AS-BUILT CLEANUP REPORT LIGNIN OPERABLE UNIT

Georgia-Pacific West Site Bellingham, Washington

Prepared for: Port of Bellingham

Project No. 210368-A-11 • May 8, 2023 FINAL

Aspect CONSULTING

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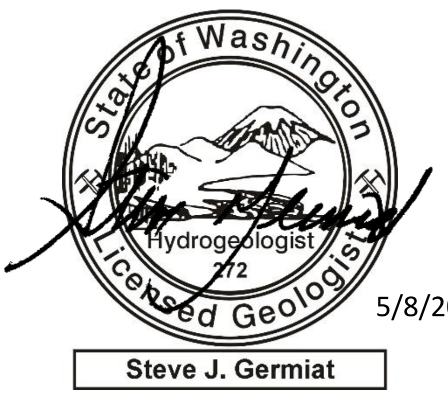

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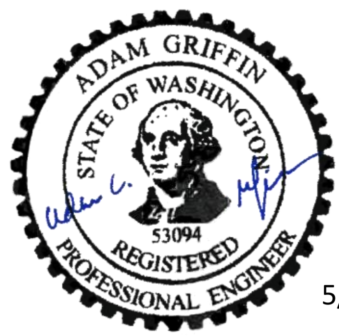

5/8/2023

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1 Introduction

This report[1] documents the soil removal component of the final cleanup action selected by the Washington State Department of Ecology (Ecology) for the portion of the Georgia-Pacific (G-P) West Site (Site) referred to as the Lignin Operable Unit (OU) of the Chlor-Alkali Remedial Action Unit (RAU) shown on Figure 1. The final soil removal action successfully achieved the following remedial action objectives (RAOs):

1. Permanent removal of carcinogenic polycyclic aromatic hydrocarbon (cPAH)- and zinc-contaminated soils greater than soil cleanup levels for unrestricted direct contact
2. Removal of an additional 6,440 tons of metals-impacted soils to permanently reduce the mass of metals contamination and thereby enhance natural attenuation of metals contamination in groundwater and reduce the groundwater restoration timeframe.

The cleanup action was conducted by the Port of Bellingham (Port) in accordance with the Lignin OU Cleanup Action Plan (CAP; Ecology, 2022b), Project Construction Plans and Specifications (Aspect, 2022e), and Compliance Monitoring Plan for Soil Removal (CMP; Aspect, 2022d). The Site cleanup was conducted under the authority of the Washington State Model Toxics Control Act (MTCA), Chapter 70A.305 of the Revised Code of Washington (RCW), and the MTCA Cleanup Regulation, Chapter 173-340 of the Washington Administrative Code (WAC).

1.1 Lignin Operable Unit Information and Background

The Lignin OU is an approximately 4.3-acre property located within the Chlor-Alkali RAU and at the corner of Cornwall Avenue and West Laurel Street (Figure 1). During G-P's operation of the pulp and paper mill, lignin, a byproduct of pulping, was converted into commercial lignin-containing products. No historical pulp/paper production processes occurred on the Lignin OU, although lignin waste liquors were stored in several aboveground storage tanks near the north[2] edge of the property. G-P used the Lignin Warehouse B, which occupied much of the Lignin OU (Figure 2), for storage of the finished lignin-containing commercial products until 2007. The Port demolished the Lignin Warehouse B in 2020.

In August 2009, Ecology and the Port entered into Agreed Order No. DE 6834 (Order), which required the Port to perform a Remedial Investigation (RI) and a Feasibility Study (FS) for the Site. The Site is defined by the extent of contamination caused by the release

[1] Deliverables B.8 and B.9 (draft and final) in the Schedule of Deliverables for the Lignin OU (Exhibit H to the First amendment to GP West Site Consent Decree).
[2] This report uses the former Georgia-Pacific mill's "Mill north" as its directional reference, with "Mill-north" (aka Project North) approximately 45 degrees west of true north (see north arrows on Figure 2). The "mill-" prefix is not used in directional references hereafter.

of hazardous substances from the former mill facility, which included a Chlorine Plant[3] and a Pulp and Tissue Mill, and associated facilities.

In August 2013, a Site-wide RI was completed (Aspect, 2013) and an amendment to the Order separated the Site into the Pulp/Tissue Mill and Chlor-Alkali RAUs, which are shown on Figure 1. The amended Order established independent timelines for cleanup of the two RAUs, which allowed for expedited cleanup and redevelopment at the Pulp/Tissue Mill RAU.

For the Chlor-Alkali RAU, Ecology issued the final CAP in September 2021 (Ecology, 2021). Since then, the Port has been conducting remedial design for cleanup of the Chlor-Alkali RAU under the Order. The 2021 CAP-selected cleanup action for the Lignin OU included hard capping to contain soils contaminated with cPAHs that pose a direct contact risk for an unrestricted land use,[4] plus monitored natural attenuation (MNA) for dissolved chromium and copper concentrations in groundwater.

In March 2022, Ecology issued a minor modification to the Order, amending the Schedule of Deliverables to include preparation of a CAP specific to the Lignin OU and completion of a pre-remedial design investigation (PRDI) to support design for cleanup of the Lignin OU. The PRDI 1 Project Plan (Aspect, 2022a) was reviewed and approved by Ecology prior to Aspect conducting the PRDI activities in January through April 2022.

The Site-wide RI and Chlor-Alkali RAU FS identified the following contaminants of concern and impacted media within the Lignin OU:

- cPAHs in soil exceeding a cleanup level based on unrestricted human direct contact.
- Chromium in groundwater exceeding cleanup levels that are protective of discharge to marine surface water and sediment.

Subsequent PRDI sampling and analysis conducted in 2022 confirmed those contaminants of concern and media, and also identified the following:

- Zinc in soil exceeding a cleanup level based on unrestricted human direct contact.
- Copper in groundwater exceeding a cleanup level that is protective of discharge to marine surface water and sediment.

The soils exceeding direct contact cleanup levels included predominantly shallow soils (upper 2 feet) contaminated by cPAHs, but also included one small area that contained high zinc concentrations to an estimated depth of 6 feet. While all portions of the historical railroad spur alignments were not sampled, they historically included creosote-treated railroad ties and, where shallow soil samples were collected from them, the soils contained cPAH concentrations greater than the cleanup level. It was therefore inferred that shallow soils along the entire railroad spur alignments contained cPAH exceedances. The Site-wide RI data also indicated that fill soils throughout most of the OU contained concentrations of one or more metals (predominantly copper and zinc) exceeding concentrations predicted to contaminate groundwater by leaching. Figure 2 depicts the

[3] The terms “Chlor-Alkali Plant” and “Chlorine Plant” are used interchangeably.

[4] Assuming a child’s incidental ingestion of soil for a lifetime.

pre-construction surface conditions and the locations of environmental explorations completed within the Lignin OU from the RI through PRDI work.

Since 2019, the Port worked with local development partners Mercy Housing Northwest and Millworks LLC to evaluate the feasibility of developing affordable/workforce housing and other mixed uses at the Lignin OU. In early 2019, Ecology selected the Port as a recipient of a Toxics Cleanup Healthy Housing Integrated Planning Grant (IPG) to fund early planning efforts for the integrated cleanup and redevelopment of the Lignin OU. In November 2021, Ecology issued a grant to the Port to support remedial design and construction for the Lignin OU Affordable Housing Project.

The Lignin OU soil removal action was conducted in accordance with the terms of the First Amendment to Consent Decree 14-2-02700-8 (CD) between Ecology and the Port, and Prospective Purchaser Consent Decree (PPCD) No. 22 2 0134237 between Ecology and the Mercy Housing Northwest development partner (MHNW 22). Completion of the cleanup will facilitate MHNW 22's development of 83 affordable housing units and childcare facility on an approximately 2.3 acre a portion of the Lignin OU. Following completion of the Lignin OU soil removal action, MHNW22 acquired the Mercy parcel from the Port on December 19, 2022. The Port retains property within the Lignin OU to the north of the Mercy parcel (1.1 acres) and to the south of it (0.9 acres) (Figure 2).

2 Final Cleanup Action Objectives and Soil Cleanup Levels

In accordance with the Lignin OU CAP (Ecology, 2022b), the selected soil removal action for the Lignin OU was conducted to achieve two RAOs, as defined below:

- Permanently remove soils contaminated with cPAHs and zinc to achieve soil cleanup levels for unrestricted direct contact (0.19 mg/kg[5] total cPAH [TEQ][6] and 24,000 mg/kg zinc). The direct-contact-driven soil cleanup included performance monitoring (excavation verification soil sampling) to document achievement of the cleanup levels in accordance with the Ecology-approved final Engineering Design Report (EDR; Aspect, 2022c) and CMP (Aspect, 2022d).
- Remove metals-impacted soil to reduce the mass of metals contamination and thereby enhance natural attenuation of metals contamination in groundwater and reduce the groundwater restoration timeframe. This soil removal was not conducted to achieve a specific cleanup level for metals. Therefore, in accordance with the CMP, verification soil sampling was not conducted for this portion of the cleanup.

[5] mg/kg =milligrams per kilogram.
[6] TEQ: Total toxic equivalent concentration of benzo(a)pyrene calculated in accordance with MTCA (WAC 173-340-708(e)). All subsequent references to cPAH concentrations in this document represent total cPAH (TEQ) concentrations.

3 Cleanup Action Activities and Methodology

Soil excavation, dewatering, handling, loading, and disposal activities were conducted by Engineering/Remediation Resources Group, Inc. (ERRG), the cleanup contractor (Contractor) selected by the Port through a publicly advertised competitive bid process. Throughout the cleanup, Aspect served as the Port's Engineer providing oversight of the Contractor and conducting monitoring to ensure compliance with the RAOs.

The final soil cleanup action included the following activities:

- Cleanup preparations and mobilization, including monitoring well decommissioning, establishment of perimeter security fencing, temporary erosion and sedimentation controls including a stabilized construction entrance, establishment of survey control, and mobilization of a Baker Tank with portable pumps for collection and storage/solids settling of water from excavation dewatering and stormwater runoff.
- Structure demolition and obstruction removal (primarily concrete foundation elements and asphalt pavement shown on Figure 3).
- Soil excavation to achieve permanent removal of soils contaminated with cPAHs and zinc to achieve soil cleanup levels for unrestricted direct contact (0.19 mg/kg cPAH and 24,000 mg/kg zinc), including performance monitoring verification sampling for cPAHs and zinc. This soil excavation constituted Phase 1 of the soil removal action[7] and consisted of five areas shown on Figure 4.
- Soil excavation to remove metals-impacted soil and meet required design subgrade depths/elevations. This soil excavation constituted Phases 2 and 3 of the soil removal action, shown on Figure 5.
- Segregation, temporary stockpiling, and off-site disposal of contaminated soils.
- Excavation dewatering and collection of stormwater runoff, testing to document compliance with performance standards, and disposal to the Port's stormwater management system.
- Excavation backfill and compaction to meet specific finish grades.

These activities are briefly described in this section.

3.1 Pre-Construction Tasks

A pre-construction meeting was conducted on August 18, 2022 with attendance from representatives of the Port, Aspect, ERRG, MHNW 22, and Ecology. The pre-construction meeting was guided by Aspect and was conducted to outline the planned cleanup permits, procedures, submittals, and schedule.

[7] Phases 1, 2, and 3 of the contaminated soil removal are described in the Ecology-approved Plans and Technical Specifications for the Lignin OU (Aspect, 2022d).

3.1.1 Pre-Construction Submittals

The Port's Contract documents required ERRG to prepare for Engineer approval following pre-construction submittals prior to mobilization:

- **A Stormwater Pollution Prevention Plan (SWPPP)** describing erosion, sedimentation, and stormwater control Best Management Practices (BMPs) to manage and prevent stormwater and fugitive dust emissions from leaving Lignin OU was provided by ERRG on August 29, 2022. Aspect reviewed and approved the SWPPP on September 1, 2022.
- **An Excavation and Water Management Plan (EWMP)** was provided by ERRG on August 30, 2022. The EWMP detailed ERRG's means and methods for soil excavation, obstruction removal and size reduction, materials handling and stockpiling on-site, loading and off-site transportation of excavated materials, excavation backfill and compaction to meet specified criteria. The EWMP also described as the methodology for excavation dewatering, collection of runoff within the stockpile area, and treatment and discharge of water generated from excavation dewatering and from the stockpile area to comply with applicable permit requirements. The plan identified Cadman, Inc.'s (Cadman) Soil Remediation Facility in Everett, Washington for disposal of Class 2 and Class 3 soils[8] during excavation Phases 1, 2, and 3. ERRG identified Waste Management's Columbia Ridge Landfill and Green Energy Plant located at 18177 Cedar Springs Lane in Arlington, Oregon, for disposal of Subtitle D material. Aspect reviewed and approved the EWMP on September 2, 2022.
- **Construction Schedule.** ERRG submitted the Contractors Schedule dated August 16, 2022 . The schedule included the following milestone dates: mobilization on September 6, completion of obstruction removal (concrete and asphalt demo) on September 30, completion of Phase 1 excavation on October 10, completion of Phases 2 and 3 excavation on October 27, and site restoration (backfill to finish grades) complete by November 18. For a variety of reasons, the project work was completed on December 7, 2022.
- **Health and Safety Plan for ERRG personnel.** ERRG submitted a Site-Specific Health and Safety Plan (HSP) for their on-site workers dated August 25, 2022. ERRG reported that the HSP was prepared pursuant to WAC Chapter 296-843, "Hazardous Waste Operations" and Occupational Safety and Health Administration (OSHA) Title 29 § CFR 1910.120, "Hazardous Waste Operations and Emergency Response." The HSP included 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPPER) certifications (or requisite refresher certifications) for all on-site ERRG personnel. Additional certifications were provided for ERRG personnel as they related to individual responsibilities during cleanup.

3.1.2 Groundwater Monitoring Well Decommissioning

Prior to start of cleanup activities on site, Aspect subcontracted with Cascade Drilling (Cascade) to perform decommissioning of monitoring wells LW-MW01 to LW-MW04 in

[8] Waste types described in Section 3.4.

accordance with Chapter 173-160 WAC. Cascade performed decommissioning activities on August 24, 2022, with Aspect oversight. Appendix A includes the driller's decommissioning records submitted to Ecology.

3.1.3 Authorizations for Discharge of Construction-Generated Water

Prior to the start of construction, the Port applied for and received from Ecology's Water Quality department the Construction Stormwater General Permit WAR311551 with Administrative Order 21254 (CSWGP; August 22, 2022) to cover discharge of construction-generated stormwater and dewatering water generated during the planned soil removal action. Per Contract Specification 2-04.1(5), the Port transferred in full the CSWGP to ERRG effective September 1, 2022.

In addition, Aspect submitted to Ecology's Water Quality department documentation regarding the planned discharge of construction-generated water from the cleanup action to the Port's Aeration and Settlement Basin (ASB), in accordance with the ASB National Pollutant Discharge and Elimination System (NPDES) permit condition S7 (Aspect, 2022b). Ecology provided written authorization for the planned discharge to the ASB (Ecology, 2022a).

In accordance with the Contract Specifications, ERRG chose to discharge all construction-generated water to the Port's ASB, and they discharged no water to surfaces of the state under their CSWGP.

3.2 Mobilization and Site Preparation

3.2.1 Perimeter Fencing, Temporary Erosion and Sedimentation Controls

ERRG installed perimeter fencing and temporary erosion and sedimentation controls (TESC) between August 25 and 29, 2022. Installation of TESC elements were conducted in accordance with Site Preparation and Temporary Erosion & Sediment Control Plan included as Sheet C-01 of the Construction Plans (Aspect, 2022e). ERRG identified Colin Duffy as Certified Erosion and Sediment Control Lead (CESCL) in the SWPPP for oversight of TESC installation.

Aspect approved a modification to the TESC silt fence requirements along the Project North perimeter of the Site on August 25, 2022. Due to the presence of asphalt surfacing in this area extending into adjacent BNSF property, the installation of visqueen-lined straw wattle, fixed into position using sand bags, was approved in lieu of silt fence.

3.2.2 Establish Survey Control

To establish positions for the Project's excavation and backfill limits and elevations, geodetic survey control was initially established by ERRG using the following control points established previously by others: WSE_808 (642498.48; 1242580.62; 17.24[9]),

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[9] The three numbers listed for each control point are its horizontal coordinates (northing and easting in feet, Washington State Plane North, NAD83/1998) and elevation (in feet above the NAVD88 vertical datum).

WSE_807 (641781.75; 1242524.86; 17.37), WSE_593 (641803.60; 1242619.57; 39.30), WSE_179 (641768.05; 1241896.49; 14.52), and WSE_803 (641664.21; 1242244.90; 16.88).

During construction, control point WSE_803 was damaged and permanently removed due to its location within the grading area. Additional temporary control points were established by ERRG during construction and carried through construction completion, as follows: ERRG_C01 (641614.598;1242385.080; 25.771), ERRG_C02 (641721.250; 1242047.394; 14.385), ERRG_C03 (641761.176; 1242089.490; 14.176), and ERRG_C04 (641810.624; 1242140.594; 14.205).

3.3 Structural Obstruction Removal

Historical structure foundations, including those associated with aboveground storage tanks near the mill-north edge of the property and Warehouse B, were removed to facilitate cleanup of contaminated soils adjacent to and beneath the structural elements. Removed structural elements included asphalt surfacing, the warehouse concrete floor slab, retaining walls, stem walls, pile caps, a metal lift-gate apparatus, concrete tank pads and ancillary structures, the upper portions of wooden pilings supporting concrete foundations, metal rail spurs and associated wooden ties, and pipes of various sizes and materials. Wood pilings encountered beneath foundation elements were broken off or cut 6-inches below the base of the excavation design subgrade.

The large structural elements including concrete pads, foundations, asphalt surfacing and tank pads were removed by using an excavator-mounted hydraulic hammer to break the features into sizes suitable for removal. Excavators with various bucket attachments were used to segregate the materials (concrete, asphalt, wood debris, and metal) into respective stockpiles for off-site disposal.

ERRG subcontracted DTG Recycle (DTG) to perform structural obstruction demolition and removal in accordance with Sheets C-03, C-04, and C-05 of the Lignin OU Construction Plans (Aspect, 2022e) and shown on Figure 3.

Concrete and asphalt inert debris were transported via truck by Granite Construction Company (Granite) to the Singer Recycle Plant located in Everson, Washington. Rebar and other metal inert debris were transported to Scrap-It in Ferndale, Washington or Northwest Recycling Inc. in Bellingham, Washington. Wooden railroad ties, wooden piling pieces, and other wood debris were transported as Subtitle D to a Waste Management (WM) facility in Seattle, Washington, as detailed in Section 3.4.

3.4 Contaminated Soil Excavation and Management

ERRG conducted the contaminated soil excavation and management between October 10 and December 5, 2022. Aspect directed the soil excavation and segregation of the excavated soil (waste) for proper off-site disposal on behalf of the Port during cleanup in accordance with the EDR.

The contaminated soil excavation was conducted in three phases as follows:

- **Phase 1 excavation** removed soils with concentrations of cPAHs and zinc posing a direct contact risk under the future unrestricted land use. Phase 1 involved excavation in five discrete areas (Areas) to specified lateral extents and to depths below existing grade based on the collective soil quality data, and then expansion of the excavation (termed over-excavation) laterally or vertically as determined by excavation verification soil sampling.

- **Phase 2 excavation** involved removal of additional metals-contaminated soils across a broad area within the Mercy parcel to accelerate groundwater restoration and, in doing so, achieved design subgrade elevations for the future affordable housing redevelopment.
- **Phase 3 excavation** involved trenching deeper than the Phase 2 subgrades to remove additional metals-contaminated soils and support the future affordable housing redevelopment.

The excavated contaminated soils were segregated into one of the following three waste streams from the point of excavation through off-site disposal at a permitted landfill:

1. **Class 3 Soil.** The majority of soils excavated to comply with direct contact cleanup levels for unrestricted direct contact (Phase 1, detailed in Section 4.1) were disposed of at Cadman's Everett facility where they underwent thermal treatment followed by disposal in the facility's inert landfill.
2. **Subtitle D Material.** The soils in a portion of Phase 1 Area 1 (Figure 4) contained cPAH concentrations exceeding acceptance criteria for Class 3 soils at the Cadman-Everett thermal treatment facility, and therefore required disposal at a Subtitle D landfill. This waste stream also included treated wood railroad ties or piling fragments and buried wood debris[10] that, due to its high organic content, is not acceptable for disposition at the Cadman-Everett facility. Subtitle D material was transported to Waste Management's Columbia Ridge Landfill and Green Energy Plant located at 18177 Cedar Springs Lane in Arlington, Oregon.
3. **Class 2 Soil.** Metals-impacted soils (Phases 2 and 3, detailed in Section 4.2) were disposed of Class 2 soils at Cadman's Everett inert landfill.

ERRG direct loaded to transport trucks or stockpiled each waste stream separately pending loading for transport to the designated landfill, in accordance with the Construction Specifications. In accordance with ERRG's EWMP, trucks were staged within the Lignin OU prior to loading, then were covered prior to departing.

3.5 Excavation Dewatering

ERRG conducted excavation dewatering as needed to achieve unsaturated conditions to facilitate soil excavation/handling/loading for transport and verification soil sampling in accordance with Section 2-04 of the Construction Specifications (Aspect, 2022e). Water was pumped from within excavations to the Baker Tank water treatment system or directly into transport water trucks that also provided for settling of solids. Water was batch tested by visual observation for floating sheens and measurement of total settleable

[10] Buried wood debris was encountered at locations B-57 and B-79 as discussed in Section 4.1.1.

solids content using an Imhoff cone Water trucks then transferred water to the Port's dockside pump station for the ASB as authorized by Ecology (2022a).

3.6 Excavation Backfill and Site Restoration

Cleanup excavation areas were backfilled in accordance with Sheet C-09 of the Construction Plans. Backfill material consisted of permeable ballast, crushed surfacing base course (CSBC), gravel base, and gravel borrow depending on location. Deviation from the specified backfill materials was limited to the approval of gravel base in lieu of common borrow for all Phase 3 trench excavations.

Prior to backfill placement, the Phase 3 trench excavations and Phase 2 structural backfill areas were lined with nonwoven geotextile (Mirafi 140N Nonwoven,) and woven geotextile (Mirafi HP270) materials, respectively, in accordance with the Construction Plans and Specifications (Aspect, 2022e). Phase 3 trench excavations were lined to mark the vertical boundary of the respective remedial trench excavations for the affordable housing redevelopment. Phase 2 structural backfill areas were lined for geotechnical design considerations. Excavation backfill, compaction, and finish grading results are detailed in Section 4.5.

4 Cleanup Action Results

4.1 Structural Obstruction Removal

DTG completed structural obstruction demolition and removal activities between September 6 and October 18, 2022. Structural obstruction removal resulted in the offsite recycling of 3,703.30 tons of concrete debris, 1,497.23 tons of asphalt debris, and 54.36 tons metal debris (combination of the metal lift gate and rebar).[11]

During obstruction removal, DTG encountered a concrete cylindrical vault feature containing an unknown sludge-like fluid beneath demolition feature 18 (tank pad) (Figure 3). The vault had a surface diameter of approximately 4 feet with an approximate 4- to 6-inch-thick concrete lid. A depth measurement of fluid in the vault was not possible due to the location within the demolition excavation. The fluid had a weathered sewage-like odor; no chemical odors were detected by ERRG or Aspect personnel and no sheen was visible on the fluid surface.

On November 10, ERRG excavated material within the footprint of tank pad 18, focusing on the location of the vault feature. Soil observed near and beneath the vault was a dark brown to black color relative to surrounding soil. The excavation was advanced to 10 feet below grade in an approximate 10- by 10-foot footprint surrounding the vault location. Aspect observed a silt interface at the 10-foot depth that delineated the vertical extent of the discolored soil. The excavation sloped up and outward to approximately 5 feet below grade for the remainder of the approximate 25-foot by 20-foot excavation footprint. Discolored soil was direct loaded or stockpiled for off-site disposal as Subtitle D.

After DTG had demobilized, during backfill and finish grading, ERRG encountered three large concrete slabs[12] buried just outside the northern extent of the Phase 2 soil removal near the northwest corner of the OU (Figures 3 and 6). Although the slabs encroached slightly on the finish grading plan for the northern edge of stormwater infiltration area created on the Port parcel, Aspect, in consultation with the Port, directed ERRG to leave them in place because DTG was no longer on site and the Contract-required schedule was coming to an end (detailed in Section 4.5).

4.2 Phase 1 Excavation of Contaminated Soil

The Phase 1 soil removal was successfully completed between October 10 and November 14, 2022, from the following five discrete Areas identified on Figure 4:

<u>cPAH-Contaminated Soil Areas</u>

- Area 1, along the north side of the former warehouse including an historical railroad spur
- Area 2, the historical railroad spur on the east side of the former warehouse

[11] Subtitle D material removed as part of structural obstruction removal was included in the total quantity detailed in Section 4.2.
[12] The slabs were not indicated on any of the available historical documentation.

- Area 3, a small area within the footprint of the former warehouse
- Area 4, on the southwest end of the former warehouse

Zinc-Contaminated Soil Area

- Area 5, located in the southwestern portion of the OU

The excavated Phase 1 soil (both waste streams) was transported off-site for permitted disposal by November 17, 2022. The total quantity of Class 3 soil excavated and properly disposed of was 5,841.19 tons. The total quantity of Subtitle D Material excavated and properly disposed of during Phase 1 is 402.72 tons. Records for the off-site disposal are presented in Appendix B.

In accordance with the EDR and CMP, compliance with the direct-contact RAO was demonstrated with verification soil sampling, detailed below.

4.2.1 Phase 1 Excavation Verification Soil Sampling Results

Excavation verification soil samples were collected from the Phase 1 excavation sidewalls and bottoms to confirm that the Lignin OU soils comply with the soil cleanup levels for unrestricted direct contact. Excavation bottom samples were collected on a systematic 25-foot grid (one sample per 25- by 25-foot square) to document that the cleanup level was met at depth (i.e., vertically bounded). Excavation sidewall samples were collected within the same 25-foot horizontal grid spacing and at 2-foot depth intervals (e.g., 0 to 2 feet, 2 to 4 feet, etc.) across the full extent of excavation sidewalls to document that the lateral extent of soil exceeding the cleanup levels for unrestricted direct contact has been removed.

Within the two planned 30- by 30-foot excavation areas (one for cPAHs [Area 3] and one for zinc [Area 5]) shown on Figure 4, two bottom samples were collected, and two sidewall samples were collected at 2-foot depth intervals from each sidewall (cPAH excavation to 2-foot depth, zinc excavation to 4-foot depth).

The excavation verification soil samples were discrete grab samples of soil collected by hand using SP Bel-Art Sterileware® disposable spoons. Samples were collected from an undisturbed sidewall or excavation bottom area.

Nomenclature for the cPAH excavations verification soil samples was as follows:

- Sidewall samples (25- by 25-foot excavation grid cell): All sidewall verification samples have an “S-” prefix to designate sidewall. The S- prefix is followed by the grid cell number (numbers 1 through 82). Where cells had two remaining perimeter sidewalls after excavation, an “-A” or “-B” was added after the cell number to designate the respective side of the excavation (Area 2 and western portion of Area 1; Figure 4). All sidewall samples were collected at a depth of 1 foot below grade (center of 2-foot depth excavation) and centered from side to side along the cell wall. Sidewall samples with “-oe” added at the end indicate that verifications sampling required a 1-foot later over-excavation and re-sample. No cells required more than 1 foot lateral over-excavations with the following exceptions: cells 3, 4 and 5 were over-excavated to the BNSF property boundary based on the initial 1-foot “-oe” sample results. Additional over-excavation was not extended onto BNSF property (thus verification samples were not collected from the property boundary sidewall) as discussed in Section 4.2.2.

- Bottom samples (25- by 25-foot excavation grid cell): Excavation bottom verification samples have a "B-" prefix to designate bottom. The B- prefix is followed by the respective cell number. All bottom samples for cPAH excavations were collected at 2 feet below grade and central to the grid cell footprint. Over-excavations, if required, were conducted in 0.5-foot increments, followed by a new verification sample. Where over-excavation was required, the cell number is followed by the sample depth for the over-excavation, corresponding to the new excavation bottom depth (e.g., B-48-2.5, with a bottom depth of 2.5 feet). Where multiple bottom over-excavations were performed, samples are shown for each iteration (corresponding to the depth), with the deepest sample representing the vertical limit of the excavation.
- For the 30- by 30-foot cPAH excavation within the footprint of the former warehouse (Phase 1 Area 3, see Figure 4):
  - Sidewall: Two samples were collected from each sidewall, at a depth of 1 foot below grade and centered from top to bottom. The samples were collected at approximately 10 feet off corners (or 10 feet and 20 feet off a single corner), measured parallel with the sidewall. Sides of the square excavation were differentiated using A, B, C and D for the respective sides. Sample nomenclature is "S-" (sidewall), cell number (83), followed by "-A1" and "-A2" for the two samples collected on the A side. The nomenclature is consistent for the B, C, and D sides.
  - Bottom: two bottom samples were collected. The samples follow the same nomenclature as above with a "B-" prefix, followed by the cell number (83). However, after the cell number, the samples are differentiated using "-cb1" and "-cb2" to identify the two bottom samples. The samples were collected at a depth of 2-feet below grade, and were collected from locations approximately 10 feet off the corner in the direction of diagonal transect between two corners.

Nomenclature for the 30- by 30-foot zinc excavation (Area 5) verification soil samples was as follows:

- Sidewall samples: Two samples were collected from each sidewall for every 2 feet of excavation depth, for a total of 4 samples from each sidewall. Sidewalls were labeled A, B, C and D for the square excavation. Consistent with previous nomenclature, sidewalls samples have an "S-" prefix, followed by "Z1" to define that samples were collected from the zinc excavation. After "Z1," the samples were labeled with "A1" or "A2" to designate the two sample locations on the sidewall. Nomenclature is the same for B, C, and D sides with the respective letter. The two sample locations were 10 feet off the nearest corner, or 10 feet and 20 feet off a single corner measured parallel to the sidewall. The final nomenclature space is reserved for the depth of the sample on the sidewall as measured from surface to bottom; "-1" and "-3," respectively, identifying 1 foot and 3 feet below grade to coincide with the center of each 2-foot sampling interval.

- Bottom samples: two bottom samples were collected. The samples follow the same nomenclature as above with a “B-” prefix, followed by “Z1” to define that samples were collected from the zinc excavation. After Z1, the samples are differentiated using “-cb1” and “-cb2” to identify the two bottom samples. The samples were collected at a depth of 4 feet below grade, and were collected from locations approximately 10 feet off the corner in the direction of diagonal transect between two corners.

In accordance with the CMP, the verification soil samples were submitted to ALS Life Sciences Division-Environmental (ALS) in Everett, Washington, an Ecology-accredited analytical laboratory, for chemical analysis. Soil samples collected from the identified cPAH excavation areas were analyzed for PAHs (U.S. Environmental Protection Agency [EPA] Method 8270 SIM), and samples collected from the identified zinc excavation area (Area 5) were analyzed for zinc (EPA Method 6020B). ALS provided 48-hour turnaround of the analytical results during most of Phase 1 to guide the excavation activities in near real-time.[13]

In accordance with the CMP, at verification sample locations where the cPAH concentration in an excavation sidewall sample exceeded the cleanup level, the length of sidewall represented by the sample was over-excavated a minimum 1 foot laterally if feasible,[14] and a new sidewall verification sample was collected with sample names assigned as detailed above. Sidewall over-excavation was completed at locations S-2-A, S-2-B, S-3-A, S-4-A, S-5-A, S-10-B, S-16-B, S-56-A, and S-81 (Figure 4).

Likewise, at verification sample locations where the cPAH concentration in an excavation bottom sample exceeded the cleanup level for unrestricted direct contact, the excavation bottom of the 25- by 25-foot grid cell was over-excavated in 0.5-foot increments, followed by collection of a new bottom verification sample. Bottom over-excavation was completed at locations B-23, B-24, B-27, B-35, B-37, B-38, B-48, B-57, B-75, and B-79 (Figure 4), and the new bottom verification samples were denoted by sample IDs with the depth suffix (e.g., B-23-2.5). At all bottom over-excavation locations, compliance was achieved with one 0.5-foot over-excavation to a total depth of 2.5 feet. Buried wood debris was encountered at locations B-56, B-57, B-58, and B-79 that was inferred to be chemically treated was also over-excavated, and the excavation bottoms resampled at total depths of 4 and 8 feet for B-57 and B-79, respectively.[15] No over-excavation was necessary in Area 5 to comply with the zinc cleanup level.

The zinc verification sample results from the final excavation limits are reported in Table 1. The cPAH verification sample results from the final excavation limits are reported in Table 2. The cPAH sample results for over-excavated soils removed from the

[13] 24-hour turnaround was provided near the end of Phase I to prevent Phase I completion delays.
[14] Excavation along the BNSF property line where further excavation was deemed infeasible is described below.
[15] Over-excavation extended into B-56 and B-58, to a depth of approximately 3-feet below grade. No additional bottom samples were collected from these cells.

Site are reported in Table 3. The laboratory analytical reports produced from the soil removal action are included in Appendix C.

The largest Phase 1 excavation area (Area 1) and the far-eastern extent of Area 2 extend to the northern boundary of the Lignin OU, where it abuts the BNSF rail line property. Along this property boundary, soil cPAH concentrations greater than those observed anywhere on the Lignin OU were detected (up to 122 mg/kg[16]; Table 3). Additionally, in sample locations S-3, S-4, and S-5, where lateral over-excavation was conducted, the cPAH concentration increased in the new sidewall verification samples progressing northward toward the BNSF line. The soils in the excavation sidewall at the property boundary consists of ballast rock typical of the BNSF rail line.

Given the contrast in soil conditions and detected cPAH concentrations at this property boundary relative to those observed throughout the Lignin OU, the cPAHs along the northern property boundary are not associated with the Lignin OU. We conclude that the soils on the BNSF property are not part of the Lignin OU, and the excavation verification sidewall samples from locations S-3-A, S-4-A, S-5-A, S-21, S-22, and S-23 are, therefore, not included in the evaluation of direct-contact compliance for the Lignin OU presented in the following section.

4.2.2 Soil Compliance for Lignin OU

Following the Phase 1 soil excavation, soils within the Lignin OU comply with the unrestricted direct-contact soil cleanup levels when applying the MTCA three-fold soil compliance criteria (WAC 173-340-740(7)(d) and (e))—the compliance evaluation described in the CMP (Aspect, 2022d).

The cleanup successfully removed all zinc concentrations exceeding the cleanup level for unrestricted direct contact, and therefore Lignin OU soils comply for zinc.

Even following soil over-excavations described above, the cPAH concentrations at some locations exceed the 0.19 mg/kg cleanup level at the final excavation limits. However, the residual cPAH concentrations in the collective soil represented by the verification samples taken from the final excavation limits (Table 2) and the soils remaining from previously conducted sampling on the Lignin OU reported in the EDR (included in Appendix D for reference) achieves the MTCA three-fold compliance criteria as follows:

- The 95 percent upper confidence limit on the mean concentration (95 percent UCL) is 0.065 mg/kg and less than the cleanup level of 0.19 mg/kg.
- All residual soil concentrations are less than or equal to two times the cleanup level (Table 2). The maximum residual cPAH concentration in Lignin OU is 0.376 mg/kg or 1.98 times the cleanup level.
- The frequency of soil sample exceedance is less than 10 percent. There are 14 exceedances (Table 2) of the cPAH cleanup level in a total of 205 samples, or an exceedance frequency of 7 percent.

[16] ALS reported PAH results in units of micrograms per kilogram (µg/kg); the cPAH cleanup level for unrestricted direct contact is 0.19 mg/kg or 190 µg/kg. We have converted all µg/kg units to mg/kg herein for consistency with the CAP and EDR.

For this evaluation, the 95 percent UCL values were calculated using the EPA's ProUCL version 5.1 software17. The tabulated cPAH concentrations representing the collective soil remaining on the Lignin OU and ProUCL calculation output is included in Appendix E.

These results confirm that, following the Phase 1 excavation, the residual soils within the Lignin OU comply with direct-contact cleanup levels for unrestricted use in accordance with MTCA and the CAP elements necessary to be completed prior to the affordable housing redevelopment. Ecology reviewed the results of the compliance analysis methods and results presented in *Aspect's Request for Authorization to Proceed with Affordable Housing Redevelopment* Letter dated November 17 (Aspect, 2022f) and provided written concurrence that the Lignin OU soils comply with the applicable direct contact cleanup levels (Ecology, 2022c). Appendix F includes a copy of Ecology's concurrence letter, dated November 30, 2022.

4.3 Phases 2 and 3 Excavation of Contaminated Soil

The Phases 2 and 3 soil removal were successfully completed between November 14 and December 5, and were performed in general accordance with Sheets C-07, C-08, C-08A, C-08B, and C-08C of the Construction Plans and shown on Figure 5.

After structural obstruction removal was complete, spot check survey activities indicated that Phase 2 subgrade soil removal actions would have localized deviations compared with Sheet C-07 of the Construction Plans. The observed conditions after obstruction removal were a result of variations in building foundation and surface cover (asphalt) dimensions, as well as excavation constraints due to utilities. The modification resulted in less soil excavation and additional import fill activities to meet Sheet C-07 subgrade elevations and subsequent compliance with finished grade elevations presented on Sheet C-09 of the Construction Plans. Cleanup during these phases resulted in the removal and off-site disposal of 6,440.44 tons of Class 2 metals-impacted soils as compared to Aspect's pre-demolition EDR estimate of 10,100 tons.

The as-built utility trench excavations (Phase 3) are shown on Figure 5. Some changes from the design trenching plan (Sheets C-08A through C-08D in Construction Plans) were required in the field as the result of discovery of an unmarked electrical utility conduit running parallel to Laurel Street, and Cascade Natural Gas's required offsets from their buried gas line along the Project South perimeter (adjacent to Cornwall Avenue).

4.4 Excavation Dewatering and Water Management

During rain events between November 2 to 14, ERRG conducted dewatering activities within excavation footprints in the northwest portion of the Lignin OU—within Area 1 of Phase 1 and adjacent to the north within the former tank pad area (see Figures and 3 and 4). A total of 138,000 gallons of water were pumped from within excavation areas noted above and transferred to the ASB pump station during the cleanup action.

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[17] EPA's statistical software package for analysis of environmental data sets (https://www.epa.gov/land-research/proucl-software).

Aspect monitored the discharge from the water treatment system for compliance with the Specifications' project water quality performance standards for discharge to the ASB (total settleable solids below 100 ml/L and no visible separate-phase oil). No exceedance of the performance standards was observed. Batch testing records for water transferred to the ASB are presented in Table 4.

4.5 Excavation Backfill and Site Restoration Results

ERRG imported, graded, and compacted backfill materials in all excavation areas in accordance with Sheet C-09 of the Construction Plans. This included gravel base overlain by CSBC in identified structural fill areas within the Mercy parcel, and gravel borrow overlain by permeable ballast in the Port's northern parcel to facilitate stormwater infiltration. All backfill materials were imported from Cowden Gravel and Ready Mix (Cowden). ERRG submitted fill material grain size analyses for Aspect approval prior to import to demonstrate conformance with applicable Washington State Department of Transportation (WSDOT) specifications, as required by the Construction Plans and Specifications. ERRG's submittals including proctor tests for the import backfill materials are presented in Appendix G.

Backfill material was placed in accordance with the Construction Plans and then compacted using a Dynapac CA2500D vibratory roller. ERRG subcontracted with GeoTest of Bellingham, Washington, to conduct compaction testing by ASTM International (ASTM) D1557 to confirm that the compaction met the Construction Specification requirements: 95 percent of the maximum dry density for each of three specified structural fill areas within the Mercy parcel and 90 percent of the maximum dry density for gravel borrow within the Port's parcel. A total of 10 compaction tests were performed; all tests were compliant or exceeded the Construction Specification requirements for the respective materials. Compaction test results are included in Appendix G. Select photographs from the soil cleanup action are included in Appendix H.

Material tonnage import for the respective backfill materials included 12,946.90 tons of gravel base, 6,112.36 tons of gravel borrow, 2,688.32 tons of CSBC, and 2,128.85 tons of permeable ballast. The aggregate backfill (gravel base and gravel borrow) products were supplied from Cowden's A&B pit in Everson, Washington. The crushed rock backfill (CSBC and permeable ballast) products were supplied from Cowden's Siper Pit in Everson, Washington.

5 Conclusions

Between September and December 2022, the Port successfully completed the Lignin OU soil removal action, in general accordance with the cleanup design documents (EDR, CMP, and Construction Plans and Specifications), to achieve the CAP’s RAOs. Following completion of the cleanup, soils across the Lignin OU no longer pose an adverse risk due to soil contact under an unrestricted land use including the planned affordable housing development on the Mercy Parcel. In the course of removing contaminated soils, approximately 5,255 tons of asphalt, concrete, and metal structural obstructions were also removed and recycled off-Site.

The permanent removal of nearly 12,700 tons of contaminated soils during excavation Phases 1, 2, and 3 also substantially decreased the mass of metals contamination remaining within the OU, which in turn will accelerate the restoration timeframe for natural attenuation of metals contamination in groundwater. The concurrent dewatering removal of 138,000 gallons of groundwater from the OU should further assist with restoration of the groundwater quality. Now that the soil removal is complete, monitoring of groundwater metals natural attenuation within the OU will be accomplished in accordance with a Groundwater MNA Compliance Monitoring Plan approved by Ecology (Deliverable D.2 in the Schedule of Deliverables for the first Amendment to the Site Consent Decree).

6 References

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7 Limitations

Work for this project was performed for the Port of Bellingham (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.

All reports prepared by Aspect Consulting for the Client apply only to the services described in the Agreement(s) with the Client. Any use or reuse by any party other than the Client is at the sole risk of that party, and without liability to Aspect Consulting. Aspect Consulting's original files/reports shall govern in the event of any dispute regarding the content of electronic documents furnished to others.

TABLES

Table 1. Zinc Verification Soil Sample Results for In-Place Soil

Project No. 210368-A, Lignin Operable Unit, GP West Site, Bellingham, Washington

	Analyte Unit	Zinc mg/kg
Soil Cleanup Level- Based on Unrestricted Direct Contact		24,000
Sample	**Date**	
S-Z1-A1-1	10/14/2022	**130**
S-Z1-A1-3	10/14/2022	**61**
S-Z1-A2-1	10/14/2022	**110**
S-Z1-A2-3	10/14/2022	**54**
S-Z1-B1-1	10/14/2022	**110**
S-Z1-B1-3	10/14/2022	**210**
S-Z1-B2-1	10/14/2022	**36**
S-Z1-B2-3	10/14/2022	**160**
S-Z1-C1-1	10/14/2022	**50**
S-Z1-C1-3	10/14/2022	**44**
S-Z1-C2-1	10/14/2022	**46**
S-Z1-C2-3	10/14/2022	**42**
S-Z1-D1-1	10/14/2022	**46**
S-Z1-D1-3	10/14/2022	**460**
S-Z1-D2-1	10/14/2022	**120**
S-Z1-D2-3	10/14/2022	**300**
B-Z1-CB1	10/14/2022	**87**
B-Z1-CB2	10/14/2022	**83**

Notes:
Bold - detected
mg/kg = milligram per kilogram

Table 2. PAH Verification Soil Sample Results for In-Place Soil

Project No. 210368-A, As-Built Soil Removal Report, Lignin Operable Unit, GP West Site, Bellingham, Washington

			Polycyclic Aromatic Hydrocarbons (PAHs) in mg/Kg											
Sample Grid Location[1]	Date	Sample ID	Total cPAHs TEQ[2]	1-Methyl naphthalene	2-Methyl naphthalene	Acenaph thene	Acenaph thylene	Anthracene	Benzo(g,h,i) perylene	Fluoran thene	Fluorene	Naphthalene	Phenanthrene	Pyrene
1	10/11/2022	B-1	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/11/2022	S-1-A	**0.06798**	0.02 U	0.02 U	0.02 U	**0.026**	**0.024**	**0.057**	**0.083**	0.02 U	0.02 U	**0.021**	**0.051**
	10/11/2022	S-1-B	**0.08847**	0.02 U	0.02 U	0.02 U	**0.028**	0.02 U	**0.066**	**0.14**	0.02 U	0.02 U	**0.051**	**0.12**
2	10/11/2022	B-2	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/11/2022	S-2-A	**0.2219**	0.02 U	0.02 U	0.02 U	**0.06**	**0.072**	**0.15**	**0.24**	0.02 U	0.02 U	**0.078**	**0.2**
	10/21/2022	S-2-B-OE	**0.0301**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.041**	**0.047**	0.02 U	0.02 U	0.02 U	**0.038**
3	10/11/2022	B-3	0.0151 U	0.02 U	0.02 U	0.02 U	**0.02**	**0.028**	0.02 U	0.02 U	0.02 U	0.02 U	**0.026**	0.02 U
	10/11/2022	S-3-B	**0.10804**	**0.032**	**0.035**	0.02 U	**0.029**	0.02 U	**0.075**	**0.16**	0.02 U	0.02 U	**0.074**	**0.13**
4	10/11/2022	B-4	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.023**	0.02 U	0.02 U	0.02 U	0.02 U
	10/11/2022	S-4-B	**0.1268**	**0.026**	**0.037**	0.02 U	**0.032**	**0.047**	**0.078**	**0.28**	0.02 U	**0.049**	**0.14**	**0.2**
5	10/11/2022	B-5	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/11/2022	S-5-B	**0.06484**	0.02 U	0.02 U	0.02 U	**0.085**	**0.15**	**0.2**	**0.074**	0.02 U	0.02 U	0.02 U	**0.053**
6	10/11/2022	B-6	**0.13338**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.068**	**0.21**	0.02 U	0.02 U	**0.059**	**0.14**
	10/11/2022	S-6-A	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.023**	0.02 U	0.02 U	0.02 U	**0.02**
	10/11/2022	S-6-B	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.023**	0.02 U	0.02 U	0.02 U	0.02 U
7	10/12/2022	B-7	**0.0202**	0.02 U	0.02 U	0.02 U	**0.023**	**0.026**	**0.033**	**0.055**	0.02 U	0.02 U	0.02 U	**0.03**
	10/12/2022	S-7-A	**0.329**	0.02 U	0.02 U	**0.027**	**0.034**	**0.075**	**0.22**	**0.35**	0.02 U	0.02 U	**0.14**	**0.25**
	10/12/2022	S-7-B	**0.0164**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.024**	**0.034**	0.02 U	0.02 U	0.02 U	0.02 U
8	10/12/2022	B-8	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.021**	**0.021**	0.02 U	0.02 U	0.02 U	0.02 U
	10/12/2022	S-8-A	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/12/2022	S-8-B	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
9	10/12/2022	B-9	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/12/2022	S-9-A	**0.0572**	0.02 U	**0.024**	0.02 U	0.02 U	**0.024**	**0.046**	**0.17**	0.02 U	**0.026**	**0.089**	**0.093**
	10/12/2022	S-9-B	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
10	10/12/2022	B-10	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/12/2022	S-10-A	**0.01837**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.087**	0.02 U	0.02 U	**0.036**	**0.049**
	10/21/2022	S-10-B-OE	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.042**	0.02 U	0.02 U	0.02 U	**0.023**
11	10/12/2022	B-11	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/12/2022	S-11-A	**0.01911**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.092**	0.02 U	0.02 U	**0.041**	**0.047**
	10/12/2022	S-11-B	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
12	10/12/2022	B-12	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/12/2022	S-12-A	**0.05639**	**0.02**	0.02 U	0.02 U	0.02 U	**0.025**	**0.042**	**0.16**	0.02 U	**0.031**	**0.074**	**0.09**
	10/12/2022	S-12-B	**0.059**	0.02 U	0.02 U	0.02 U	**0.04**	**0.095**	**0.084**	**0.11**	0.02 U	0.02 U	**0.035**	**0.065**
13	10/13/2022	B-13	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/13/2022	S-13-A	**0.05288**	**0.12**	**0.16**	**0.14**	**0.022**	**0.14**	**0.049**	**0.44**	**0.16**	**0.25**	**0.47**	**0.35**
	10/13/2022	S-13-B	**0.06503**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.065**	**0.11**	0.02 U	0.02 U	**0.039**	**0.088**

Table 2. PAH Verification Soil Sample Results for In-Place Soil

Project No. 210368-A, As-Built Soil Removal Report, Lignin Operable Unit, GP West Site, Bellingham, Washington

			Polycyclic Aromatic Hydrocarbons (PAHs) in mg/Kg											
Sample Grid Location[1]	Date	Sample ID	Total cPAHs TEQ[2]	1-Methyl naphthalene	2-Methyl naphthalene	Acenaph thene	Acenaph thylene	Anthracene	Benzo(g,h,i) perylene	Fluoran thene	Fluorene	Naphthalene	Phenanthrene	Pyrene
14	10/13/2022	B-14	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.036	0.028	0.02 U	0.02 U	0.02 U	0.023
	10/13/2022	S-14-A	0.1219	0.037	0.061	0.042	0.035	0.14	0.14	0.51	0.057	0.024	0.42	0.37
	10/13/2022	S-14-B	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
15	10/13/2022	B-15	0.3748	0.68	0.75	0.1	0.035	0.02 U	0.15	0.19	0.079	0.16	0.38	0.3
	10/13/2022	S-15-A	0.3274	0.045	0.058	0.097	0.034	0.11	0.25	0.92	0.11	0.02 U	0.99	0.7
	10/13/2022	S-15-B	0.01817	0.05	0.075	0.02 U	0.02 U	0.02 U	0.024	0.087	0.02 U	0.02 U	0.1	0.089
16	10/13/2022	B-16	0.06358	0.17	0.22	0.046	0.02 U	0.02 U	0.06	0.18	0.039	0.035	0.22	0.18
	10/13/2022	S-16-A	0.1823	0.045	0.067	0.036	0.036	0.13	0.14	0.54	0.042	0.026	0.3	0.39
	10/21/2022	S-16-B-OE	0.0897	0.038	0.057	0.02 U	0.02 U	0.068	0.062	0.44	0.021	0.02 U	0.2	0.33
17	10/13/2022	B-17	0.06264	0.02 U	0.02 U	0.02 U	0.02 U	0.031	0.055	0.099	0.02 U	0.02 U	0.025	0.099
	10/13/2022	S-17-A	0.07664	0.02 U	0.02 U	0.02 U	0.026	0.045	0.088	0.11	0.02 U	0.02 U	0.034	0.095
	10/13/2022	S-17-B	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/13/2022	S-17-C	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.022	0.038	0.02 U	0.02 U	0.021	0.026
18	10/20/2022	B-18	0.0162	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.042	0.02 U	0.02 U	0.02 U	0.029
	10/21/2022	S-18-A	0.0163	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.048	0.02 U	0.02 U	0.02 U	0.027
	10/21/2022	S-18-B	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.029	0.02 U	0.02 U	0.02 U	0.022
19	10/20/2022	B-19	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/20/2022	S-19	0.0161	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.03	0.02 U	0.02 U	0.025	0.02 U
20	10/21/2022	B-20	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/21/2022	S-20	0.04787	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.032	0.093	0.02 U	0.02 U	0.045	0.053
21	10/21/2022	B-21	0.0174	0.056	0.099	0.1	0.02 U	0.02 U	0.02 U	0.11	0.08	0.02 U	0.036	0.087
22	10/21/2022	B-22	0.2638	0.031	0.045	0.054	0.02 U	0.041	0.16	0.32	0.046	0.03	0.2	0.27
23	11/02/2022	B-23-2.5	0.01694	0.033	0.032	0.055	0.02 U	0.02 U	0.063	0.088	0.035	0.031	0.077	0.075
24	11/02/2022	B-24-2.5	0.10645	0.02 U	0.02 U	0.027	0.02 U	0.028	0.07	0.21	0.029	0.021	0.1	0.17
	10/19/2022	S-24	0.0172	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.066	0.02 U	0.02 U	0.03	0.039
25	10/19/2022	B-25	0.07145	0.042	0.033	0.099	0.02 U	0.066	0.038	0.47	0.11	0.037	0.26	0.29
	10/19/2022	S-25	0.0168	0.02 U	0.02	0.02 U	0.02 U	0.02 U	0.02 U	0.053	0.02 U	0.02 U	0.031	0.041
26	10/20/2022	B-26	0.04478	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.046	0.091	0.02 U	0.028	0.039	0.065
	11/01/2022	S-26	0.0341	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.038	0.088	0.02 U	0.02	0.062	0.083
27	11/02/2022	B-27-2.5	0.01785	0.02 U	0.02 U	0.048	0.02 U	0.02 U	0.02 U	0.29	0.04	0.029	0.084	0.18
	11/01/2022	S-27	0.05463	0.02 U	0.02 U	0.02 U	0.02 U	0.022	0.066	0.11	0.02 U	0.02 U	0.073	0.097
28	10/26/2022	B-28	0.03981	0.02 U	0.02 U	0.04	0.02 U	0.057	0.027	0.17	0.023	0.02 U	0.13	0.082
	10/26/2022	S-28	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
29	10/26/2022	B-29	0.08248	0.02 U	0.02 U	0.02 U	0.042	0.084	0.11	0.14	0.02 U	0.02 U	0.081	0.067
	10/26/2022	S-29	0.2005	0.02 U	0.02 U	0.042	0.02 U	0.12	0.12	0.42	0.037	0.02 U	0.29	0.3
30	10/26/2022	B-30	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/26/2022	S-30	0.04458	0.02 U	0.02 U	0.02 U	0.02 U	0.044	0.025	0.11	0.02 U	0.02 U	0.097	0.081

Table 2. PAH Verification Soil Sample Results for In-Place Soil

Project No. 210368-A, As-Built Soil Removal Report, Lignin Operable Unit, GP West Site, Bellingham, Washington

			Polycyclic Aromatic Hydrocarbons (PAHs) in mg/Kg											
Sample Grid Location[1]	**Date**	**Sample ID**	**Total cPAHs TEQ[2]**	**1-Methyl naphthalene**	**2-Methyl naphthalene**	**Acenaph thene**	**Acenaph thylene**	**Anthracene**	**Benzo(g,h,i) perylene**	**Fluoran thene**	**Fluorene**	**Naphthalene**	**Phenanthrene**	**Pyrene**
31	10/27/2022	S-31-A	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/27/2022	B-31	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/27/2022	S-31-B	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
32	10/27/2022	B-32	**0.1303**	**0.028**	**0.036**	0.02 U	0.02 U	**0.03**	**0.11**	**0.17**	0.02 U	**0.041**	**0.11**	**0.18**
	10/27/2022	S-32	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
33	10/26/2022	B-33	**0.04505**	0.02 U	0.02 U	**0.02**	0.02 U	**0.024**	**0.035**	**0.11**	0.02 U	**0.023**	**0.087**	**0.082**
34	10/26/2022	B-34	**0.05125**	**0.024**	**0.026**	0.02 U	0.02 U	0.02 U	**0.037**	**0.08**	0.02 U	**0.085**	**0.059**	**0.07**
35	11/02/2022	B-35-2.5	**0.01646**	0.02 U	0.02 U	0.02 U	0.02 U	**0.021**	0.02 U	**0.12**	0.02 U	0.02 U	**0.064**	**0.091**
36	10/21/2022	B-36	**0.13984**	**0.022**	**0.023**	**0.042**	0.02 U	**0.06**	**0.098**	**0.33**	**0.041**	0.02 U	**0.15**	**0.24**
37	11/02/2022	B-37-2.5	**0.1742**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.1**	**0.12**	0.02 U	**0.034**	**0.062**	**0.2**
38	11/02/2022	B-38-2.5	**0.0264**	**0.034**	0.02 U	0.02 U	0.02 U	0.02 U	**0.03**	**0.042**	0.02 U	0.02 U	**0.037**	**0.041**
39	10/26/2022	B-39	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
40	10/24/2022	B-40	**0.04123**	0.02 U	**0.022**	**0.088**	0.02 U	**0.035**	**0.022**	**0.18**	**0.091**	0.02 U	**0.24**	**0.11**
41	10/24/2022	B-41	**0.07146**	**0.057**	**0.059**	**0.075**	0.02 U	**0.025**	**0.045**	**0.15**	**0.067**	0.02 U	**0.17**	**0.11**
42	10/21/2022	B-42	**0.15254**	0.02 U	0.02 U	0.02 U	0.02 U	**0.023**	**0.12**	**0.19**	0.02 U	0.02 U	**0.075**	**0.14**
43	10/21/2022	B-43	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
44	10/24/2022	B-44	**0.0865**	0.02 U	0.02 U	0.02 U	0.02 U	**0.022**	**0.081**	**0.16**	0.02 U	**0.03**	**0.1**	**0.14**
45	10/26/2022	B-45	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
46	10/26/2022	B-46	**0.01762**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.029**	**0.051**	0.02 U	0.02 U	**0.028**	**0.042**
47	10/26/2022	B-47	**0.02791**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.023**	**0.034**	0.02 U	0.02 U	**0.022**	**0.027**
48	11/02/2022	B-48-2.5	**0.1609**	**0.4**	**0.59**	**0.62**	0.02 U	**0.41**	**0.047**	**0.93**	**0.5**	**1.4**	**1.7**	**0.73**
49	10/27/2022	B-49	**0.03282**	**0.057**	**0.086**	0.02 U	0.02 U	0.02 U	**0.031**	**0.05**	0.02 U	**0.073**	**0.057**	**0.085**
50	10/27/2022	B-50	**0.2294**	**0.038**	**0.068**	0.02 U	0.02 U	0.02 U	**0.096**	**0.057**	0.02 U	**0.063**	**0.062**	**0.42**
51	10/27/2022	B-51	**0.02775**	**0.032**	**0.055**	0.02 U	0.02 U	0.02 U	0.02 U	**0.06**	0.02 U	**0.081**	**0.056**	**0.077**
	10/27/2022	S-51	**0.05478**	**0.046**	**0.057**	0.02 U	0.02 U	**0.025**	**0.045**	**0.088**	0.02 U	**0.093**	**0.087**	**0.13**
52	10/18/2022	B-52	**0.04503**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.062**	**0.14**	0.02 U	0.02 U	**0.053**	**0.11**
	10/18/2022	S-52-A	**0.01965**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.04**	**0.081**	0.02 U	0.02 U	**0.053**	**0.056**
	10/18/2022	S-52-B	**0.0166**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.025**	**0.048**	0.02 U	0.02 U	**0.027**	**0.039**
53	10/18/2022	B-53	**0.05796**	0.02 U	**0.021**	**0.039**	0.02 U	**0.036**	**0.038**	**0.18**	**0.03**	**0.041**	**0.1**	**0.15**
	10/18/2022	S-53-A	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.031**	**0.032**	0.02 U	0.02 U	0.02 U	**0.023**
	10/18/2022	S-53-B	**0.08614**	0.02 U	0.02 U	0.02 U	**0.029**	0.02 U	**0.056**	**0.093**	0.02 U	0.02 U	0.02 U	**0.089**
54	10/26/2022	B-54-2.5	**0.2904**	**0.14**	**0.04**	**0.66**	0.02 U	0.02 U	**0.14**	**0.84**	**0.26**	**0.084**	**0.61**	**0.54**
	10/18/2022	S-54-A	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/18/2022	S-54-B	**0.04603**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.039**	**0.053**	0.02 U	0.02 U	**0.032**	**0.052**
55	10/18/2022	B-55	**0.04869**	**0.023**	**0.028**	**0.054**	0.02 U	**0.044**	**0.041**	**0.18**	**0.041**	**0.06**	**0.19**	**0.14**
	10/18/2022	S-55-A	**0.08569**	0.02 U	0.02 U	0.02 U	**0.028**	**0.022**	**0.074**	**0.21**	0.02 U	**0.076**	**0.096**	**0.16**
	10/18/2022	S-55-B	**0.1391**	0.02 U	0.02 U	0.02 U	0.02 U	**0.043**	**0.11**	**0.12**	0.02 U	0.02 U	**0.062**	**0.11**

Table 2. PAH Verification Soil Sample Results for In-Place Soil

Project No. 210368-A, As-Built Soil Removal Report, Lignin Operable Unit, GP West Site, Bellingham, Washington

			Polycyclic Aromatic Hydrocarbons (PAHs) in mg/Kg											
Sample Grid Location[1]	Date	Sample ID	Total cPAHs TEQ[2]	1-Methyl naphthalene	2-Methyl naphthalene	Acenaph thene	Acenaph thylene	Anthracene	Benzo(g,h,i) perylene	Fluoran thene	Fluorene	Naphthalene	Phenanthrene	Pyrene
56	10/26/2022	S-56-A-OE	**0.0438**	**2.2**	**2.2**	**0.34**	0.02 U	0.02 U	**0.041**	**0.12**	**0.44**	**0.38**	**0.71**	**0.15**
	10/18/2022	B-56	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.036**	0.02 U	0.02 U	**0.023**	**0.035**
	10/18/2022	S-56-B	**0.19242**	0.02 U	0.02 U	0.02 U	**0.045**	**0.033**	**0.21**	**0.19**	0.02 U	0.02 U	**0.086**	**0.15**
57	10/26/2022	B-57-4	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/18/2022	S-57-A	**0.07249**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.064**	**0.14**	0.02 U	**0.024**	**0.051**	**0.11**
	10/18/2022	S-57-B	**0.01762**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.021**	**0.068**	0.02 U	0.02 U	**0.042**	**0.062**
58	10/18/2022	B-58	**0.2273**	**0.071**	**0.1**	**0.23**	**0.038**	**0.17**	**0.13**	**0.93**	**0.21**	**0.13**	**0.87**	**0.72**
	10/18/2022	S-58-A	**0.0706**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.057**	**0.12**	0.02 U	0.02 U	**0.042**	**0.1**
	10/18/2022	S-58-B	**0.04188**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.036**	**0.069**	0.02 U	0.02 U	**0.038**	**0.07**
59	10/18/2022	B-59	**0.3039**	0.02 U	0.02 U	0.02 U	**0.069**	**0.11**	**0.18**	**0.66**	**0.025**	0.02 U	**0.25**	**0.62**
	10/18/2022	S-59-A	**0.1084**	0.02 U	0.02 U	0.02 U	**0.024**	**0.028**	**0.076**	**0.25**	0.02 U	0.02 U	**0.064**	**0.22**
	10/18/2022	S-59-B	**0.01851**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.04**	**0.037**	0.02 U	0.02 U	**0.035**	**0.042**
	10/18/2022	S-59-C	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
60	10/27/2022	B-60	**0.04599**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.032**	**0.062**	0.02 U	**0.062**	**0.049**	**0.06**
	10/27/2022	S-60	**0.07094**	**0.045**	**0.041**	0.02 U	**0.023**	0.02 U	**0.047**	**0.13**	0.02 U	**0.047**	**0.099**	**0.12**
61	10/27/2022	B-61	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.043**	0.02 U	0.02 U	**0.039**	**0.04**
62	10/27/2022	S-62	**0.0935**	**0.052**	**0.055**	**0.21**	0.02 U	**0.17**	**0.04**	**0.63**	**0.26**	**0.077**	**1.2**	**0.43**
63	10/26/2022	B-63	**0.0163**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.045**	0.02 U	0.02 U	**0.02**	**0.041**
64	10/27/2022	B-64	**0.06808**	**0.02**	**0.022**	0.02 U	0.02 U	0.02 U	**0.062**	**0.092**	0.02 U	**0.033**	**0.074**	**0.12**
65	10/27/2022	B-65	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/27/2022	S-65	**0.04823**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.044**	**0.065**	0.02 U	**0.031**	**0.051**	**0.063**
66	11/01/2022	B-66	**0.04756**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.051**	**0.087**	0.02 U	**0.061**	**0.06**	**0.079**
67	11/01/2022	B-67	**0.04698**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.037**	**0.054**	0.02 U	**0.03**	**0.058**	**0.063**
	11/01/2022	S-67	**0.11521**	0.02 U	0.02 U	0.02 U	0.02 U	**0.023**	**0.076**	**0.14**	0.02 U	**0.042**	**0.085**	**0.14**
69	11/03/2022	B-69	**0.08489**	0.02 U	0.02 U	0.02 U	0.02 U	**0.033**	**0.055**	**0.15**	0.02 U	**0.04**	**0.17**	**0.17**
	11/03/2022	S-69	**0.02696**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.027**	**0.052**	0.02 U	**0.029**	**0.029**	**0.055**
70	11/02/2022	B-70	**0.0623**	0.02 U	**0.024**	0.02 U	0.02 U	0.02 U	**0.052**	**0.083**	0.02 U	**0.079**	**0.055**	**0.08**
71	10/20/2022	B-71	**0.06714**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.045**	**0.12**	0.02 U	0.02 U	**0.046**	**0.088**
72	10/20/2022	B-72	**0.07411**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.054**	**0.12**	0.02 U	0.02 U	**0.045**	**0.1**
73	10/19/2022	B-73	**0.1838**	**0.029**	**0.034**	0.02 U	**0.023**	**0.11**	**0.13**	**0.36**	**0.024**	0.02 U	**0.23**	**0.32**
74	10/19/2022	B-74	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.024**	0.02 U	0.02 U	0.02 U	0.02 U
75	11/02/2022	B-75-2.5	**0.3758**	0.02 U	0.02 U	0.02 U	**0.051**	**0.13**	**0.21**	**0.66**	**0.025**	0.02 U	**0.51**	**0.65**
76	11/01/2022	B-76	**0.3013**	**0.023**	0.02 U	0.02 U	**0.056**	**0.049**	**0.24**	**0.3**	0.02 U	**0.05**	**0.2**	**0.32**
77	11/02/2022	B-77	**0.05259**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.048**	**0.083**	0.02 U	**0.068**	**0.057**	**0.082**
	11/02/2022	S-77	**0.02958**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.033**	**0.044**	0.02 U	**0.026**	**0.027**	**0.047**

Table 2. PAH Verification Soil Sample Results for In-Place Soil

Project No. 210368-A, As-Built Soil Removal Report, Lignin Operable Unit, GP West Site, Bellingham, Washington

Sample Grid Location[1]	Date	Sample ID	Polycyclic Aromatic Hydrocarbons (PAHs) in mg/Kg											
			Total cPAHs TEQ[2]	1-Methyl naphthalene	2-Methyl naphthalene	Acenaph thene	Acenaph thylene	Anthracene	Benzo(g,h,i) perylene	Fluoran thene	Fluorene	Naphthalene	Phenanthrene	Pyrene
78	10/20/2022	B-78	**0.03257**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.028**	**0.068**	0.02 U	0.02 U	**0.064**	**0.062**
	10/20/2022	S-78-A	**0.03475**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.025**	**0.066**	0.02 U	0.02 U	**0.025**	**0.054**
	11/02/2022	S-78B	**0.08605**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.068**	**0.095**	0.02 U	0.02 U	**0.05**	**0.11**
79	10/19/2022	S-79	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	11/14/2022	B-79-8	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
80	10/19/2022	B-80	**0.2961**	**0.033**	**0.042**	0.02 U	**0.043**	**0.093**	**0.19**	**0.47**	**0.022**	**0.066**	**0.19**	**0.47**
	10/19/2022	S-80	**0.0175**	0.02 U	0.02 U	0.02 U	0.02 U	**0.02**	**0.024**	**0.046**	0.02 U	0.02 U	0.02 U	**0.042**
81	10/19/2022	B-81	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	11/03/2022	S-81-OE	**0.10797**	0.02 U	0.02 U	0.02 U	**0.045**	**0.075**	**0.086**	**0.067**	0.02 U	0.02 U	**0.03**	**0.055**
82	10/19/2022	B-82	**0.01855**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.04**	**0.085**	0.02 U	0.02 U	**0.04**	**0.058**
	10/26/2022	S-82	**0.03256**	0.02 U	0.02 U	0.02 U	0.02 U	**0.022**	**0.028**	**0.083**	0.02 U	0.02 U	**0.035**	**0.059**
83	10/14/2022	S-83-A1	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/14/2022	S-83-A2	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/14/2022	S-83-B1	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	**0.028**	0.02 U	0.02 U	**0.041**	0.02 U
	10/14/2022	S-83-B2	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/14/2022	S-83-C1	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/14/2022	S-83-C2	0.0151 U	0.02 U	0.02 U	**0.02**	0.02 U	**0.032**	0.02 U	**0.095**	**0.029**	0.02 U	**0.071**	**0.055**
	10/14/2022	B-83-CB1	**0.04688**	0.02 U	**0.024**	0.02 U	0.02 U	0.02 U	**0.031**	**0.084**	0.02 U	**0.025**	**0.041**	**0.066**
	10/14/2022	B-83-CB2	**0.0164**	**0.03**	**0.029**	0.02 U	0.02 U	0.02 U	0.02 U	**0.061**	0.02 U	**0.042**	**0.038**	**0.044**
	10/14/2022	S-83-D1	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
	10/14/2022	S-83-D2	0.0151 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U

Notes:

(1) Grid cell locations for excavation verification soil sampling (refer to text).

(2) Individual cPAH results are not displayed because only the total cPAH (TEQ) result is considered for compliance. All of the non-carcinogenic PAH results are displayed.

mg/kg = milligrams per kilogram

Bold - detected

Blue Shaded - Detected result exceeded cleanup level for total cPAH (TEQ) (0.19 mg/kg)

U - Analyte not detected at or above the reporting limit shown

Table 3. PAH Verification Soil Sample Results for Over-Excavated Soil Removed from Site

Project No. 210368-A, As-Built Soil Removal Report, Lignin Operable Unit, GP West Site, Bellingham, Washington

			Polycyclic Aromatic Hydrocarbons (PAHs) in mg/Kg											
Sample Grid Location[1]	Date	Sample	Total cPAHs TEQ[2]	1-Methyl naphthalene	2-Methyl naphthalene	Acenaph thene	Acenaph thylene	Anthracene	Benzo(g,h,i) perylene	Fluoran thene	Fluorene	Naphthalene	Phenan threne	Pyrene
2	10/11/2022	S-2-B	0.4098	0.026	0.02 U	0.024	0.076	0.06	0.21	0.53	0.047	0.02 U	0.43	0.48
3	10/11/2022	S-3-A	0.4048	0.02 U	0.02 U	0.038	0.028	0.065	0.25	0.33	0.025	0.02 U	0.15	0.26
	10/21/2022	S-3-A-OE	11.286	0.15	0.23	0.93	0.25	0.97	8.7	9.7	0.45	0.31	5.2	8.9
4	10/11/2022	S-4-A	4.469	0.055	0.083	0.33	0.14	0.36	2.3	3.6	0.18	0.099	1.2	3
	10/21/2022	S-4-A-OE	7.71	0.12	0.19	0.77	0.38	0.96	6.2	6.9	0.36	0.23	3.6	6.1
5	10/11/2022	S-5-A	0.7022	0.02 U	0.029	0.071	0.059	0.16	0.4	0.57	0.053	0.025	0.29	0.48
	10/21/2022	S-5-A-OE	29.61	0.24	0.4	3	1.1	5.3	21	25	1	0.7	13	24
10	10/12/2022	S-10-B	2.417	0.02	0.025	0.02 U	0.46	0.32	1.1	1.2	0.062	0.037	0.39	2.5
16	10/13/2022	S-16-B	0.4675	0.99	1.4	3.1	0.1	2	0.11	3.7	3.1	0.94	6.8	2.4
21	10/21/2022	S-21	122.08	0.99 J	1.8 J	11	0.94 J	14	78	89	3.6	1.3 J	37	80
22	10/21/2022	S-22	51.3	0.44 J	0.63 J	4.2	0.21 J	6.1	32	39	1.5 J	0.75 J	16	34
23	10/19/2022	B-23	0.5378	0.048	0.061	0.19	0.02 U	0.14	0.35	0.8	0.16	0.05	0.43	0.63
	10/19/2022	S-23	39.99	0.27	0.46	4.1	0.042	5.9	25	34	1.2	0.62	15	31
24	10/19/2022	B-24	10.546	0.097	0.16	1.1	0.031	0.94	7.9	8.2	0.43	0.15	4.1	8.1
27	10/21/2022	B-27	0.4034	0.13	0.045	0.56	0.045	0.16	0.15	2.2	0.34	0.072	0.87	1.2
35	10/26/2022	B-35	1.718	0.068	0.13	0.33	0.067	0.45	1.2	2.2	0.18	0.13	1.3	1.4
37	10/20/2022	B-37	0.4455	0.021	0.029	0.055	0.02 U	0.06	0.3	0.46	0.022	0.047	0.22	0.4
38	10/26/2022	B-38	1.379	0.068	0.057	0.17	0.26	0.83	0.62	3.4	0.51	0.026	2.6	2.2
48	10/26/2022	B-48	1.1508	0.11	0.14	0.31	0.078	0.43	0.69	2.4	0.27	0.25	2	1.5
54	10/18/2022	B-54	1.2547	0.02 U	0.02 U	0.098	0.039	0.16	0.74	0.92	0.037	0.039	0.44	0.84
56	10/18/2022	S-56-A	1.816	0.02 U	0.024	0.025	0.16	0.61	0.63	1.3	0.02 U	0.021	0.14	2.1
57	10/18/2022	B-57	1.427	0.31	0.44	0.62	0.062	0.41	0.92	3.3	0.12	0.8	3.2	2.1
75	10/20/2022	B-75	0.5373	0.08	0.078	0.34	0.02 U	0.36	0.26	1.1	0.23	0.11	2	1.2
79	10/19/2022	B-79	1.1772	0.049	0.043	0.038	0.16	0.33	0.69	1.4	0.085	0.067	0.62	2.1
	11/02/2022	B-79-2.5	0.8922	0.16	0.17	0.14	0.077	0.3	0.49	1	0.16	0.47	1.1	1.4
	11/09/2022	B-79-3	1.0209	0.022	0.023	0.029	0.08	0.25	0.49	1.3	0.047	0.046	0.56	1.3
	11/11/2022	B-79-3.5	12.887	0.071	0.076	0.099	0.76	4.3	6.9	14	0.32	0.22	6.7	21
81	10/19/2022	S-81	0.5866	0.18	0.098	0.081	0.086	0.22	0.37	1	0.24	0.027	1.5	1.4

Notes:

(1) Grid cell locations for excavation verification soil sampling (refer to text).

(2) Individual cPAH results are not displayed because only the total cPAH (TEQ) result is considered for compliance. All of the non-carcinogenic PAH results are displayed.

mg/kg = milligrams per kilogram

Bold - detected

Blue Shaded - Detected result exceeded cleanup level for total cPAH (TEQ) (0.19 mg/kg)

U - Analyte not detected at or above the reporting limit shown

Table 4. Testing Results for Water Batches Discharged to ASB

Project No. 210368-A, As-Built Soil Removal Report, Lignin Operable Unit, GP West Site, Bellingham, Washington

Date	Water Batch No.	Batch Volume (gal)	Start TSS Test Time	Finish TSS Test Time	TSS (mL/L)	Sheen Visible? (Y/N)
11/2/2022	1	16,000	1540	1625	0	N
11/5/2022	2	20,000	0715	0800	<0.5 (Trace)	N
11/7/2022	3	20,000	0710	0755	0	N
11/7/2022	4	20,000	1340	1425	0	N
11/8/2022	5	20,000	1430	1515	0	N
11/10/2022	6	4,000	0940	1025	0	N
11/10/2022	7	4,000	1205	1250	0	N
11/10/2022	8	4,000	1420	1505	0	N
11/11/2022	9	4,000	0755	0840	0	N
11/11/2022	10	4,000	1015	1100	0	N
11/11/2022	11	4,000	1205	1250	0	N
11/11/2022	12	4,000	1415	1500	0	N
11/12/2022	13	4,000	0800	0845	0	N
11/12/2022	14	4,000	0950	1035	0	N
11/12/2022	15	4,000	1100	1145	0	N
11/14/2022	16	2,000	1315	1400	0	N
Total Discharged (gal)		**138,000**				

Notes:

TSS: Total Settleable Solids as measured in milliliters per Liter (mL/L) using Imhoff cone.

Batches 1-5 were tested in discharge from ERRG's Baker tank. Batches 6-16 were tested from ERRG's water truck used to convey the water to the ASB discharge point.

FIGURES

Site Location Map

As-Built Cleanup Report
Lignin Operable Unit, GP West Site
Bellingham, Washington

Aspect CONSULTING	JAN-2023	BY: MRE / NLK	FIGURE NO.
	PROJECT NO. 210368	REVISED BY: - - -	1

GIS Path: G:\projects\ChlorAlkaliRAU 210368\Delivered\As Built Cleanup\01 Site LocationMap.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 1/13/2023 || User: nkochie || Print Date: 1/13/2023

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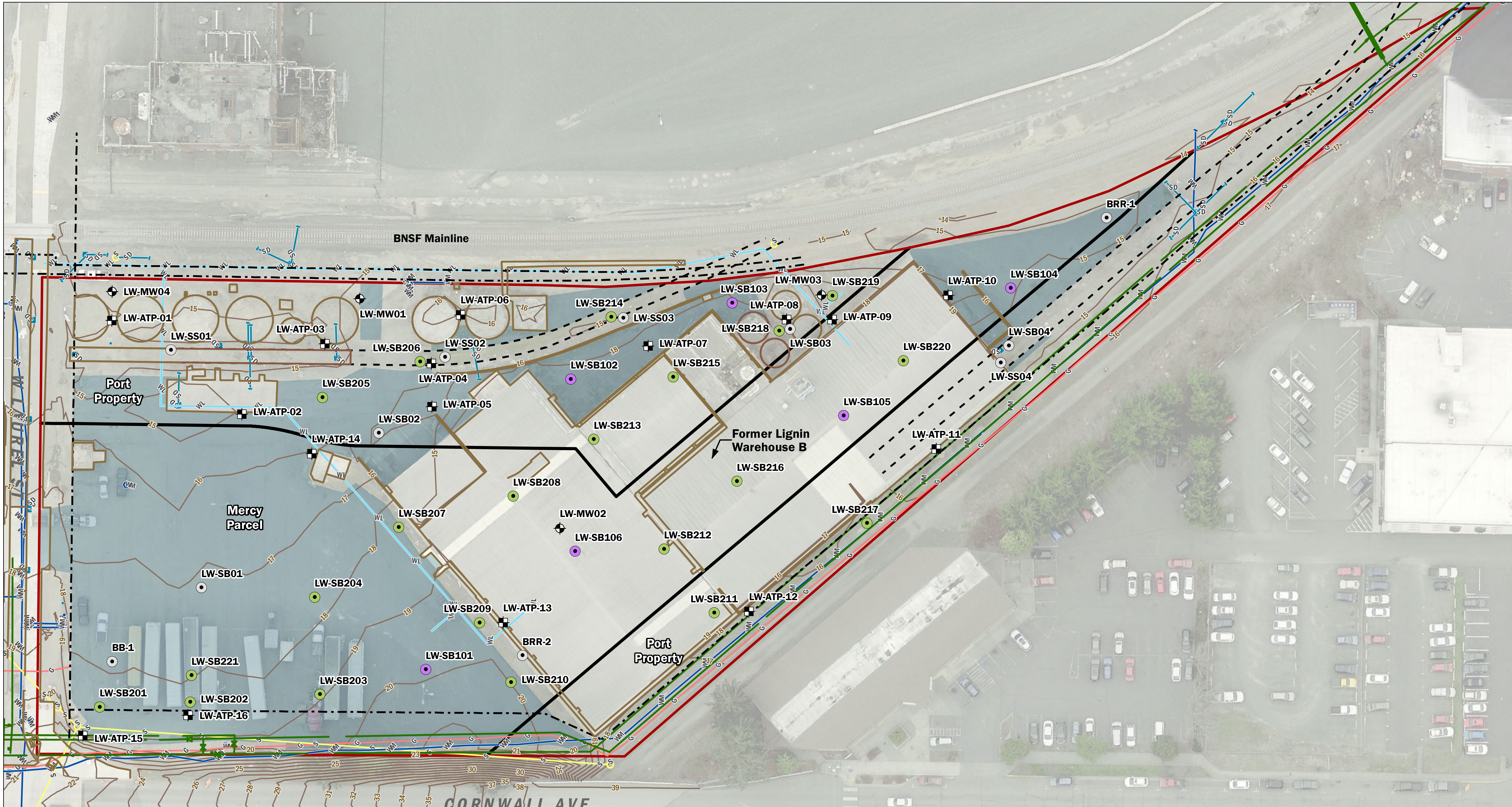

Explorations

- Soil Boring (2022)
- Soil Boring (2020)
- Soil Boring (2004)
- Monitoring Well
- Test Pit

- Gas Line
- Storm Drain Line
- Sewer Line
- Water Line (Potable)
- Water Line (Non-potable)
- City Raw Water Line (non-potable)
- Remnant Concrete Structure
- Utility Easement
- Topographic Elevations (NAVD88)
- Asphalt Pavement
- Railroad Spur
- Lignin Operable Unit

MILL NORTH

TRUE NORTH

0 30 60

Feet

Notes:
1. Existing features, specific binding plan, and utility lines from Millworks survey NOV-2021.
2. City raw water lines from Georgia-Pacific CAD file.

Investigation Locations and Conditions Prior to Soil Removal

As-Built Cleanup Report
Lignin Operable Unit, GP West Site
Bellingham, Washington

Aspect CONSULTING	FEB-2023	BY: SJG / AAF	FIGURE NO.
	PROJECT NO. 210368	REVISED BY: NLK	2

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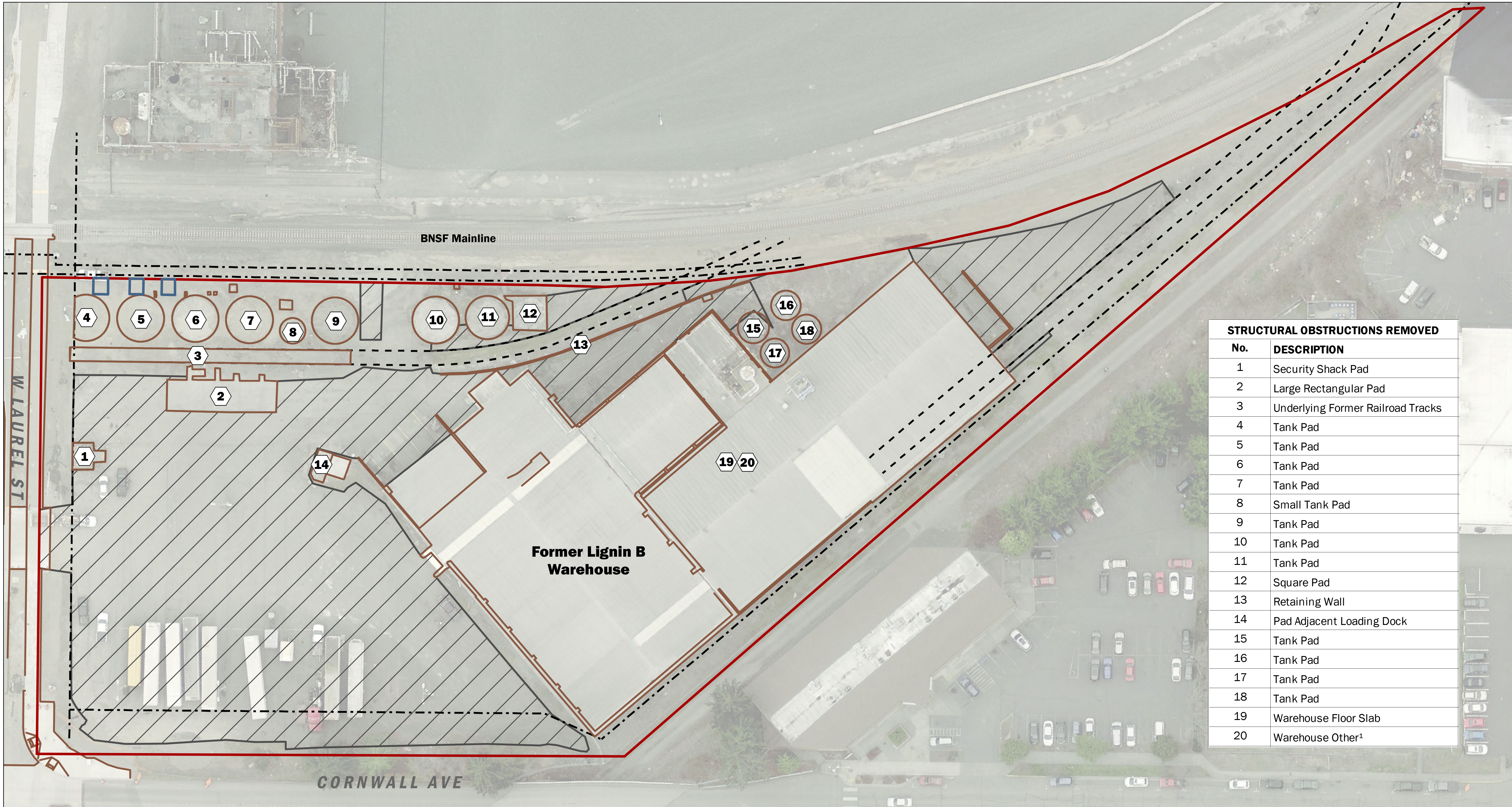

STRUCTURAL OBSTRUCTIONS REMOVED	
No.	**DESCRIPTION**
1	Security Shack Pad
2	Large Rectangular Pad
3	Underlying Former Railroad Tracks
4	Tank Pad
5	Tank Pad
6	Tank Pad
7	Tank Pad
8	Small Tank Pad
9	Tank Pad
10	Tank Pad
11	Tank Pad
12	Square Pad
13	Retaining Wall
14	Pad Adjacent Loading Dock
15	Tank Pad
16	Tank Pad
17	Tank Pad
18	Tank Pad
19	Warehouse Floor Slab
20	Warehouse Other[1]

Remnant Concrete Structure - Removed

Railroad Spur - Removed

Pavement - Removed

Concrete slabs remaining in place

Utility Easement

Lignin Operable Unit

Notes:
[1]Warehouse Other encompasses pile caps, foundation footings, retaining walls, all other concrete foundation elements, and wood pilings to approximately 6 inches below soil excavation subgrade.
- Existing features, and specific binding plan from Millworks survey NOV-2021.

MILL NORTH

TRUE NORTH

0 30 60
Feet

Obstruction Removal Areas

As-Built Cleanup Report
Lignin Operable Unit, GP West Site
Bellingham, Washington

Aspect CONSULTING

JAN-2023	BY: MRE / NLK	FIGURE NO.	3
PROJECT NO. 210368	REVISED BY: ---		

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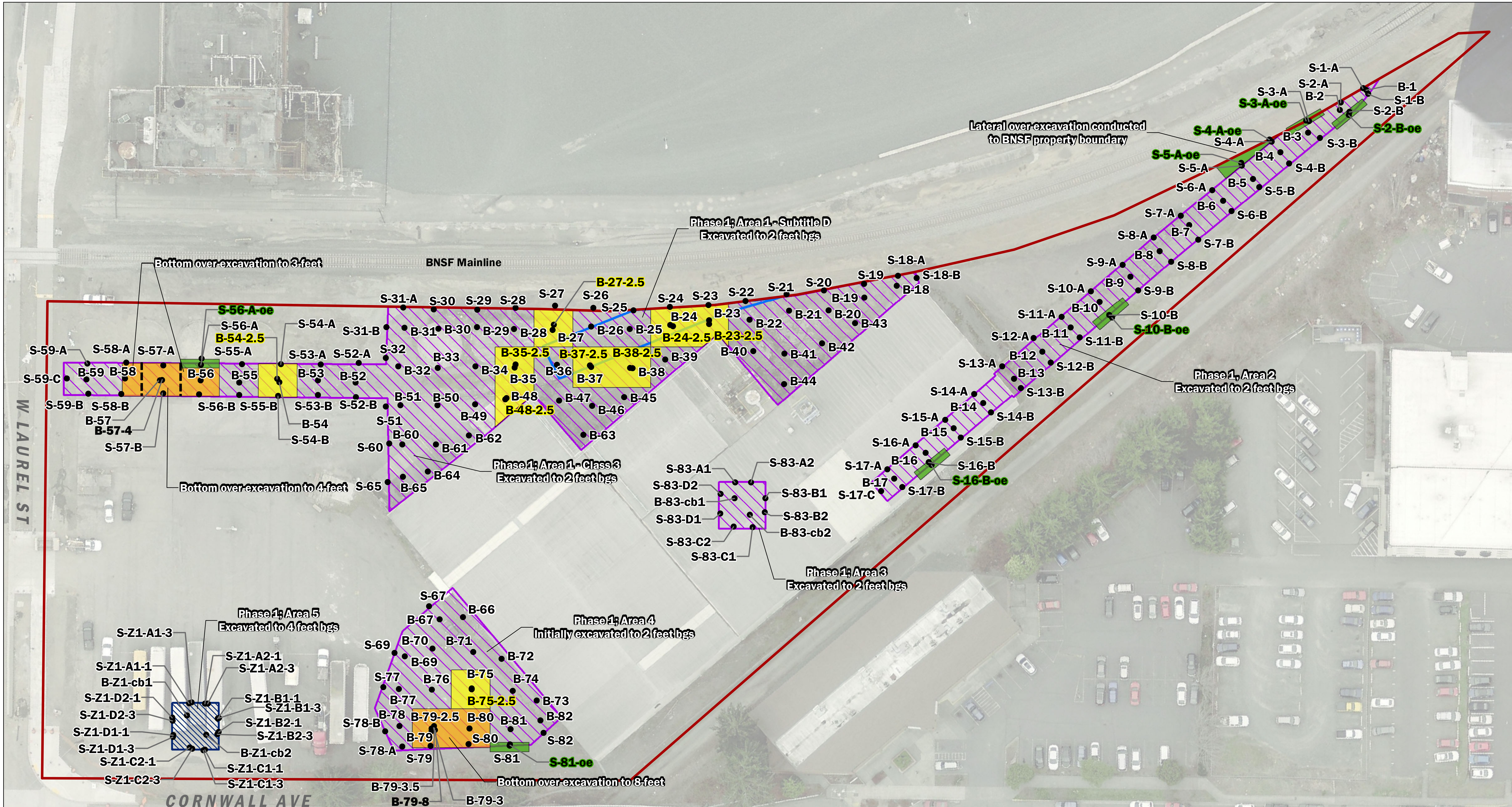

- Verification Soil Sample

Phase 1 Cleanup Soils Removal:
Soil Exceeding Direct Contact CULs

- Zinc > direct contact CUL (4-foot depth excavation)
- cPAH > direct contact CUL (Minimum 2-foot depth excavation)
- cPAH -Contaminated Soils disposed at Subtitle D Landfill
- Bottom over-excavation exceeding 2.5 feet
- Bottom over-excavation to 2.5-feet
- Lateral 1-foot over-excavation
- Lignin Operable Unit

Phase 1 Excavation Areas and Verification Soil Sample Locations

As-Built Cleanup Report
Lignin Operable Unit, GP West Site
Bellingham, Washington

Aspect CONSULTING

FEB-2023	BY: MRE / NLK	FIGURE NO.
PROJECT NO. 210368	REVISED BY: - - -	4

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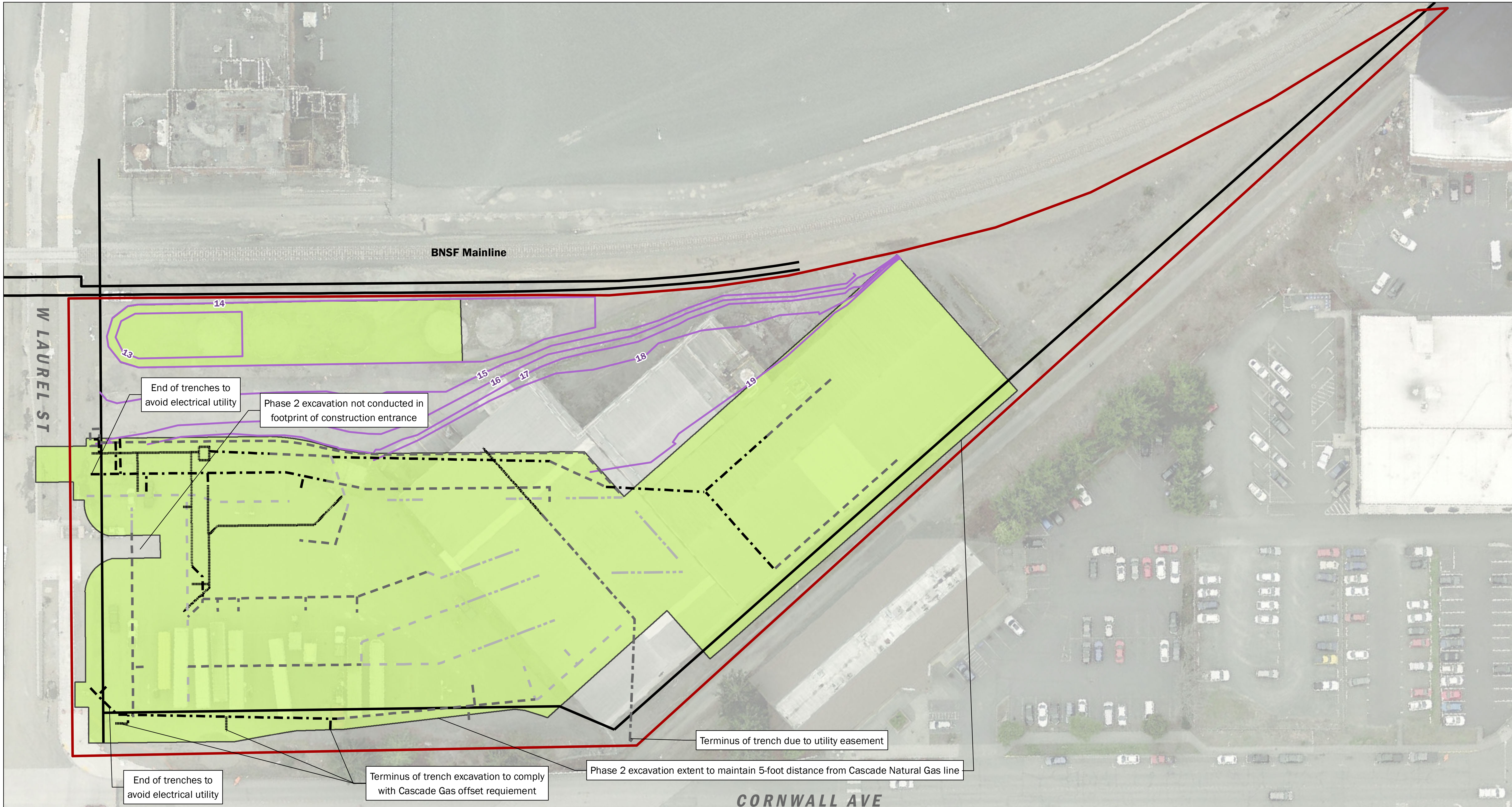
GIS Path: G:\projects\ChlorAlkaliRAU_210368\Delivered\As Built Cleanup\Figure 4 Phase I Excavation Areas and Confirmation Sample Locations.mxd || Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet || Date Saved: 2/3/2023 || User: npawlikowski || Print Date: 3/10/2023



Phase 2 and 3 Cleanup Soil Removal:

Additional Metals Impacted Soils Excavation

Phase 3 Trenching

1-foot Deep Trench

2-foot Deep Trench

3-foot Deep Trench

4-foot Deep Trench

5-foot Deep Trench

6-foot Deep Trench

7.5-foot Deep Trench

Subrade Elevation Contour

Utility Easement

Lignin Operable Unit

Notes:
1. Existing features, and specific binding plan from Millworks survey NOV-2021.
*Excavation depths based on observed elevations after obstruction removal activities. Excavations (and fill) conducted to meet design subgrade elevations specified in Sheets C-07 and C-08 of Lignin OU Construction Plans (Aspect, 2022).

MILL NORTH

TRUE NORTH

45°

0 30 60

Feet

Phases 2 and 3 Excavation

As-Built Cleanup Report
Lignin Operable Unit, GP West Site
Bellingham, Washington

Aspect CONSULTING

FEB-2023

PROJECT NO. 210368

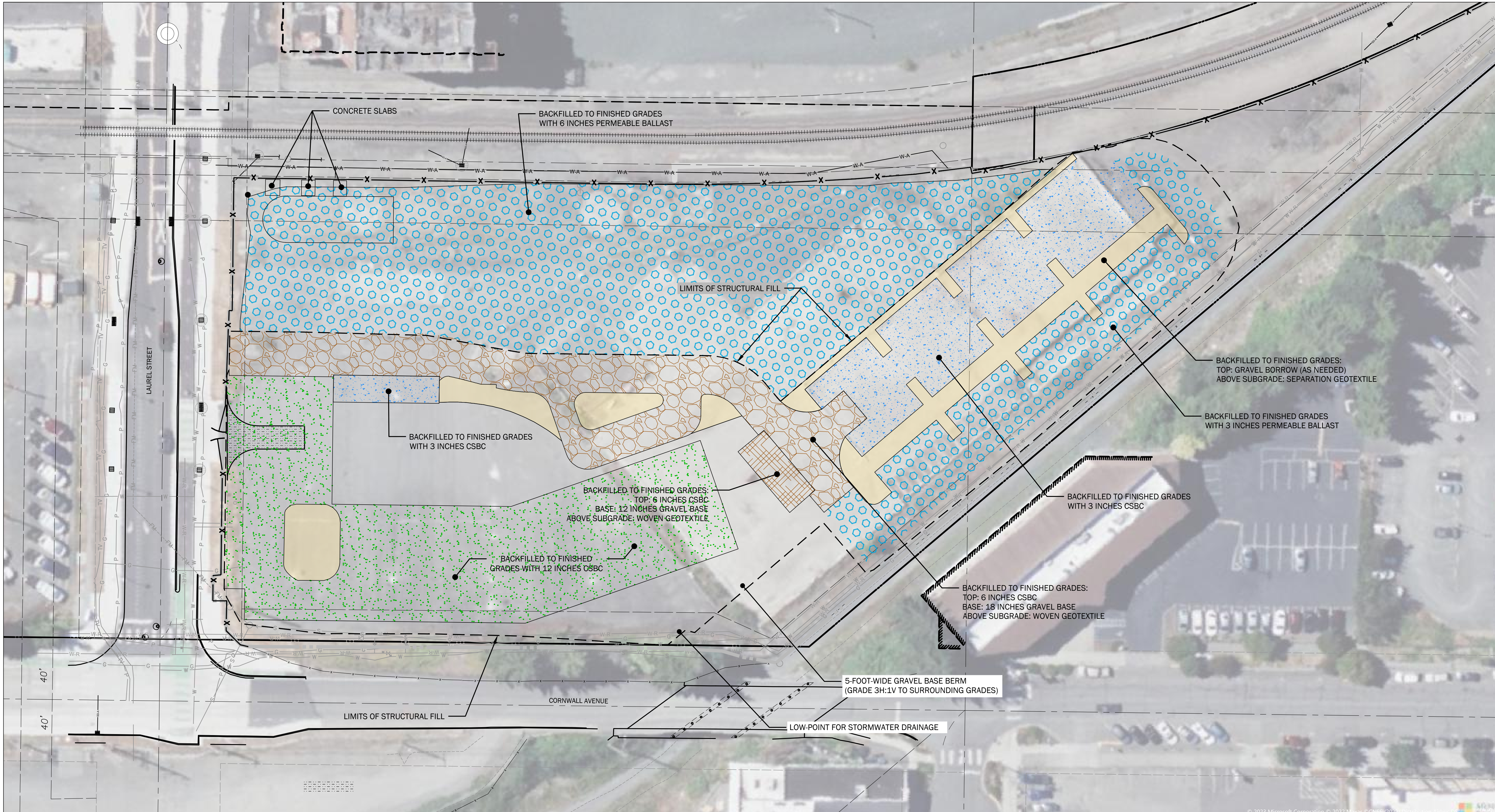
BY: MRE / NLK

REVISED BY: - - -

FIGURE NO. 5

Basemap Layer Credits || Whatcom County

GIS Path: G:\projects\ChlorAlkaliRAU_210368\Delivered\As Built Cleanup\Figure 5 Phase 2 and 3 Excavation.mxd || Coordinate System: WGS 1984 Web Mercator Auxiliary Sphere || Date Saved: 2/7/2023 || User: nkochie || Print Date: 2/7/2023



LEGEND

- PROJECT LIMITS
- PROPERTY BOUNDARY
- CONSTRUCTION FENCE
- PERMEABLE BALLAST BACKFILLED AREA (3-INCH OR 6-INCH)
- 24-INCH STRUCTURAL BACKFILLED AREA
- 18-INCH STRUCTURAL BACKFILLED AREA
- 12-INCH STRUCTURAL BACKFILLED AREA
- 3-INCH STRUCTURAL BACKFILLED AREA
- GRAVEL BORROW BACKFILLED AREA
- QUARRY SPALLS CONSTRUCTION ENTRANCE
- AREA WITHOUT BACKFILL

PROJECT NORTH

TRUE NORTH

0 30 60 Feet

Backfill and Finished Grading Plan

Lignin Operable Unit Cleanup Action
Chlor-Alkali Remedial Action Unit, GP West Site
Bellingham, Washington

Aspect CONSULTING

Feb-2023	BY: MRE/SCC	FIGURE NO.	6
PROJECT NO. 210368	REVISED BY: -		

CAD Path: Q:\Port of Bellingham\210368 GP West Chlor-Alkali\2023-02 Report Figures\210368 Plan Set 1 of 2 - Plans.dwg 06 Backfill and Finished Grading Plan (C-09) || Date Saved: Feb 07, 2023 4:28pm || User: scudd