# INTERIM ACTION WORK PLAN

## Snopac Property, Uplands Source Control
## Seattle, Washington

Prepared for: 5055 Properties LLC

Project No. 150054 • June 4, 2019 • Public Review Draft

Aspect CONSULTING

earth + water

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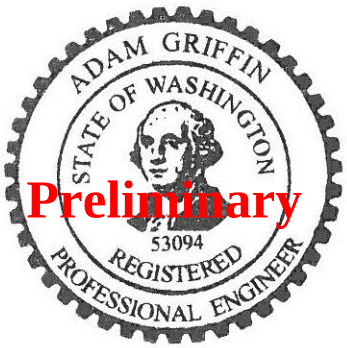


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# Executive Summary

This Interim Action Work Plan (Work Plan) was prepared by Aspect Consulting, LLC (Aspect), on behalf of 5055 Properties LLC, to describe interim action cleanup activities to be completed landward (east) of the planned sheet pile shoring wall located immediately landward of the mean higher high water (MHHW) at the Snopac Site (Site). The Site is generally located at 5055 and 5053 East Marginal Way South in Seattle, Washington (Property), and borders the eastern portion of Slip 1 of the Lower Duwamish Waterway (LDW) (Figure 1). The Site, as defined by Washington State's Model Toxics Control Act (MTCA), includes all upland and in-water areas impacted by historical releases of hazardous substances from the Property. 5055 Properties LLC is entering an Agreed Order with the Washington State Department of Ecology (Ecology) and this Work Plan is prepared to satisfy the requirements of the Agreed Order.

The 1.33-acre Property has supported various industrial uses since the 1920s and currently includes an approximately 23,600-square-foot building used for storage and staging of construction equipment. A makeshift retaining wall comprised of vertical steel plates interwoven into pilings that once supported a dock structure extends the full length of the LDW shoreline. Fill materials, including spent sandblast grit (SBG), were placed landward of the retaining wall to bring the area to current grade.

Based on Site explorations, Site soil units include a shallow fill material (Fill Unit) overlying native soil consisting of estuarine deposits (Estuarine Unit) underlain by native alluvium. The native alluvium (Alluvium Unit) is underlain by overconsolidated glacial deposits first observed at a depth of approximately 158 feet bgs. The Fill Unit is an unconfined, water-bearing unit that is tidally influenced by the LDW. The Estuarine Unit functions as an aquitard, restricting but not preventing groundwater flow between the Fill Unit and underlying Alluvium Unit. The net (tidally averaged) groundwater flow direction in both units is to the west, with discharge to the LDW. However, during high-tide periods, the nearshore groundwater flow direction in both units temporarily reverses to an eastward (landward) direction.

Site groundwater, groundwater seeps, soil, and Slip 1 sediments have been impacted by historical releases of hazardous substances from the Site property. As early as 2004, seep sampling conducted on the Slip 1 shoreface (Seep 76) confirmed the presence of metals in seeps at concentrations exceeding applicable Washington State Water Quality Standards. Notably, the detected arsenic concentrations in this seep were the highest reported in any LDW seeps sampled in 2004.

The SBG-containing fill located in the uplands landward (east) of the planned sheet pile shoring wall (Figure 2) is targeted for removal in this interim action. Data collected during the Site investigation work indicate that fill soils containing spent SBG collected from the shoreline area and base of the existing retaining wall contained elevated concentrations of arsenic, copper, lead and zinc. Elevated concentrations of tributyl tin (TBT), gasoline-, diesel-, and/or oil-range total petroleum hydrocarbons (TPH), carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and total polychlorinated biphenyls (PCBs) were also present in some of the soil samples. The estimated weight of SBG- containing fill soil to be excavated from the uplands during the interim action is approximately 3,500 tons.

The uplands interim action cleanup east of the shoring wall includes the following primary elements:

- **Shoring Wall Installation.** The sheet pile shoring wall will extend 32 feet below the estimated 13-foot-deep excavation bottom to support the excavation, for a total embedment depth of approximately 45 feet. Removal of subsurface obstructions (large debris) and localized regrading will likely be required for shoring wall construction.
- **Removal of Contaminated Fill Landward (East) of the Shoring Wall.** The excavation goal is to remove all fill materials containing SBG (to estimated depth of 13 feet bgs) and achieve soil remediation levels at the excavation limits. All excavated contaminated soil and debris will be disposed of off-Site at a permitted Subtitle D landfill. The removal will require excavation dewatering and strict adherence to project technical specifications. Means and methods for conducting the removal will be detailed in a separate Excavation and Dewatering Plan to be prepared by the Contractor and submitted to Ecology.
- **Engineering Controls.** Following completion of the interim action excavation and backfilling, 5055 Properties LLC will implement interim fencing and signage to restrict human access and use of the shoreface and tidelands until completion of the subsequent shoreface and in-water cleanup actions west of shoring wall.
- **Contingency Removal.** This interim action also includes a contingency to permanently remove any other upland contaminant source materials if encountered beneath the existing Site structure after it is demolished, and additional characterization is completed there.

The preliminary anticipated schedule of construction and Interim Action Work Plan milestones are as follows:

- **March through July 2019** – Complete remedial design and contracting, Agreed Order and Public Review Draft IAWP public review, Agreed Order execution and Final IAWP
- **July 2019** – Complete shoring wall installation
- **August through September 2019** – Excavation and disposal of contaminated fill materials, dewatering and water management, and excavation backfill

This schedule may be adjusted based on permitting, conditions encountered during the cleanup, and/or other factors. The implementation of interim action activities will not commence until Ecology approval of the Final IAWP. The completion of the Interim Action Work Plan is designed to satisfy the interim action requirements of the AO, and will be reported in the AO-deliverable, Interim Action Report.

# 1 Background and Goal for Interim Action

Aspect Consulting, LLC (Aspect) has prepared this Interim Action Work Plan (Work Plan), on behalf of 5055 Properties LLC, that describes interim action cleanup activities to be completed landward (east) of the planned sheet pile shoring wall located immediately landward of the mean higher high water (MHHW) at the Snopac Site (Site). The Site is generally located at 5055 and 5053 East Marginal Way South in Seattle, Washington (Property), and borders the eastern portion of Slip 1 of the Lower Duwamish Waterway (LDW) (Figure 1). The Site, as defined by Washington State's Model Toxics Control Act (MTCA), includes all upland and in-water areas impacted by historical releases of hazardous substances from the Property.

The 1.33-acre Property has supported various industrial uses since the 1920s. Physical improvements on the property include an approximately 23,600-square-foot building currently used for storage and staging of construction equipment. A makeshift retaining wall comprised of vertical steel plates interwoven into pilings that once supported a dock structure extends the full length of the LDW shoreline. Fill materials, including spent sandblast grit (SBG), were placed landward of the retaining wall to bring the area to current grade.

Site groundwater, groundwater seeps, soil, and Slip 1 sediments have been impacted by historical releases of hazardous substances from the Site. As early as 2004, seep sampling conducted on the Slip 1 shoreface (Seep 76) confirmed the presence of metals in seep discharge at concentrations exceeding applicable Washington State Water Quality Standards. Notably, the detected arsenic concentrations in this seep were the highest reported in any LDW seeps sampled in 2004 (Windward, 2004).

In June 2014, Ecology performed an Initial Investigation of the Site and completed a Site Hazard Assessment (SHA; Ecology, 2014a and 2014b). Ecology ranked the Site as a 2 on a scale of 1 to 5, where 1 indicates the highest relative risk and 5 the lowest. The exposure pathway that the SHA scored as the highest concern was the surface water to human and ecological receptors pathway. The data used to score this pathway were the Seep 76 arsenic results collected in 2004. Ecology subsequently notified 5055 Properties LLC via an Early Notice Letter that the Site was being added to Ecology's Confirmed and Suspected Contaminated Sites List (CSCSL) and was assigned a Cleanup Site ID #12463.

Since 2015, 5055 Properties LLC has been conducting independent remedial investigations at the Site. Aspect completed remedial investigations for the uplands portion of the Site. Integral Consulting, Inc. (Integral) conducted investigations and is assessing cleanup alternatives for the intertidal and subtidal portions of the Site, and the uplands soils on the shoreface that are seaward (west) of the planned sheet pile shoring wall. Considered collectively, Aspect's and Integral's Site investigations and cleanup plans have been intended to meet applicable requirements of Ecology's), MTCA Cleanup Regulations, Chapter 173-340 of the Washington Administrative Code (WAC), and the United States Environmental Protection Agency's (EPA) LDW Superfund Site Record of Decision (ROD). During the independent remedial action process, 5055 Properties LLC

met with and received informal technical consultation from Ecology LDW source control staff in accordance with MTCA 173-340-515(5), during a series of meetings held between 2016 and early 2018. Written opinions authorized pursuant to WAC 173-340-515(5)(a)-(c) were not provided by Ecology. 5055 Properties LLC and Ecology are currently negotiating an Agreed Order to complete a Remedial Investigation (RI), Feasibility Study (FS), and Draft Cleanup Action Plan for the Site.

5055 Properties LLC plans to redevelop the upland portion of the Site with a new commercial office building, with construction planned to start in summer 2019.[1] The planned footprint of the new building overlies part of the contaminated SBG-containing fill. The SBG-containing fill represents an ongoing source of contaminants to upland groundwater discharging to the sediments and surface waters of the LDW. Given the location of spent-SBG source material and Site-specific constraints including the instability of the existing shoreface, excavation and off-Site disposal of the SBG-containing fill is a well-demonstrated remedial approach for achieving permanent removal of the documented contaminant source.

Therefore, the removal of the SBG-containing fill will be conducted as an interim action in accordance with the purpose of an "Interim Action" defined in MTCA (WAC 173-340-430 (1)). MTCA allows for "Interim Actions" to occur "anytime during the cleanup process" as long as the interim action "does not foreclose reasonable alternatives for the cleanup action" per WAC 173-340-430 (3-4). This interim action permanently removes sources of contamination to groundwater and the LDW and will not conflict with reasonable alternatives for the final cleanup action as required by MTCA (WAC 173-340-430[3][b]).

Therefore, the interim action will proactively and permanently remove contaminated SBG-containing fill soils landward from the planned sheet pile shoring wall prior to start of the redevelopment project construction. This interim action also includes a contingency to permanently remove other potential upland contaminant source materials if encountered beneath the existing building after it is demolished and additional characterization is completed. The sampling and analysis plan for the additional characterization beneath the existing building will be submitted to Ecology under separate cover.

Prior to beginning of remedial excavation work, the existing building will be demolished, including its subsurface footings, leaving that area of the Site accessible for earthwork. Building demolition is not a component of this interim action.

This Work Plan is prepared as an exhibit to Agreed Order No. (16300) between 5055 Properties LLC and Ecology.

## 1.1 Work Plan Organization

The following sections of this Work Plan are as follows:

- **Section 2—Subsurface Conditions** presents a brief description of the subsurface conditions pertinent to the planned interim action.

[1] Demolition of the existing building will occur prior to the interim action and is not addressed in this Work Plan.

- **Section 3—Contaminated Fill to be Removed** describes the specific area and type of contaminated materials targeted for permanent removal during the interim action.
- **Section 4—Interim Action Remediation Levels** describes the constituents to be analyzed during performance monitoring and establishes the remediation levels for each analyte to be applied during the interim action.
- **Section 5—Interim Action Components** describes the various construction activities to be completed during the interim action.
- **Section 6—Permits and Other Requirements** describes permitting substantive requirements for conducting the interim action activities.
- **Section 7—Reporting** describes the reporting of interim action activities once completed.
- **Section 8—Schedule** describes the anticipated schedule milestones for accomplishing the interim action.
- **Section 9—References** lists the documents cited in this Work Plan.

Appendix A is a Sampling and Analysis Plan for Performance Monitoring that includes a Field Sampling Plan and Quality Assurance Project Plan (QAPP) for interim action performance monitoring in accordance with WAC 173-340-820. Appendix B includes a copy of the wastewater minor discharge authorization obtained from the King County Industrial Waste Program for the interim action. Appendix C includes the documentation for designation of the contaminated materials (waste) to be generated and disposed of during the interim action. Appendix D provides the basis for defining analytes for the interim action performance monitoring, and, as such, includes Site soil and groundwater quality data tables with comparison of data to screening levels.

# 2 Subsurface Conditions

This section provides a general description of the uplands subsurface conditions that have relevance for conducting the interim action activities.

The Duwamish River Valley is a subglacial valley created during the most recent glaciation by scour and erosion from meltwater channels beneath glacier ice. Dense/hard glacially consolidated deposits have been compacted beneath the weight of glacier ice and define the bottom of the valley. They are mantled by up to hundreds of feet of recent alluvium deposited by the Duwamish River, and by lahars/debris flows from Mt. Rainier. Locally, the recent alluvium is described as predominantly sandy with horizontal fine and coarse-grained lenses, including estuary peat and clay, deposited within the Duwamish River Valley. The deep geotechnical boring confirmed that the recent alluvium is underlain by glacially consolidated soils (Aspect, 2017).

In the early 20th century, the meandering Duwamish River was dredged, filled, and straightened to create a navigable waterway and associated developments. In areas where this filling took place, including at the Site, the recent alluvium is overlain by a variety of fill materials.

## 2.1 Hydrostratigraphic Units

Based on the Site explorations, four discrete, mappable soil units were identified at the Property. These soil units include a shallow unit comprised of fill material overlying native soil units consisting of estuarine deposits underlain by native alluvium. The native alluvium is underlain by overconsolidated glacial deposits observed at a depth of approximately 158 feet bgs (elevation -143 feet). Based on the existing information, the following three hydrostratigraphic units are identified as relevant to this interim action:

- **Fill Unit,** which across much of the Property consists of a heterogeneous mix of gravelly sand, silt, and silty sand with little or no anthropogenic debris (interpreted to be primarily hydraulic fill). In the western portion of the Property adjacent to the LDW, the Fill Unit consists of anthropogenic debris including spent SBG, railroad ties, coal fragments, glass shards, and brick or masonry fragments. This contaminated SBG-containing fill material generally extends to a depth of less than 10 feet bgs (elevation 6 feet) but extends to about 13 feet bgs (elevation 3 feet) in its western extent along the shoreline. The contaminated spent SBG-containing fill along the shoreline and east of the planned sheet pile shoring wall is the target for removal in this interim action.
- **Estuarine Unit** consists of very soft/loose organic silt and clay, with shells, abundant organic (wood) debris, and a sulfur-like odor. The Estuarine Unit is interpreted as generally laterally continuous across the Property, but with variable thickness (typically 3 to 6 feet). The thickness variation is attributed to west-draining alluvial channels incised into the intertidal estuarine surface prior to historical placement of the overlying fill. Based on this interpretation, there is a potential that the Estuarine Unit may have been fully eroded in localized areas, although it was observed every Site boring drilled to a depth greater than 10 feet.

The Estuarine Unit directly underlies the contaminated fill material where present and extends to a depth of about 16 feet bgs (elevation 0 feet).

- **Alluvium Unit** consists of interbedded very loose to medium dense sand, sandy to very sandy silt, and very soft to stiff low-plasticity clay and silt with variable organic content. The Alluvium Unit was observed to extend from the base of the Estuarine Unit to a depth of about 158 feet bgs, which is considerably below the base of the planned sheet pile shoring wall and the planned interim action excavation.

The hydrostratigraphic units are depicted in cross section on Figure 3.

## 2.2 Groundwater Conditions

The Fill Unit is a water table (unconfined), water-bearing unit that is tidally influenced by the LDW. Based on tidal study work conducted in 2017 and 2018, the tidally influenced water level elevations in the Fill Unit range from about 5 to 9 feet and an average elevation of approximately 7.5 feet NAVD88.[2]

The Estuarine Unit functions as an aquitard, restricting but not preventing groundwater flow between the Fill Unit and underlying Alluvium Unit. Although the aquitard does transmit groundwater and can thus be considered a leaky aquitard it's effective hydraulic separation of the two units is illustrated by the feet of head difference maintained between Fill Unit monitoring well MW-12 and Alluvium Unit MW-8 on the east side of the Property (see Figure 2). Based on the water level data from those two wells, there is a downward hydraulic gradient from the Fill Unit to the Alluvium Unit in the eastern portion of the Property. The magnitude of the vertical hydraulic gradient likely becomes less toward the west end of the Property, where both units discharge to the LDW.

A confined aquifer is present in the Alluvium Unit beneath the Estuarine Unit aquitard. The confined Alluvium Unit is also tidally influenced with water level elevations ranging from 4 to 7.5 feet and an average elevation of 6 feet NAVD88, based on the 2017 and 2018 tidal study work.

The net (tidally averaged) groundwater flow direction in both units is to the west, with discharge to the LDW. However, during high-tide periods, the nearshore groundwater flow direction in both units temporarily reverses to an eastward (landward) direction.

Following installation of the planned sheet pile shoring wall depicted on Figure 2, the hydraulic connection between the LDW and the Fill Unit east of it will largely be cut off other than limited connectivity through joints in the wall. However, the Fill Unit will remain in hydraulic communication with the LDW via flow north and south of the shoring wall. Because the Alluvium Unit extends below the bottom of the shoring wall, the Alluvium Unit will remain in hydraulic connection with the LDW, although the wall will create localized changes in groundwater flow directions.

[2] Elevations in this report referenced to North American Vertical Datum of 1988 (NAVD88).

## 2.3 Geotechnical Considerations During Excavation

The removal of soils in this setting present unique design considerations. This section discusses potential conditions that may occur during the interim action implementation and warrant conservative design analysis. This design consideration is necessary for establishing contractor project specifications that prevent or minimize these conditions.

The interim action approach will require, in some areas, fully excavating contaminated fill materials down to the top of the Estuarine Unit aquitard (estimated depth 13 feet; see Section 5), which potentially increases artesian pressures in the underlying Alluvium Unit. Fully removing the overlying weight of soil creates the potential that the bottom of the excavation (Estuarine Unit) will "heave" when advanced near or at its full depth. Heave occurs when the weight of the in-place soil layer at the excavation base is less than the artesian pressure pushing up on it from below, thus turning that native soil into a slurry (liquefies) with essentially no shear strength. Conducting the excavation to minimize potential for bottom heave, to the extent practical, is a performance criterion for the interim action.

The presence of the shoring wall is expected to have little influence on the potential for excavation bottom heave, because the artesian pressure is provided by the Alluvium that extends below the bottom of the shoring wall. Therefore, the Alluvium Unit will remain in hydraulic connection with the LDW tides and its tidally-influenced artesian pressures will be maintained.

The greatest potential for heave occurs where the greatest depth of excavation will occur, which is at the shoring wall face defining the western edge of excavation, and during times when Alluvium Unit water levels are highest in response to tidal fluctuations. The potential heave condition can be mitigated by conducting excavation when the underlying Alluvium Unit's artesian pressure (as expressed by groundwater elevation or "head") is below a threshold value, incorporating a factor of safety.[3] The alternative of installing/operating a separate dewatering system solely to depressurize the Alluvium Unit throughout excavation is not practicable in our judgement because it would require use of several deep, high-capacity wells along the landward perimeter of the excavation pumping large quantities of groundwater (attempting to suppress artesian pressures created by the LDW).

Based on an analysis of the potential for excavation bottom heave, excavation below elevation 7 feet NAVD88 will be constrained to times when the LDW tide is below elevation 1 feet NAVD88.

For purposes of remedial construction, LDW tide data could be used from either the Lockheed Shipyard tide station on Harbor Island (National Oceanic and Atmospheric Administration [NOAA] station 9447110, about two miles downstream of Property) or the Duwamish Waterway at 8th Avenue South tide station (NOAA station 9447029, about two miles upstream of Property). Based on review of data from the two stations, their concurrent tide elevations are consistently within 0.4 feet of each other, and tidal peaks

[3] Applying conservative assumptions and an engineering factor of safety of 1.25, the threshold Alluvium Unit groundwater elevation was calculated as elevation 5 feet NAVD88. Based on the available tidal study information, this groundwater elevation occurs when the LDW tide is at or below elevation 1 feet NAVD88.

occur within 12 minutes of each other, both of which are within the resolution of this analysis.

These design considerations are defined in the project technical specifications to be submitted to Ecology under separate cover. In addition, these project technical specifications require the contractor to submit an Excavation and Dewatering Plan to describe means and methods for meeting the project technical specifications. This contractor's Excavation and Dewatering Plan will also be submitted to Ecology. The submittal schedule is provided in Section 8.

# 3 Contaminated Fill to be Removed

The SBG-containing fill located in the uplands landward (east) of the planned sheet pile shoring wall (Figure 2) is targeted for removal in this interim action.

Data collected during the Site investigation work to date indicate that fill soils containing primarily contaminated spent SBG collected from the shoreline area and base of the existing retaining wall contained elevated concentrations of arsenic, copper, lead and zinc. Elevated concentrations of tributyl tin (TBT), gasoline-, diesel-, and/or oil-range total petroleum hydrocarbons (TPH), carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and total polychlorinated biphenyls (PCBs) were also present in some of the soil samples.

Based on the collective Site data, maximum contaminant concentrations detected in the SBG-containing fill targeted for removal in this interim action are as follows:

- Arsenic = 3,880 mg/kg
- Copper = 2,540 mg/kg
- Lead = 2,780 mg/kg
- Zinc = 9,700 mg/kg
- TBT = 5.6 mg/kg
- Gasoline-range TPH = 420 mg/kg
- Diesel-/oil-range TPH = 8,700 mg/kg
- Total cPAHs (TEC)[4] = 58 mg/kg
- Naphthalene = 24 mg/kg
- Total PCBs = 0.5 mg/kg

The sampling data indicate that elevated concentrations of metals (arsenic, copper, lead and zinc) are the most reliable indicators of contaminated spent SBG and paint wastes in the nearshore fill soil, with TBT, PAHs, and PCBs as secondary indicators. Appendix D contains existing Site soil and groundwater quality data tables, with data compared against screening levels. The soil and groundwater screening levels applied are the most stringent preliminary cleanup levels (PCULs) established in the 2019 LDW Preliminary Cleanup Level Workbook and Supplemental Information (Ecology, 2019).

Based on the results of a supplemental waste characterization sampling program completed in November 2018, the contaminated fill soil in the planned excavation area has been designated as non-dangerous solid waste and can therefore be disposed of in a non-hazardous waste (Subtitle D) landfill.

[4] Total toxic equivalent concentration of benzo(a)pyrene calculated in accordance with MTCA (WAC 173-340-708(8)).

To supplement the completed investigation data presented in Appendix D, the waste designation program included the following additional waste characterization steps:

- Aspect performed additional characterization of soil within the planned excavation area in accordance with a waste designation sampling and analysis plan prepared by DH Environmental (Attachment 6 in Appendix C). Random sample locations and depths were determined using the statistical sampling plan developed with Visual Sampling Plan (VSP), a software package developed by the U.S. Department of Energy's Pacific Northwest National Laboratory (Appendix C).
- Samples were collected from test pits at 15 locations within the estimated extent of excavation. One sample of the SBG-containing fill material was collected from each test pit and analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) for RCRA 8 metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) and select samples were analyzed for PCBs as required by the subtitle D landfill facilities. Leachable metals by the TCLP test were not detected in any sample. Each sample was also analyzed for selected total metals (arsenic, copper, lead, nickel, and zinc). The analytical results from the November 2018 waste designation samples are included in Table 1.
- To evaluate the fill soil relative to Washington state-only dangerous waste criteria, a dangerous waste characterization fish bioassay was conducted by Rainier Environmental on the soil sample (VSP-12-3.3) exhibiting the highest total metals concentrations (bioassay report provided as Attachment 5 in Appendix C). There was no fish mortality during the test.

Using results of the robust waste characterization sampling program and the investigation data in Appendix D, DH Environmental concluded that the target contaminated fill soils designate as non-dangerous solid waste upon excavation (Appendix C).

Based on the current data, the estimated length of the SBG-containing fill (parallel to the shoring wall) to be removed is roughly 240 feet and the estimated width (perpendicular to the shoring wall) averages approximately 40 feet. The depth of removal is greatest at the shoring wall with an estimated maximum depth of 13 feet bgs with the depth of removal decreasing to zero to the east (Figure 3). On this basis, the in-place volume of contaminated fill material to be removed is estimated at roughly 2,100 bank cubic yards (BCY). Assuming an in-place unit weight of 1.65 tons/BCY,[5] the estimated weight of contaminated fill soil to be excavated from the uplands during the interim action is approximately 3,500 tons.

[5] Assuming a bulking factor of 1.1, 1.65 tons/BCY is equivalent to a loose cubic yard (LCY) unit weight of 1.5 tons/LCY.

# 4 Interim Action Remediation Levels

Appendix D presents existing Site soil and groundwater quality data, and an analysis of the data to define the constituents to be analyzed for (analytes) during the interim action performance monitoring. The interim action performance monitoring analytes are:

- Metals (arsenic, copper, lead, mercury, and zinc)
- PAHs
- PCBs

In addition, TPH as gasoline-, diesel-, and oil-range organics will be analyzed for in the area around MW-2, where soil TPH concentrations exceed a generic direct contact soil cleanup level of 1,500 mg/kg (Ecology, 2017).

Because cleanup levels have not yet been determined for the Site, contaminated fill soil will be removed to comply with remediation levels defined for the interim action in accordance with WAC 173-340-355. The soil remediation levels for the analytes are the most stringent PCULs established in Ecology (2019) and the generic direct contact cleanup level for combined TPH (Ecology, 2017). Table 2 presents the soil remediation levels for the interim action.

# 5 Interim Action Components

The uplands interim action cleanup east of the shoring wall includes the following primary elements:

**Shoring Wall Installation.** A sheet pile shoring wall will be installed on the landward (east) side of the existing makeshift retaining wall to facilitate full removal of the spent SBG-contaminated fill to the east of it.[6] The proposed shoring wall alignment depicted on Figure 2 is based on the expected setback requirements relative to the ordinary high-water mark (OHWM) and adjacent property boundaries.

**Removal of Contaminated Fill Landward (East) of the Shoring Wall.** Removal of spent SBG-contaminated fill landward of the shoring wall will be accomplished using conventional earthwork equipment. Figure 2 shows the estimated lateral extent of excavation in plan view, and Figure 3 provides five interpreted cross sections through the planned excavation area. Based on the existing data, spent SBG-contaminated fill extends down to approximately 13 feet (maximum) below ground surface (bgs) at the shoring wall alignment.

Given the shallow water table at the Site and proximity to the LDW, dewatering of the excavation will be required to facilitate handling of soils, performance monitoring (excavation verification soil sampling), and excavation backfill. During excavation, soils will be monitored in the field for visual presence of spent SBG and/or paint wastes, and soil samples will be collected for chemical analysis from the excavation bottom and sidewalls without visual indications of SBG or paint wastes.

The excavation goal is to remove all fill materials containing SBG and paint wastes and achieve soil remediation levels at the excavation limits, and all excavated contaminated soil and debris will be disposed of off-Site at a permitted Subtitle D landfill. The completed excavation will be backfilled with imported clean aggregate and/or excavated soil that meets remediation levels and is geotechnically suitable for reuse, as further described below.

**Engineering Controls.** Following completion of the interim action excavation and backfilling, 5055 Properties LLC will implement interim fencing and signage to restrict human access and use of the shoreface and tidelands until completion of the subsequent shoreface and in-water source-removal actions west of shoring wall.

**Contingency Removal.** As stated in Section 1, this interim action also includes a contingency to permanently remove any other upland contaminant source materials if encountered beneath the existing Site structure after it is demolished, and additional characterization is completed there. If the additional characterization identifies any soil warranting removal during the interim action, the removal of the additional soil is expected to be conducted using the same procedures included in this Work Plan.

[6] The shoring wall will also facilitate removal of SBG-containing fill material from the shoreface and intertidal area immediately west of it in subsequent cleanup efforts.

The interim action activities other than the contingency action (which is uncertain) are described in greater detail below.

## 5.1 Mobilization and Site Preparation

Prior to the start of interim action earthwork, the contractor's pre-construction submittals to be prepared for owner approval include:

- **Temporary Erosion and Sedimentation Control (TESC) Plan** describing erosion and sedimentation control Best Management Practices (BMPs) to be installed to manage and prevent stormwater and fugitive dust emissions from leaving the Site. The TESC Plan and BMPs implemented shall comply with City of Seattle and King County requirements.
- **Excavation and Dewatering Plan** that describes in detail the contractor's planned means and methods for completing concurrent excavation, dewatering, and backfill to meet specified performance criteria, including treating and discharging extracted water to sanitary sewer and disposing of contaminated materials off-Site. The Excavation and Dewatering Plan will be submitted to Ecology according to the schedule in Section 8.

  The project technical specifications are largely "performance-based," in that they specify required outcomes but rely on the contractor to propose the most efficient means and methods (within specified constraints) of achieving those outcomes. This approach takes advantage of the contractor's previous experience with similar projects and places the contractor in more of an "ownership" role with respect to the construction means and methods to be employed.

Mobilization and construction site preparation activities include:

- Mobilize construction equipment, materials, and utilities (e.g., electrical generators)
- Mobilize, install, and test dewatering and water treatment systems (refer to Sections 4.3.1 and 4.3.2)
- Construct bermed and lined soil stockpile area(s) for contaminated materials, and a separate stockpile area for potentially clean soil excavated to access contaminated soil
- Construct temporary erosion and sedimentation controls
- Remove or reroute any active utilities that may be impacted by the cleanup activities
- Decommission monitoring wells that are within the footprint of the planned excavation (refer to Figure 2). Monitoring wells located outside of the planned excavation footprint will be protected if practicable; otherwise, they will be decommissioned and replaced. Monitoring well decommissioning will be performed in accordance with the provisions of Chapter 173-160 WAC.

## 5.2 Sheet Pile Shoring Wall

The proposed shoring wall alignment shown on Figure 2 extends approximately 290 feet laterally to the north and south Property boundaries, or roughly 20 feet beyond the long dimension of the anticipated excavation limits. On a preliminary basis, the shoring wall will need to extend some 32 feet below the estimated 13-foot-deep excavation bottom to support the excavation, for a total embedment depth of approximately 45 feet (elevation -29 feet NAVD88; the upper portion of the wall is depicted on Figure 3). Removal of subsurface obstructions (large debris) and localized regrading will likely be required to install the shoring wall. Any contaminated materials generated during these activities will be handled with the contaminated fill soils generated during the interim action excavation.

KPFF Consulting Engineers is the engineer of record for the shoring wall design. The contractor will be responsible for the installation of the shoring wall, and the geotechnical engineer of record will be responsible for its installation oversight. The shoring wall engineering plans prepared by others will be submitted to Ecology under separate cover according to the submittal schedule in Section 8.

## 5.3 Soil Excavation and Backfilling

As stated above, the interim action involves excavation and proper off-Site disposal of all contaminated SBG-containing fill located east of shoring wall, with concurrent dewatering to facilitate soil removal and handling. Once the interim action cleanup goals are achieved, the excavation will be backfilled with imported clean aggregate and compacted as specified by the project geotechnical engineer of record.

### *5.3.1 Excavation and Dewatering*

The estimated 3,500 tons of contaminated fill soil to be excavated extends from ground surface (nominal elevation 16 feet NAVD88) to depths ranging from approximately 5 feet bgs on the east side, at the western limit of the existing building, to 13 feet bgs adjacent to the new shoring wall on the west side (bottom elevations ranging from 11 to 3 feet NAVD88 from east to west). The tidally influenced water levels in the excavation area are estimated range in elevation from about 5 to 9 feet and average approximately 7.5 feet NAVD88. To minimize water handling requirements and reduce the risk of bottom heave in the deepest portions of the excavation[7], the contractor will comply with the following performance criteria during the excavation and dewatering work:

- Dewater excavations as needed to maintain unsaturated conditions to facilitate soil excavation/handling/loading for transport, verification soil sampling in the excavation, and excavation backfilling.
- To limit the potential for heave of the excavation bottom, conduct excavation below elevation 7 feet only during time periods when the LDW tide is below elevation 1 foot NAVD88.
- Minimize the area of open excavation below elevation 7 feet at any one time.

[7] Refer to Section 2.3.

The contractor will be responsible for final design in their Excavation and Dewatering Plan they will submit for owner approval prior to start of construction, and for implementation of a dewatering system that is compatible with the soil excavation methods. Depending on observed groundwater conditions during excavation near the north/south ends of the excavation, the contractor has the option to install supplemental groundwater cutoff walls ("wing walls") tied into the shoring wall to further reduce the flow of groundwater coming from the LDW around the north/south ends of the shoring wall.

If excavated soils are saturated, they will be drained directly back into the excavated area prior to loading. Care will be taken so that groundwater from the excavation bucket flows back into the excavation and not to adjacent areas.

### 5.3.2 Water Management

All construction-generated wastewater will be pretreated on-Site and discharged to sanitary sewer under King County Industrial Waste (KCIW) Issuance of Wastewater Discharge Authorization No. 1092-01 (discharge authorization) obtained for the project and attached as Appendix B. Sources of water to be managed include the excavation dewatering system and stormwater generated within the project site. On-Site pretreatment will include retention in holding tank(s) for removal of settleable solids. The water treatment system will include flow metering and conveyance piping from the source areas to the treatment system inlet and from the treatment system outlet to the point of sanitary sewer discharge.

The KCIW discharge authorization for the project constrains the rate of discharge to sewer to a maximum instantaneous rate of 100 gallons per minute (gpm) and a maximum daily rate of 72,000 gallons per day (gpd). All pre-treatment, discharge monitoring and reporting will be in accordance with the requirements of the KCIW discharge authorization in Appendix B.

### 5.3.3 On-Site Materials Excavation and Segregation

The estimated extents of excavation for the interim action are shown on Figure 2 and in five cross-sections on Figure 3. Figure 2 depicts the estimated lateral extent of the contaminated fill east of the shoring wall (gray dashed line), which is the anticipated remedial excavation area bottom based on the current understanding of subsurface conditions. Temporary excavation sidewalls will be sloped and extend laterally beyond the excavation bottom as needed to maintain a stable excavation, and the corresponding estimated total extent of excavation (excavation top) is depicted in green hatching on Figure 2.

Throughout excavation of the known contaminated fill soils east of the shoring wall, the engineer will conduct field screening and direct segregation of all excavated materials according to the following types:

1. Potential Clean Soil
2. Contaminated Soil
3. Contaminated Debris

Visual field screening will rely on the visual presence of spent SBG that contains paint chips, which are visually apparent based on the November 2018 test pit work. Soils with no visual presence of SBG can be segregated as potential clean soil, to be stockpiled on-Site and verified as clean or not with analytical testing. If any SBG is visually present in the soil it will be segregated as contaminated soil. Where the contaminated soil extends to the top of the Estuarine unit (Figure 3), visual screening will also include the organic content of Estuarine unit soils to determine the excavation bottom.

Soils that are judged by the engineer to be contaminated based on field screening do not require sampling/analysis prior to load-out for off-Site treatment/disposal, if there are no free-draining liquids which warrant additional dewatering. However, if the contractor chooses to stockpile contaminated soil prior to loading for off-Site disposal, the ground surface in that stockpile area will be lined/sealed to prevent contaminated soil from contacting underlying materials. Stockpile management is discussed in Section 5.3.3.3.

#### 5.3.3.1 Potential Clean Soil

The potential clean soil will be stockpiled on site pending completion of analysis of interim action analytes (Table 2) by an Ecology-accredited laboratory to confirm its designation as contaminated soil or not. Stockpiles of potential clean soil will not exceed 20 cubic yards in size for the purpose of designation testing for disposition, and each stockpile will have one representative five-point composite sample to determine its compliance with the remediation levels and thus its disposition.

Potential clean soil stockpiles containing a detected interim action analyte concentration exceeding the soil remediation levels will be properly disposed of off Site as contaminated soil. Stockpiles of potential clean soil with no detections, or detections below soil remediation levels will be evaluated for reuse by the geotechnical engineer of record. If unsuitable for reuse, the clean soil will be transported off Site by the contractor.

#### 5.3.3.2 Contaminated Debris

During excavation to remove soil, subsurface debris will be encountered. Contaminated soil stockpiles cannot contain any non-wood debris whose largest dimension exceeds 1 foot, wood debris whose largest dimension exceeds 6 feet, or a total debris content that exceeds 10 percent by volume of the total waste stream based on disposal facility acceptance requirements. Any debris that does not meet these criteria will be segregated and managed as contaminated debris as directed by the engineer, and in accordance with the Specifications.

#### 5.3.3.3 Stockpile Management

If temporary stockpiling of excavated materials is needed during the interim action activities, the contractor will stockpile the excavated material in a location that will not hinder completion of the cleanup activities. Stockpiles will be located away from storm-drain catch basins and more than 50 feet from the LDW shoreline. Materials will be transported on Site in a way to limit spillage of materials between the excavation location and the stockpile location.

Stockpiles of Potential Clean Soil, Contaminated Soil, and Contaminate Debris will be segregated such that intermixing does not occur.

Each stockpile will be underlain by plastic sheeting with a minimum 10-mil thickness, with adjacent sheeting sections continuously overlapped by a minimum of 3 feet. The ground surface on which the sheeting will be placed will be free of objects that could damage the sheeting. Alternatively, a layer of geotextile or plywood may be placed beneath the sheeting to protect it. The stockpile area will be surrounded by straw bales or equivalent to limit transport of sediment potentially generated from the stockpiles.

Each stockpile will be covered by plastic sheeting of minimum 10-mil thickness to prevent precipitation from entering the stockpiled material. Each stockpile cover will be anchored (e.g., using sand bags) sufficiently to prevent it from being removed by wind. All stockpiles will be covered when not in use, and as needed, during periods of rain and wind to prevent transport of soil.

Water accumulating in the stockpile area will be pumped to the contractor's on-Site water treatment system and handled according to conditions of the KCIW discharge authorization.

### 5.3.4 Performance Monitoring and Over-Excavation

When field screening indicates that contaminated fill soils have been removed from a portion of the excavation, excavation sidewall and bottom verification soil samples will be collected for laboratory analysis to confirm compliance with the soil remediation levels defined in Table 2. The soil samples will be collected from within the excavation using the excavator bucket, or by hand if safely accessible to a worker.

Excavation bottom samples will be collected on a systematic 20-foot grid (one representative sample per 20-foot by 20-foot square), or at least 12 bottom samples along the approximately 240-foot-long (parallel to the shoreline) excavation to verify soil remediation levels are achieved at the bottom of the excavation.

Excavation sidewall sampling will be conducted to document that the lateral extent of soil exceeding remediation levels has been removed on the northern, eastern, and southern extents of the remedial excavation area. The excavation will be advanced to the planned shoring wall to the west and therefore no sidewall samples will be collected from the western sidewall of the excavation. Sidewall samples will be collected at a horizontal spacing of approximately 20 feet and at 4-foot-depth intervals of 0 to 4 feet and 4 to 8 feet (depths below 8 feet will be verified with bottom samples based on estimated depth of excavation away from the shoring wall). One representative soil sample will be collected from each sidewall grid location at each depth interval. A total of 28 sidewall samples are estimated based on this sampling frequency. Field sampling and analytical procedures for the performance monitoring program are described in the Sampling and Analysis Plan included as Appendix B.

Where the concentration of any interim action analyte in an excavation sidewall sample exceeds the remediation level, the length of sidewall represented by the sample will be over-excavated at least 1 foot laterally, if practicable, subject to the requirements in the plans and specifications. If field screening at the new sidewall location indicates the remediation levels are met, then a new sidewall verification sample will be collected at that location and submitted for analysis.

Where the concentration of any interim action analyte in an excavation bottom sample exceeds the remediation level, the excavation will be deepened in the area represented by

the sample by at least 1 foot, if feasible, followed by collection of a new bottom verification sample. Unmanageable dewatering rates, excavation bottom heaving, and/or other unstable excavation conditions could all affect the feasibility of over-excavation.

### 5.3.5 Off-Site Disposal of Contaminated Materials

All soil and debris removed that is designated by engineer as contaminated will be loaded and transported off-Site for disposal at a permitted Subtitle D landfill. Trucks transporting contaminated materials from the Site will comply with applicable state and federal regulations and local ordinances and will be covered from the time they are loaded on-Site until they off-load at the designated off-Site disposal facility.

### 5.3.6 Backfilling the Excavation

Once the interim action goal is met, the completed excavation will be backfilled to a predetermined final grade with a combination of excavated "clean" soils (stockpiled on site) and virgin aggregate imported from a Washington State Department of Transportation (WSDOT)-approved source. Imported backfill and compaction requirements will be determined by the geotechnical engineer of record.

# 6 Permits and Other Requirements

The interim action will be performed under the Agreed Order, and it is therefore exempt from the procedural requirements of Chapters 70.94 (Washington Clean Air Act), 70.95 (Solid Waste Management Act), 70.105 (Hazardous Waste Management Act), 90.48 (Water Pollution Control), and 90.58 (Shoreline Management Act) Revised Code of Washington (RCW), and of laws requiring or authorizing local government permits or approvals. However, the interim action must still comply with the substantive requirements of such permits or approvals (WAC 173-340-520). In addition, the interim action is not exempt from federal permits.

The starting point for Applicable or Relevant and Appropriate Requirements (ARARs) is MTCA regulations (Chapter 173-340 WAC) that address implementation of a cleanup and define cleanup standards under the MTCA statute (Chapter 173.105D RCW). Other ARARs include, but is not limited, to the following:

1. State Water Pollution Control Act (Chapter 90.48 RCW)
2. Water Resources Act (Chapter 90.54 RCW)
3. Applicable surface water quality criteria published in the water quality standards for surface waters of the State of Washington (Chapter 173-201A WAC)
4. Applicable surface water quality criteria published under Sections 303(c) and 304 of the Clean Water Act
5. Washington State Hazardous Waste Management Act (Chapter 70.105 RCW)
6. State Dangerous Waste Regulations (Chapter 173-303 WAC)
7. Solid Waste Management-Reduction and Recycling (Chapter 70.95 RCW)
8. Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 RCW)
9. Washington Clean Air Act (Chapter 70.94 RCW)
10. Puget Sound Clean Air Agency Regulations (http://www.pscleanair.org)
11. Occupational Safety and Health Act (OSHA), 29 CFR Subpart 1910.120
12. Washington Industrial Safety and Health Act (WISHA)
13. Shoreline Management Act (Chapter 90.58 RCW)
14. Archaeological and Cultural Resources Act (Chapter 27.53 RCW)
15. State Environmental Policy Act (SEPA; Chapter 43.21C RCW, Chapter 197-11 WAC, and Chapter WAC 173-802)

Section 6.1 describes the State Environmental Policy Act (SEPA) and permit substantive requirements applicable to conducting the interim action activities. No federal permits will be required because the interim action will be limited to the uplands (above MHHW)

and will not include any in-water work. Section 6.2 describes other requirements for conducting the interim action.

## 6.1 Permitting and Substantive Requirements

### 6.1.1 City of Seattle Master Use Permit

Because Site redevelopment activities will occur quickly following completion of the interim action cleanup, 5055 Properties LLC has applied for a City of Seattle (City) Master Use Permit (MUP) for the demolition of the existing building, the interim action, and initial redevelopment activities. The City's MUP process incorporates City of Seattle Shoreline Master Program (SMP) requirements and zoning requirements, and it includes public notice. The pending MUP covers demolition of the existing on-Site building, installation of the sheet pile shoring wall along the shoreline, the interim action (soil removal landward of shoring wall), and ground improvement and subgrade preparation to meet current seismic standards for the redevelopment. Construction of the new building is covered under a subsequent MUP. 5055 Properties LLC will obtain and comply with all provisions of the MUP.

### 6.1.2 State Environmental Policy Act (SEPA)

Compliance of the interim action activities with SEPA, Chapter 43.21C RCW, will be achieved by conducting a SEPA review in accordance with applicable regulatory requirements, including WAC 197-11-268, and Ecology guidance as presented in Ecology Policy 130A (Ecology, 2004). In accordance with the City of Seattle MUP permitting for this project, 5055 Properties LLC has undergone the preparation of a SEPA Checklist and SEPA review, which will be completed prior to interim action implementation, and will include a SEPA determination by the City of Seattle.

### 6.1.3 KCIW Discharge Authorization

5505 Properties LLC has obtained a KCIW minor discharge authorization to allow discharge to sanitary sewer of industrial wastewater (excavation dewatering water and stormwater runoff) generated during the interim action (Appendix B). The discharge authorization imposes maximum instantaneous and daily discharge volume limitations and numerical water quality limits for wastewater discharged. It also requires monitoring of the quantities and chemical quality of water discharged and submittal of the monitoring data to King County to demonstrate permit compliance. The discharge authorization is predicated on discharge during the dry season and is valid for the time period of June 1 through August 31, 2019. All project-generated wastewater will either infiltrate or be discharged to sanitary sewer; the project will not result in discharge to surface waters of Washington State.

### 6.1.4 City of Seattle Grading Permit

Soil excavations exceeding 50 cubic yards are subject to a grading permit from the City of Seattle Department of Construction and Inspections (SDCI). The grading permit is incorporated into the MUP. Substantive requirements of the grading permit include erosion control, which is addressed by implementation BMPs in accordance with the project-specific TESC Plan.

## 6.2 Other Requirements

This subsection provides a description of additional requirements that will be addressed during planning and execution of the interim action.

### *6.2.1 Monitoring Well Decommissioning*

Groundwater monitoring wells located within the footprints of interim action excavation will be properly decommissioned, prior to start of excavation, in accordance with the requirements of Chapter 173-160 WAC. The need for replacement monitoring wells in the interim action area will be determined in consultation with Ecology when preparing the plan for groundwater compliance monitoring in accordance with the final Cleanup Action Plan (CAP) for the Site under the Agreed Order.

### *6.2.2 Archaeological Resources*

The interim action excavation work will occur in the non-native fill underlain by native soils (Estuarine Unit). Therefore, there is a low likelihood for encountering archaeological materials. However, if the Estuarine Unit native soil horizon is encountered, the materials excavated from it and immediately above it will be observed closely by the environmental professional overseeing the interim action activities, with attention paid to looking for evidence of potential archaeological materials (e.g., animal bone, fire-modified rock (FMR), concentrations of shell, ground/flaked stone tools and flaked stone tool-making debris, burned earth, cordage or fiber, organically stained sediments, charcoal, ash, and exotic rocks and minerals).

According to the schedule in Section 8, a Cultural Resources Assessment and Inadvertent Discovery Plan will be submitted to Ecology prior to the interim action. If potential archaeological materials are observed in the excavation, work will be stopped, and 5055 Properties LLC will mobilize a professional archaeologist to the excavation location to observe and assess the materials encountered and determine the appropriate path forward in accordance with applicable laws and regulations.

# 7 Reporting

Within 90 days of completing the interim action construction activities and receipt of all construction reporting and laboratory analytical data, 5055 Properties LLC will submit to Ecology an Interim Action Report as required by the Agreed Order. Information provided in the Interim Action Report will include a description of the lateral and vertical limits of excavations, the volume of contaminated material removed/landfilled, how the contaminated media was managed, volume of groundwater pumped during excavation dewatering, and the performance monitoring data. Certificates of Disposal for the waste disposition will also be included.

The analytical data collected during the interim action will also be uploaded to Ecology's Environmental Information Management (EIM) database within 60 days after it being validated. The results of the interim action will also subsequently be incorporated into the Site RI and FS.

# 8 Schedule

The interim action includes design-related information to be submitted to Ecology. The submittals and their respective schedule for submitting to Ecology are listed below. The interim action will proceed after all project permitting is completed and after Ecology has reviewed and provided feedback (approval or acknowledgement of receipt) on all documents as follows:

| **Interim Action Submittal** | **Submittal Schedule** |
|---|---|
| Project Plans and Technical Specifications | No more than 10 days after effective date of Agreed Order. |
| Excavation and Dewatering Plan (by Contractor) | No more than 10 days after effective date of Agreed Order. |
| Sampling and Analysis Plan for Additional Characterization | At least 30 days prior to sampling activities. |
| Shoring Design Plans (by Others) | No more than 10 days after effective date of Agreed Order. |
| Imported Fill Quality | At least 30 days prior to placement of any imported backfill. |
| Cultural Resources Assessment and Inadvertent Discovery Plan | No more than 10 days after effective date of Agreed Order. |
| Health and Safety Plan | No more than 10 days after effective date of Agreed Order. |

The preliminary anticipated schedule of construction and Interim Action Work Plan milestones for the interim action are as follows:

- **March through July 2019** – Complete remedial design and contracting, Agreed Order and Public Review Draft IAWP public review, Agreed Order execution and Final IAWP.
- **July 2019** – Complete shoring wall installation.
- **August through September 2019** – Excavation and disposal of contaminated fill materials, dewatering and water management, and excavation backfill.

The implementation of interim action activities will not commence until Ecology approval of the Final IAWP. This schedule may be adjusted based on permitting, conditions encountered during the cleanup, and/or other factors.

# 9 References

Aspect Consulting, LLC (Aspect), 2017, Conceptual Phase Geotechnical Report, 5055 East Marginal Way S, July 20, 2017

Washington State Department of Ecology (Ecology), 2004, Toxics Cleanup Program Policy 130A, Coordination of SEPA and MTCA, Revised July 28, 2004.

Washington State Department of Ecology (Ecology), 2009, Lower Duwamish Waterway RM 0.9 to 1.0 East (Slip 1) Source Control Action Plan, May 2009.

Washington State Department of Ecology (Ecology), 2014a, Letter to Sir or Madam, Snopac Property, RE: Early Notice Letter: Facility Site # 1523145, Snopac Property. October 10, 2014.

Washington State Department of Ecology (Ecology), 2014b, Letter to Sir of Madam, Snopac Property, RE: Site Hazard Assessment – Snopac Property, Ecology FS ID: 1523145 / CD ID: 12463. November 26, 2014.

Washington State Department of Ecology (Ecology), 2016, Lower Duwamish Waterway Source Control Strategy, June 2016.

Washington State Department of Ecology (Ecology), 2017, Model Remedies for Sites with Petroleum Contaminated Soils, Revised December 2017.

Washington State Department of Ecology (Ecology), 2019, Lower Duwamish Waterway Preliminary Cleanup Level Workbook – Supplemental Information, April 5, 2019.

Windward Environmental (Windward), 2004, Data Report: Survey and Sampling of Lower Duwamish Waterway Seeps Final, November 18, 2004.

# 10 Limitations

Work for this project was performed for 5055 Properties LLC (Client), and this report was prepared in accordance with generally accepted professional practices for the nature and conditions of work completed in the same or similar localities, at the time the work was performed. This report does not represent a legal opinion. No other warranty, expressed or implied, is made.

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# TABLES

## Table 1. Waste Characterization - Soil Analytical Results

DRAFT

Project No. 150054, Snopac Site, Seattle, WA

| Analyte | Units | Soil Cleanup Level (mg/kg) | Location: VSP-01<br>Sample Date: 11/12/2018<br>Sample Name: VSP-1-2.2<br>Sample Depth: 2.2 ft | VSP-02<br>11/12/2018<br>VSP-2-5.1<br>5.1 ft | VSP-03<br>11/12/2018<br>VSP-3-3.6<br>3.6 ft | VSP-04<br>11/12/2018<br>VSP-4-4.5<br>4.5 ft | VSP-05<br>11/12/2018<br>VSP-5-2.6<br>2.6 ft | VSP-06<br>11/13/2018<br>VSP-6-6.2<br>6.2 ft | VSP-07<br>11/12/2018<br>VSP-7-8.2<br>8.2 ft | VSP-08<br>11/12/2018<br>VSP-8-5.6<br>5.6 ft | VSP-09<br>11/12/2018<br>VSP-9-3.2<br>3.2 ft | VSP-10<br>11/13/2018<br>VSP-10-4.6<br>4.6 ft | VSP-11<br>11/12/2018<br>VSP-11-5.6<br>5.6 ft | VSP-12<br>11/12/2018<br>VSP-12-3.3<br>3.3 ft | VSP-13<br>11/13/2018<br>VSP-13-2.2<br>2.2 ft | VSP-14<br>11/12/2018<br>VSP-14-4.1<br>4.1 ft | VSP-15<br>11/12/2018<br>VSP-15-4.8<br>4.8 ft |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Total Metals | | | | | | | | | | | | | | | | | |
| Arsenic | mg/kg | 7.3 | **816** | **15.5** | **2.54** | **337** | **15.4** | **17.5** | **1.95** | **207** | **57** | **135** | **17.3** | **3880** | **1340** | **95.4** | **3.3** |
| Copper | mg/kg | 36 | **603** | **51.8** | **85.3** | **214** | **51.1** | **52.2** | **124** | **154** | **72.2** | **87.7** | **33.1** | **2540** | **803** | **107** | **21.7** |
| Lead | mg/kg | 81 | **605** | **221** | **5.08** | **268** | **99.9** | **69.7** | **4.88** | **179** | **154** | **124** | **52.5** | **2780** | **1130** | **157** | **22.9** |
| Nickel | mg/kg | | < 50 U | **17.1** | **13 J** | < 25 U | **17.6** | **7.46** | **15.7 J** | **10.9** | **16.3** | **21** | **5.98** | < 125 U | < 50 U | **19.7** | **5.44** |
| Zinc | mg/kg | 86 | **2250** | **221** | **38.2** | **923** | **151** | **77.6** | **49.6** | **626** | **284** | **401** | **97.6** | **9700** | **3630** | **393** | **21.7** |
| PCB Aroclors | | | | | | | | | | | | | | | | | |
| Aroclor 1016 | mg/kg | | -- | < 0.02 U | -- | -- | -- | < 0.02 U | -- | < 0.02 U | -- | -- | -- | -- | -- | < 0.02 U | -- |
| Aroclor 1221 | mg/kg | | -- | < 0.02 U | -- | -- | -- | < 0.02 U | -- | < 0.02 U | -- | -- | -- | -- | -- | < 0.02 U | -- |
| Aroclor 1232 | mg/kg | | -- | < 0.02 U | -- | -- | -- | < 0.02 U | -- | < 0.02 U | -- | -- | -- | -- | -- | < 0.02 U | -- |
| Aroclor 1242 | mg/kg | | -- | < 0.02 U | -- | -- | -- | < 0.02 U | -- | < 0.02 U | -- | -- | -- | -- | -- | < 0.02 U | -- |
| Aroclor 1248 | mg/kg | | -- | < 0.02 U | -- | -- | -- | < 0.02 U | -- | < 0.02 U | -- | -- | -- | -- | -- | < 0.02 U | -- |
| Aroclor 1254 | mg/kg | | -- | **0.044** | -- | -- | -- | < 0.02 U | -- | **0.24** | -- | -- | -- | -- | -- | **0.37** | -- |
| Aroclor 1260 | mg/kg | | -- | **0.064** | -- | -- | -- | < 0.02 U | -- | < 0.02 U | -- | -- | -- | -- | -- | < 0.02 U | -- |
| Aroclor 1262 | mg/kg | | -- | < 0.02 U | -- | -- | -- | < 0.02 U | -- | < 0.02 U | -- | -- | -- | -- | -- | < 0.02 U | -- |
| Aroclor 1268 | mg/kg | | -- | < 0.02 U | -- | -- | -- | < 0.02 U | -- | < 0.02 U | -- | -- | -- | -- | -- | < 0.02 U | -- |
| Total PCB Aroclors | mg/kg | 0.2 | -- | **0.11** | -- | -- | -- | na | -- | **0.24** | -- | -- | -- | -- | -- | **0.37** | -- |
| TCLP Metals | | | | | | | | | | | | | | | | | |
| Arsenic | mg/L | | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U |
| Barium | mg/L | | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U |
| Cadmium | mg/L | | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U |
| Chromium | mg/L | | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U |
| Lead | mg/L | | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U |
| Mercury | mg/L | | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U | < 0.1 U |
| Selenium | mg/L | | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U |
| Silver | mg/L | | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U | < 1 U |

**Notes**

Bold - detected

Blue highlight - exceeded soil cleanup level

U - not detected at or above the reporting limit shown

J - estimated concentration

# Table 2. Soil Remediation Levels for Interim Action

DRAFT

Project 150054 - Snopac Site, Seattle, WA

| Indicator Hazardous Substance | Soil Remediation Levels (mg/kg) | |
|---|---|---|
| | Vadose Zone Soil | Saturated Zone Soil |
| **Metals** | | |
| Arsenic | 7.3 | 7.3 |
| Copper | 36 | 36 |
| Lead | 250 | 250 |
| Mercury | 0.07 | 0.07 |
| Zinc | 100 | 85 |
| **Polycyclic Aromatic Hydrocarbons (PAH)** | | |
| 1-Methylnaphthalene | 29 | 29 |
| 2-Methylnaphthalene | 0.67 | 0.67 |
| Acenaphthene | 0.5 | 0.028 |
| Acenaphthylene | 1.3 | 1.3 |
| Anthracene | 0.96 | 0.051 |
| Chrysene | 0.13 | 0.13 |
| Fluoranthene | 1.7 | 0.09 |
| Fluorene | 0.54 | 0.029 |
| Naphthalene | 0.039 | 0.0021 |
| Phenanthrene | 1.5 | 1.5 |
| Pyrene | 2.6 | 0.14 |
| Total HPAHs | 12 | 12 |
| Total LPAHs | 5.2 | 5.2 |
| Total cPAHs TEQ | 0.00031 | 0.000016 |
| **Polychlorinated Biphenyls (PCB)** | | |
| Total PCB Aroclors | 0.000043 | 0.0000022 |
| **Total Petroleum Hydrocarbons (TPH)[4]** | | |
| Gasoline Range Organics | 1,500 | 1,500 |
| Diesel Range Organics | | |
| Motor Oil Range Organics | | |

**Notes**

1. All concentrations are in milligrams per kilogram (mg/kg).

2. Remediation levels are based on the Preliminary Cleanup Levels Workbook for the Lower Duwamish Waterway (Ecology, 2018). A combined TPH remediation level is based on the generic direct contact cleanup level of 1,500 mg/kg. (Ecology, 2017).

3. TEQ: Total toxic equivalent concentration of benzo(a)pyrene, calculated in accordance with WAC 173-340-708(8)( e).

4. Performance samples will only analyzed in the area of MW-2, the only location where results exceeded the direct contact TPH combined cleanup level.

# FIGURES