be measured to the nearest 0.01 foot.
8. Remove probe and decontaminate probe and leader that have come in contact with well water using alcohol wipes.

SPH in monitoring well

1. Repeat above steps 1 through 5.
2. Slowly lower the oil/water interface probe until the signal indicates that SPH has been contacted (generally a steady tone and signal light).
3. Record the depth-to-product (DTP) probe reading at the reference point. Measurements should be collected to the nearest 0.01 foot.
4. Continue lowering the probe until the signal indicates that water has been contacted (generally an intermittent tone and signal light).
5. Record the DTW probe reading at the reference point. Measurements should be collected to the nearest 0.01 foot.
6. Withdraw the probe and repeat steps 5 and 6. Measurements should agree within a precision of 0.01 feet. Repeat if needed until a precision of 0.01 feet is obtained.
7. Remove probe and initially decontaminate using alcohol wipes then wash/scrub in a detergent (Alconox®) solution, rinse with tap water, and a final deionized water rinse. Describe in field notes unusual characteristics of SPH that may bias thickness readings (e.g. unusually viscous product).
8. If unusual SPH thicknesses are detected (e.g. SPH is detected in well with no prior history of SPH or thicknesses are greater than prior detections), verify presence/thickness using alternative technique (e.g. bailer, tape and water/petroleum colorimetric paste).

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods used for obtaining surface soil samples for physical and/or chemical analysis. For purposes of this SOP, surface soil (including shallow subsurface soil) is loosely defined as soil that is present within 3 feet of the ground surface at the time of sampling. Various types of sampling equipment are used to collect surface soil samples including spoons, scoops, trowels, shovels, and hand augers.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Spoons, scoops, trowels, shovels, and/or hand augers. Stainless steel is preferred.
- Stainless steel bowls
- Field documentation materials
- Decontamination materials
- Personal protective equipment (as required by Health and Safety Plan)

3. METHODOLOGY

Project-specific requirements will generally dictate the preferred type of sampling equipment used at a particular site. The following parameters should be considered: sampling depth, soil density, soil moisture, use of analyses (e.g., chemical versus physical testing), type of analyses (e.g., volatile versus non-volatile). Analytical testing requirements will indicate sample volume requirements that also will influence the selection of the appropriate type of sampling tool. The project sampling plan should define the specific requirements for collection of surface soil samples at a particular site.

Collection of Samples

- Volatile Analyses. Surface soil sampling for volatile organics analysis (VOA) is different than other routine physical or chemical testing because of the potential loss of volatiles during sampling. To limit volatile loss, the soil sample must be obtained as quickly and as directly as possible. If a VOA sample is to collected as part of a multiple analyte sample, the VOA sample portion will be obtained first. The VOA sample should be obtained from a discrete portion of the entire collected sample and should not be composited or homogenized. Sample bottles should be filled to capacity, with no headspace. Specific procedures for collecting VOA samples using the EPA Method 5035 are discussed under a separate SOP.
- Other Analyses. Once the targeted sample interval has been collected, the soil sample will be thoroughly homogenized in a stainless steel bowl prior to bottling. Sample homogenizing is accomplished by manually mixing the entire soil sample in the stainless steel bowl with the sampling tool or with a clean teaspoon or spatula until a uniform mixture is achieved. If packing of the samples into the bottles is necessary, a clean stainless steel teaspoon or spatula may be used.

General Sampling Procedure:

- Decontaminate sampling equipment in accordance with the Sampling and Analysis Plan (SAP) before and after each individual soil sample.
- Remove surface debris that blocks access to the actual soil surface or loosen dense surface soils, such as those encountered in heavy traffic areas. If sampling equipment is used to remove surface debris,

the equipment should be decontaminated prior to sampling to reduce the potential for sample interferences.

- When using a hand auger, push and rotate downward until the auger becomes filled with soil. Usually a 6- to 12-inch long core of soil is obtained each time the auger is inserted. Once filled, remove the auger from the ground and empty into a stainless steel bowl. If a VOA sample is required, the sample should be taken directly from the auger using a teaspoon or spatula and/or directly filling the sample container from the auger. Repeat the augering process until the desired sample interval has been augered and placed into the stainless steel bowl.

Backfilling Sample Locations:

Backfill in accordance with federal and state regulations including OAR 690-240 (e.g., bentonite requirements). The soils from the excavation will be used as backfill unless project-specific or state requirements include the use of clean backfill material.

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods for observing and sampling from push-probes (i.e., GeoProbe™). Subsurface soil cores may be obtained using this system for purposes of determining subsurface soil conditions and for obtaining soil samples for physical and/or chemical evaluation. Grab groundwater samples may be collected using temporary well screens. Soil vapor samples may be obtained using temporary well points. Shallow (less than 50 feet), small-diameter (2-inch max) pre-packed wells may also be installed using push-probe equipment. This procedure is applicable during all Apex Companies, LLC (Apex) push-probe activities.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Traffic cones, measuring tape, spatula, and buckets/drums
- Sampling equipment (water level probe, pumps, tubing) and laboratory-supplied sample containers
- Field documentation materials
- Decontamination materials
- Personal protective equipment (as required by project Health and Safety Plan)

3. METHODOLOGY

Coring Procedure (Conducted by Drilling Subcontractor):

The sampling procedure includes driving a 2-inch outside-diameter, 5-foot-long, push-probe soil sampler to the desired depth using a combination of hydraulic pressure and mechanical hammer blows. When the sampling depth is reached, the pin attaching the sampler's tip is released (if a tip is used), which allows the tip to slide inside the sampler (Macro-Core Sampler with removable plastic liner). The sampler is driven the length of the sampler to collect a soil core, which is then withdrawn from the exploration. When the sampler is retrieved from the borehole the drive head/cutting shoe is detached and the liner is removed. Soil cores are collected continuously to the full depth of the exploration unless otherwise specified in a project-specific sampling and analysis plan (SAP). Verify that the subcontractor decontaminates the sampling device (per SOP 1.2) prior to its initial use and following collection of each soil sample.

Logging and Soil Sample Collection:

Remove the soil core from the sampler for field screening, description, and placement into sample jars. Soil samples will be collected for field screening and possible chemical analysis on two foot intervals unless otherwise specified in a project-specific SAP. The sampling interval will be determined in the field based on recovery, soil variability, and evidence of contamination. Complete field screening as specified in SOP-2.1. Soil samples should be collected using different procedures for volatile on non-volatile analyses, as follows.

- Volatile Analyses. Sampling for volatile organics analysis (VOA) is different than other routine physical or chemical testing because of the potential loss of volatiles during sampling. To limit volatile loss, the soil sample must be obtained as quickly and as directly as possible. If a VOA sample is to collected as part of a multiple analyte sample, the VOA sample portion will be obtained first. The VOA sample should be obtained from a discrete portion of the entire collected sample and should not be composited or homogenized. Sample bottles should be filled to capacity, with no headspace. Specific procedures for collecting VOA samples using the EPA Method 5035 are discussed in SOP 2.7.
- Other Analyses. Soil samples for non-volatile analyses will be thoroughly homogenized in a stainless steel bowl prior to bottling. Sample homogenizing is accomplished by manually mixing the entire soil

sample in the stainless steel bowl with a clean sampling tool until a uniform mixture is achieved. The sample jar should be filled completely.

Any extra soil generated during probing activities will be placed in Department of Transportation (DOT) approved drums.

Grab Groundwater Sample Collection:

Collect grab groundwater samples using a sampling attachment with a 4 to 5-foot-long temporary screen (decontaminated stainless steel or disposable PVC). Obtain samples using a peristaltic pump with new tubing for each boring. Record field parameters (e.g., temperature, conductivity, and pH) prior to sampling.

Backfilling the Excavation (Conducted by Drilling Subcontractor):

After sampling activities are completed, abandon each exploration in accordance with Oregon Water Resources Department (OWRD) regulations and procedures. The abandonment procedure typically consists of filling the exploration with granular bentonite and hydrating the bentonite with water. Match the surface completion to the surrounding materials.

1. PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) describes the methods for collection of groundwater samples from monitoring wells applying low flow protocols. Low flow sampling is a method of collecting samples that does not require the removal of large volumes of water and therefore does not overly agitate the water, suspend particles, or potentially aspirate VOCs. Typical flow rates for low flow sampling range from 0.1 L/min to 0.5 L/min depending on site characteristics. The groundwater monitoring activities will consist of measuring water levels, purging and sampling groundwater, and measuring groundwater field parameters. This procedure is applicable during all Apex Companies, LLC (Apex) low flow groundwater sampling activities.

2. EQUIPMENT AND MATERIALS

The following materials are necessary for this procedure:

- Traffic cones, tools, keys, and buckets/drums
- Sampling equipment (water level probe, pumps, tubing) and laboratory-supplied sample containers
- Field documentation materials
- Decontamination materials
- Personal protective equipment (as required by project Health and Safety Plan)

3. METHODOLOGY

Water Levels:

Water levels in the wells will be measured and recorded for the purpose of determining groundwater elevations and gradient. The wells will be opened and the water level allowed to equilibrate before the measurements are taken. Measurements of the depth to water will be made to the nearest 0.01 foot using an electronic probe.

Purging:

Purge using low-flow sampling equipment (e.g., peristaltic pump or bladder pump) at a rate no greater than the recharge rate of the groundwater to prevent water table drawdown. Unless specified otherwise in the project-specific sampling and analysis plan (SAP) the sample tubing/pump will be lowered to one foot below the water table (petroleum hydrocarbons) or to the middle of the screened interval (all other analytes). To assess the effectiveness of purging, groundwater field parameters (pH, electrical conductivity, and temperature) will be measured using a flow cell connected to the discharge tubing of the sample pump. Purging will be considered complete when the water quality parameters (i.e., pH, temperature, and specific conductance) stabilize within 10 percent for three consecutive 3-minute intervals. Consult the project-specific SAP for additional parameters and stabilization criteria. Purge water will be placed in Department of Transportation (DOT) approved drums.

Sample Collection:

After the purging of each well is complete, collect groundwater samples for chemical analyses using the same pump used for the well purging.

Low Yield Sampling Procedure:

If a well pumps dry during purging discontinue measurement of water quality parameters. Collect groundwater samples once the water level recovers to 90 percent of the pre-purge water column. Contact project manager in the event of slow recharge conditions. Always collect samples for VOC analysis as soon after recharge as possible.

Attachment C

City of Everett Land Use Map

Zoning Map

Site Investigation Work Plan
Cascade Plaza
Everett, Washington

City of Everett Growth Management Comprehensive Plan Land Use Map provided is found at http://www.everettwa.org/Get_PDF.aspx?pdfID=7665

Apex Companies, LLC
3015 SW First Avenue
Portland, Oregon 97201

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Attachment D

Aerial Photograph of the Site Vicinity

NOTES: Base map prepared from 2013 - Google Imagery.
Aerial dated May 4, 2013.

0 200 400

Approximate Scale in Feet

Aerial Photograph of Site Vicinity

Site Investigation Work Plan
Cascade Plaza
Everett, Washington

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