Final Pre-Remedial Design Investigation Work Plan – Upland Areas of Jeld Wen Site

Jeld Wen Site

Prepared for

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Table of Contents

Figures

Appendices

Attachments

1.0 Introduction

This Final Pre-Remedial Design Investigation (PRDI) Work Plan (WP) – Upland Areas of the Jeld Wen Site (Upland PRDI WP) has been prepared in accordance with Agreed Order (AO) Number DE 5095 for the former E.A. Nord, Inc, door facility (i.e., Former Nord Door Facility) (through its successor-in-interest, JELD-WEN, Inc. [JELD-WEN]), located at 300 West Marine View Drive, Everett, Washington, 98201 (Jeld Wen Site), executed between JELD-WEN and the Washington State Department of Ecology (Ecology). This WP is specifically described in the Second Amendment to the AO (effective date July 28, 2023), Exhibit G – Scope of Work and Schedule, Task 1: Development of PRDI project plan and implementation, and was prepared in accordance with the Cleanup Action Plan (CAP)(Ecology, 2023). This Upland PRDI WP has been prepared to support engineering design and implementation of the selected remedial alternatives. This Upland PRDI WP identifies sampling and analysis procedures and schedules to implement PRDI activities of upland soil and groundwater for characterization, and pilot testing of selected remedial alternative components. This Upland PRDI WP also presents the expected contents of the PRDI Data Report (Task 2 of the Second Amendment to the AO).

This Upland PRDI WP has been prepared to meet the requirements of the Model Toxics Control Cleanup Act (MTCA) administered by Ecology under Chapter 173-340 of the Washington Administrative Code (WAC).

JELD-WEN received final comments on the draft PRDI Work Plan – Upland Areas from Ecology on February 21, 2024. In addition, JELD-WEN received a formal deferral letter from Ecology regarding the selected BIO remedy on February 23, 2024 (copy of deferral letter included as Attachment 1). Ecology suggested the PRDI Work Plan be modified to elect installation and pilot testing of air sparge (AS) and soil vapor extraction (SVE) as the remedial action for the Creosote/Fuel Oil Area following hot spot excavation and disposal, while deferring various components of BIO testing activities that were presented in the 2023 CAP, including Nitrate, Nutrients, and Surfactant [NNS] injection and recirculation.

Per Ecology's request, JELD-WEN provided a response to comment letter indicating the edits to be made for the final Upland PRDI WP (copy of response letter included as Attachment 2). Universal changes reflecting the BIO deferral letter were also made to this Final Upland PRDI WP and all those individual changes were not detailed in the response letter.

1.1 Background

The Site is in Snohomish County, Washington, and is bound by vacant land and tidal mudflats to the east, northeast, and west; West Marine View Drive and Burlington Northern Santa Fe (BNSF) railroad tracks to the southeast; and Port Gardner Bay to the north and northwest (Figure 1). The Site is further defined by the extent of contamination caused by the release of hazardous substances at the Site, as described in the CAP.

From 2009 to 2021 JELD-WEN performed a Remedial Investigation and Feasibility Study (RI/FS) to assess site conditions and evaluate cleanup alternatives in accordance with MTCA (SLR/Anchor, 2021). The cleanup alternatives were evaluated using a Disproportionate Cost Analysis (DCA) and the cleanup action was selected by Ecology and detailed in the August 2023 CAP. As presented in the CAP, PRDI activities are undertaken to support engineering design and implementation of the selected remedies. Upon development of the PRDI scope of work, Ecology indicated that the selected alternative for the Creosote/Fuel Oil Area of enhanced bioremediation including NNS injections and recirculation following hot spot removal appeared to be misaligned with the Conceptual Site Model (CSM) that indicates volatilization of groundwater impacts to on-

site workers (current and future) via vapor intrusion as the primary source/receptor/pathway for the Creosote/Fuel Oil Area. Therefore, Ecology provided JELD-WEN a formal deferral letter of the enhanced BIO system alternative (see Attachment 1) and to focus the PRDI activities on assessing specific components of the BIO system, mainly air sparging (AS) and soil vapor extraction (SVE) which is a proven technology for addressing sites with vapor intrusion concerns. As stated in the deferral letter, the NNS injections and recirculation could be considered a primary contingent remedial action (CRA); however, per the CAP, if the selected alternative does not appear capable of achieving cleanup objectives within a reasonable timeframe, performing Potentially Liable Parties (PLPs) must implement a CRA or prepare a focused feasibility study (FFS) under Ecology's direction and perform associated actions.

1.2 PRDI Work Plan Objectives

General objectives of this Upland PRDI WP are described below:

- To collect data to refine the understanding of the extent of impacts in soil, groundwater, and soil gas;
- To collect data to assist with full-scale engineering design and implementation of remedial alternatives; and,
- To perform pilot testing of remedial alternative components to assess feasibility of full-scale implementation.

1.3 PRDI Work Plan Organization

This Upland PRDI WP document is organized as follows:

- Section 2 provides the CSM for the selected areas (Woodlife Area and Creosote/Fuel Oil Area) and a summary of remedy actions, cleanup goals, and objectives.
- Section 3 presents the scope of work for the upland PRDI activities.
- Section 4 presents the regulatory and permitting requirements.
- Section 5 presents expected contents of the PRDI Data Report.
- Section 6 presents the schedule.
- Section 7 lists references cited in this Upland PRDI WP.
- Appendix A presents the Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) that describes detailed sampling methodologies and quality assurance protocols to be used during the PRDI.
- Appendix B presents the Health and Safety Plan (HASP) that describes the health and safety procedures that will be followed during field activities conducted at the Site.
- Appendix C presents the Inadvertent Discovery Plan (IDP) to be followed during field activities at the Site.
- Attachments provided at the end of the Upland PRDI WP include the BIO deferral letter from Ecology and JELD-WEN's formal response to Ecology's comments to the draft WP.

2.0 Upland Areas

This section presents a summary of the selected remedies and cleanup/remediation levels, and a description of the proposed PRDI activities for the upland areas of the Site selected for remedial action.

2.1 Woodlife Area

2.1.1 Conceptual Site Model

A CSM including discussion of suspected points of release, contaminant fate and transport, and exposure pathways for the Woodlife Area is provided below.

Historical Use

Characterization data and history indicate that the primary source of COPCs in soil and groundwater in the Woodlife Area are attributed to an approximately 10,000-gallon aboveground storage tank (AST) containing Woodlife wood treatment solution (which contained PCP) that was formerly located northeast of the main manufacturing building, associated underground piping from the AST, and the former dip tank located within the main manufacturing building. The use of the Woodlife AST was discontinued prior to JELD-WEN's purchase of the Site in 1986, and the AST was removed in 1991.

Suspected and Confirmed Releases

Soil and groundwater sampling was completed for analysis of pentachlorophenol (PCP), dioxins, and total petroleum hydrocarbons (TPH) based on the location and historical use of the Woodlife solution containing PCP. PCP was not measured above the laboratory reporting limit in any groundwater samples on the Site and was only detected above the laboratory reporting limit in 3 soil samples from the Woodlife Area (GP-5, GP-29, and GP-501). TPH was detected above the reporting limit in some soil and groundwater samples from the Woodlife Area but were limited in extent. Therefore, there appears to be some crossover with impacts associated with the former National Pole treating operations and fuel oil storage. Field screening at one historical soil boring, GP-501, noted elevated photoionization detector (PID) measurements that suggest the presence of volatile-range contaminants. This boring is in the vicinity of a former toluene tank and no other borings in the Woodlife Area exhibited similar field screening anomalies.

Polychlorinated dibenzo-p-dioxin and dibenzofurans (hereafter referred to as "dioxins") analytical results indicate that the impacts are from underground piping connected to the Woodlife AST and former dip tank, and these impacts are localized. It is likely that residual dioxins are more persistent than the PCP that was used in the solution and is an apt constituent to trace the horizontal and vertical extent of Woodlife-associated impacts.

Contaminant Fate and Transport

Soil

Contaminants of potential concern (COPCs) identified for the Woodlife Area (and particularly dioxins) have relatively high partition coefficients and migrate slowly in soil through natural processes including density-driven flow, capillary draw, advection, and diffusion into the subsurface. Remedial Investigation (RI) data indicate that the migration pathway from soil to groundwater is complete; however, additional transport associated with groundwater flow through contaminated soil is limited (see below).

Groundwater

Groundwater sampling data has demonstrated that dioxin impacts to soil and groundwater are localized around the former operation areas in the Woodlife Area. Given the substantive groundwater data available for the Site, the distance between the areas of impact and surface water, and the passage of time since these former operations, groundwater migration/seepage to surface water does not appear to be a significant release mechanism for dioxins impacts in the Woodlife Area. Dioxins have a low solubility and tend to bind to soil particles making it comparatively less mobile.

Surface Water and Stormwater

Dioxin impacts in the Woodlife Area are located beneath buildings or pavement; therefore, overland transport/surface runoff is not considered a significant release mechanism for the dioxins impacts in the Woodlife Area. Historical stormwater discharges from the North Truck Dock (NTD) sump, surface flow from off-site properties, including West Marine View Drive, or infiltration of groundwater into the NTD sump and/or drainage from the sump to the subsurface via the apparent sump weep holes were assessed during the source control evaluation and are described below.

Volatilization to Air

COPCs in the Woodlife Area, particularly dioxins, have relatively low volatility/vapor pressure under typical environmental conditions and will not readily volatilize from the pure organic state; therefore, direct inhalation is a less significant route of exposure. Henry's Law Constants indicate that volatilization of dioxins from water to air could be a potential transfer mechanism during warmer temperatures, which could result in seasonal volatilization/deposition and long-range air transport. Air blown transport of dioxins is more likely to be the result of air emissions from historical wood-fired boilers, many of which were located in the Everett, Washington area, including the Former Bay Wood Site immediately to the North of the Site.

Nature and Extent of Contamination

Investigations at the Woodlife Area to further characterize dioxins impacts found that soil and groundwater impacts were generally shallow (less than 5 feet bgs) and appeared to be from a shared sub-slab origin source area (i.e., release from underground piping) that 'pancaked' out through the surface soils beneath the asphalt driveway and/or building foundation (see Figure 2). Sentry groundwater monitoring wells MW-6 and MW-7 were installed downgradient of the Woodlife Area and the adjacent surface water and sediment (i.e. the "log way"). Groundwater data collected during the RI/FS and groundwater seep data collected during the SCE show no groundwater migration of dioxins above Preliminary Cleanup Levels (PCLs) to surface water or sediments in the adjacent "log way". Assessment of a stormwater sump in the NTD identified weep holes. Following the investigation, the current property owner plugged the weep holes, re-routed the discharge line to an existing stormwater line that discharges to the "log way", and removed accumulated solids from within the NTD sump and the truck dock ramp area.

Affected Media and Potential Exposure Pathways

Results of the RI indicate that affected media at the Woodlife Area include soil and groundwater and potentially complete exposure pathways for these media in the Woodlife Area are described below.

Soil

The Property is zoned as industrial use, and it is likely that industrial activities will continue to occupy the Woodlife Area for the foreseeable future. Potentially complete exposure pathways for soil in the Woodlife Area include:

- Direct exposure by construction workers and industrial workers (e.g. dermal, incidental ingestion) associated with future on-site work or development work to a maximum depth of 15 feet or less.
- Shallow groundwater conditions are likely to limit potential future construction worker exposure to soil within less than approximately 5 feet from the ground surface. Due to the presence of asphalt caps, roadways, and structures in the Woodlife Area, the terrestrial ecological exposure pathway is not considered complete.

Groundwater

Groundwater at the Site is not considered potable as described in Section 5.2.7 of the RI/FS and no groundwater production wells are located at the Site.

Groundwater impacts are currently contained under existing surface caps, buildings, and roadways, further limiting potential exposure. Sampling of shoreline seeps in the "log way" indicate that groundwater COCs are not present in surface water or sediment adjacent to the Woodlife Area. Volatilization of dioxins from groundwater is not considered a pathway based on the low volatility. Therefore, no complete exposure pathways were identified for groundwater impacts in the Woodlife Area.

2.1.2 Summary of Selected Remedy

Affected media in the Woodlife Area include soil and groundwater. FS alternatives for the Woodlife Area were developed by considering the horizontal and vertical delineation of impacts identified during RI sampling activities. Based upon the specifics of the assessment area remedial actions retained as FS alternatives for the Woodlife Area included:

- Alternative 1: Engineering Controls, Institutional Controls and Long-Term Monitoring
- Alternative 2: Soil Removal, Engineering Controls, Institutional Controls

Ecology has selected Alternative 2 as the preferred cleanup alternative.

Alternative 2 for the Woodlife Area includes soil excavation, engineering controls (re-establishing the existing surface caps), and institutional controls.

The purpose of the onsite soil excavation for the Woodlife Area would be to remove the impacted soil for offsite disposal. Removal of the impacted soil will effectively address the groundwater impacts via source removal due to the hydrophobic nature of dioxins.

Conceptually, impacted soil to an estimated maximum depth of 5 feet bgs would be excavated and hauled to an appropriate off-site disposal facility as special waste. The extent of the excavation will be based on existing analytical data supplemented with additional investigation completed during the PRDI activities (see Section 3). The use of dewatering equipment would likely be needed as the excavation would extend into the shallow groundwater table. The water would be profiled prior to discharge (pending a permit) or disposal. Clean backfill would be imported, placed into the excavation, and compacted. The area would be finished with an asphalt surface cap to match the existing surface capping to ensure contiguous surface capping throughout the contaminated area (i.e. engineering control). As the proposed excavation area encompasses the main access driveway of the Site, and it has been repeatedly documented that

stormwater runoff from West Marine View Drive flows onto the Site, JELD-WEN will work with the property owner regarding backfilling, regrading/re-contouring, and surface paving in this area during the engineering design phase to redirect stormwater runoff migration from off-site sources.

Institutional controls will include restrictions on soil disturbance where impacted soil remains or placement of drinking water wells in the property.

2.1.3 Cleanup Standards

This section presents the Cleanup Standards applicable to the affected media of the Woodlife Area and the related contaminants of concern (COCs) from the CAP. Cleanup Standards consist of Cleanup Levels (CULs) defined by a hazardous substance's concentration in soil, water, air and sediment with regards to human health and the environment; Remediation Levels (RELs) which may be used to identify the concentrations (or other methods of identification) of hazardous substances at which different cleanup action components will be implemented; designation of location at the Site where the CULs/RELs must be met based on pathway-specific point of compliance (POC); and, additional regulatory requirements that apply to the cleanup action.

COCs

Assessments performed as part of the RI established the following Indicator Hazardous Substances (IHSs) as COCs for the Woodlife Area:

- Dioxins Toxic Equivalency (TEQ) values for soil and groundwater

Cleanup Levels

Selected CULs for IHSs in the Woodlife Area from the CAP are the following:

- 5.2 picograms per gram (pg/g, or parts per trillion [ppt]) for Dioxins TEQ (based on natural regional background concentration, Ecology, 2010) in soil in the Woodlife Area
- 72 picograms per liter (pg/L, or parts per quadrillion [ppq] for Dioxins TEQ (based on the laboratory practical quantitation limit [PQL]) in groundwater in the Woodlife Area

As presented in the Woodlife Area CSM, dioxins readily adsorb into soil particles and it is expected that source removal of the impacted soils will result in instantaneous reductions in groundwater concentrations. Therefore, there is no significant assessment of current groundwater conditions in the Woodlife Area as part of the PRDI activities, with the exception of on-going annual groundwater monitoring at the downgradient existing monitoring wells MW-6 and MW-7 that is scheduled up to implementation of the final cleanup action.

Remediation Levels

RELs are not proposed for the soil and groundwater cleanup components in the Woodlife Area. The CULs presented above are proposed to be used for the Woodlife Area; however, as presented in the CAP, if the soil impacts can't be fully delineated due to site conditions or health & safety concerns (i.e., significant groundwater infiltration causing excavation/trenching concerns) some contamination will remain in place and capped with clean backfill and asphalt pavement. If soil impacts extend below 5 feet bgs an REL of 13 pg/g (MTCA method B direct contact value) will be used to limit the depth and spatial extent of excavation, in conjunction with observations of site conditions or health & safety concerns which will dictate the use of engineering controls (clean backfill and asphalt surface cap) and institutional controls as primary components of the remedial action.

Points of Compliance

Upland Soil

The standard POC for the soil cleanup levels will be throughout the soil column from the ground surface to 15 feet bgs as presented in the CAP. Due to the shallow groundwater table and sandy soil it is unlikely that construction work could be safely performed down to the standard POC for soil of 15 feet bgs described in WAC 173-340-740(6)(d) and WAC 173-340-7490(4)(b). Ecology believes conditions specified in WAC 173-340-740(6)(f)(i)-(vi) will be met for the alternate POC because engineering and institutional controls are included as part of the remedy.

Groundwater

For groundwater, the POC is the point or points where the groundwater cleanup levels must be attained for a site to be in compliance with the cleanup standards. Groundwater cleanup levels shall be attained in all groundwaters from the POC to the outer boundary of the hazardous substance plume per WAC 173-340-720(8)(a). Under MTCA, the standard POC for groundwater is throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest depth that could potentially be affected by an activity.

For groundwater potentially discharging to surface water, MTCA provides for a conditional point of compliance (CPOC) at the point of discharge of groundwater to surface water when it can be demonstrated that it is not practicable to meet the cleanup level at a point within the upland groundwater. The CPOC for the Site is the downgradient edge of the property, at the point of entry of groundwater to Port Gardner Bay.

2.2 Creosote/Fuel Oil Area

2.2.1 Conceptual Site Model

A CSM including discussion of suspected points of release, contaminant fate and transport, and exposure pathways for the Creosote/Fuel Oil Area is provided below.

Physical Setting

Characterization data and reported history of use indicate that the primary source of COPCs in the Creosote/Fuel Oil Area is the pre-1940 to ca. 1948 former pole treating operation and the 1950's oil-fired boiler on the eastern portion of the Site and adjacent to the current placement of West Marine View Drive.

The current location of West Marine View Drive historically consisted of tidally-influenced mudflats that were likely filled between 1938 and 1947. Based on a review of boring logs from the Creosote/Fuel Oil Area, fill material appears to consist primarily of dredged sandy sediment with aggerate material below roadway pavement. Construction of West Marine View Drive in its current location (filled land versus elevated roadway on pilings) was completed by 1947 based on the available aerial photographs and Site maps. West Marine View Drive was modified as a wider paved roadway in the 1960's.

Groundwater has been measured as shallow as approximately 2 feet bgs and is likely influenced by surface water infiltration, site features, stormwater conveyance lines, and utilities infrastructure. Boring logs do not identify a continuous aquitard or aquiclude for the Site within the extent of site investigations (up to 60' bgs); however, strata of finer-grained soils (i.e., silty sands) have been observed in some soil borings. Shallow groundwater samples at the Creosote/Fuel Oil Area have

shown elevated conductivity, TDS, and salinity measurements indicating brackish groundwater conditions. The tidal influence assessment conducted in 2019 within the Creosote/Fuel Oil Area indicated changes in groundwater elevation associated with tidal swings were minimal.

Calculated shallow groundwater gradients flow primarily to the west from the historical operations area towards Port Gardner Bay with a gradient that averages approximately 0.002 feet per foot (ft/ft). Groundwater below 15 feet bgs is considered "deep" groundwater; however, as noted above there is no continuous confining layer that separates the deep groundwater from the shallow groundwater (<15 feet bgs).

Groundwater at the Site is not considered potable because it is not currently used as a source of drinking water, and it contains natural background concentrations of constituents that make use of the water as a source of drinking water not practicable (brackish conditions).

Suspected and Confirmed Releases

Historical operations by National Pole included treating timber poles with a creosote wood preservative. Creosote is derived from coal tar and consists of a mixture of aromatic hydrocarbons, anthracene, naphthalene, and phenanthrene derivatives (i.e., heavy chain hydrocarbons). Likely historical releases of COPCs associated with pole treating operations include spills and incidental releases of creosote to the ground surface associated with transporting and drying treated poles which eventually migrated to shallow groundwater, and subsequently to deep groundwater in some areas due to the density of the product.

Releases of petroleum hydrocarbons in the Creosote/Fuel Oil Area are likely associated with the historical fuel storage tanks that were located south of the identified pole treating activities. Grading and filling activities associated with construction of West Marine View Drive likely resulted in burial of surficial contamination east of the primary operations area.

Contaminant Fate and Transport

Soil

COPCs identified for the Site have relatively high partition coefficients and migrate slowly in soil through natural processes including density-driven flow, capillary draw, advection, and diffusion into the subsurface. RI data indicate that the migration pathway from soil to groundwater is complete at the Site; however, additional transport associated with groundwater flow through contaminated soil is also limited (see below). Droplets of non-aqueous phase liquid (NAPL) were observed in soil samples from Geoprobe boring locations, although not as a continuous unit. The presence of dense non-aqueous phase liquid (DNAPL) at depth indicates vertical migration of historical releases through density-driven flow.

Soil Vapor

Migration of vapor from the volatilization of vapor intrusion (VI) COPCs (naphthalene and benzene) in contaminated shallow groundwater into soil gas has been assessed from within the footprint of the existing main manufacturing building and VI COPCs have been measured in exceedance of sub-slab soil gas PCLs. As noted above, the vadose zone in this area is at times as little as 2 feet thick, depending on the shallow groundwater elevation. While the shallow groundwater is the primary concern for volatilization of VI COPCs there is a potential that volatilization of VI COPCs present in the deep groundwater (as lighter-end hydrocarbon faction of the NAPL) could impact the shallow groundwater, in turn migrating to soil gas. A large portion of the area of groundwater impacted by VI COPCs consists of a public roadway (West Marine

View Drive), and BNSF railroad property, which do not have current or any likely future receptors for VI concerns.

Groundwater

Groundwater sampling data has demonstrated that creosote impacts to soil and groundwater are localized around the former operation areas in the Creosote/Fuel Oil Area and beneath West Marine View Drive. Groundwater data from permanent groundwater monitoring wells and from groundwater seeps throughout the Site's shoreline shows groundwater migration and/or seepage to surface water does not appear to be a significant mechanism for the transport of Creosote/Fuel Oil Area impacts.

Estimates of the shallow groundwater velocity in the Creosote/Fuel Oil Area are on the order of 0.5 feet per day. At this velocity, hundreds of soil porewater volume exchanges have occurred in the Creosote/Fuel Oil Area over the estimated 80 years since the suspected release(s). However, creosote impacts to soil and groundwater remain localized and analytical results indicate that groundwater transport is not a significant mechanism for Creosote/Fuel Oil Area contaminant migration.

While measurable DNAPL is observed in monitoring well MW-8B, there does not appear to be a contiguous DNAPL plume and the majority of groundwater impacts appear to be as dissolved phase.

Surface Water and Stormwater

Creosote and fuel oil impacts at the Site in soil are primarily located at depth beneath buildings or pavement. Therefore, overland transport/surface runoff via stormwater is not considered a significant release mechanism for the creosote or fuel oil impacts at the Site.

Stormwater collection and transport via the on-site stormwater conveyance system has been identified as a potential historical contributor to sediment contamination on the north and south off-shore areas. However, the on-site stormwater conveyance system is located outside of the Creosote/Fuel Oil Area and the primary COPCs in sediment are dioxins and polychlorinated biphenyls (PCBs), which are not considered COPCs for the Creosote/Fuel Oil area and its historical operations. The stormwater system is not considered a significant potential pathway for migration of COPCs at the Site.

Nature and Extent of Contamination

Soil contamination at the Creosote/Fuel Oil Area includes TPH, Polynuclear Aromatic Hydrocarbons (PAHs), and Volatile Organic Compounds (VOCs) under the historical pole treating operations area primarily located between approximately 5 and 15 feet bgs. Deep soil contamination was observed in saturated soils to a maximum depth of approximately 50 feet.

Shallow groundwater contamination in the Creosote/Fuel Oil Area includes TPH, PAHs, VOCs, and Semi-Volatile Organic Compounds (SVOCs). The distribution of COCs in groundwater is spatially consistent with the distribution observed for COPCs in soil (see Figure 2).

Deep monitoring well MW-8B was installed to a depth of 55 feet bgs and DNAPL has accumulated in the sump that was constructed at the bottom of the well. Based on previous observations at the Site from soil borings, DNAPL is present in discontinuous ganglia within the Creosote/Fuel Oil Area and small pockets in the deep subsurface. A continuous DNAPL plume or lens has not been identified.

Affected Media and Potential Exposure Pathways

Results of the RI indicated that affected media at the Creosote/Fuel Oil Area include soil, soil vapor, and groundwater. Potentially complete exposure pathways related to these media in the Creosote/Fuel Oil Area are described below.

Soil

The Property is zoned as industrial use and it is likely that industrial activities will continue to occupy the on-property portion of the Creosote/Fuel Oil Area for the foreseeable future. Off-property portion of the Creosote/Fuel Oil Area consists of a public roadway and railroad-owned property which will also remain at their current use for the foreseeable future. Potentially complete exposure pathways for soil in the Creosote/Fuel Oil Area include:

- Direct exposure by construction workers (e.g. dermal, incidental ingestion) associated with future on-site work or development work to a maximum depth of 15 feet or less.
- Terrestrial ecological exposure (e.g. dermal, ingestion, bio accumulative) to shallow soil in the unpaved areas only.

Shallow groundwater conditions are likely to limit potential future construction worker exposure to soil within less than approximately 5 feet from the ground surface. Due to the presence of shallow groundwater, surface structures, and the relatively conductive hydrogeology at the Site, no reasonable scenario exists for human or terrestrial ecological exposure to soil contamination greater than 15 feet bgs; therefore, no exposure pathway for deep soil is considered complete.

Soil Gas

Concentrations of VI COPCs (naphthalene and benzene) in soil gas samples exceeded applicable screening criteria under the existing main manufacturing building foundation. Therefore, the indoor air exposure pathway for workers on property is considered complete. Exposure to soil gas outside of existing buildings (i.e., volatilization to outdoor air) is unlikely due to immediate dilution by ambient air and lack of confinement to allow buildup of VI COPCs in the vapor phase. The volatilization of VI COPCs in the deep zone groundwater that are untreated may have the potential to re-contaminate the shallow groundwater, which has a direct pathway to receptors via VI. The VI pathway is not complete for off-property portions of the Creosote/Fuel Oil Area.

Groundwater

Groundwater is not considered a current or likely future source of drinking water. Groundwater impacts are currently contained under existing surface caps, buildings, and roadways, further limiting potential exposure. Impacted groundwater within the shallow or deep zone of the Creosote/Fuel Oil Area has not been shown to migrate to adjacent surface water or sediments despite the duration between the initial release(s) and the site investigation activities (up to 80 years in some cases). Therefore, no complete exposure pathways were identified for shallow or deep groundwater associated with the Creosote/Fuel Oil Area; however, there is a connection and complete pathway between soil gas and shallow/deep zone groundwater that does necessitate risk controls for on-property portions of the Creosote/Fuel Oil Area.

2.2.2 Summary of Selected Remedy

Affected media in the Creosote/Fuel Oil Area include soil, groundwater, and soil gas. FS alternatives for the Creosote/Fuel Oil Area were developed by considering distinct areas that require cleanup action: on-property (“property” defined as the legal boundaries of the former E.A. Nord facility; as opposed to the “Site” which includes the extent of contamination caused by the

release of hazardous substances) vadose zone; on-property shallow groundwater (to 15 feet bgs); on-property deep groundwater (>15 feet bgs); off-property vadose zone; off-property shallow groundwater (to 15 feet bgs); and, off-property deep groundwater (>15 feet bgs). Based upon the specifics of the assessment area remedial actions retained as FS alternatives for the Creosote/Fuel Oil Area included combinations of remediation technologies. Those technologies included: monitored natural attenuation (MNA), sub-slab depressurization (SSD), soil vapor extraction (SVE), *in-situ* chemical oxidation (ISCO), enhanced *in-situ* bioremediation (BIO), soil removal, thermal treatment (via steam injection), and *in-situ* stabilization / solidification (ISS). The following seven alternatives were evaluated for this area:

- Alternative 1: SSD, Engineering Controls, and Institutional Controls
- Alternative 2: BIO and SSD
- Alternative 3: ISCO and SSD
- Alternative 4: Soil Removal and BIO
- Alternative 5: Thermal Treatment
- Alternative 6: ISS and Thermal Treatment
- Alternative 7: Hot Spot Soil Removal and BIO (with MNA, IC, EC)

Ecology has selected Alternative 7 as the preferred cleanup alternative.

Alternative 7 includes excavation and offsite disposal of Hot Spot contaminated soil on-property, operation of an enhanced BIO treatment system for deeper on-site groundwater and shallow and deeper off-property groundwater (Figure 3), MNA, and institutional and engineering controls. As noted in the introduction to this WP, Ecology issued a BIO deferral letter that refines the scope of the BIO treatment system to consist of AS and SVE to target the primary risk mechanism of volatilization of groundwater to on-property workers via vapor intrusion, and the enhanced component of the BIO system described in the FS (NNS injections and recirculation) is to be considered the primary CRA, pending completion of an FFS. As stated in the BIO deferral letter (Attachment 1), this change is not considered a significant change to the CAP, but rather primarily results in a modification of the sequencing of the cleanup components specified within the CAP.

The Hot Spot excavation will address a majority of the high concentration soil impacts at depths where direct exposure is most likely (via future construction worker scenario) and will reduce potential exposures from VI due to volatilization of shallow groundwater impacts (to future building/Site occupants), via source removal. Operation of the BIO treatment system (AS/SVE) in the shallow zone groundwater will reduce potential exposures through VI and operation of the BIO treatment system (AS) in deeper groundwater will reduce the presence of NAPL and address potential migration of lighter end hydrocarbon contamination that could migrate vertically to the shallow groundwater zone.

Conceptually, excavation of contaminated soil will proceed after completion of the PRDI and engineering design. Site conditions could easily lead to flowing sands that could quickly destabilize a shored excavation and additional data will be collected during the PRDI to support a detailed design of the shoring system necessary for soil removal to the alternate POC of 9 feet bgs. Based on the findings of the RI, it is assumed that the top three feet of soil is clean and can be stockpiled and subsequently used as backfill. The extent of the excavation will be based on existing analytical data supplemented with additional investigation completed during the PRDI. Limits of excavation will be guided by field observations (there should not be any visible NAPL or PID measurements greater than 100 parts per million [ppm]). Impacted soil will be hauled off-site

to an approved waste disposal destination pending waste profiling and approval. The use of engineered shoring and dewatering equipment will be needed as the excavation will extend into the shallow groundwater table. The water would be treated prior to discharge (pending a permit) or disposal. Clean backfill would be imported (or sourced from clean overburden), placed into the excavation, and compacted. The area would be finished with concrete surface cap to match the existing surface capping to ensure contiguous surface capping throughout the contaminated area (i.e. engineering control). Due to the prolonged disruption and required closures that would be necessary, excavation will not include soil beneath West Marine View Drive or BNSF property.

The BIO System (as modified in the BIO deferral letter from Ecology) will consist of AS and SVE to focus on removal of residual volatile hydrocarbons following Hot Spot soil removal and address potential migration of lighter end hydrocarbon contamination in the deep zone groundwater that could migrate vertically to the shallow groundwater zone.

Institutional controls may include restrictions on on-site soil disturbance or placement of drinking water wells, and notices of impacted soil. If the soil restrictions are utilized, a soil management plan would be developed to control potential exposure risks posed by direct exposure to residual subsurface contamination (i.e., off-property areas where sufficient remedial action is not feasible, under public roadway or railroad tracks) and to protect the integrity of the remedy. In addition, a paved surface (engineering control) will be maintained so that the site still qualifies for Terrestrial Ecological Evaluation exclusion.

As presented in the CAP, the BIO cleanup action will continue until there is a diminishing return and approval from Ecology. When REL has been achieved and the BIO System is showing diminishing return, the performing Potentially Liable Persons (PLPs) will initiate a study to determine if MNA is applicable to achieve the CULs in a reasonable restoration timeframe, which is estimated at 10 years in the CAP. At any stage in the cleanup, if Ecology determines that CUL will not be achieved within a reasonable restoration timeframe, the performing PLPs shall conduct a CRA or prepare a Focused Feasibility Study (FFS) under Ecology's direction to address the remaining contamination. As described in the BIO deferral letter, the primary CRA would be enhancement of the AS/SVE BIO system with NNS injections and recirculation, and the existing contingency measure stated in the CAP (thermal treatment) is unchanged; however, thermal treatment essentially becomes a second contingency measure should a primary contingency of NNS injections and recirculation (if needed) also fails to result in achieving cleanup objectives within a reasonable timeframe.

2.2.3 Cleanup Standards

This section defines the Cleanup Standards applicable to the affected media of the Creosote/Fuel Oil Area and the related COCs.

COCs

Assessment performed as part of the RI established the following IHSs as COCs for the Creosote/Fuel Oil Area:

- Carcinogenic PAH (cPAH) TEQ values for soil in the Creosote/Fuel Oil Area
- Naphthalene for groundwater in the Creosote/Fuel Oil Area
- Naphthalene for soil vapor in the Creosote/Fuel Oil Area

Cleanup Levels

Selected CULs for IHSs in the Creosote/Fuel Oil Area from the CAP are the following:

- 0.19 milligram per kilogram (mg/kg or ppm) for cPAHs TEQ (based on MTCA Method B direct contact) in the Creosote/Fuel Oil Area
- 8.9 micrograms per liter (µg/L or parts per billion [ppb]) for naphthalene (based on groundwater protective of vapor intrusion criteria) in shallow on-property groundwater in the Creosote/Fuel Oil Area
- 0.015 µg/L for cPAHs TEQ (based on laboratory PQL) in shallow on-property groundwater in the Creosote/Fuel Oil Area

Remediation Levels

The CULs presented above are proposed to be used for the Hot Spot soil removal in the Creosote/Fuel Oil Area; however, as presented in the RI/FS, if the soil impacts can't be fully delineated due to site conditions or health & safety concerns (i.e. significant groundwater infiltration causing excavation/trenching concerns), some contamination will remain in place and a qualitative REL will be implemented. Limits of excavation will be guided by the physical appearance of the excavated material. There should not be any visible NAPL or excessive creosote/fuel odor. Field screening (i.e. a handheld PID) will be used to differentiate the relative concentration of VOCs and a threshold of 100 ppm PID measurement has been established to screen sidewall samples post-excavation.

The CULs are based on protection of vapor intrusion for groundwater in the Creosote/Fuel Oil Area. RELs will be dependent upon the potential for current and future VI exposure. The REL for areas covered with buildings without engineered vapor control (i.e., SVE) will be the same as the CUL. The REL for areas covered with buildings with engineered vapor control or areas with no structures (roadway, railroad right-of-way) is the 500 µg/L for naphthalene for shallow groundwater and removal of mobile NAPL (defined as the discovery of NAPL in new sentry wells or in existing wells that previously had not had product present) in deep groundwater.

Points of Compliance

Upland Soil

The alternate POC for the soil cleanup levels in the Creosote/Fuel Oil Area will be throughout the soil column from the ground surface to 9 feet bgs as presented in the CAP. Due to the shallow groundwater table and sandy soil it is unlikely that construction work could be safely performed down to the standard POC for soil of 15 feet bgs described in WAC 173-340-740(6)(d) and WAC 173-340-7490(4)(b). Ecology believes conditions specified in WAC 173-340-740(6)(f)(i)-(vi) will be met for the alternate POC because engineering and institutional controls are included as part of the remedy.

Groundwater

For groundwater, the POC is the point or points where the groundwater cleanup levels must be attained for a site to be in compliance with the cleanup standards. Groundwater cleanup levels shall be attained in all groundwaters from the POC to the outer boundary of the hazardous substance plume per WAC 173-340-720(8)(a). Under MTCA, the standard POC for groundwater is throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest depth that could potentially be affected by an activity.

For groundwater potentially discharging to surface water, MTCA provides for a CPOC at the point of discharge of groundwater to surface water when it can be demonstrated that it is not practicable to meet the cleanup level at a point within the upland groundwater. The CPOC for the Site is the downgradient edge of the property, at the point of entry of groundwater to Port Gardner Bay.

For deep groundwater impacts, including the presence of NAPL, there are no applicable receptors or pathways for which risk to the contamination can be assessed. The Ecology-selected remedial action of BIO will be performed in the deep groundwater zone to reduce the presence of and potential for migration of NAPL, and to minimize the potential vertical migration of lighter end hydrocarbons in the deep zone groundwater to shallow zone groundwater and ultimately to indoor air via VI.

Summary of Cleanup Standards

Due to the complexities associated with the various remedial technologies and characteristics of the Creosote/Fuel Oil Area Site, the following table is included in this Upland PRDI WP (also included as Exhibit 2 and Exhibit 3 of the CAP) to summarize the cleanup standards that are described in the above sections.

SOIL	ON PROPERTY	OFF PROPERTY
Remedial Action:	Hot Spot Soil Removal, IC, EC, BIO	IC, EC, BIO (via SVE)
CUL	0.19 mg/kg for cPAHs Toxic Equivalency (TEQ) (based on Method B direct contact)	
REL	1) Remove visible NAPL from excavation footprint 2) PID readings of 100ppmv from excavated soil (limited to where additional excavation is possible)	

GROUNDWATER	ON PROPERTY	OFF PROPERTY
Remedial Action:	Hot Spot Soil Removal, BIO, IC, EC, MNA	BIO, IC, EC, MNA
CUL	1) 8.9 µg/L for naphthalene (based on groundwater protective of vapor intrusion) 2) 0.015 µg/L for cPAHs TEQ (based on laboratory PQL)	
REL	1) 500 µg/L for naphthalene in shallow groundwater 2) Removal of mobile NAPL* in deep groundwater (for protection of shallow groundwater)	

*Mobile NAPL is defined as discovery of NAPL in new sentry wells or in existing wells that previously had not had product present.

3.0 Upland Pre-Remedial Design Investigation

The upland RI utilized IHSs to identify areas of concern that warranted remedial action due to soil, groundwater, and/or soil vapor contamination. The IHSs and corresponding upland areas included dioxins for soil and groundwater in the Woodlife Area and cPAHs for soil and naphthalene for groundwater and soil vapor in the Creosote/Fuel Oil Area.

The existing data summarized in the RI were sufficient to characterize the nature and extent of COC contamination in the upland portions of the Site, for the purpose of the RI/FS. As described in the CAP, soil removal and surface capping are the selected remedy for the Woodlife Area, and Hot Spot soil removal and bioremediation (as amended in the BIO deferral letter) is the selected remedy for the Creosote/Fuel Oil Area.

Further vertical and lateral delineation in removal areas is needed to refine these areas for completion of the remedial design and ensure results of the implementation of the remedies are protective of human health and the environment. Pilot testing of various components of the BIO system is needed to assess the feasibility of the technology for Site-specific conditions, and to appropriately design the multi-faceted remedial technology selected for the Creosote/Fuel Oil Area.

3.1 General Scope of Work

This section presents the upland PRDI scope of work to address data gaps related to the following components of the Ecology-selected upland remedial actions and the modification to the selected alternative detailed in the BIO deferral letter:

- Assessment of Site features including surface topography, underground utilities, and subsurface infrastructure of the main manufacturing building (i.e., configuration of pilings).
- Lateral and vertical delineation of soil impacts for soil removal in Woodlife Area.
- Lateral and vertical delineation of soil impacts for Hot Spot soil removal in Creosote/Fuel Oil Area.
- Aquifer testing of the shallow groundwater zone to assist with shoring and excavation design..
- Pilot testing components of the BIO system for the Creosote/Fuel Oil Area; including AS and SVE testing to determine effective radius of influence (ROI) to assist with full-scale design.

Upland PRDI activities will be performed in accordance with the Upland SAP and the analytical methodology and quality assurance protocols to be used during the PRDI are described in the Quality Assurance Project Plan (QAPP), both included as Appendix A. The following sections present a summary of the various Upland PRDI activities. Additional detail and step-by-step procedures to be used by field personnel during implementation of the Upland PRDI activities are provided in the SAP/QAPP.

3.2 Site Features (Survey)

Prior to performance of any subsurface work, a licensed surveyor will be subcontracted to survey the Site and select features including: parcel and property boundaries, current shoreline and edge of asphalt (to support design of sediment remedy), surface topography (particularly for the Woodlife Area due to the presence of stormwater surface flow that enters the property from the adjacent public roadway and to assess future concerns with sea level rise and site inundation during king tide events), subsurface utilities within the proposed soil removal areas, and the location and configuration of the pilings supporting the main manufacturing building within the treatment area (see Figure 4). Identifying the location and configuration of the pilings will be an essential element to the design of the shoring for the Hot Spot soil removal in the Creosote/Fuel Oil Area. Understanding the site topography in this area is essential to properly design the construction activities, as well as to assist in designing post-construction conditions that account for changes in site stormwater conditions due to the proposed soil removal, surface re-paving, and demolition of the main manufacturing building (Note: demolition of the main manufacturing building is not included as part of the Upland PRDI; however, demolition activities may be performed by others prior to the performance of PRDI activities).

In addition, a private utility locating contractor will mark the location of any publicly or privately-owned utilities within the work areas in accordance with the SLR utility contact prevention program described in the HASP (Appendix B).

3.3 Woodlife Area

This section describes the soil removal delineation assessment scope for the Woodlife Area. The data from this scope along with the data from the Survey (Section 3.2) will allow for the design of the Woodlife Area soil removal; design of traffic/pedestrian controls during the soil excavation; design of dewatering systems to be used during the soil excavation (if needed), design of surface run-on/run-off controls and erosion control BMPs, and the design of a backfilling and surface grading/paving plan. It is anticipated that the backfilling and surface grading/paving plan will involve the property owner and may involve the City of Everett for changes to the driveway access that would redirect surface water run-on.

As described in the RI/FS, the soil removal boundaries for the Woodlife Area are controlled by dioxins TEQ values that exceed the CUL, which is equivalent to the regional natural background concentration (Ecology, 2010). Upland PRDI activities in this area will focus on further delineating and confirming the lateral and vertical extent of dioxins contamination that will require removal to meet cleanup objectives.

3.3.1 Soil Removal Delineation Assessment

The sampling design to delineate the soil removal area includes collection of discrete soil samples from an approximately 40 x 40-foot grid across the preliminary Hot Spot removal area. Sampling in the Woodlife Area will include 26 soil boring locations with most borings completed to 10 feet bgs. The boring completed near the former sampling location GP-501 will be completed to a depth of at least 15 feet bgs and may extend deeper if field observations show lithology or field instrumentation measurements inconsistent with surrounding borings. Borings will be completed using direct push methods, recovering the soil core(s) and the boreholes will be backfilled with bentonite. Dioxins tend to partition onto soil. The proposed drilling methods, boring backfilling techniques, and relatively shallow investigation depth significantly reduce potential for creating a conduit for downward contaminant migration. The soil lithology throughout the fill area of the site

is consistent (dredge sands) and a significant confining layer has not been encountered, despite investigation depths up to 55 feet bgs.

Up to three soil samples at each location will be collected for laboratory analysis of dioxins by EPA 1613 method. 1613 is a high-resolution superfund method (HRSM) that demands an extended turnaround time for results delivery, requires additional review and validation, and has a recommended sample holding time of 1 year. It is a common practice to delineate bottom depths of an excavation by collecting additional samples to be held in reserve pending upper-depth sample results. It is anticipated that a maximum of two follow-up rounds of analysis for dioxins will be completed during the activities outlined in the PRDI in order to remain within the laboratory method holding time requirements and stay on schedule for production of the PRDI Data Report and subsequent remedial design. In addition, two soil samples from the boring completed near former sampling location GP-501 will be submitted for laboratory analysis of VOCs by EPA 8260 method, as well as at any additional borings that exhibit characteristics of volatile constituents during field screening (i.e., elevated PID measurements).

A proposed sample location map is shown on Figure 5 and cross-sections showing boring depths and preliminary soil sample intervals are shown on Figure 6a to 6c. Further detail on the basis for depth of borings, sampling depths, and methodology for selection of samples for analysis is provided in the SAP (Appendix A).The Upland PRDI analytical data for the Woodlife Area, in conjunction with the surface topographical assessment described above, will be utilized to design the proposed construction activities and provide more certainty as to the potential lateral extents to address site access concerns (as the Woodlife Area is located within the main driveway and vehicle access point for the Site in its entirety) and the potential vertical extents to design the necessary dewatering apparatus and understand the scale of dewatering activities.

3.4 Creosote/Fuel Oil Area

As described in the RI/FS, the removal and treatment boundaries for this area are controlled by cPAH concentrations in soil, naphthalene concentrations in groundwater and soil gas, and the presence of DNAPL in deep zone groundwater. Upland PRDI activities include a multi-faceted approach to focus on further delineating and confirming the lateral and vertical extent of shallow soil contamination that will require removal, the lateral and vertical extent of shallow soil contamination that will require treatment, as well as assessing the feasibility and performance of the components of the BIO System.

3.4.1 Hot Spot Soil Removal Delineation Assessment

Sampling in this area will focus on further delineating and confirming the lateral and vertical extent of Hot Spot cPAH contamination. The sampling design includes collection of discrete soil samples and field screening from an approximately 40 x 40-foot grid across the preliminary Hot Spot removal area (Figure 7). Sampling in the Creosote/Fuel Oil Area will include 42 soil boring locations to up to 10 feet bgs (the proposed alternate POC for soil is 9 feet bgs). A continuous soil core will be collected using a Geoprobe direct push drilling method and the core will be field screened with a PID. PID measurements and descriptions of product in the soil matrix will be recorded in approximately 1-foot increments throughout the soil column and one soil sample at each location will be collected for potential laboratory analysis of cPAHs based on the location with the highest PID measurement. Samples will not be collected for laboratory analysis from borings with the presence of product. A proposed sample location map is shown on Figure 7 and cross-sections showing boring depths and preliminary soil sample intervals are shown on Figure 8 and Figure 9 and boring logs from the locations shown on the cross-sections are included as

Attachment 3. Some boring locations will be advanced deeper to assist with the other components of the Upland PRDI activities, and/or may be completed as monitoring wells or pilot test wells with an alternate drilling method (e.g., Hollow-Stem Auger, Sonic).

The upland PRDI analytical results and field data from the delineation assessment (and the topographical survey) will be utilized to design the proposed construction activities, particularly the shoring apparatus, and to account for the presence of subsurface infrastructure (pilings). The objective of the Hot Spot soil removal component of the selected remedy is mass source removal to control potential direct contact exposure risk of the highest impacted soils as well as removal of a potential on-going source of impacts to shallow zone groundwater. Engineering controls (surface cap) and institutional controls (restrictions on soil disturbance) are also elements of the selected remedy due to the acknowledgement that residual soil contamination above CULs will likely remain in-place, particularly prior to full implementation of the BIO system.

3.4.2 Shallow Groundwater Zone Assessment

Five shallow groundwater monitoring wells to 13 feet bgs will be installed outside of the horizontal extents of the Hot Spot excavation area to assess the extent of shallow groundwater impacts (see Figure 7). These locations will be co-located with soil borings completed as part of the Hot Spot delineation assessment and their location will be based on whether they will remain outside of the excavation footprint, but still within the shallow groundwater zone area of impacts. The shallow groundwater monitoring wells will be sampled after installation and development activities are completed and groundwater samples will be submitted for laboratory analysis of naphthalene and cPAHs. The shallow groundwater monitoring wells will be used to assist with other components of the Upland PRDI activities (aquifer test, AS pilot).

The shallow groundwater zone data collected during the Upland PRDI activities will be utilized to determine the extents in the shallow zone that will require treatment. These locations are also planned to be utilized as compliance monitoring points following completion of the Hot Spot removal and during implementation of the BIO System.

3.4.3 Deep Groundwater Zone Assessment

Five deep groundwater monitoring wells with a bottom sump to approximately 55’ bgs will be installed to assess deep zone groundwater for mobile DNAPL presence and migration in the Creosote/Fuel Oil Area (see Figure 7). Some of these locations will be co-located with soil borings completed as part of the Hot Spot delineation assessment to confirm that they would be outside of the excavation footprint but potentially still within the deep zone groundwater area of impacts; and, some of the proposed deep groundwater monitoring wells will be installed within the excavation footprint and will likely need to be decommissioned prior to remedy implementation. The deep groundwater monitoring wells will be monitored after installation and development activities are completed on an initial monthly basis for accumulation of DNAPL in the sumps in the interim prior to design and implementation of the full-scale remedial action. The frequency of the DNAPL gauging will be adjusted as necessary and based upon field observations.

The deep groundwater zone data collected during the Upland PRDI activities will be utilized to determine the extents in the deep zone that will require treatment and establish the parameters for monitoring mobile DNAPL. For wells placed outside of the excavation footprint, these locations are also planned to be utilized as compliance monitoring points during implementation of the BIO System (i.e., when the REL transitions to MNA).

3.4.4 Geotechnical Assessment

The scope of work for the Upland PRDI activities needed for full system design of excavation shoring includes geotechnical subsurface explorations and field and laboratory testing. A geotechnical boring will be completed to about 15 feet below the bottom of the anticipated shoring system; therefore, to provide a potential benefit for future liquefaction evaluation, a minimum exploration depth of 50 feet is needed. The geotechnical boring will be located outside of the contaminated area; however, as discussed in the CSM the soil lithology is consistent throughout the hydraulically-filled portion of the Site.

One geotechnical boring (see Figure 7) will be advanced using a hollow stem auger rig with SPT and Modified California split spoon samples for recovery of relatively undisturbed ring samples which can then be used for laboratory direct shear testing to obtain soil strength parameters necessary for shoring design. Additional sampling and testing will be done to obtain *in-situ* moisture and density of soils, gradation, and Atterberg Limits of plastic soils. Bulk samples will be obtained from soil cuttings for obtaining representative compaction curves for the site soil types.

The geotechnical assessment data, in addition to the aquifer pump test data (see Section 3.4.5), will be utilized to appropriately design the excavation shoring system to enhance the probability of completing soil excavation activities to the alternate POC of 9 feet bgs in a safe and efficient manner. The geotechnical laboratory parameters results will be utilized to select a backfill material that is similar to the existing fill material to support continuity in Site conditions between the pilot testing of the BIO System components and implementation of the BIO System remedy.

3.4.5 Aquifer Test

Characteristics of the shallow aquifer underlying the Creosote/Fuel Oil Area will be assessed using traditional aquifer testing protocols to support dewatering and shoring design considerations. Historical groundwater level measurements from monitoring wells in the Creosote/Fuel Oil Area are included as Attachment 4. Findings from the PRDI activities, particularly from the survey and Geoprobe investigation(s) will be used to assess the area, depth, and volume of soil below the groundwater table (if any) that will be removed. This assessment of the lithology, the soil sampling data, and the survey data will be discussed with Ecology prior to the performance of the aquifer test(s). Sufficient data for remedial design could possibly be obtained from performing aquifer testing on existing groundwater monitoring wells (i.e., slug test, rising/falling head). Potential PRDI activities to assess the shallow aquifer include the following:

- Transducer assessment to assess tidal fluctuations and background conditions at existing groundwater monitoring wells and new monitoring wells described above.
- Shallow zone step-test.
- Shallow zone steady state test.
- Slug tests and/or rising/falling head test at existing monitoring wells.

The step-test and steady state test would necessitate the installation of a pumping well in the shallow zone (See Figure 7). Other existing monitoring wells or new wells that are proposed as part of the Upland PRDI activities may be utilized to further support the aquifer tests. Water accumulated as part of the aquifer testing will be containerized and properly disposed or discharged pending permitting.

The Upland PRDI data for the aquifer testing in the Creosote/Fuel Oil Area will be utilized to: aid in determining the estimated rate and volume of dewatering for proposed soil removal areas; and

designing the shoring required for the soil removal areas (in addition to geotechnical assessment described in Section 3.4.4). As stated above, findings from the PRDI activities will be discussed with Ecology prior to the performance of the aquifer pump test as sufficient data for remedial design could possibly be obtained from performing aquifer testing on existing groundwater monitoring wells (i.e., slug test, rising/falling head).

3.4.6 BIO System

Bioremediation (BIO) comprising of AS and SVE has been selected as the remedy alternative to address the VI risk from COCs within the Creosote/Fuel Oil Area.

This Upland PRDI WP describes the tasks required to obtain site specific data on air injection flows and pressures, and flow and vacuum requirements (i.e., ROIs) to design the full-scale BIO System.

The Air Sparging / SVE Testing AS/SVE pilot testing consists of an assessment of the AS component of the BIO System and the SVE component of the BIO System as these elements will work in conjunction to stimulate the bioremediation process while also enhancing volatilization of lighter end hydrocarbons to be captured, treated, and discharged, to control the primary exposure pathway of VI.

The SVE pilot test includes installation of a horizontal well (slotted horizontal pipe in a trench excavation that is backfilled with gravel and sealed at the top) within the proposed treatment area (but outside of the preliminary Hot Spot removal area), a horizontal well step test, and a horizontal well constant rate test (Figure 7). This test method, along with lower than usual induced vacuum during the pilot test, should allow for proper assessment of this technology for the current site conditions. As the future configuration of the building or Site usage in general is unknown, the only feasible design consideration is that of current site conditions. Per Ecology's request, pressure transducers have been installed in monitoring wells within the proposed soil removal areas to start collecting long-term monitoring data to assess the depth of groundwater that could affect the success of an SVE system. The transducers will also be utilized during the below-mentioned ROI testing.

To monitor the vacuum influence on the subsurface, eight vapor pins will be installed around the horizontal well at varied distances (see Figure 7 inset) with connections for magnehelic differential pressure gauges. A step test will be conducted by connecting a blower to the horizontal well to generate data to select a vacuum for a constant rate test (anticipated to produce an ROI in the range of 40 to 50 feet). Exhaust vapors from the SVE pilot tests will be screened with a PID to assess the presence of contaminant removal and whether sampling or treatment of the emissions may be required pending permitting (it is assumed that the short-term pilot tests will not require authorization from the regional clean air agency, see Section 3.5.2).

AS pilot testing will be performed in both the shallow and deep zones. Similar to other tests being performed, the testing in each zone will consist of a step test to establish flow/pressure curves for the AS point as well as a longer-term steady state test that will help to establish the ROI of the AS in each zone. The AS ROI will be estimated based on measured changes in dissolved oxygen (DO), oxidation reduction potential (ORP), groundwater elevation, well head space PID readings, and presence/absence of bubbles in the monitoring wells (assessed visually or auditorily). Dedicated monitoring wells will be installed or utilized from other components of the Upland PRDI (see Figure 7). The SVE pilot system will be used in conjunction with the AS pilot test to replicate the function of the full-scale system to control sub-slab vapors.

The Upland PRDI data from the AS/SVE testing will be utilized to assess the performance of a horizontal well to capture sub-slab vapors generated through sparging of the groundwater zones, and to design the AS/SVE components of the full-scale system based on ROI calculations from the pilot tests.

3.4.6.1 Resilience to Climate Change

The new MTCA rule includes a requirement that cleanup alternatives be sufficiently resilient to potential climate change. As previously presented in the RI/FS Report (see Attachment 5), climate change may bring rising sea levels that could potentially inundate portions of the upland areas of the Site, including in the vicinity of the remedial action area(s). These concerns will be expanded upon in the PRDI Data Report pending completion of the PRDI activities, including the topographic survey.

3.5 Permitting and Regulatory Requirements

3.5.1 Archaeology

An Inadvertent Discovery Plan (IDP) was prepared in accordance with applicable state and federal laws and will be followed in the event of a discovery of archaeological materials or human remains. A copy of the IDP is included as Appendix C. A request for tribal consultation will be made by Ecology for development of a Tribal Engagement Plan for the proposed work.

3.5.2 Air Emissions

The Puget Sound Clean Air Agency regulates business operations with air discharges in King, Kitsap, Pierce, and Snohomish Counties. The SVE pilot testing will produce off-gas which may require notice for registration with the Puget Sound Clean Air Agency to ensure compliance with air pollution control requirements. Per Regulation I, Section 6.03(b)(10), the Puget Sound Clean Air Agency Control Officer will determine based on the provided emission information if the project is under the de minimis impact levels per WAC 173-460-150, or if an Order of Approval is required.

3.5.3 Water

Wastewater discharge to the sanitary sewer is regulated by the City of Everett. Prior to discharge of wastewater to the sanitary sewer, authorization with the City of Everett per the 2008 Pretreatment Ordinance #3070-08 must be obtained. Section 2.4 of the ordinance states that the wastewater must be sampled prior to being discharged, and the sample results cannot be higher than the allowed discharge limits provided in the ordinance. If sample results are above the allowable wastewater discharge limits, a plan detailing how the discharge will meet the required limits will be provided to the City of Everett. Due to the expected volume of water generated during the aquifer tests, a wastewater discharge permit will likely be required as part of these Upland PRDI activities. Correspondence related to all water discharges will be provided to Ecology.

3.5.4 Waste Management

Solid waste generated as part of the Upland PRDI activities (soil cuttings, disposable sampling equipment) will be handled in accordance with applicable solid waste handling and disposal requirements in regard to storage, labelling, profiling, and disposal destination. Documentation of disposal, aside from general refuse, will be kept in project files and included within the PRDI Data Report. Additional detail concerning waste management procedures is included in the SAP.

4.0 Reporting

Data generated as part of the PRDI activities will be presented to Ecology in a PRDI Data Report, per the schedule established in the Second Amendment to the AO (Task 2). The upland PRDI Data Report will consist of the following information, at a minimum:

- Maps showing sampling locations;
- Tables presenting data (including historical and current results);
- Tabulation of field observations used to delineate Hot Spot areas;
- Analysis of data (e.g., delineated excavation lateral extent and depth, and derived ROI for later use in design);
- Appendices (boring logs, laboratory analytical reports, data quality review [discussion of laboratory qualified data, review field and laboratory quality control samples, and discussion of overall usability of the acquired data], field data forms, disposal documentation for IDW);
- Documentation of mitigation measures employed to prevent runoff from entering the investigation area during the PRDI activities; and,
- Aerial map showing the current inundation area under King Tides, and the anticipated future inundation area(s) taking into account anticipated sea level rise from the previously provided sea level rise analysis.

5.0 Schedule

The final Project schedule was established in the Second Amendment to the AO. Mobilization for the Upland PRDI activities will occur following Ecology's approval of the final version of the Upland PRDI WP, currently anticipated for May to June 2024. The current schedule from the CAP denotes the duration of Upland Investigation and Pilot Testing at 1 year; however, due to the modification to the selected alternative presented in the BIO deferral letter, the project schedule for duration of Upland Investigation and Pilot Testing is now 180 days.

6.0 Closure

This document has been prepared by SLR International Corporation (SLR). The material and data in this report were prepared under the supervision and direction of the undersigned.

Sincerely,

SLR International Corporation

R. Scott Miller, P.E.
Senior Principal

Chris Kramer
Principal

7.0 References

SLR International Corp./Anchor QEA LLC (SLR/Anchor). 2021. Final Remedial Investigation / Feasibility Study. Jeld-Wen / Former Nord Door Facility. January.

Washington Department of Ecology (Ecology). 2023 (Amended). Model Toxics Control Act (MTCA) Cleanup Regulation Chapter WAC 173-340.

Ecology. 2023. Final Cleanup Action Plan. Jeld Wen Site. August (included as Exhibit H of the Second Amendment to Agreed Order for Remedial Investigation/Feasibility Study and Draft Cleanup Action Plan between JELD-WEN, Inc. and Department of Ecology, effective date of July 28. 2023).

Ecology. 2010. Natural Background for Dioxins/Furans in WA Soils. Technical Memorandum #8. August.

Figures

LEGEND

EXISTING BUILDINGS

REMOVED BUILDINGS

SLR

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

AERIAL PHOTO FROM GOOGLE EARTH PRO, JULY 2019

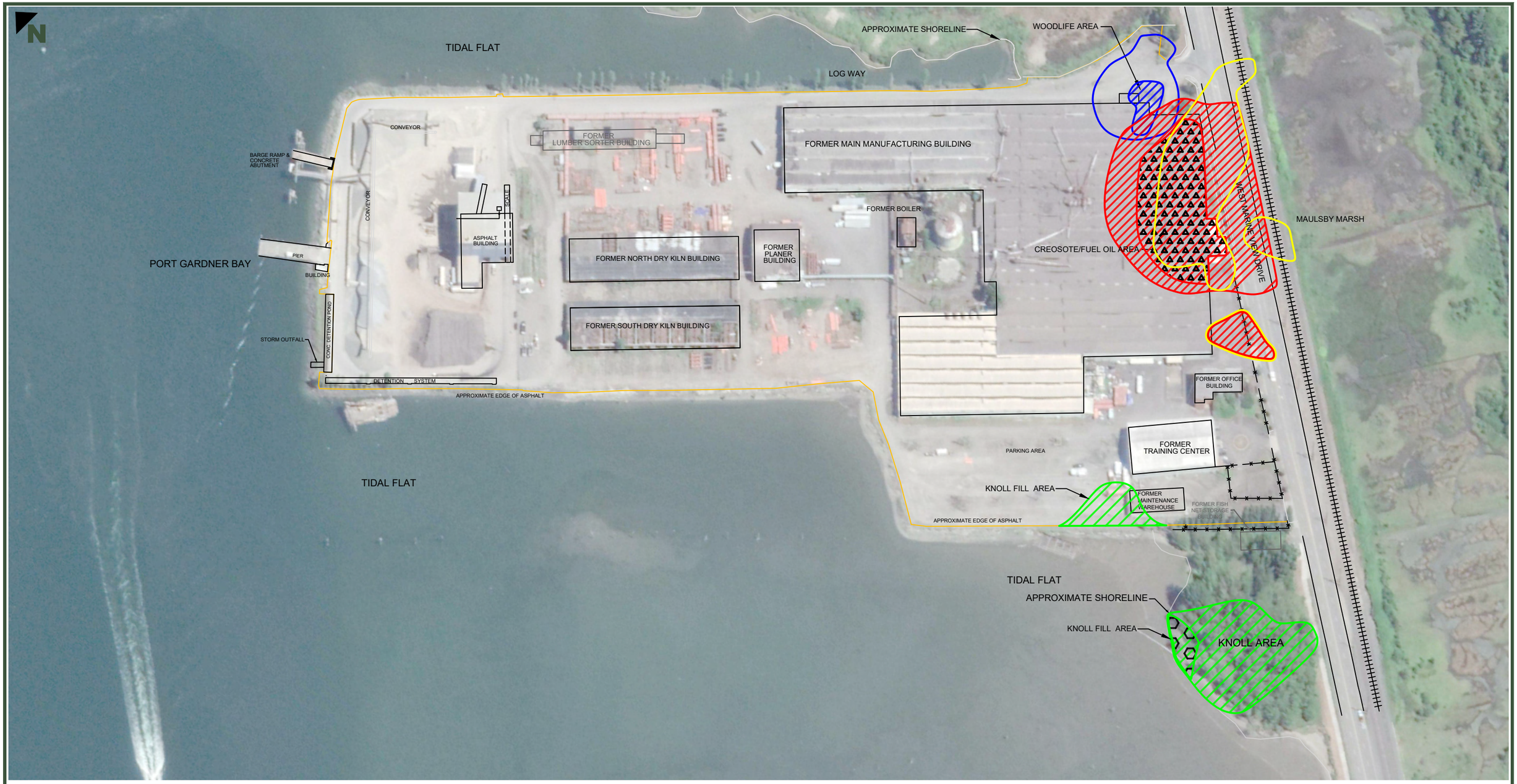
0 200 400 600'

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
FINAL PRDI WORK PLAN - UPLAND AREAS OF JELD-WEN SITE

Drawing
SITE PLAN

Date	MARCH 2024	Scale	AS SHOWN	Fig. No.
File Name		Project No.	108.V20689.00001	1



LEGEND

- EXISTING BUILDINGS
- REMOVED BUILDINGS
- cPAH IN SOIL
- NAPHTHALENE IN GROUNDWATER
- NAPHTHALENE IN SOIL–GAS
- PCB CONGENERS IN GROUNDWATER
- PCB CONGENERS IN GROUNDWATER SEEP
- DIOXINS IN SOIL
- DIOXINS IN GROUNDWATER

SLR

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

AERIAL PHOTO FROM GOOGLE EARTH PRO, JULY 2019

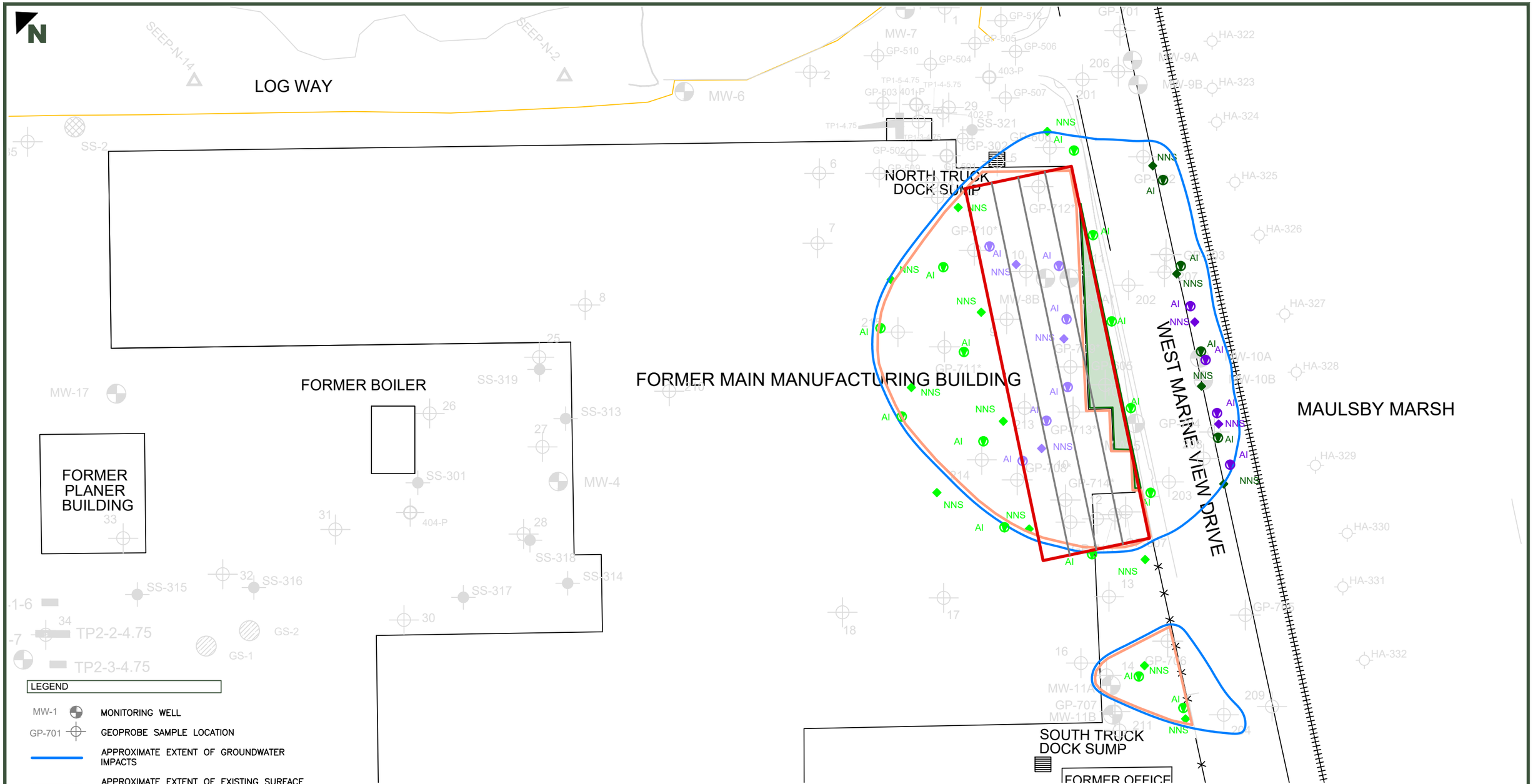
0 200 400 600'

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
FINAL PRDI WORK PLAN - UPLAND AREAS OF JELD-WEN SITE

Drawing
CUL EXCEEDANCES IN DIFFERENT MEDIA

Date	MARCH 2024	Scale	AS SHOWN	Fig. No.	2
File Name		Project No.	108.V20689.00001		



LEGEND

MW-1	MONITORING WELL
GP-701	GEOPROBE SAMPLE LOCATION
	APPROXIMATE EXTENT OF GROUNDWATER IMPACTS
	APPROXIMATE EXTENT OF EXISTING SURFACE CAP WITHIN IMPACTED AREA ON PROPERTY
	APPROXIMATE EXTENT OF UNPAVED GROUND SURFACE ON PROPERTY (3,700 SQ FT)
	HOTSPOT REMOVAL AREA (100 FT X 350 FT)
	PROPOSED SHORING (25 FT SPACING)

PROPOSED BIOREMEDIATION TREATMENT

AI	AI WELLS (ON PROPERTY)	NNS	NNS WELLS (ON PROPERTY)
AI	AI WELLS (OFF PROPERTY)	NNS	NNS WELLS (OFF PROPERTY)
AI	AI DEEP WELLS (ON PROPERTY)	NNS	NNS VERTICAL RECIRCULATION WELLS (ON PROPERTY)
AI	AI DEEP WELLS (OFF PROPERTY)	NNS	NNS VERTICAL RECIRCULATION WELLS (OFF PROPERTY)

SLR

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

0 90 180 270'

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
FINAL PRDI WORK PLAN - UPLAND AREAS OF JELD-WEN SITE

Drawing
UPLAND CLEANUP ACTION - CREOSOTE/FUEL OIL AREA

Date	MARCH 2024	Scale	AS SHOWN	Fig. No. 3
File Name		Project No.	108.V20689.00001	

LEGEND

- EXISTING BUILDINGS
- REMOVED BUILDINGS
- SITE SURVEY AREA

SLR

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

AERIAL PHOTO FROM GOOGLE EARTH PRO, JULY 2019

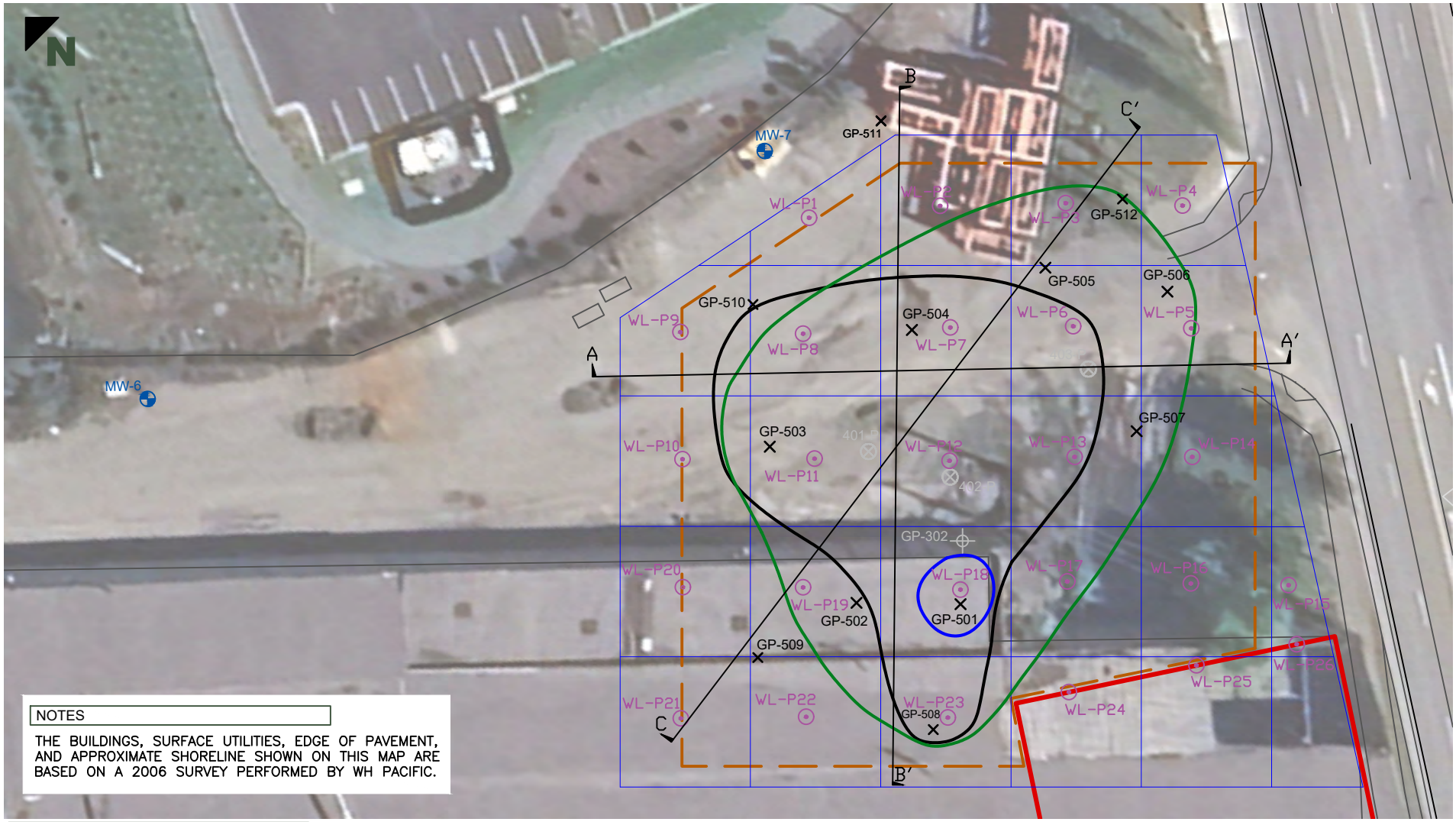
0 200 400 600'

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
FINAL PRDI WORK PLAN - UPLAND AREAS OF JELD-WEN SITE

Drawing
SITE SURVEY SCOPE OF WORK

Date	MARCH 2024	Scale	AS SHOWN	Fig. No.
File Name		Project No.	108.V20689.00001	4



NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

LEGEND

- GEOPROBE SAMPLING LOCATION, SLR 2012
- GEOPROBE SAMPLE LOCATION, SLR 2009
- SURFACE SOIL SAMPLE LOCATION, SLR 2009
- NEAR SURFACE SOIL SAMPLE LOCATION, SLR 2009
- EXISTING MONITORING WELL
- GEOPROBE SAMPLING LOCATION, SLR 2013
- PROPOSED SOIL BORING LOCATION
- HOTSPOT REMOVAL AREA (100 FT X 350 FT)
- WOODLIFE SOIL REMOVAL AREA
- ESTIMATED EXTENT OF IMPACTS AT 1' bgs
- ESTIMATED EXTENT OF IMPACTS AT 3' bgs
- ESTIMATED EXTENT OF IMPACTS AT 5' bgs
- 40'x40' SAMPLING GRID

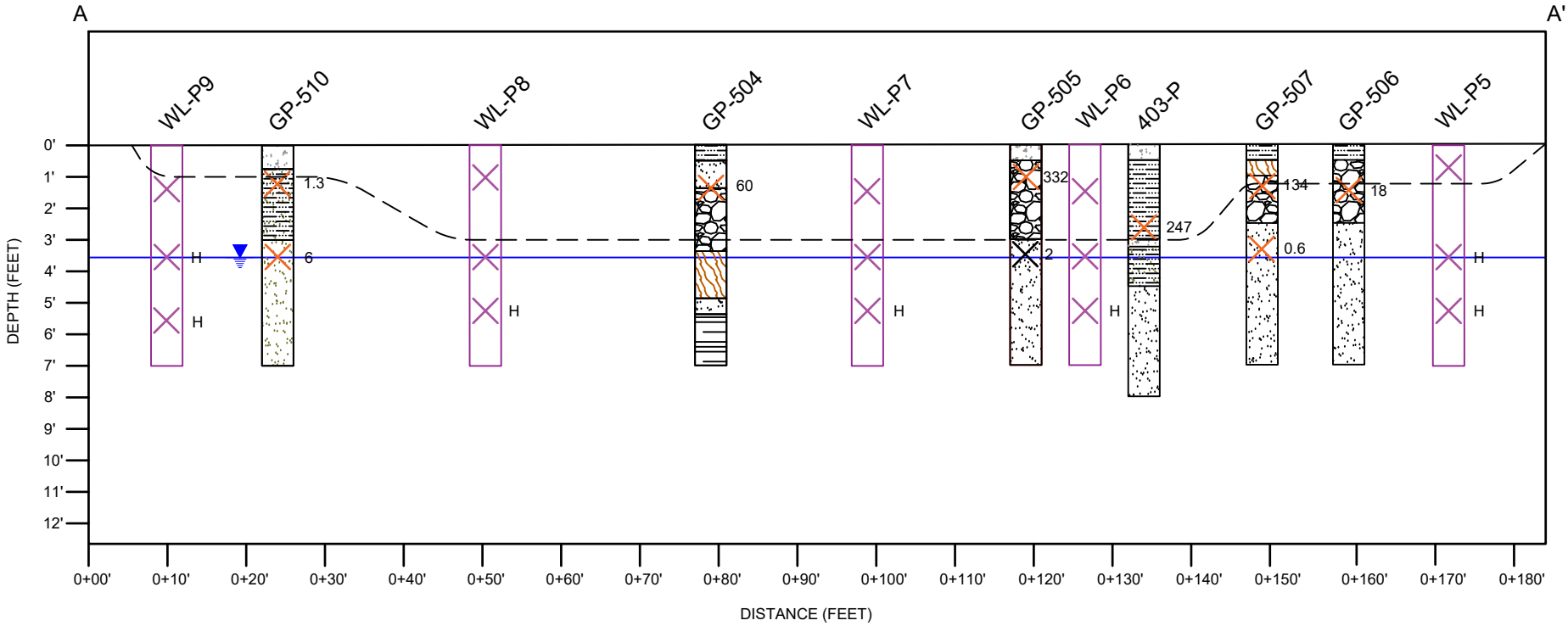
0 45 90 135'

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report: FINAL PRDI WORK PLAN - UPLAND AREAS OF JELD-WEN SITE

Drawing: WOODLIFE AREA PROPOSED SAMPLE LOCATIONS

Date: January 23, 2024	Scale: AS SHOWN	Fig. No. 5
File Name	Project No. 108.V20689.00001	



LEGEND

- ASPHALT/CONCRETE
- SAND
- GRAVEL
- SILT
- CLAY
- WOODY DEBRIS
- APPROXIMATE WATER LEVEL
- GEOPROBE GROUNDWATER SAMPLING LOCATION, SLR 2013
- 60 DIOXINS TEQ VALUE (pg/g)
- ESTIMATED EXTENT OF EXCAVATION
- PROPOSED SOIL BORING
- GEOPROBE SAMPLING LOCATION
- H SAMPLE INTERVAL TO BE HELD BY LABORATORY PENDING RESULT OF SHALLOWER SAMPLE

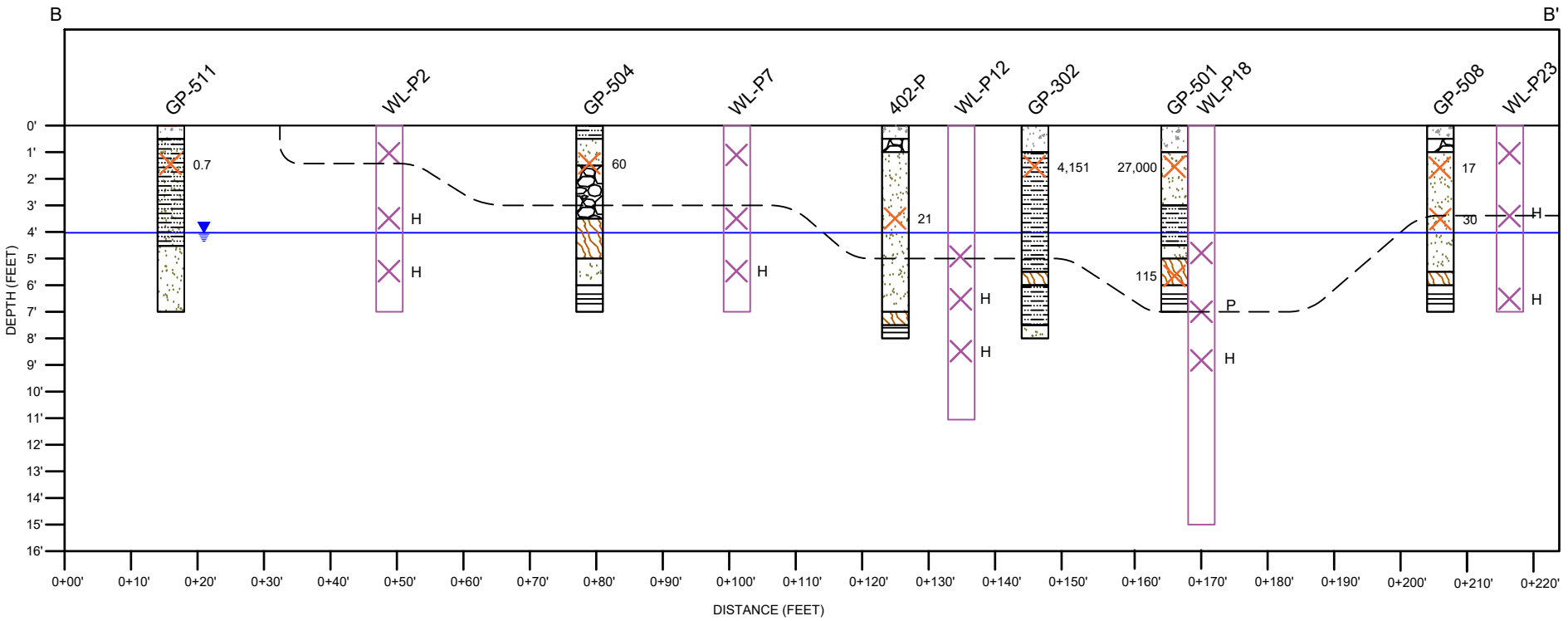
SLR

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report: FINAL PRDI WORK PLAN - UPLAND AREAS OF JELD-WEN SITE

Drawing: CROSS-SECTION A - A'

Date: January 23, 2024
Scale: AS SHOWN
Fig. No.: 6A
File Name:
Project No.: 108.V20689.00026



LEGEND

- ASPHALT/CONCRETE
- SAND
- GRAVEL
- SILT
- CLAY
- WOODY DEBRIS
- APPROXIMATE WATER LEVEL
- GEOPROBE GROUNDWATER SAMPLING LOCATION, SLR 2013
- 60 DIOXINS TEQ VALUE (pg/g)
- ESTIMATED EXTENT OF EXCAVATION
- PROPOSED SOIL BORING
- GEOPROBE SAMPLING LOCATION
- H SAMPLE INTERVAL TO BE HELD BY LABORATORY PENDING RESULT OF SHALLOWER SAMPLE
- P ACTUAL DEPTH INTERVAL TO BE DETERMINED IN FIELD BY HIGHEST PID MEASUREMENT

SLR

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report: FINAL PRDI WORK PLAN - UPLAND AREAS OFJELD-WEN SITE

Drawing: CROSS-SECTION B - B'

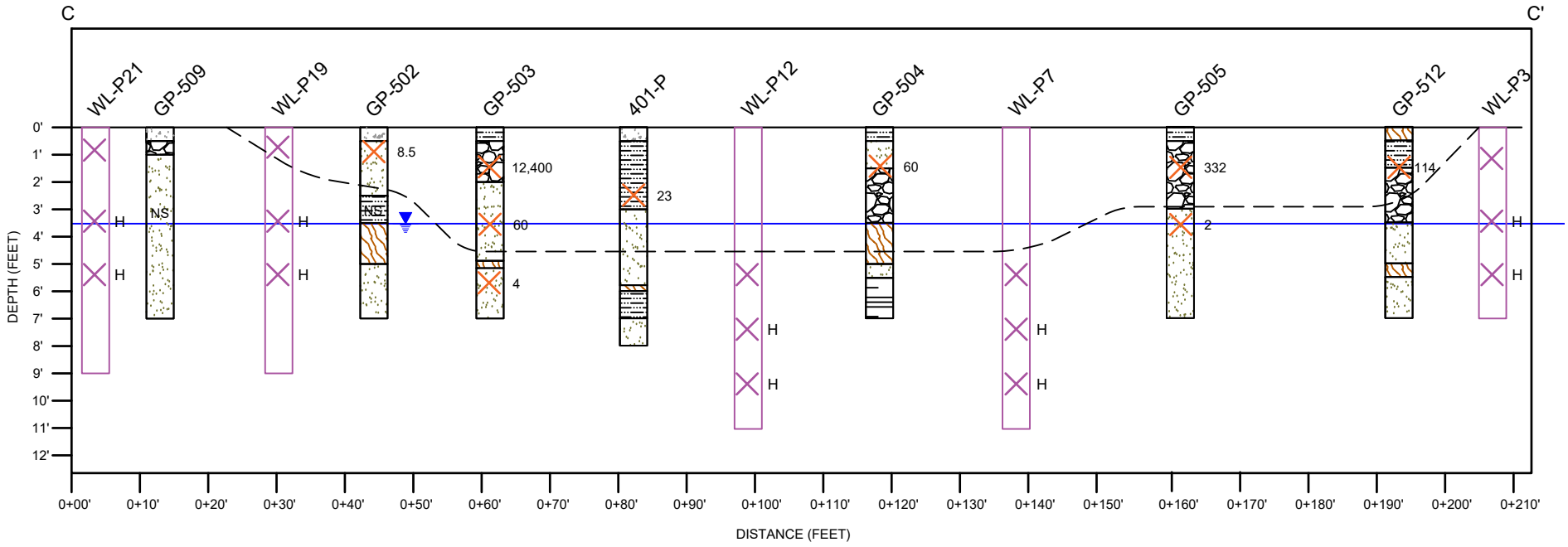
Date: January 23, 2024

Scale: AS SHOWN

File Name:

Project No. 108.V20689.00001

Fig. No. 6B



LEGEND

- ASPHALT/CONCRETE
- SAND
- GRAVEL
- SILT
- CLAY
- WOODY DEBRIS
- APPROXIMATE WATER LEVEL
- GEOPROBE GROUNDWATER SAMPLING LOCATION, SLR 2013
- 60 DIOXINS TEQ VALUE (pg/g)
- ESTIMATED EXTENT OF EXCAVATION
- PROPOSED SOIL BORING
- GEOPROBE SAMPLING LOCATION
- H SAMPLE INTERVAL TO BE HELD BY LABORATORY PENDING RESULT OF SHALLOWER SAMPLE

NOTES

NS = NOT SAMPLED

CLEANUP LEVEL (CUL) FROM CAP IS 5.2 pg/g FOR DIOXINS TEQ.

SLR

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
FINAL PRDI WORK PLAN- UPLAND AREAS OF JELD-WEN SITE

Drawing
CROSS-SECTION C - C'

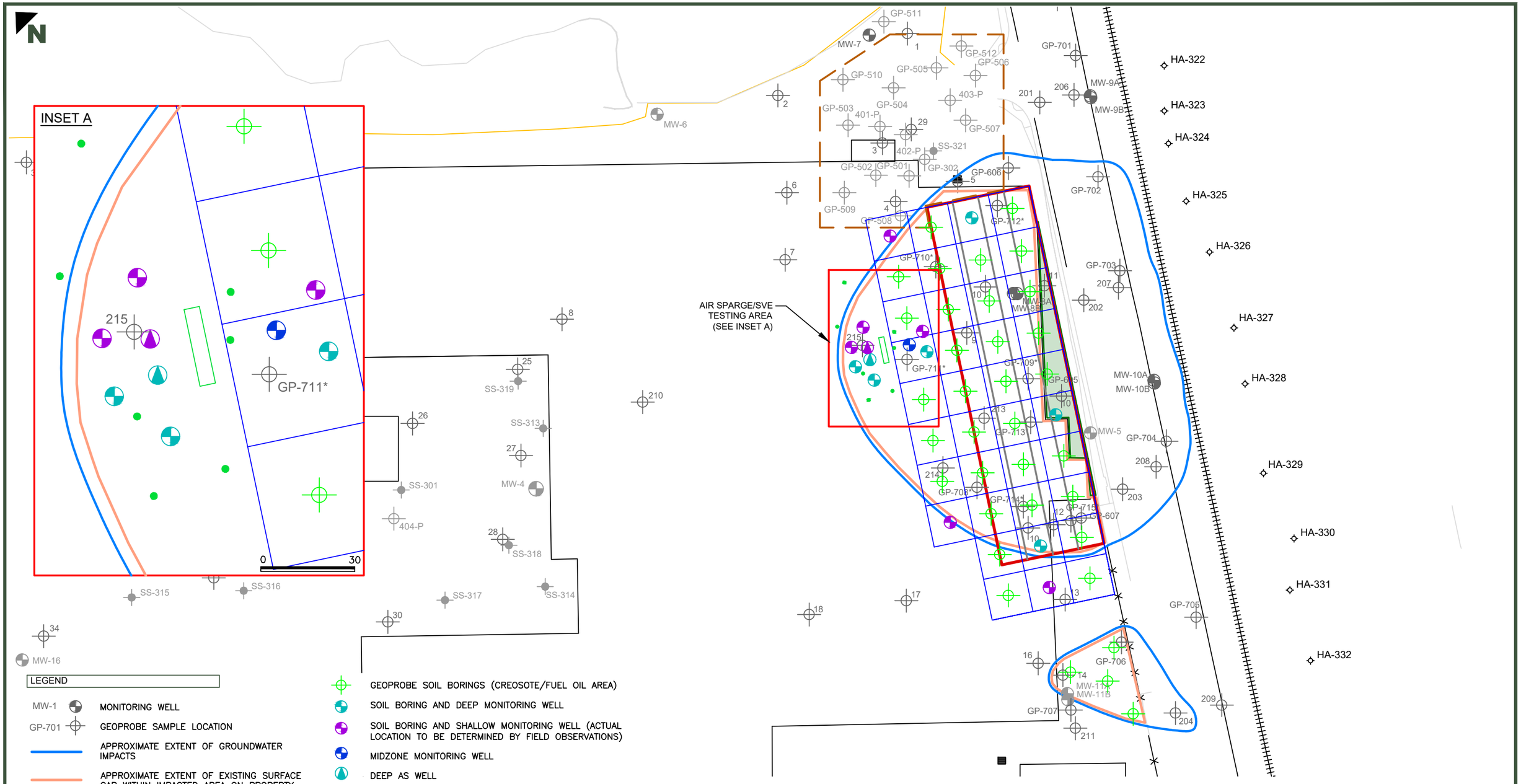
Date January 23, 2024

Scale AS SHOWN

Fig. No. 6C

File Name

Project No. 108.V20689.00001



LEGEND

MW-1	MONITORING WELL
GP-701	GEOPROBE SAMPLE LOCATION
	APPROXIMATE EXTENT OF GROUNDWATER IMPACTS
	APPROXIMATE EXTENT OF EXISTING SURFACE CAP WITHIN IMPACTED AREA ON PROPERTY
	APPROXIMATE EXTENT OF UNPAVED GROUND SURFACE ON PROPERTY (3,700 SQ FT)
	HOTSPOT REMOVAL AREA (100 FT X 350 FT)
	PROPOSED SHORING (25 FT SPACING)
	WOODLIFE SOIL REMOVAL AREA
	GEOPROBE SOIL BORINGS (CREOSOTE/FUEL OIL AREA)
	SOIL BORING AND DEEP MONITORING WELL
	SOIL BORING AND SHALLOW MONITORING WELL (ACTUAL LOCATION TO BE DETERMINED BY FIELD OBSERVATIONS)
	MIDZONE MONITORING WELL
	DEEP AS WELL
	SHALLOW AS WELL
	DEEP PUMPING WELL AND GEOTECHNICAL BORING
	SHALLOW PUMPING WELL
	VAPOR PIN
	SVE HORIZONTAL WELL
	40'x40' SAMPLING GRID

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

0 90 180 270'

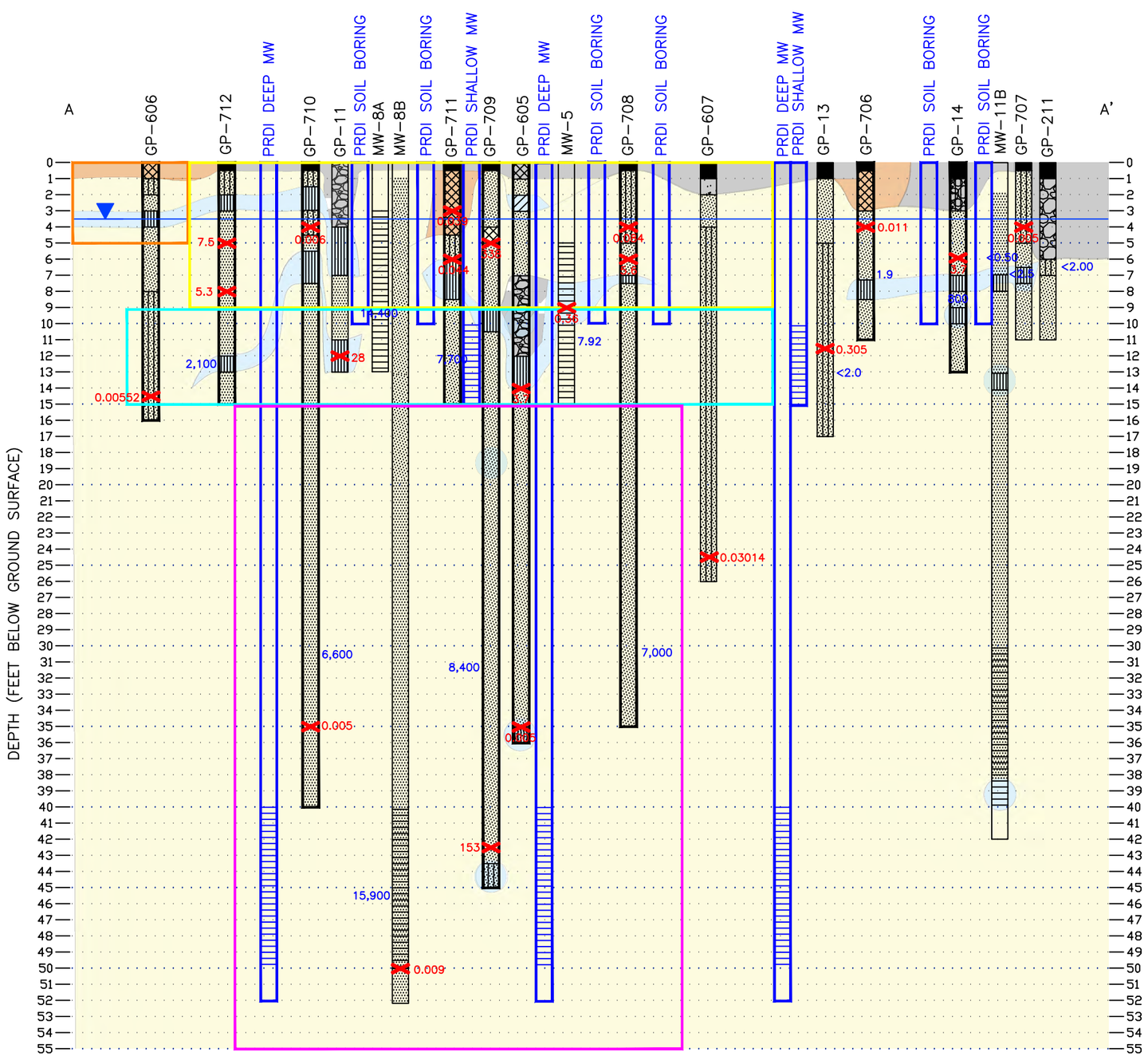
SLR

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
FINAL PRDI WORK PLAN - UPLAND AREAS OF JELD-WEN SITE

Drawing
CREOSOTE/FUEL OIL AREA PROPOSED SAMPLE LOCATIONS

Date	MARCH 2024	Scale	AS SHOWN	Fig. No. 7
File Name		Project No.	108.V20689.00001	



APPROXIMATE HORIZONTAL SCALE

0 75 150 225'

APPROXIMATE VERTICAL SCALE

0 7.5 15 22.5'

NOTES

NOT ALL SAMPLE LOCATIONS PRESENTED ON THIS CROSS SECTION

NOT ALL SAMPLE ANALYTICAL RESULTS PRESENTED (LIMITED TO SOIL AND GROUNDWATER SAMPLES FOR TPH-Dx (DIESEL RANGE))

PCLs
2,000 MG/KG FOR SATURATED SOIL
500 UG/L FOR GROUNDWATER

LEGEND

- APPROXIMATE GROUNDWATER LEVEL
- PROPOSED BORING/MW
- AS ASPHALT
- CL CLAY
- CONCRETE
- GM GRAVEL WITH SILT
- GP GRAVEL AND SAND
- PT PEAT
- ML SILT
- SM SILTY SAND
- SP SAND
- TOPSOIL
- SAND/SILTY SAND
- SILT
- TOPSOIL
- GRAVEL/CEMENT
- ESTIMATED WOODLIFE REMOVAL AREA
- ESTIMATED CREOSOTE/FUEL OIL AREA HOT SPOT REMOVAL
- ESTIMATED CREOSOTE/FUEL OIL AREA SHALLOW GROUNDWATER BIO TREATMENT AREA
- CREOSOTE/FUEL OIL AREA DEEP GROUNDWATER BIO TREATMENT AREA
- GEOPROBE SOIL SAMPLE LOCATION
- 200 SOIL ANALYTICAL RESULTS (cPAH TEQ, MG/KG)
- 700 GROUNDWATER ANALYTICAL RESULTS (NAPHTHALENE, ug/L)

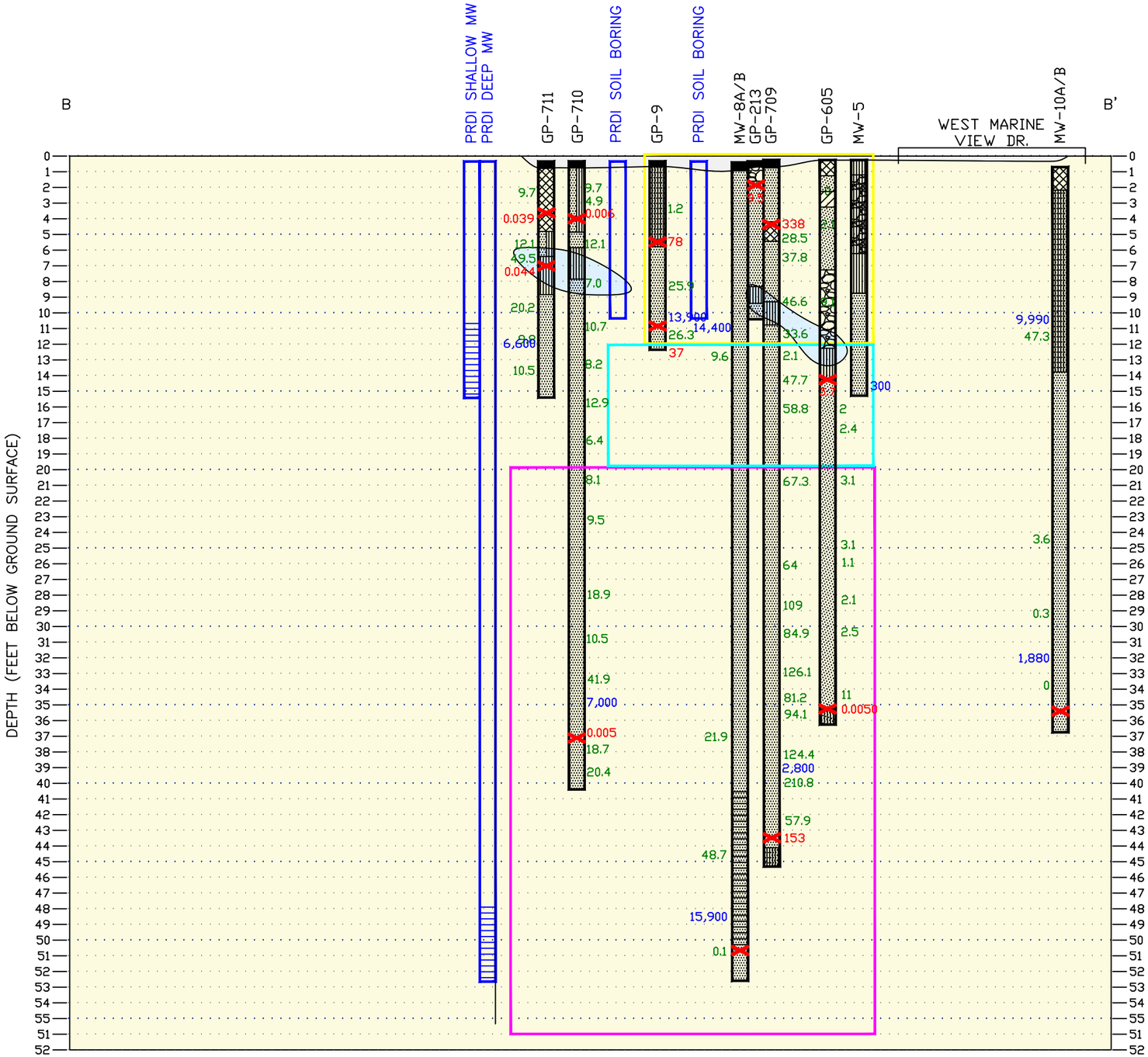
JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
FINAL PRDI WORK PLAN - UPLAND AREAS OF JELD-WEN SITE

Drawing
CREOSOTE/FUEL OIL AREA
CROSS SECTION A-A'

Date	March 13, 2024	Scale	AS SHOWN	Drawing No.
File Name		Project No.	108.V20689.00001	8

SLR



APPROXIMATE HORIZONTAL SCALE

0 50 100 150'

APPROXIMATE VERTICAL SCALE

0 7.5 15 22.5'

NOTES

NOT ALL SAMPLE LOCATIONS PRESENTED ON THIS CROSS SECTION

NOT ALL SAMPLE ANALYTICAL RESULTS PRESENTED (LIMITED TO SOIL AND GROUNDWATER SAMPLES FOR TPH–Dx (DIESEL RANGE))

PCLs
2,000 MG/KG FOR SATURATED SOIL
500 UG/L FOR GROUNDWATER

LEGEND

- APPROXIMATE GROUNDWATER LEVEL
- PROPOSED BORING/MW
- AS ASPHALT
- CL CLAY
- CONCRETE
- GM GRAVEL WITH SILT
- GP GRAVEL AND SAND
- PT PEAT
- ML SILT
- SM SILTY SAND
- SP SAND
- TOPSOIL
- SAND/SILTY SAND
- SILT
- TOPSOIL
- GRAVEL/CEMENT
- ESTIMATED WOODLIFE REMOVAL AREA
- ESTIMATED CREOSOTE/FUEL OIL AREA HOT SPOT REMOVAL
- ESTIMATED CREOSOTE/FUEL OIL AREA SHALLOW GROUNDWATER BIO TREATMENT AREA
- CREOSOTE/FUEL OIL AREA DEEP GROUNDWATER BIO TREATMENT AREA
- GEOPROBE SOIL SAMPLE LOCATION
- 58.8 PID READINGS
- 3.7 cPAH TEQ VALUES (mg/kg)
- 300 NAPTHALENE VALUES IN GROUNDWATER (µg/L)

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
FINAL PRDI WORK PLAN - UPLAND AREAS OF JELD-WEN SITE

Drawing
CREOSOTE/FUEL OIL AREA
CROSS SECTION B-B'

Date	March 13, 2024	Scale	AS SHOWN	Drawing No.
File Name		Project No.	108.V20689.00001	9

SLR

Appendix A Upland Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP)

Appendix A: Upland SAP and QAPP

Pre-Remedial Design Investigation Work Plan – Upland Areas of Jeld Wen Site

Jeld Wen Site

300 West Marine View Drive
Everett, Washington

Making Sustainability Happen

Table of Contents

Tables

Figures

Appendices

1.0 Introduction

SLR International Corporation (SLR) has prepared the following Sampling and Analysis Plan (SAP) and Quality Assurance Project Plan (QAPP) to accompany the Pre-Remedial Design Investigation (PRDI) Work Plan – Upland Areas of the Jeld Wen Site (Upland PRDI WP).

1.1 Objectives

The overall objectives of the Upland PRDI activities are to assess the extent of contamination identified during completion of the Remedial Investigation (RI) and to evaluate the feasibility and design specifications of the selected remedial actions evaluated in the Feasibility Study (FS) and presented in the Cleanup Action Plan (CAP), and the modification to the selected alternative detailed in the BIO deferral letter (Attachment 1 of the WP):

The Upland PRDI scope of work specifically entails the following tasks that are summarized in the Upland PRDI WP:

- Assessment of Site features including surface topography, underground utilities, and subsurface infrastructure of the main manufacturing building (i.e., configuration of pilings).
- Lateral and vertical delineation of soil impacts for soil removal in Woodlife Area.
- Lateral and vertical delineation of soil impacts for Hot Spot soil removal in Creosote/Fuel Oil Area.
- Aquifer testing of the shallow groundwater zone to assist with shoring and excavation design.
- Pilot testing components of the BIO system for the Creosote/Fuel Oil Area; including AS and SVE testing to determine effective radius of influence (ROI) to assist with full-scale design.

Upland PRDI activities will be performed in accordance with the SAP (Section 2) and the analytical methodology and quality assurance protocols to be used during the Upland PRDI activities are described in the QAPP (Section 3).

1.2 General Site Information

Site Name: Jeld Wen Site

Site Address: 300 West Marine View Drive

City and State: Everett, WA 98201

County: Snohomish

Latitude: 48.014780°

Longitude: -122.211467°

Washington State Department of Ecology (Ecology) Facility Site ID Number: 2757

Ecology Region: Northwest Region

Ecology Project Manager/Coordinator: Frank P. Winslow, LHG, Ecology, Toxics Cleanup Program

JELD-WEN Project Coordinator: Eric Rapp, JELD-WEN, Inc.

JELD-WEN Project Manager: Scott Miller, SLR

A Site Location Map is included as SAP Figure 1.

2.0 Sampling and Analysis Plan

This SAP presents the detailed scope of work for implementation of the Upland PRDI activities described in the Upland PRDI WP.

2.1 General Procedures

To support project objectives (see Section 1.1), the following general procedures shall be used during the sampling efforts:

- Sample collection methods have been designed to evaluate soil and groundwater per similar methodology as previous site investigations for comparison purposes. Environmental sample collection specifications (sampling container, preservative, and hold time) are shown in Table 1.
- The field sampling team will document the sampling efforts with photographs as well as field notes and sampling documentation sheets. Example Field Forms are included in Appendix A.
- Sample collection efforts will be implemented in such a manner as to minimize worker exposures in compliance with applicable Occupational Safety and Health Administration (OSHA) regulations 29 CFR 1910.120 and other applicable federal, state, and local laws, regulations and statutes. It is anticipated that the work will be performed in the exclusion zones in Level D or Level C personal protective equipment (PPE). For additional detail on minimizing worker exposures, please refer to the site-specific HASP (included as Appendix B of the Upland PRDI WP).
- Groundwater and soils will be analyzed by Washington State-accredited laboratories using U.S. Ecology-approved analytical methods with appropriate detection limits. Detection limits must be lower than cleanup levels defined in the Cleanup Action Plan (CAP). Laboratory quality objectives are shown in Table 2.
- Total concentrations of carcinogenic polynuclear aromatic hydrocarbons (cPAHs) and polychlorinated dibenzo-p-dioxins and dibenzofurans (dioxins) will be reported as toxic equivalents (TEQs) in accordance with Model Toxics Control Act (MTCA) Table 708-1 and Table 708-2.
- Common adjustments (e.g. monitoring well screen intervals) and final specifications of soil borings and well constructions will be decided by field observations. Communication with Ecology will be engaged prior to any significant alterations to the sampling plan. A summary of the proposed boring and well program is included in Table 3.
- Laboratory analytical data validation will be performed as presented in the QAPP (Section 3) and in general accordance with data quality control guidance. Internal data validation guidance is included in Table 4.

2.2 Site Features (Survey)

Prior to performance of any subsurface work, a licensed surveyor will be subcontracted to survey the Site and select features. A Site Plan and Survey Scope of Work are shown on SAP Figure 2.

Sample Locations, Types, and Frequency

Survey locations and features include: parcel and property boundaries, current shoreline and edge of asphalt (to support design of sediment remedy), surface topography (particularly for the Woodlife Area due to the presence of stormwater surface flow that enters the property from the adjacent public roadway and to assess future concerns with sea level rise and site inundation during king tide events), subsurface utilities within the proposed soil removal areas, and the location and configuration of the pilings supporting the main manufacturing building within the treatment area (see SAP Figure 2). Identifying the location and configuration of the pilings will be an essential element to the design of the shoring for the Hot Spot soil removal in the Creosote/Fuel Oil Area. Understanding the site topography in this area is essential to properly design the construction activities, as well as to assist in designing post-construction conditions that account for changes in site stormwater conditions due to the proposed soil removal, surface re-paving, and demolition of the main manufacturing building (Note: demolition of the main manufacturing building is not included as part of the Upland PRDI; however, demolition activities may be performed by others prior to the performance of PRDI activities).

In addition, a private utility locating contractor will mark the location of any publicly or privately-owned utilities within the work areas in accordance with the SLR utility contact prevention program described in the HASP (Appendix C of the Upland PRDI WP).

Sample Analyses and Methods

No analytical testing is required for this task.

Sample Designation

No environmental samples will be collected for this task.

Sample Procedures

Survey information will be collected by a licensed land surveying contractor in accordance with Ecology guidance on horizontal and vertical datum and survey precision and accuracy presented in the *Guidance for Remediation of Petroleum Contaminated Site* (Ecology, 2016).

Requirements for horizontal and vertical datum and survey precision and accuracy include where feasible, measurements should be recorded with at least the following precision relative to an on-site reference monument:

- To facilitate site work, a site coordinate system should be established to tie the locations of points within the site relative to one or more on-site or near-site reference monument(s). The reference monument(s) should be established at a location that is unlikely to be disturbed by future remediation or site redevelopment activities and identified on the site map.
- If it is cost prohibitive to establish coordinates and the vertical elevation of the reference monument(s) using the conventional surveying methods or a survey-grade GPS, coordinates and elevation can be estimated using other methods.

- The horizontal location of objects and sampling locations should be measured to within 1.0 foot.
- The ground surface elevation at boreholes, monitoring wells and soil sampling locations should be measured to within 0.1 foot.
- For boring logs and backhoe test pits, sample depths should be measured to within 1.0 foot. For surface soil samples, the sample depth should be measured to within 0.1 foot.
- For all monitoring wells, the vertical elevation of the reference point on the top of the casing for water levels should be measured to within 0.01 foot. Subsequent water levels should be measured to within 0.01 foot from this reference point to the casing.

2.3 Woodlife Area Soil Removal Area Delineation

As described in the Upland PRDI WP the soil removal boundaries for the Woodlife Area are controlled by dioxins TEQ values that exceed the Cleanup Level (CUL), which is equivalent to the regional natural background concentration. Upland PRDI activities in this area will focus on further delineating and confirming the lateral and vertical extent of dioxins contamination that will require removal to meet cleanup objectives.

Sample Locations, Types, and Frequency

The sampling design to delineate the soil removal area in the Woodlife Area includes collection of discrete soil samples from an approximately 40 x 40-foot grid across the preliminary Hot Spot removal area. Sampling in the Woodlife Area will include 26 soil boring locations to approximately 10 feet below ground surface (bgs) from the approximate center of each grid cell pending access and safety due to site features or utilities (SAP Figure 3 and Table 3). The boring completed near the former sampling location GP-501 will be completed to a depth of at least 15 feet bgs and may extend deeper if field observations show lithology or field instrumentation measurements inconsistent with surrounding borings. Borings will be completed using direct push methods, recovering the soil core(s) and the boreholes will be backfilled with bentonite. Dioxins tend to partition onto soil. The proposed drilling methods, boring backfilling techniques, and relatively shallow investigation depth significantly reduce potential for creating a conduit for downward contaminant migration. The soil lithology throughout the fill area of the site is consistent (dredge sands) and a significant confining layer has not been encountered, despite investigation depths up to 55 feet bgs. In general, nine feet bgs is the alternate Point of Compliance (POC) presented in the CAP and soil borings are not anticipated to proceed deeper than this depth, regardless of evidence of impacts, except as noted above.

Grab soil samples will be collected from continuous soil cores generated from a Geoprobe direct push drilling rig operated by a subcontractor. Cross-sections showing historical investigation results, proposed boring depths and preliminary soil sample intervals are shown on SAP Figure 4a to 4c. The terminal lateral extent and depth of the soil samples are designed to be outside of the anticipated removal area (i.e., free of evidence of impacts).

Up to 3 soil samples at each location will be collected for laboratory analysis of dioxins by EPA 1613 method. 1613 is a high-resolution superfund method (HRSM) that demands an extended turnaround time for results delivery, requires additional review and validation, and has a recommended sample holding time of 1 year. It is a common practice to delineate bottom depths of an excavation by collecting additional samples to be held in reserve pending upper-depth sample results. It is anticipated that a maximum of two follow-up rounds of analysis for dioxins will be completed during the activities outlined in the PRDI in order to remain within the laboratory method holding time requirements and stay on schedule for production of the PRDI Data Report

and subsequent remedial design. In addition, 2 soil samples from the boring completed near former sampling location GP-501 will be submitted for laboratory analysis of VOCs by EPA 8260 method, as well as at any additional borings that exhibit characteristics of volatile constituents during field screening (i.e., elevated PID measurements).

QA/QC samples will be collected at the frequency described in Section 2.1.4.

Sample Analyses and Methods

Soil samples will be submitted for the following constituents and laboratory methods:

- Dioxins by EPA 1613 Method

The samples will be shipped to Pace Analytical in Minneapolis, Minnesota per the procedures described in Section 2.11 of this SAP. Sample container, preservation, and hold time requirements are shown in Table 1 and laboratory quality objectives are shown in Table 2 and are further described in the QAPP (Section 3).

- VOCs by EPA 8260 Method – for boring adjacent to former boring GP-501 and other anomalous elevated PID intervals

The samples will be delivered to Friedman & Bruya laboratory (F&B) in Seattle, Washington per the procedures described in Section 2.11 of this SAP. Sample container, preservation, and hold time requirements are shown in Table 2 and laboratory quality objectives are shown in Table 3 and are further described in the QAPP (Section 3).

Sample Designation

Soil samples collected for the Woodlife Area soil removal delineation assessment will begin with a “WL” indicator to distinguish as being from the Woodlife Area. These soil samples will also be designated by the sampling grid unit from which they were collected as shown on SAP Figure 3. The sample name will also include the sample depth interval and the sampling date.

For example, a soil sample collected as part of the Woodlife Area soil removal delineation assessment from sample grid P7 at a depth from 3 to 4 feet bgs on June 17, 2024 would be designated WL-P7-1-3-061724.

QA/QC samples will be designated with unique sample names per Section 2.14.

Sample Procedures

A summary of the soil sampling procedures for the Woodlife Area soil removal delineation assessment is listed below.

1. Soil borings will be advanced with a direct push (i.e. Geoprobe) drilling rig operated by a Washington-licensed drilling subcontractor to an initial depth of 10 feet bgs. The soil cores are typically completed as 5-foot intervals (continuous soil sampling). Areas with concrete surface will be cored prior to Geoprobe drilling and areas with asphalt pavement will be driven through the asphalt with the Geoprobe drilling rig.
2. The soil interval will be retrieved from the drilling core via an acetate sampling sleeve, placed on a sampling table with new plastic sheeting, and cut open to expose the full soil core.
3. Soil will be photographed and logged for characteristics consistent with the Unified Soil Classification System (USCS) and for field evidence of impact (e.g., odors, staining). The soils will be individually bagged in 1-foot increments and allowed to rest in a sealed zip

lock bag after being slightly agitated. The bags will be pierced with the tip of the PID to record a head space vapor measurement. Field logging results and PID measurements will be noted on a field boring log form (example included in SAP Appendix A).

4. Sample intervals for laboratory analysis will be based on the CSM presented in the Upland PRDI WP, field observations, and previous investigation findings, and per the following procedure as shown on SAP Figure 4a to 4c:
    a. Field screening will proceed from the uppermost profile of the soil core. If no evidence of impacts are observed from surface to 3 feet bgs, a soil sample will be collected from 0 to 2 feet bgs and submitted for laboratory analysis. Secondary samples from the same boring will be collected from approximately 3 to 4 feet bgs and 5 to 6 feet bgs and held by the analytical laboratory pending the results of the shallower sample interval.
    b. If field screening indicates impacts in the uppermost profile of the soil core (0 to 2 feet bgs) only, a soil sample will be collected from 3 to 4 feet bgs and submitted for laboratory analysis. Secondary samples from the same boring will be collected from approximately 5 to 6 feet bgs and 7 to 8 feet bgs and held by the analytical laboratory pending the results of the shallower sample interval.
    c. If field screening indicates impacts in the uppermost and lower profiles of the soil core (0 to 5 feet bgs), a soil sample will be collected from 7 to 8 feet bgs and submitted for laboratory analysis. A secondary sample from the same boring will be collected from approximately 9 to 10 feet and held by the analytical laboratory pending the results of the shallower sample interval. As noted above, the alternate POC is 9 feet bgs and proposed excavation activities are not expected to be feasible beyond this depth.
    d. Soil sampling for VOCs at the location adjacent to former boring GP-501, will be completed at 4.5 to 5.5 feet bgs and from the depth interval with the highest PID reading. Anomalous elevated PID readings at other borings may also be submitted for laboratory analysis of VOCs, pending discussion with Ecology (if conversations are delayed, field samples will be collected and held by the laboratory).
5. A disposable plastic sampling spoon will be used to transfer the selected sample intervals for laboratory analysis into laboratory-provided sample jars. Care will be taken to minimize disturbance of soil placed in the containers and each jar will be filled as full as possible to minimize headspace. The sample will be labeled, placed on ice in a cooler, and handled as described in Section 2.11.
6. Sampling equipment and reusable materials that will contact the sample will be decontaminated onsite in accordance with procedures identified in Section 2.12. The field sampler and drilling personnel will use clean nitrile gloves prior to handling any sample material or sampling equipment.
7. Residual soil and disposable sampling equipment will be containerized per Section 2.13.
8. Soil borings will be backfilled with bentonite chips to the approximate ground surface and hydrated and the surrounding surface material will be patched with like material.
9. The location of the boring will be field marked using a handheld GPS device for latitude/longitude information, photographed, and measured from physical site features (i.e., building foundation edges or utility features) and noted on a scaled Site Plan.

2.4 Creosote/Fuel Oil Area Hot Spot Soil Removal Area Delineation

Sampling in this area will focus on further delineating and confirming the lateral and vertical extent of Hot Spot cPAH contamination.

Sample Locations, Types, and Frequency

The sampling design to delineate the Hot Spot soil removal area includes collection of discrete soil samples and field screening from an approximately 40 x 40-foot grid across the preliminary Hot Spot removal area (SAP Figure 5). Cross-sections showing boring depths and preliminary soil sample intervals are shown on SAP Figure 6 and Figure 7. Sampling in the Creosote/Fuel Oil Area will include 42 soil boring locations to up to 10 feet bgs from the approximate center of each grid cell pending access (including location of building support pilings) and safety due to site features or utilities. Nine feet bgs is the alternate POC presented in the CAP and soil borings are not anticipated to proceed deeper than this depth, regardless of evidence of impacts.

Grab soil samples will be collected from continuous soil cores generated from a Geoprobe direct push drilling rig operated by a subcontractor.

Up to one soil sample at each location will be collected for laboratory analysis based on field observations and screening with a PID. Samples will not be collected for laboratory analysis from borings with the presence of product.

QA/QC samples will be collected at the frequency described in Section 2.14.

Sample Analyses and Methods

Soil samples will be submitted for the following constituents and laboratory methods:

- cPAHs by EPA 8270E Method

The samples will be delivered to Friedman & Bruya laboratory (F&B) in Seattle, Washington per the procedures described in Section 2.11 of this SAP. Sample container, preservation, and hold time requirements are shown in Table 2 and laboratory quality objectives are shown in Table 3 and are further described in the QAPP (Section 3).

Sample Designation

Soil samples collected for the Creosote/Fuel Oil Area Hot Spot soil removal delineation assessment will begin with a “CF” indicator to distinguish as being from the Creosote/Fuel Oil Area. These soil samples will also be designated by the sampling grid unit from which they were collected as shown on SAP Figure 5. The sample name will also include the sample depth interval and the sampling date.

For example, a soil sample collected as part of the Creosote/Fuel Oil Area Hot Spot soil removal delineation assessment from sample grid P9 at a depth from 7 to 8 feet bgs on June 27, 2024 would be designated CF-P9-7-8-062724.

QA/QC samples will be designated with unique sample names per Section 2.14.

Sample Procedures

A summary of the soil sampling procedures for the Creosote/Fuel Oil Area Hot Spot soil removal delineation assessment is listed below.

1. Soil borings will be advanced with a direct push (i.e. Geoprobe) drilling rig operated by a Washington-licensed drilling subcontractor to an initial depth of 10 feet bgs (if significant field evidence of impacts is noted in soils greater than 10 feet, the boring may be extended). The soil cores are typically produced in 5-foot intervals.
2. The soil interval will be retrieved from the drilling core via an acetate sampling sleeve, placed on a sampling table with new plastic sheeting, and cut open to expose the full soil core.
3. Soil will be photographed and logged for characteristics consistent with the USCS and for field evidence of impact (e.g., odors, staining). The soils will be individually bagged in 1-foot increments and allowed to rest in a sealed zip lock bag after being slightly agitated. The bags will be pierced with the tip of the PID to record a head space vapor measurement. Field logging results and PID measurements will be noted on a field boring log form (example included in SAP Appendix A).
4. Field observations will include the presence, saturation, or staining of NAPL as follows:
    a. Descriptions of product in the soil matrix from the recovered Geoprobe cores will be described as:
        i. Product Saturated Soil – Interval (i.e., 3.0-3.5')
        ii. Some Product Present in Soil Matrix (e.g., blebs) – Interval
        iii. Significant Grain Staining (e.g., >50% soil particles coated with product) – Interval
        iv. Some Grain Staining (e.g., <50% soi particles coated with product) - Interval
5. Sample intervals for laboratory analysis will be based on field observations and previous investigation findings, per the following procedure:
    a. Field screening will proceed from throughout the soil profile. While PID measurements will be recorded throughout the soil core in 1-foot increments, only one soil sample interval will be collected for laboratory analysis.
    b. The approximately 1-foot interval with the highest PID head space reading will be selected for laboratory analysis of cPAHs.
    c. If field screening does not indicate significant impacts throughout the soil profile, one soil sample will be collected from approximately 4.5 feet bgs to represent the approximate middle of the sidewalls for the proposed excavation.
6. A disposable plastic sampling spoon will be used to transfer the selected sample intervals for laboratory analysis into laboratory-provided sample jars. Care will be taken to minimize disturbance of soil placed in the containers and each jar will be filled as full as possible to minimize headspace. The sample will be labeled, placed on ice in a cooler, and handled as described in Section 2.11.
7. Sampling equipment and reusable materials that will contact the sample will be decontaminated onsite in accordance with procedures identified in Section 2.12. The field sampler and drilling personnel will use clean nitrile gloves prior to handling any sample material or sampling equipment.
8. Residual soil and disposable sampling equipment will be containerized per Section 2.13.

9. Soil borings will be backfilled with bentonite chips to the approximate ground surface and hydrated and the surrounding surface material will be patched with like material.
10. The location of the boring will be field marked using a handheld GPS device for latitude/longitude information, photographed, and measured from physical site features (i.e., building foundation edges or utility features) and noted on a scaled Site Plan.

2.5 Shallow Zone Groundwater Assessment

Sample Locations, Types, and Frequency

Five shallow groundwater monitoring wells to approximately 13 feet bgs will be installed outside of the horizontal extents of the Hot Spot excavation area to assess the extent of shallow groundwater impacts (see SAP Figure 5). The shallow groundwater monitoring wells will be co-located with soil borings completed as part of the Hot Spot delineation assessment and their location will be based on whether they will remain outside of the excavation footprint, but still within the shallow groundwater zone area of impacts (see estimated locations on SAP Figure 5, however actual soil borings that will be converted to shallow wells will be determined based on findings of the soil assessment).

Soil samples will be collected as part of the Hot Spot delineation assessment; therefore, no soil samples will be collected as part of the Shallow Zone Groundwater Assessment.

An initial round of groundwater samples will be collected from the shallow monitoring wells per low-flow purging and sampling methodology; however, the shallow monitoring wells will be installed as permanent fixtures that will allow for subsequent sample collection to assess seasonal variability, contaminant migration, and/or to support compliance monitoring during and following implementation of the remedies.

QA/QC samples will be collected at the frequency described in Section 2.14.

Sample Analyses and Methods

Groundwater samples will be submitted for the following constituents and laboratory methods:

- Naphthalene by EPA 8260D Method
- cPAHs by EPA 8270E Method

The samples will be delivered to F&B per the procedures described in Section 2.11. Sample container, preservation, and hold time requirements are shown in Table 2 and laboratory quality objectives are shown in Table 3 and are further described in the QAPP (Section 3).

Sample Designation

Groundwater samples collected for the Shallow Zone Groundwater Assessment will begin with a “MW” indicator to distinguish as being from a permanent monitoring well. The numeric order of monitoring wells will continue from existing monitoring well network starting at MW-22. The new shallow groundwater monitoring wells will also be designated with an “s” to distinguish as being representative of the shallow zone groundwater. The sample name will also include the sample sampling date.

For example, a groundwater sample collected from new shallow groundwater monitoring well MW-22s on June 4, 2024 would be designated MW-22s-060424.

QA/QC samples will be designated with unique sample names per Section 2.14.

Sample Procedures

The shallow monitoring wells will be installed with a hollow-stem auger drilling rig at locations of previous soil borings completed as part of the Hot Spot delineation assessment.

1. Following completion of the Geoprobe drilling, the soil boring will be overdrilled with an auger using a hollow-stem auger drilling rig (or auger attachment for the Geoprobe rig) to approximately 13' bgs. No split spoons or soil sampling/screening will be performed; however, the soil cuttings will be visually observed for significant field impacts not observed in the Geoprobe cores.
2. A 2-inch diameter 10-foot section of slotted well screen with 0.020 slot size will be installed with blank PVC risers to the ground surface. The annulus of the well screen interval will be backfilled with a silica sand filter pack to approximately 1-foot above the well screen, followed by a hydrated bentonite seal to approximately 1-foot bgs. A concrete surface seal and traffic-rated flush mount well box will be installed at the surface and allowed to set for a minimum of 48 hours.
3. After the monument has set the well will be developed by surge and bail method to remove fines or leftover drilling materials, and to enhance the continuity of the surrounding groundwater formation and the conditions within the screened section of the well. The wells will be developed until the produced water is clear and measures less than 5 nephelometric turbidity units (NTUs) using a field turbidimeter. After development the well will be allowed to set for a minimum of 24 hours.
4. After 24 hours post-development, the depth-to-water will be measured to confirm that the groundwater surface is within the slotted well screen interval prior to checking for NAPL. The shallow groundwater wells will be checked with a bailer for the presence of NAPL. No groundwater sample will be collected for laboratory analysis if the presence of NAPL is confirmed.
5. For wells that do not contain measurable NAPL, a decontaminated submersible bladder pump with new polyethylene tubing will be inserted into the well casing to the approximate middle of the saturated zone within the well screen. The polyethylene tubing will be connected to variable frequency drive (VFD) controller. Tubing will be sourced from a new unopened spool designated for this investigation.
6. Groundwater samples will be collected per EPA Low Stress (low flow) protocol (*EPA, 2017)* using water quality parameter stabilization via a hand-held multi-parameter meter with a transparent flow-through-cell on the following basis for stabilization:
    a. Stabilization is considered to be achieved when three consecutive readings are within the following limits:
        i. Turbidity (10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized),
        ii. Dissolved Oxygen (10% for values greater than 0.5 milligrams per liter [mg/L], if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values stabilized),
        iii. Specific Conductance (3%),
        iv. Temperature (3%),
        v. pH (+/- 0.1 unit),
        vi. Oxidation/Reduction Potential (+/- 10 millivolts).

7. After stabilization, the polyethylene sample tubing will be removed from the flow-through-cell and used to directly fill laboratory provided containers with appropriate preservative (Table 1). The sample will be labeled, placed on ice in a cooler, and handled as described in Section 2.11.
8. Sampling equipment and reusable materials that will contact the sample will be decontaminated on-site in accordance with the procedures identified in Section 2.12 prior to and before each use. The field sampler and drilling personnel will use clean nitrile gloves for handling each sample or sampling equipment.
9. Soil cuttings, development water, purge water and disposable sampling equipment will be containerized per Section 2.13.

2.6 Deep Zone Groundwater Assessment

Sample Locations, Types, and Frequency

Five deep groundwater monitoring wells will be co-located with soil borings completed as part of the Hot Spot delineation assessment and their location will be based on an estimate of whether they will remain outside of the excavation footprint, but still within the deep groundwater zone area of impacts (see proposed locations on SAP Figure 5). Some of these locations will be co-located with soil borings completed as part of the Hot Spot delineation assessment to confirm that they would be outside of the excavation footprint but potentially still within the deep zone groundwater area of impacts; and, some of the proposed deep groundwater monitoring wells will be installed within the excavation footprint and will likely need to be decommissioned prior to remedy implementation. As opposed to the shallow monitoring well installations, it is not feasible to advance every soil boring that is part of the Hot Spot soil delineation to the deep zone.

Soil samples for laboratory analysis will be collected as part of the Hot Spot delineation assessment for the upper 10 feet bgs. Deeper soils will be screened for field evidence of impacts, including descriptions of product saturation level, if observed.

An initial round of groundwater samples will be collected from the deep monitoring wells; however, the deep monitoring wells will be installed as permanent fixtures that will allow for subsequent sample collection to assess seasonal variability, contaminant migration, and/or to support compliance monitoring during and following implementation of the remedies. The well sumps will also be periodically checked for the presence of NAPL.

QA/QC samples will be collected at the frequency described in Section 2.14.

Sample Analyses and Methods

Groundwater samples will be submitted for the following constituents and laboratory methods:

- Naphthalene by EPA 8260D Method
- cPAHs by EPA 8270E Method

The samples will be delivered to F&B per the procedures described in Section 2.11 of this SAP. Sample container, preservation, and hold time requirements are shown in Table 2 and laboratory quality objectives are shown in Table 3 and are further described in the QAPP (Section 3).

If sufficient product for sample collection is encountered, a sample will be collected for chemical composition and density testing.

Sample Designation

Groundwater samples collected for the Deep Zone Groundwater Assessment will begin with a "MW" indicator to distinguish as being from a permanent monitoring well. The numeric order of monitoring wells will continue from existing monitoring well network and the proposed shallow groundwater monitoring wells starting at MW-27. The new deep groundwater monitoring wells will also be designated with a "d" to distinguish as being representative of the deep zone groundwater. The sample name will also include the sampling date.

For example, a groundwater sample collected from new deep groundwater monitoring well MW-27d on June 4, 2024 would be designated MW-27d-060424.

QA/QC samples will be designated with unique sample names per Section 2.14.

Sample Procedures

The deep monitoring wells will be installed with a hollow-stem auger drilling rig at locations of previous soil borings completed as part of the Hot Spot delineation assessment.

1. The soil boring initiated for the Hot Spot delineation assessment will be continued to the target depth of 55' bgs to provide for a continuous soil core for observation of deep impacts. Previous Geoprobe borings at the Site have advanced to this approximate depth; however, it is near the extent of capabilities of a direct push rig and may not reach target depth. Ideally, the boring will be advanced until observation of a significant deep fine-grained or confining unit.
2. The soil interval will be retrieved from the drilling core via an acetate sampling sleeve, placed on a sampling table with new plastic sheeting, and cut open to expose the full soil core.
3. Soil will be photographed and logged for characteristics consistent with the USCS and for field evidence of impact (e.g., odors, staining). The soils will be individually bagged in 1-foot increments and allowed to rest in a sealed zip lock bag after being slightly agitated. The bags will be pierced with the tip of the PID to record a head space vapor measurement. Field logging results and PID measurements will be noted on a field boring log form (example included in SAP Appendix A).
4. Field observations will include the presence, saturation, or staining of NAPL as follows:
    a. Descriptions of product in the soil matrix from the recovered Geoprobe cores will be described as:
        i. Product Saturated Soil – Interval (i.e., 3.0-3.5')
        ii. Some Product Present in Soil Matrix (e.g., blebs) – Interval
        iii. Significant Grain Staining (e.g., >50% soil particles coated with product) – Interval
        iv. Some Grain Staining (e.g., <50% soi particles coated with product) - Interval
5. Following completion of the Geoprobe drilling, the soil boring will be overdrilled with a hollow-stem auger drilling rig to approximately 55' bgs, pending on soil lithology observations. No split spoons or soil sampling/screening will be performed unless they are needed to supplement the observations of the Geoprobe cores, particularly at greater depths.

6. A 2-inch diameter 10-foot section of slotted well screen with 0.020 slot size and with a 2-foot bottom sump will be installed with blank PVC risers to above the ground surface. The annulus of the well screen interval will be backfilled with a silica sand filter pack to approximately 1-foot above the well screen, followed by a hydrated bentonite seal to approximately 1-foot bgs. A concrete surface seal and traffic-rated flush mount well box will be installed at the surface and allowed to set for a minimum of 48 hours.
7. After the monument has set the well will be developed by surge and bail method to remove fines or leftover drilling materials, and to enhance the continuity of the surrounding groundwater formation and the conditions within the screened section of the well. The wells will be developed until the produced water is clear and measures less than 5 NTU using a field turbidimeter. After development the well will be allowed to set for minimum of 24 hours.
8. After 24 hours post-development, the sump of the deep groundwater wells will be checked with a bailer for the presence of DNAPL. No groundwater sample will be collected for laboratory analysis if the presence of DNAPL is confirmed.
9. For wells that do not contain measurable DNAPL, a decontaminated submersible bladder pump with new polyethylene tubing will be inserted into the well casing to the approximate middle of the saturated zone within the well screen. The polyethylene tubing will be connected to a VFD controller. Tubing will be sourced from a new unopened spool designated for this investigation.
10. Groundwater samples will be collected per EPA Low Stress (low flow) protocol (*EPA, 2017)* using water quality parameter stabilization via a hand-held multi-parameter meter with a transparent flow-through-cell on the following basis for stabilization:
    a. Stabilization is considered to be achieved when three consecutive readings are within the following limits:
        i. Turbidity (10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized),
        ii. Dissolved Oxygen (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values stabilized),
        iii. Specific Conductance (3%),
        iv. Temperature (3%),
        v. pH (+/- 0.1 unit),
        vi. Oxidation/Reduction Potential (+/- 10 millivolts).
11. After stabilization, the polyethylene sample tubing will be removed from the flow-through-cell and used to directly fill laboratory provided containers with appropriate preservative (Table 1). The sample will be labeled, placed on ice in a cooler, and handled as described in Section 2.11.
12. Sampling equipment and reusable materials that will contact the sample will be decontaminated on-site in accordance with the procedures identified in Section 2.12 prior to and before each use. The field sampler and drilling personnel will use clean nitrile gloves for handling each sample or sampling equipment.
13. Soil cuttings, development water, purge water and disposable sampling equipment will be containerized per Section 2.13.

2.7 Geotechnical Assessment

The scope of work for the Upland PRDI activities needed for full system design of excavation shoring include geotechnical subsurface explorations and field and laboratory testing.

Sample Locations, Types, and Frequency

One geotechnical boring (see SAP Figure 5) will be advanced using a hollow stem auger rig to 50 feet bgs. The geotechnical boring will extend to about 15 feet below the bottom of the anticipated shoring system. For an approximate 10-foot excavation, the cantilevered sheet pile depth in these soils would be of the order of twice the excavation depth, for a minimum depth of 45 feet. To support future liquefaction evaluation, a minimum exploration depth of 50 feet is needed. For sands below the groundwater table, appropriate measures will need to be taken including providing water in the auger to prevent bottom heave and sample disturbance. If very loose sands are encountered, an alternate drilling method (i.e., sonic) may be needed.

Samples will be collected alternately with Standard Penetration Test (SPT) and Modified California split spoon samples continuously for the uppermost 10 feet of the soil profile and at 5-foot increments thereafter. SPT tests consist of dropping an SPT hammer (typically approximately 64 kilograms [kg]) onto an 18-inch split spoon sampler from a designated height (typically 30 centimeters [cm]) and counting the number of blows for the split spoon to advance in six-inch increments. The blow counts can then be used to calculate an N value to support geotechnical engineering design.

The Modified California split spoon samples will provide for enhanced recovery of relatively undisturbed ring samples (i.e., intact soil cores) which can then be used for laboratory direct shear testing to obtain soil strength parameters necessary for shoring design. The samples with the Modified California split spoon sampler will be collected in the same manner as the SPT tests.

Bulk samples will be obtained from soil cuttings from the uppermost 10 feet of the soil column for obtaining representative compaction curves for the site soil types within the excavation and backfill area.

Samples are anticipated to be from outside of the impacted area as Geotechnical laboratories are not accustomed to handle contaminated material. No QA/QC samples will be collected.

Sample Analyses and Methods

Soil samples will be submitted for the following constituents and laboratory methods:

- Moisture and Visual Class per D2216, D2487/D2488
- Percent Passing #200 Sieve per D1140
- Sieve Analysis per D6913/D7928
- Atterberg Limits per D4318
- Direct Shear, 3 Points (Intact Sample) per D3080
- Unconfined Compressive Strength per D2166
- Proctor per D698/D1557

The samples will be delivered to HWA Laboratory in Bothell, Washington per the procedures described in Section 2.11 of this SAP. Sample intervals that will be submitted for laboratory geotechnical analysis will be determined upon review of boring logs and field data by the project geotechnical engineer.

Sample Designation

Soil samples collected for the Geotechnical Assessment will begin with a "GT" indicator to distinguish as being from the geotechnical assessment. The sample name will also include the sample depth interval and the sampling date.

For example, a soil sample collected as part of the Geotechnical assessment boring at a depth from 25 to 26 feet bgs on June 27, 2024 would be designated GT-25-26-062724.

Sample Procedures

1. The Geotechnical boring will be drilled with hollow-stem auger drilling rig to approximately 50' bgs.
2. Standard Penetration Tests (SPT) will be performed alternately with Modified California split spoons in 18-inch intervals for the first 10 feet of the boring, and then at approximately 5-foot intervals until the terminus of the boring. Blow counts from the SPTs will be recorded on field boring logs (example included in Appendix A).
3. Samples from the Modified California split spoons will consist of the bottom 6" of the split spoon core to avoid capturing slough or other disturbance of the soil core.
4. Soil cuttings from the uppermost 10 feet of the boring will be collected as a bulk sample into large plastic bags.
5. Following completion of the geotechnical boring, the location will be converted to a deep pumping well (See Section 2.8).
6. The samples will be labeled and handled as described in Section 2.11.
7. Sampling equipment and reusable materials that will contact the sample will be decontaminated on site in accordance with procedures identified in Section 2.12, if field evidence of impacts are observed.
8. Residual soil and disposable sampling equipment will be containerized per Section 2.13.

2.8 Aquifer Test

Characteristics of the aquifer underlying the Creosote/Fuel Oil Area will be assessed using traditional aquifer testing protocols to support dewatering and shoring design considerations. Findings from the PRDI activities, particularly from the survey and Geoprobe investigation(s) will be used to assess the area, depth, and volume of soil below the groundwater table (if any) that will be removed. This assessment of the lithology, the soil sampling data, and the survey data will be discussed with Ecology prior to the performance of the aquifer test(s). Sufficient data for remedial design could possibly be obtained from performing aquifer testing on existing groundwater monitoring wells (i.e., slug test, rising/falling head).

Sample Locations, Types, and Frequency

The following aquifer tests may be performed as part of the Upland PRDI activities:

- Transducer assessment to assess tidal fluctuations and background conditions at existing groundwater monitoring wells and new monitoring wells described above.
- Shallow zone step-test.
- Shallow zone steady state test.

- Slug tests and/or rising head/falling head tests on existing monitoring wells.

The pumping tests will necessitate the installation of a 4-inch pumping well in the shallow zone and one shallow zone monitoring well (installed as part of the shallow zone assessment) are proposed for installation to support the aquifer test (See SAP Figure 5). Other existing monitoring wells or new wells that are proposed as part of the Upland PRDI activities may be utilized to further support the aquifer tests. Water accumulated as part of the aquifer testing will be containerized and properly disposed pending permitting. There are existing monitoring wells within the Creosote/Fuel Oil Area Hot Spot removal area (MW-8A/8B) and adjacent to the Woodlife Area excavation (MW-7) that could be utilized for slug tests and/or rising head/falling head tests.

Sample Analyses and Methods

No analytical testing is required for this task.

Sample Designation

No environmental samples will be collected for this task.

Sample Procedures

Shallow Pumping Well Installation (if selected)

1. A soil boring will be drilled with a hollow-stem auger drilling rig to approximately 15' bgs. No split spoons or soil sampling/screening will be performed.
2. A 4-inch diameter 10-foot section of slotted well screen with 0.020 slot size will be installed with blank PVC risers to above the ground surface. The annulus of the well screen interval will be backfilled with a silica sand filter pack to approximately 1-foot above the well screen, followed by a bentonite grout seal to approximately 1-foot bgs. A concrete surface seal and traffic-rated flush mount well box will be installed at the surface and allowed to set for a minimum of 48 hours.
3. After the monument has set the well will be lightly developed by surge and bail method to remove fines or leftover drilling materials. After development, the well will be allowed to set for a minimum of 24 hours.

Monitoring Well Installation (if selected)

1. One additional shallow groundwater monitoring well will be installed per procedures in Section 2.5, with the exception that soil samples will not be collected for laboratory analysis, pending observations of impacts during field screening.

Aquifer Pump Testing Procedures (if selected)

1. Background water level information will be collected prior to the start of the aquifer testing via pressure transducers placed within key observation wells at the Site, including existing monitoring wells MW-4, MW-5, MW-6, MW-7, MW-8A/8B, MW-9A/9B, MW-10A/10B, MW-11A/11B, the new shallow and deep monitoring wells to be installed as part of the Upland PRDI activities, and the new pumping wells.
    a. Background data will be collected for approximately two weeks.
    b. Manual soundings will be made when the pressure transducers are installed and before the aquifer test begins. Data from the pressure transducers will be downloaded before every test to ensure that data is being recorded properly.

c. The background data will be used if correcting water levels for tidal or barometric effects is warranted. Tidal fluctuations in the estuary will be monitored by installing a temporary well that extends into the adjacent surface water at the end of the property.

1. The aquifer test in the deep zone will be performed first:
    a. A temporary submersible pump will be installed in the well within the screened interval.
    b. A short-term step test will be performed to help determine a reasonable flow rate for the longer term, steady state test.
    c. The well will be pumped at three rate steps of approximately 5, 10, and 15 gallons per minute (gpm). Each step will last for approximately 30 minutes. During this time the water level in the pumping well and nearest well completed at the same depth will be monitored manually every 5 minutes.
    d. The flow rate will be monitored and adjusted as necessary to maintain the target value. Water levels will also be recorded by pressure transducers.
    e. The water level response in the monitored wells will be evaluated to determine the steady state test rate.
2. At least 24 hours after the step test in the deep pumping well, a step test will be performed in the shallow pumping well. Testing will proceed similarly to Step 2, except that the flow rates will likely range from 5 to 10 gpm.
3. The steady state aquifer test in the deep zone will begin at least 24 hours after the shallow zone step test to allow water levels to recover.
    a. Prior to starting the pump, the logging frequency of the pressure transducers will be increased to every minute for at least the first hour of pumping.
    b. Thereafter the frequency may be reduced to every 5 minutes until the recovery period of the test where the frequency will again be increased to every minute for the first hour of recovery.
    c. A manual sounding of water level will be collected in all wells to be monitored during the test.
4. During active pumping, manual soundings at the pumping and select observation wells will be collected every hour.
    a. The flow rate and pressure at the pumping well will be monitored and adjusted as necessary to maintain a nearly constant flow rate.
    b. Pumping at a steady rate will continue for at least 6 hours.
    c. After the pump is turned off recovery measurements will be made manually in the pumping well every 30 seconds for 5 minutes.
        i. One round of manual soundings will be made 30 minutes into the recovery period.
        ii. Pressure transducers will continue to record water levels at 1-minute intervals for at least the next 4 hours.

5. The steady state shallow zone aquifer test will begin at least 24 hours after the end of pumping for the deep zone aquifer test. This test will be conducted similarly to the deep zone test in terms of the frequency of data collection and pumping duration.
6. Groundwater pumped during the testing will be containerized pending disposal or discharge.

Aquifer Slug Testing Procedures (if selected)

1. Measure depth-to-water manually at selected slug testing well and install a pressure transducer set to record measurements at a maximum of 1-minute intervals.
2. Introduce a slug into the well and monitor the water level response over time manually, at approximately 1-minute intervals initially.
3. Continue recording water level measurements by adjusting the interval between measurements until stabilization is observed. Stabilization is considered to be no significant change in water level over a 5-minute period or return to the static conditions observed prior to the test.

Aquifer Rising Head Testing Procedures (if selected)

1. Measure depth-to-water manually at selected rising head testing well and install a pressure transducer set to record measurements at a maximum of 1-minute intervals.
2. Pump water from the well until dry and monitor the water level response over time manually, at approximately 1-minute intervals initially.
3. Continue recording water level measurements by adjusting the interval between measurements until stabilization is observed. Stabilization is considered to be no significant change in water level over a 5-minute period or return to the static conditions observed prior to the test.

Aquifer Falling Head Testing Procedures (if selected)

1. Measure depth-to-water manually at selected falling head testing well and install a pressure transducer set to record measurements at a maximum of 1-minute intervals.
2. Introduce clean (i.e., potable) water to the well up to the approximate TOC and monitor the water level response over time manually, at approximately 1-minute intervals initially.
3. Continue recording water level measurements by adjusting the interval between measurements until stabilization is observed. Stabilization is considered to be no significant change in water level over a 5-minute period or return to the static conditions observe prior to the test.

2.9 BIO System Components

Bioremediation (BIO) comprising of AS and SVE has been selected as the remedy alternative to address the VI risk from COCs within the Creosote/Fuel Oil Area.

This SAP describes the tasks required to obtain site specific data on air injection flows and pressures, and flow and vacuum requirements (i.e., ROIs) to design the full-scale BIO System.

2.9.1 Air Sparging / SVE Pilot Testing

The AS/SVE pilot testing consists of an assessment of the AS component of the BIO System and the SVE component of the BIO System as these elements will work in conjunction to stimulate the bioremediation process and also control the primary exposure pathway of VI.

Sample Locations, Types, and Frequency

The AS components of the pilot test include installation of a deep AS well, installation of a shallow AS well, and installation of associated monitoring wells. Other monitoring wells installed as part of the Shallow Zone Groundwater Assessment and Deep Zone Groundwater Assessment (Section 2.5 and 2.6) will also be utilized as monitoring points for the pilot test (see SAP Figure 5). Each AS well, shallow and deep, will have three associated monitoring points screened in the same zone located approximately 10', 20', and 30' laterally. A midpoint monitoring well, installed to 35' bgs, will be located equidistance from the AS wells at approximately 25' laterally.

The SVE components of the pilot test include installation of a horizontal well (slotted horizontal pipe in a trench excavation that is backfilled with gravel and sealed at the top of the trench excavation) within the proposed treatment area (but outside of the preliminary Hot Spot removal area), and 8 vapor pins at varied distances between 10' and 100' laterally to monitor induced sub-slab vacuum.

Sample Analyses and Methods

Soil and/or groundwater samples will not be collected for analytical testing from the borings or wells installed as part of the AS/SVE pilot test.

Effluent air samples from the SVE system will be submitted for laboratory analysis (pending permit requirements):

- BTEX and Naphthalene per TO-15 method

Samples will be analyzed by F&B laboratory.

Sample Designation

Effluent air samples collected during the SVE pilot test will begin with an "SVE" to distinguish as being part of the soil vapor extraction test. The sample name will also include the sampling date and will end with an "EFF" designation to indicate an effluent sample.

For example, an effluent air sample collected from the SVE on June 4, 2024 would be designated SVE-060424-EFF.

QA/QC samples will be designated with unique sample names per Section 2.14.

Sample Procedures

SVE Testing Procedures:

1. Installation of horizontal well
    a. The existing concrete floor will be cut to allow for excavation of a trench. The excavation area will be located in gaps between the building support pilings.
    b. An approximately 10-foot long trench will be excavated to approximately 2-feet bgs to remain above the shallow groundwater table.

c. Filter fabric will be placed in the trench to minimize migration of fines into the gravel.

d. A bed of ¾"-minus gravel will be equally distributed in the excavation trench.

e. Two 5-foot sections of 3-inch diameter perforated/slotted section of PVC piping will be placed into the excavation atop the gravel bedding. The 5-foot sections will be connected with a blank PVC Tee that will extend to above the ground surface. Each end of the 5-foot sections will be capped.

f. The horizontal well will be covered with gravel and a 6-mil plastic vapor barrier will be installed over the gravel and up the sides of the trench excavation to below the bottom of the concrete surface pavement. Additional backfilling needed to return the excavated area to just below the concrete surface will be sourced from the excavation spoils.

g. The concrete surface will be restored to match the surrounding thickness, with the PVC Tee protruding through the concrete pad. The annulus between the PVC Tee and concrete will be sealed with a silicone sealant.

2. Prior to beginning the testing of the horizontal well, the PVC Tee will be connected to a temporary 2-inch diameter PVC piping that is connected to a blower system.

   a. The blower system will consist of a manifold for monitoring and adjusting the flow and vacuum of the extracted vapor and a sample collection port.

   b. The blower system will also include a moisture knockout drum and a fresh air inlet that can be opened to operate at low vacuums applied to the horizontal piping.

   c. Vapors from the blower during this short-term test will be discharged to atmosphere; however, the local clean air agency will be engaged prior to beginning the pilot test to confirm that authorization is not required (see Section 4 of the Upland PRDI WP).

3. Testing of the horizontal well will consist of a step test and a constant rate test. Prior to the test, all shallow wells in the area shall be fitted with caps with vapor monitoring ports.

   a. Vapor Pins® shall be installed through the slab to monitor the induced vacuum under the slab.

   b. Eight Vapor Pins® shall be installed as shown on SAP Figure 5 at distances between 10' and 100' laterally from the extraction point.

4. The condition of the existing slab shall be inspected and any significant joints or crack in the slab shall be sealed with a silicone sealant to prevent short circuiting of induced vacuum through the cracks.

5. Before vapor extraction begins, the ambient pressure or vacuum at all monitoring points will be measured with a magnehelic (or comparable) differential pressure gauge capable of recording differential pressures to the nearest hundredth of an inch of water. Field measurements throughout the pilot test will be recorded on standard field forms (examples included in Appendix A).

6. Then the blower shall be started, and the system shall apply a vacuum of 10 inches of water to the horizontal well. Flow from the well shall be monitored and the vacuum shall be adjusted to maintain a vacuum of 10 inches of water.

a. Two rounds of vacuum readings shall be collected – one at approximately 15 minutes of operation and another at approximately 30 minutes of operation.
    i. PID readings of the extracted vapor shall also be collected at 15 and 30 minutes.
b. After two rounds of data collection, the vacuum shall be increased to 20 inches of water.
    i. Vacuum, flow, and PID readings shall be collected at the same frequency as the first step.
c. Vacuum, flow, and PID readings shall be collected at the same frequency as the first step, conducted at a vacuum of 30 inches of water or the maximum capacity of the blower/manifold system. Vacuum range will be modified based upon site conditions observed at the time of the test (i.e., groundwater level, moisture in knockout tank).

7. Based on the data collected during the step test, a vacuum for the steady state test will be selected.
    a. The vacuum selected is expected to produce an ROI in the range of 40 to 50 feet. The steady state test shall continue for 4 hours.
8. During that time, vacuum readings in the monitoring points and at the horizontal well shall be collected at least once an hour.
    a. Flow and PID readings shall also be collected hourly at the horizontal well.
9. Near the end of the 4 hours, one sample shall be collected from the extracted vapor for laboratory analysis.

AS Testing Procedures:

AS testing will be performed in both the shallow and deep zones. Similar to other tests being performed, the testing in each zone will consist of a step test to establish flow/pressure curves for the AI point as well as a longer-term steady state test that will help to establish the ROI of the AI in each zone.

1. Deep AS Well Install
    a. The Deep Zone AS well will be installed in a similar manner as the Deep Zone Groundwater Assessment wells with the following exceptions:
        i. The well will be completed to 50 feet bgs with an HSA drilling rig.
        ii. The well will be constructed of 1” PVC with only a 2-foot section of screen.
        iii. The well screen will be backfilled with silica sand to approximately 1 foot above the screen and the annulus above the filter sand will be sealed with approximately 1 foot of hydrated bentonite chips and then bentonite grout to 1-foot bgs.
        iv. The well will be completed with a concrete surface seal and flush-mount well monument.
        v. Soil and/or groundwater samples will not be collected as part of this AS test.

2. Shallow AS Well Install
    a. The Shallow Zone AS well will be installed in a similar manner as the Shallow Zone Groundwater Assessment wells with the following exceptions:
        i. The well will be completed to 20 feet bgs with an HSA drilling rig.
        ii. The well will be constructed of 1" PVC with only a 2-foot section of screen.
        iii. The well screen will be backfilled with silica sand to approximately 1-foot above the screen and the annulus above the filter sand will be sealed with approximately 1 foot of hydrated bentonite chips and then bentonite grout to 1-foot bgs.
        iv. The well will be completed with a concrete surface seal and flush-mount well monument.
        v. Soil and/or groundwater samples will not be collected as part of this AI test.
3. Mid-Zone Monitoring Well Install
    a. The Mid-zone monitoring well will be installed in a similar manner as the Shallow Zone Groundwater Assessment wells with the following exceptions:
        i. The well will be completed to 35 feet bgs with an HSA drilling rig.
        ii. The well will be constructed of 2" PVC with only a 5-foot section of screen.
        iii. The well screen will be backfilled with silica sand to approximately 1 foot above the screen and the annulus above the filter sand will be sealed with approximately hydrated bentonite chips to 1-foot bgs.
        iv. The well will be completed with a concrete surface seal and flush-mount well monument.
        v. Soil and/or groundwater samples will not be collected as part of this AI test.
4. AS testing will be performed first in the shallow zone. The shallow AS well shall be connected to a compressor with pressure rated hose or piping.
    a. The headworks at the well shall include a means of measuring flow and pressure with valving to allow the adjustment of the flow.
    b. Shallow zone monitoring wells shall be capped as in the SVE testing and the SVE blower shall be started.
    c. Vacuums in the shallow wells and monitoring points shall be measured after 30 minutes.
    d. PID, flow and vacuum readings shall also be collected from the SVE.
        i. At that time depth to water, dissolved oxygen (DO), oxidation/reduction potential (ORP), well head space PID readings, and presence/absence of bubbles in the monitoring wells (assessed visually or auditorily) in the shallow and medium zone wells will be measured.
        ii. DO and ORP shall be measured with a down hole probe.

1. The probe that collects the DO and ORP measurements shall be lowered to a consistent depth below the water level in each well to collect the data.
2. This depth shall correspond to the top of the screen interval or 2 feet below the water level, whichever is deeper.

5. After the collection of the above data, the compressor shall be started and the pressure to the AS well shall be slowly increased until flow is detected. This “breakthrough” pressure shall be recorded.
    a. The pressure shall be increased until an AS flow of approximately 3 cfm is achieved. After 30 minutes, a round of water level, DO, ORP, well head space PID readings, and presence/absence of bubbles in the monitoring wells (assessed visually or auditorily) measurements shall be collected from the shallow and medium zone monitoring wells in the area.
        i. PID, flow and vacuum readings shall also be collected from the SVE at the end of each step. Then the flow will be increased to approximately 6 cfm.
        ii. After 30 minutes a round measurements shall be collected. Then the flow will be increased to approximately 9 cfm.
        iii. After 30 minutes a round of measurements shall be collected.
6. At the end of these steps, a flow rate for the steady state test shall be selected. The AI well flow rate shall be adjusted to this rate and shall operate for at this flow for at least 6 hours.
    a. During this time, measurements shall be collected hourly from the shallow and medium zone monitoring wells in the area.
    b. PID, flow, and vacuum readings shall also be collected every hour from the SVE system.
    c. Near the end of the 6 hours of operation a sample from the SVE system shall be collected for laboratory analysis for TPH and VOCs.
        i. At least 15 minutes after the compressor has been turned off another round of water levels shall be collected.
7. The deep zone AS testing will be performed at least 12 hours after the shallow AS testing. Testing will be performed similarly to the testing performed for the shallow zone.
    a. The SVE blower shall be started and vacuum measurements at the shallow monitoring points shall be collected after 30 minutes of operation.
    b. PID, flow and vacuum readings shall be collected from the SVE. At that time, depth to water, dissolved oxygen (DO), ORP, well head space PID readings, and presence/absence of bubbles in the monitoring wells (assessed visually or auditorily) in the shallow, medium, and deep zone wells will be measured.
8. The deep zone AS will be operated at three flow steps of approximately 3, 6, and 9 steps.
    a. The length of the steps and the measurements collected will be the same as those for the shallow zone AS test.

b. The steady state test will also be conducted similarly to the test performed in the shallow zone.

2.10 Sampling Procedure Alterations

Any deviations from the general sampling procedures presented here will be brought to the attention of the SLR Project Manager.

2.11 Sample Management

Sample Labeling

Sample container labels will be completed immediately before or immediately after sample collection with the sample designations described throughout Section 2 of this SAP. Container labels will also include the following information:

- Project name
- Sample number
- Name/Initials of collector
- Date and time of collection
- Analyses requested

Sample Shipping

Samples will be transported in a sealed, iced cooler. In each cooler, glass bottles will be separated by a shock-absorbing and absorbent material to prevent breakage and leakage. Ice, sealed in separate plastic bags, will be placed into each cooler with the samples. All sample coolers will be accompanied by a Chain-of-Custody (COC) Form (example included in Appendix A). The completed form will be sealed in a plastic bag and will be transported with the cooler(s). Sample coolers will either be: hand delivered to the analytical laboratory by SLR personnel; picked up by a laboratory-designated courier; or, transported via a commercial shipping site (i.e. FedEx) for overnight shipping.

Chain-of-Custody

Once a sample is collected, it will remain in the custody of the sampler or other SLR personnel until shipped to the laboratory, delivered to the laboratory, or picked up by laboratory-designated courier. Upon transfer of sample containers to subsequent custodians, a COC (Appendix A) will be signed by each person transferring custody of the sample container with the exception of the commercial shipping provider (i.e. FedEx), however a shipping receipt and tracking number will be retained in the project files. Upon receipt of samples at the laboratory, the condition of the samples will be recorded by the receiver and login and COC details will be provided to SLR for review. Login and COC records will be included in the analytical reports prepared by the laboratory.

2.12 Decontamination Procedures

Non-disposable sampling equipment that comes into contact with the sampling media will be decontaminated prior to each use. A decontamination zone will be established inside the exclusion zone for cleaning the sampling equipment. The non-disposable sampling equipment that is anticipated to be utilized consists of drilling accessories (drill rods and endpoints; auger

flights) used by the drilling subcontractor. Non-disposable sampling equipment will be decontaminated by the following general procedure; however, the specifics of the equipment decontamination procedure will be determined by the drilling subcontractor:

- Pressure wash or steam clean (for larger non-disposable sampling equipment);
- Tap water rinse;
- Scrubbing equipment thoroughly with water and a non-phosphatic detergent (i.e., Liquinox, Alconox, or similar);
- Tap water rinse;
- Isopropanol rinse (for smaller non-disposable sampling equipment);
- Tap water rinse;
- Final rinse with deionized or organic-free water (provided by analytical laboratory), if an associated Equipment Rinsate Blank is to be collected.

Wash water from the decontamination zone will be containerized per Section 2.13.

Disposable sampling equipment that is only used one time to collect samples (e.g. plastic spoons, dedicated polyethylene tubing) will not require decontamination. This equipment will be disposed of with investigation derived waste (IDW) debris. To the extent possible, disposable sampling equipment (e.g. sample gloves, tubing) will be sourced from new unopened supplies dedicated to this investigation. In addition, new plastic sheeting will be used to cover the sample table between each sampling location. Used plastic sheeting will be disposed of with the IDW debris.

2.13 Residuals Management

IDW, including soil cuttings, groundwater purge water, wastewater generated by the cleaning of the sampling equipment, and personal protective equipment used during sampling will be temporarily stored in properly labeled 55-gallon drums at the property. For disposal purposes, these materials may be represented by samples collected during this investigation unless IDW specific sampling is utilized. These materials will be grouped and disposed of as IDW waste and potentially dioxin-contaminated waste will be handled separately.

For significant dewatering efforts (i.e., for aquifer pump tests), the produced groundwater will be containerized in large Baker tanks with oil-water separation and sediment trap configuration. Prior to discharge, the local municipality will be engaged and a sanitary sewer discharge permit will be obtained. In accordance with the terms of the discharge permit, the produced groundwater will be filtered for solids via bag filters, and treated for contaminants via carbon filtration, and the effluent of the treatment system will be sampled and submitted for laboratory analysis per the terms of the permit.

2.14 Field Quality Assurance

Due to the objective of the Upland PRDI activities to support the engineering design of the selected remedies, field quality assurance procedures are less stringent than for compliance-related or risk assessment-related field activities. It should be noted that even for compliance related field activities (delineation of soil removal areas) post-excavation confirmation sampling and screening is proposed. Field quality assurance will be maintained through compliance with the sampling plan and documentation of sampling plan alterations.

Field QA will still be assessed per the following protocols:

Field Duplicates

Field duplicate samples will only be collected for the soil removal delineation tasks (Woodlife Area and Creosote/Fuel Oil Area Hot Spot) and shallow and deep groundwater assessment tasks presented in this SAP. Field duplicates will be collected at a rate of 1 for every 20 project samples collected. Field duplicates will be labeled with a fictious sample name but in a similar manner as the sample designation instructions included in this SAP. The associated project sample location for each duplicate sample will be noted in field forms.

It should be noted that for solid samples, field duplicates are more likely to be affected by variability in constituent concentrations due to sorption and the generally higher variability of constituents in solids as opposed to liquids. As a result, field duplicates will be assessed for variability taking into account sampling technique and possible sample heterogeneity. Differences between each set of sample results will be considered as part of the overall analysis and quality assurance evaluation rather than on the merits of this result alone. Consideration will be given to both field and laboratory precision with respect to field duplicates. Field duplicate quality assurance will be evaluated by the SLR project manager and SLR QA staff. Steps taken based on field duplicate data will include an evaluation of data variability, sampling technique, and laboratory analytical methods and results.

Trip Blanks

Laboratory-provided trip blanks will be included in all coolers transporting VOC samples. Trip blanks will be used to assess contamination introduced during shipping. Trip blanks will be labeled with the TB identifier, the number, and the date.

For example, the second trip blank on April 10, 2024 will be labeled TB2-041024. Trip blanks will likely be held by the laboratory pending the results of the original samples. Trip blank data will be evaluated by SLR QA Staff as appropriate during the progression of the sampling and data evaluation process.

Temperature Blanks

A temperature blank will be provided by the analytical laboratory for each sample cooler. The temperature of the blank will be measured with a calibrated digital thermometer at the time of sample receipt by the laboratory and that temperature shall be immediately noted on the COC. The temperature blank will not be opened during sampling activities.

2.15 Standard Field Forms and Equipment List

Standard field forms used to record sampling data and field observations include:

- Chain of Custody Form
- Boring Log
- Groundwater Purging and Sampling Form
- Soil Sampling Form
- Pumping Test Log
- Air Sparging and SVE Pilot Test Form

Example forms are presented in Appendix A of this document. Revised field forms may be used for the Upland PRDI activities (i.e., each laboratory will have their own standard COC).

2.16 Schedule and Deliveries

Field activities will be coordinated upon Ecology approval of the final Upland PRDI WP and SAP/QAPP but is estimated to coincide with the revised project schedule. Project reporting will be submitted per the schedule presented in the AO.

3.0 Quality Assurance Project Plan

3.1 Purpose

The purpose of this Quality Assurance Project Plan (QAPP) is to identify the quality assurance and quality control (QA/QC) protocols necessary to achieve the project-specific data quality objectives (DQOs) for the proposed Upland PRDI sampling activities at the Site.

3.2 Project Organization

Primary responsibility for project quality rests with SLR project manager (PM), Mr. Scott Miller. The PM will review all project deliverables before submittal to appropriate regulatory agencies. Where quality assurance problems or deficiencies are observed, the PM will identify the appropriate corrective action to be initiated.

Subcontractors will be screened by SLR administrative staff for a health & safety prequalification and for confirmation of applicable state licensures and certifications.

3.3 Data Quality Objectives

This section presents the DQOs for the sampling project. This sampling program is being initiated to support engineering design of the selected remedial alternatives at the Site. As noted above, soil removal delineation sampling will still be supplemented with post-excavation confirmation sampling. Pilot test data will be interpreted using accepted engineering practice and industry standards as applied by the project engineers.

DQO's from the analytical laboratory for internal quality control measures are summarized in Table 3.

3.3.1 Quantitative Objectives: Precision, Accuracy, and Completeness

3.3.1.1 Accuracy

Accuracy quantifies the extent to which a measurement agrees with a known reference or true value. It is determined in the analytical laboratory by "spiking" samples with a known concentration of analyte and comparing the measured concentration with the spiked value. Accuracy is expressed as a percentage, known as the recovery (R) of the measured concentration (C_m) less the sample or "background" concentration (C_b) to the spike concentration (C_s):

$$R = \frac{(C_m - C_b)}{C_s} x100$$

Accuracy can be measured on both an individual sample basis with the use of surrogate spikes (organic analyses only) and for each group of samples analyzed together as a "batch." For this project, accuracy will be assessed through the use of both surrogate and batch QC.

For the batch QC, one or more of the following types of spiked samples are used to assess the accuracy of the method for the batch:

- Matrix or Sample Spike (MS): One sample in the batch is spiked and analyzed to determine R (usually analyzed with a matrix or sample spike duplicate; see Precision)
- Blank Spike (BS): A laboratory-prepared blank sample is spiked and analyzed to determine R (usually analyzed with a blank spike duplicate; see Precision)
- Laboratory Control Sample (LCS): A laboratory-prepared blank sample is spiked and analyzed to determine R (may be analyzed with a duplicate)

Accuracy goals (acceptance limits for R) are established by the analytical laboratory for each method and detailed in the analytical reports. Accuracy goals vary by MS, BS, and LCS, and they are updated annually (see Table 3 of this QAPP for accuracy goals provided by the analytical laboratories). Out-of-range recoveries are summarized by the laboratory in the case narrative for the analytical report. This information is used for data validation as described in Section 3.3.5 of this QAPP.

3.3.1.2 Precision

Precision (reproducibility) is estimated by comparing the analytical results of duplicate samples. Precision is determined at both the field and laboratory levels. Blind duplicates will be collected at the frequency and locations described in Section 2.14. The blind duplicate will be analyzed for the same suite of analyses as the corresponding sample.

Precision is also measured as an internal laboratory batch QC check for all analytical methods. Laboratory MS and/or BS analyses are analyzed in duplicate. The analytical results are compared and reported by the laboratory as the relative percent difference (RPD),

$$RPD = \frac{2|C_1 - C_2|}{C_1 + C_2} x100$$

where C_1 and C_2 are the concentrations in the duplicate samples.

In addition to the MS and BS, the laboratory may split an environmental sample from a single container to create a laboratory duplicate.

Precision goals (upper limits for the RPD) are established by the analytical laboratory for each method and detailed in analytical reports. Precision goals vary by MS, BS, and laboratory duplicates, and they are updated annually. Current precisions goals provided by the analytical laboratories are included in Table 3. Out-of-range precisions are summarized by the laboratory in the case narrative for the analytical report. This information is used for data validation as described in Section 3.3.5 if this QAPP.

Precision values for the field duplicates will be calculated upon receipt of the analytical data and compared to SLR internal alert limits. Exceedance of the alert limits will trigger a thorough review

of field protocols as wells as discussions with the laboratory. Precision will only be calculated for analytes at or above concentrations five times the reporting limit. Out-of-range precision values for field duplicates will be used for data validation as described in Section 3.3.5 of this QAPP.

3.3.1.3 Completeness

Completeness (C) is the percentage of measurements planned (N_p) that are actually obtained and validated (N_v):

$$C = \frac{N_v}{N_p} x100$$

Each of the QC sample types described in the SAP (i.e. field duplicates) is used in the data validation process; consequently, each plays a role in assessing completeness. Completeness provides a final, overall measure of data quality for each sampling event.

The goal is to achieve 100% data completeness. Where data are not complete, professional judgment will be used to either qualify the data or reject the data. Actions and remedies such as re-sampling or re-analysis may be necessary, depending on the required data quality.

3.3.2 Qualitative Objectives: Comparability and Representativeness

3.3.2.1 Representativeness

An important goal of the sampling events is to collect data that are representative of conditions at the site. Since the true conditions, i.e., chemical concentrations, are not known in an absolute sense, they cannot be compared to the measured values in a quantitative fashion. Instead, quality control samples and other procedures are used to qualitatively assess data representativeness.

Field procedures such as equipment decontamination before sampling and adherence to established practices for sample collection (described in Section 2), help ensure that the data collected represent conditions at the site and are not compromised by sampling methods or cross-contamination.

3.3.2.2 Comparability

Comparability describes the extent to which valid comparisons between measurements taken at different locations and different times can be made. Like representativeness, comparability can only be ensured in a qualitative fashion. Consistency in sampling methods, measurement devices, calibration practices, and reporting limits and units will help to ensure comparability. Deviations from protocols will be noted and used for data validation as described in Section 3.3.5.

3.3.3 Field Data Quality Assurance Objectives

This QAPP also presents the field data quality assurance objectives for the sampling project. The field data quality assurance objectives include field measurements and observations, chain-of-custody procedures, and sample handling procedures.

Field Measurement and Observation

Field measurements and observations will be recorded in the project log notes or on designated field data sheets. Sufficient information will be recorded so that all field activities can be reconstructed without reliance on personnel memory. Entries will be recorded legibly directly in waterproof ink and will be signed/initialed and dated by the person conducting the work at the end of each field day. If changes are made, the changes will not obscure the previous entry, and the changes will be initialed and dated. At a minimum, the following data will be recorded:

- Location of activity
- Description of sampling reference point(s)
- Date and time of any activity
- Sample number and volume or number of containers along with preservatives (if necessary)
- Field measurements made
- Relevant comments regarding field activities
- Initials of responsible personnel
- Any deviations from the original sampling plan and reasons for those deviations

Chain-of-Custody Procedures

The management of samples collected in the field will follow specific procedures to maintain sample integrity. To maintain sample integrity, the samples will be handled by as few people as possible and the sample collector will be responsible for the care and custody of the samples. Sample possession will be tracked from collection to analysis. Each time the samples are transferred between parties, both the sender and receiver will sign and date the chain-of-custody form and specify what samples have been transferred, with the exception of commercial shipping activities (i.e., FedEx). When a sample shipment is sent to the laboratory, the original form will be placed with the samples and transmitted to the laboratory. A copy of the form will be retained in the project files. A chain-of-custody record will be completed for each batch of samples hand delivered or shipped to the laboratory.

The following information will be included on the chain-of-custody form:

- Sample number
- Sampler signature
- Sample collection date and time
- Site Name
- Sample type
- Inclusive dates of possession
- Signature of sender and receiver

In addition to the chain-of-custody form, other components of sample tracking will include the sample labels and seals, field logs, sample shipment receipt, and laboratory log book. The sample labels and seals will include the following information:

- Project name and number
- Name/initials of sampler
- Date and time of sample collection
- Sample location and number
- Preservation, if applicable

Sample Handling Procedures

Sampling plan design, sampling techniques, sampling locations, and sample handling protocols are included in the Section 2.11 to ensure that samples collected are representative of site conditions within the limitations of the collection technologies.

3.3.4 Quality Control

Quality control checks consist of measurements and tests performed in the field and laboratory. The analytical methods that will be performed as a part of this project have routine quality control checks performed to evaluate the precision and accuracy and to determine whether the data are within the quality control limits.

3.3.4.1 Field Quality Control Methods

Blind Duplicate

The analytical results between the sample/blind duplicate will be used to assess variance of the total method, including sampling and analysis. As presented in the Section 2.14, one blind duplicate will be collected for every 20 environmental samples for the Woodlife Area soil removal delineation soil samples, the Creosote/Fuel Oil Area Hot Spot delineation soil samples, and the shallow and deep zone groundwater assessment only.

Trip Blanks

A trip blank will accompany any cooler that contains sample material selected for volatile analysis (i.e., VOCs). Analysis of the trip blank will be held by the laboratory pending the results of original sample analysis.

3.3.4.2 Laboratory Quality Control Methods

Specific procedures and frequencies for laboratory quality control are detailed by the analytical method in the laboratory's Quality Assurance Manual. A general description of the types of laboratory quality control samples is as follows:

Method Blanks

A minimum of one laboratory method blank will be analyzed per twenty samples or one per batch (whichever is greater) to assess possible laboratory contamination. Method blanks will contain all reagents and undergo all procedural steps used for analysis.

Control Samples

A minimum of one laboratory control sample per twenty samples or one per batch (whichever is greater) will be analyzed to verify the precision of the laboratory equipment. The control sample will be at a concentration within the calibration range but at a different concentration than the standards used to establish the calibration curve.

Matrix Spike

A minimum of one laboratory matrix spike sample will be analyzed per twenty samples or one per batch (whichever is greater) to monitor recoveries and assure that extraction and concentration levels are acceptable for quality assurance and quality control review.

3.3.5 Data Validation and Usability

This section of the QAPP addresses the final project QA to determine if the data collected during site sampling activities conform to the specified criteria discussed in the SAP and estimate the effects of any deviations.

Data Validation Guidance

Field and laboratory data will be evaluated with respect to the DQOs discussed in Section 2.0 of this QAPP and based on the United States Environmental Protection Agency (EPA)'s *National Functional Guidelines for Organic Superfund Methods Data Review* (EPA, 2017) and *National Functional Guidelines for High Resolution Superfund Methods Data Review* (EPA, 2016). In accordance with these guidance documents, the process presented below will invalidate data determined to be inaccurate, imprecise, unrepresentative, or incomparable. Completeness will be calculated for each analyte as the last step in the validation process. Guidelines for internal data validation tasks are shown in Table 4.

Step 1 – Laboratory Evaluation

The standard laboratory data package will correspond with the EPA2B validation level, with the exception of high-resolution method analyses (i.e., 1613 Method) which will include an EPA4 validation level initially for 10% of the project samples. If significant issues are identified by the data validator, the remaining results may be submitted for EPA4 validation.

Each laboratory data package will be checked to ensure that the samples arrived intact and cold (temperature blank measure of ≤6°C), properly preserved, and arrived at the laboratory in proper condition. For each analyte, the sample collection dates and times will be compared to the dates of analysis to ensure that required hold times were not exceeded. Any non-conformances will be discussed with the laboratory to determine the effects on the validity of the analytical results. This

discussion will be used to determine, on a case-by-case basis, if the data are unrepresentative and should be invalidated.

Second, each laboratory report will be reviewed for non-conformances in internal laboratory QC samples – positive detects in method blanks, surrogate or spiked sample recoveries that are out the accepted accuracy range, and relative percent differences between spiked sample duplicates that may indicate an unacceptable method precision. Usually, any non-conformances will be noted in the laboratory report case narrative along with an assessment, based on internal laboratory procedures, of whether the batch data are acceptable. Any data deemed invalid by the laboratory will also be invalidated by SLR's validation process; conversely, data deemed acceptable by the laboratory will also be accepted by SLR.

In addition, information regarding instrument performance checks, initial calibration and verification, and continuing calibration verification will be reviewed as part of the laboratory evaluation.

Step 2 – Field Procedures Evaluation

To assess method precision, the RPD will be calculated for field duplicates as discussed in Section 3.3.1 and compared to SLR internal alert limits. Out-of-range precision values for field duplicates will trigger a detailed review of field procedures and potential discussions with the analytical laboratory.

Step 4 – Completeness

Completeness will be calculated for each analyte as outlined in Section 3.3.2 to provide a final, overall measure of data quality for the project. A completeness goal of 100 percent is established.

3.3.6 Data Management

This section addresses issues related to data sources, data processing, and data evaluation. Raw data generated in the field or received from analytical laboratories will be validated, entered into a computerized database, and verified for consistency and correctness.

Field Data Management

Accurate documentation of field activities (e.g., field parameters measurements, field notes) will be maintained using field log books and/or field data forms. Entries will be made in sufficient detail to provide an accurate record of field activities without reliance on memory.

Field log entries will be dated and include a chronological description of task activities, names of individuals present, names of visitors, weather conditions, etc. All entries will be legibly entered in waterproof ink and initialed at the end of each field day by personnel performing the work.

Borehole logs will be used to report field observations and will be subsequently entered in tabular format.

Analytical Data Management

Following QA/QC, all analytical data will be entered into a computerized database (i.e., MS Excel). The data may require some manipulation, such as common unit conversions and extraction from support information. To accomplish these manipulations, data reduction and tabulation techniques will be applied to the data and documented.

Several different tabular reports will be generated from the database. All analytical, locational, and tracking data will be stored in the database. Data reports for each type of analysis will be generated to produce standard reports.

Project data backups will be made concurrently with internal network server backup activities. Access to the database will be limited to the project manager and authorized project personnel.

Sample Management

The sample management system forms the foundation of all other analytical data collection, verification, and QA/QC tasks. Analytical data cannot be considered valid unless all the proper steps have been carried out with respect to sample management. These include:

- Sample properly documented in field notes
- Chain of-custody requirements met
- All sample-related documents filed
- Use of unique sample identification numbers

Data that do not pass the QA/QC process either will be assigned data qualifiers to restrict or modify usage or will be rejected for use. Modifications to the use of data will be documented in data validation reports.

Data Reporting Requirements

Quality assured and validated data will be submitted to the Washington Department of Ecology's Environmental Information Management (EIM) database established for the project, per the EIM data submittal protocol. This will not include laboratory analytical data performed for the Geotechnical Assessment or the AS/SVE test.

References

Washington Department of Ecology (Ecology). 2016. Guidance for Remediation of Petroleum Contaminated Sites. (10-09-057).

Ecology. 2023 (Amended). Model Toxics Control Act (MTCA) Cleanup Regulation Chapter WAC 173-340.

Ecology. 2023. Final Cleanup Action Plan. Jeld Wen Site. August (included as Exhibit H of the Second Amendment to Agreed Order for Remedial Investigation/Feasibility Study and Draft Cleanup Action Plan between JELD-WEN, Inc. and Department of Ecology, effective date of July 28. 2023)

SLR International Corp./Anchor QEA LLC (SLR/Anchor). 2021. Final Remedial Investigation / Feasibility Study. Jeld-Wen / Former Nord Door Facility. January.

United States Environmental Protection Agency (USEPA). 2016. National Functional Guidelines for High Resolution Superfund Methods Data Review (EPA-542-B-16-001). April.

USEPA. 2017a. Field Sampling Quality Control Standard Operating Procedure (SESDPROC-011-R5) USEPA Region 4, Science and Ecosystem Support Division. April.

USEPA. 2017b. Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (EQASOP-GW4) USEPA Region 1, Quality Assurance Unit. September.

USEPA. 2017. National Functional Guidelines for Organic Superfund Methods Data Review (EPA-540-R-2017-002). January.

Tables

Table 1: Sample Container Information
Appendix A - Upland SAP and QAPP
PRDI Work Plan - Upland Areas of the Jeld Wen Site

ANALYTES	ANALYTICAL METHOD[1]	SAMPLE CONTAINER / PRESERVATIVE	HOLDING TIME
Groundwater Samples			
VOCs (Naphthalene)	EPA 8260	(3): 40-mL glass vials / preserved with HCl to pH <2	14 Days
cPAHs	EPA 8270E	(1): 1-L amber glass bottle with a Teflon lined cap / Unpreserved	7 Days
Soil Samples			
VOCs	EPA 8260 / 5035[2]	(1): 40mL VOA / Preserved with Methanol	14 Days
cPAHs	EPA 8270E	(1): 8-oz. glass jar with Teflon lined cap / Unpreserved	14 Days
Dioxins	EPA 1613B	(1): 8-oz. amber glass jar with Teflon lined cap / Unpreserved	365 Days

1 - USEPA or SW-846 Analytical Methods

2 - Purge and Trap field collection method

Hold times listed above represent the minimum allotted time between sampling and lab extraction, prep, or analysis.

All samples should be kept cold at 6 degrees C.

Table 2: Laboratory Quality Objectives
Appendix A - Upland SAP and QAPP
PRDI Work Plan - Upland Areas of the Jeld Wen Site

			Limits		LCS/LCSD		MS/MSD		Duplicate
ANALYTES	ANALYTICAL METHOD[1]	Units	PQL	MDL	%R	RPD	%R	RPD	RPD[4]
Groundwater Samples									
Naphthalene	EPA 8260	ug/L	1	0.12	70-130	20	70-130	20	60
cPAHs									
Benzo(a)pyrene	EPA 8270E	ug/L	0.02	0.005	66-129	20	66-129	20	75
Benzo(a)anthracene	EPA 8270E	ug/L	0.02	0.007	66-131	20	66-131	20	75
Benzo[b]fluoranthene	EPA 8270E	ug/L	0.02	0.008	55-144	20	55-144	20	75
Benzo[k]fluoranthene	EPA 8270E	ug/L	0.02	0.009	58-139	20	58-139	20	75
Chrysene	EPA 8270E	ug/L	0.02	0.006	66-129	20	66-129	20	75
Dibenzo[a,h]anthracene	EPA 8270E	ug/L	0.02	0.009	55-146	20	55-146	20	75
Indeno[1,2,3-cd]pyrene	EPA 8270E	ug/L	0.02	0.009	62-136	20	62-136	20	75
TEQ	Calculated[2]	ug/L	0.015	-	-	-	-	-	-
Soil Samples									
cPAHs									
Benzo(a)pyrene	EPA 8270E	mg/kg	0.01	0.00016	50-150	20	50-150	20	100
Benzo(a)anthracene	EPA 8270E	mg/kg	0.01	0.00021	50-150	20	50-150	20	100
Benzo[b]fluoranthene	EPA 8270E	mg/kg	0.01	0.00024	50-150	20	50-150	20	100
Benzo[k]fluoranthene	EPA 8270E	mg/kg	0.01	0.00023	50-150	20	50-150	20	100
Chrysene	EPA 8270E	mg/kg	0.01	0.00015	50-150	20	50-150	20	100
Dibenzo[a,h]anthracene	EPA 8270E	mg/kg	0.01	0.00031	41-136	20	41-136	20	100
Indeno[1,2,3-cd]pyrene	EPA 8270E	mg/kg	0.01	0.00034	40-140	20	40-140	20	100
TEQ	Calculated[2]	mg/kg	0.08	-	-	-	-	-	-
Dioxins									
2,3,7,8-TCDF	EPA 1613B	ng/Kg	1	0.221	70-130	20	70-130	20	80
2,3,7,8-TCDD	EPA 1613B	ng/Kg	1	0.193	70-130	20	70-130	20	80
1,2,3,7,8-PeCDF	EPA 1613B	ng/Kg	5	0.227	70-130	20	70-130	20	80
2,3,4,7,8-PeCDF	EPA 1613B	ng/Kg	5	0.206	70-130	20	70-130	20	80
1,2,3,7,8-PeCDD	EPA 1613B	ng/Kg	5	0.202	70-130	20	70-130	20	80
1,2,3,4,7,8-HxCDF	EPA 1613B	ng/Kg	5	0.393	70-130	20	70-130	20	80
1,2,3,6,7,8-HxCDF	EPA 1613B	ng/Kg	5	0.402	70-130	20	70-130	20	80
2,3,4,6,7,8-HxCDF	EPA 1613B	ng/Kg	5	0.347	70-130	20	70-130	20	80
1,2,3,7,8,9-HxCDF	EPA 1613B	ng/Kg	5	0.385	70-130	20	70-130	20	80
1,2,3,4,7,8-HxCDD	EPA 1613B	ng/Kg	5	0.382	70-130	20	70-130	20	80
1,2,3,6,7,8-HxCDD	EPA 1613B	ng/Kg	5	0.469	70-130	20	70-130	20	80
1,2,3,7,8,9-HxCDD	EPA 1613B	ng/Kg	5	0.452	70-130	20	70-130	20	80
1,2,3,4,6,7,8-HpCDF	EPA 1613B	ng/Kg	5	0.35	70-130	20	70-130	20	80
1,2,3,4,7,8,9-HpCDF	EPA 1613B	ng/Kg	5	0.431	70-130	20	70-130	20	80
1,2,3,4,6,7,8-HpCDD	EPA 1613B	ng/Kg	5	0.338	70-130	20	70-130	20	80
OCDF	EPA 1613B	ng/Kg	10	1.09	70-130	20	70-130	20	80
OCDD	EPA 1613B	ng/Kg	10	0.956	70-130	20	70-130	20	80
TEQ	Calculated[3]	ng/Kg	5.7	-	-	-	-	-	-

1 - USEPA or SW-846 Analytical Methods

2 - Toxic Equivalency (TEQ) calculated using the Toxicity Equivalent Factors (TEFs) presented in MTCA Table 708-2 and using ND values as 1/2*PQL

3 - TEQ calculated using the TEFs presented in MTCA Table 708-1 and using ND values as 1/2*PQL

4 - SLR Internal Alert Limits for Field Duplicate and Original Sample. Concentrations of each must be >5x MDL for valid comparison

Table 3: Well and Boring Summary
Appendix A - Upland SAP and QAPP
PRDI Work Plan - Upland Areas of the Jeld Wen Site

Purpose	No.	Method	Boring Depth	Boring Dia.	Well Casing Dia.	Screen Interval	Slot Size	Sampling Plan	Other Details
Woodlife Area									
Excavation Extents Borings	26	Geoprobe	10'	2"	-	-	-	Grab soil samples, up to 3 at each boring	Soil borings only
Former boring GP-501	1	Geoprobe	15'+	2"	-	-	-	1 sample from 4.5-5.0', 1 sample from highest PID measurement. Submit for VOCs	Soil boring only.
Creosote/Fuel Oil Area									
Excavation Extents Borings	36	Geoprobe	10'	2"	-	-	-	Grab soil samples, 1 per boing, PID screening in 1' intervals	Soil borings only
Shallow Groundwater	5	Hollow-Stem Auger	13'	6"	2"	3-13'	0.020	Low flow groundwater samples	Co-located with Creosote/Fuel Oil Area Extents Geoprobes. To be utilized in Aquifer Tests and Air Sparging Tests, as needed
Deep groundwater	5	Hollow-Stem Auger	55'	6"	2"	45-55' (with 2' sump)	0.020	Low flow groundwater samples, DNAPL monitoring	Co-located with Creosote/Fuel Oil Area Extents Geoprobes. To be utilized in Aquifer Tests and Air Sparging Tests, as needed
Geotechnical Assessment Boring	1	Hollow-Stem Auger/Sonic	50'	8"	-	-	-	SPT and California Modified Split Spoons	
Shallow Pumping Well	1	Hollow-Stem Auger	15'	6" to 8"	4" or 6"	5-15'	0.020	-	-
Shallow Pump Test Observation Well	1	Hollow-Stem Auger	15'	6"	2"	5-15'	0.020	-	-
SVE Horizontal Well	1	Excavator	2 to 3'	-	3"	10' length (horizontal)	-	Effluent air samples during test	Installed near the AS wells
SVE Vapor Pins	8	Hammer Drill	1'	1"	-	-	-	-	Vapor pins for vacuum measurements during SVE pilot test
Deep Air Sparge Well	1	Hollow-Stem Auger	50'	4"	1"	48-50'	0.020	-	-
Shallow Air Sparge Well	1	Hollow-Stem Auger	20'	4"	1"	18-20'	0.020	-	-
Medium Air Sparge Test Observation Well	1	Hollow-Stem Auger	30'	6"	2"	20-30'	0.020	-	-

Ultimate drilling method and boring diameter to be determined based upon discussions with selected drilling contractor
Ultimate boring and well depths to be determined based on field observations

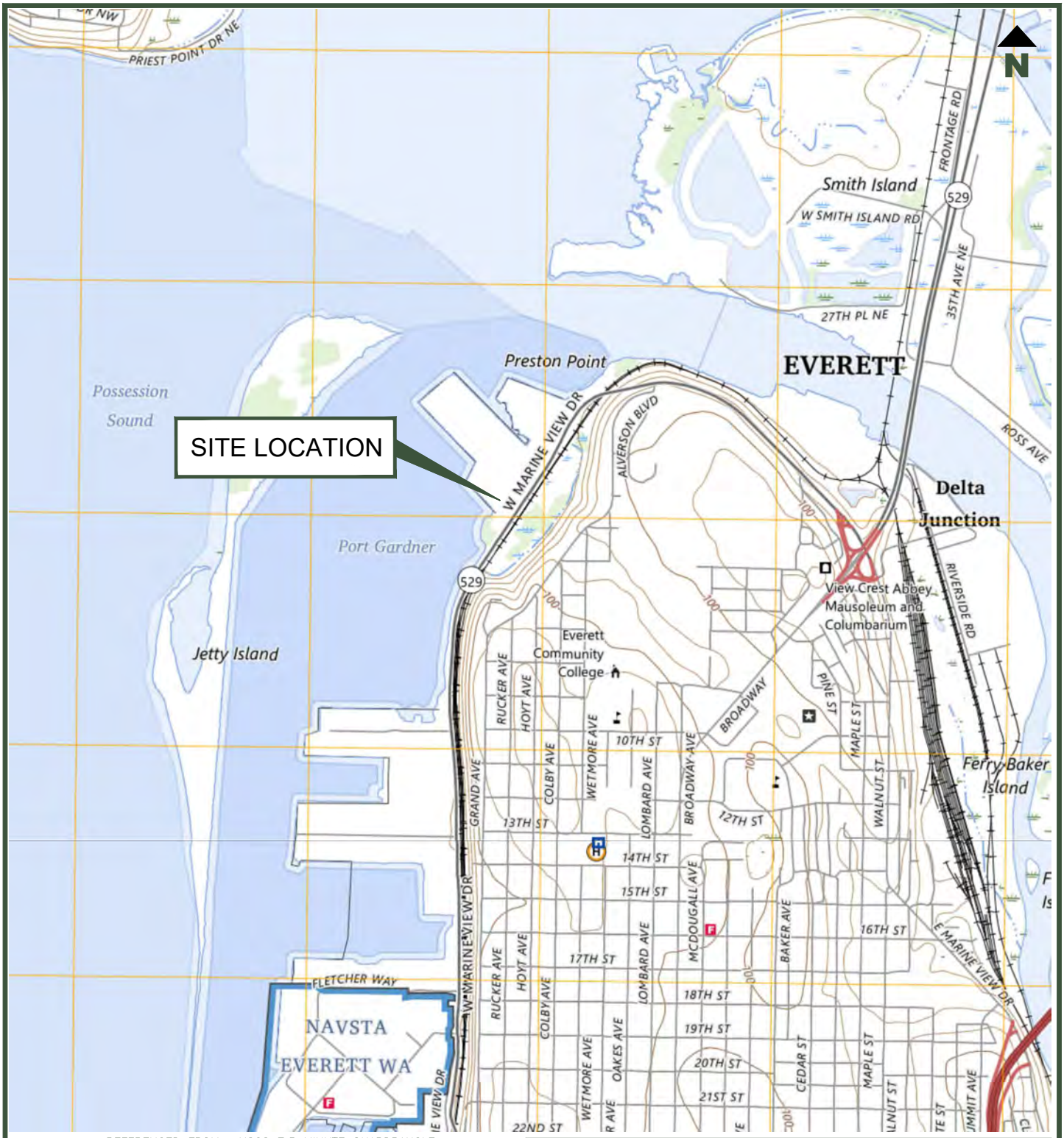
Table 4: Data Validation Guidance
Appendix A - Upland SAP and QAPP
PRDI Work Plan - Upland Areas of the Jeld Wen Site

Data Validation Parameter	Evaluation Procedure	Acceptance Criteria	Guidelines for Corrective Action
Holding Time	Compare date of sample collection on Chain-of-Custody with date of analysis on laboratory reports.	Each sample should meet holding times (presented in Attachment 2)	Analytical results flagged as estimated concentrations (J) or as estimated quantitation limits (UJ). A slight exceedance may not be qualified at the discretion of the data validator.
Field and Method Blanks	Compare results of field and method blanks for the presence of field or laboratory contamination.	Contaminants are not present in the blanks.	Flag values as estimated (J) if less than 10X for method specific laboratory contaminants and 5X for other contaminants. Request that laboratory review data. Carefully consider type of blank, compounds present, and origin of contaminants. Modify sampling procedures or laboratory SOPs.
Practical Quantitation Limits	Compare the analytical results for each parameter with the method sensitivity for each parameter.	Positive results are above the lowest practical quantitation limit. If dilution is required as a result of matrix interference, the practical quantitation limits will be adjusted by the laboratory and the lowest practical quantitation limits may not be achievable.	Concentrations reported below the practical quantitation limit will be flagged as estimated (J). Review sensitivity data and discuss specific results with testing laboratory in a qualitative manner to determine if reanalysis or modification of procedures should be performed to meet desired objectives.
Matrix Spike/Matrix Spike Duplicate	Compare the spike recoveries and RPDs to laboratory-generated QC limits.	Spike recoveries and RPDs within laboratory- generated QC limits.	Refer to LCS for data acceptability when the MS/MSD fails. Data are not qualified based on MS/MSD results alone. Verify that the associated LCS is within QC limits.
Surrogates	Compare surrogate recoveries to laboratory-generated QC limits.	Surrogate recoveries within QC limits.	Samples with surrogate recoveries below QC limits will be flagged as estimated (J) for detected results and (UJ) for non-detects. Samples with surrogate recoveries above QC limits will be flagged as estimated (J) for detected results. Non-detects will not be qualified. In all cases, qualification of the data is at the discretion of the data validator, i.e., where dilutions are involved, the validator may determine that data qualifications are not necessary.
Laboratory Control Sample	Compare the LCS recovery to QC limits specified by the method.	LCS recovery within laboratory-generated limits.	Review data and discuss with laboratory. Reanalysis may be necessary. Data qualifications may be necessary at the discretion of the data validator.
Initial Calibration	For organic analysis, check % RSD is within method limits.	Organics - % RSD is less 30 for calibration check compounds and less than 15 for other analytes.	Laboratory should recalibrate instrument. Samples run on ICAL which is out of QC limits are qualified as estimated (J) for detected results and (UJ) for non-detects.
Continuing Calibration Verification	For organic analysis, compare the % D between ICAL and CCAL to the method limits.	Organics - % D is less than 20% for calibration check compounds.	Calibration standard should be reinjected. A new calibration curve should be run if reinjection fails. Analyses associated with the CCAL will be qualified as estimated (J) for detected results and (UJ) for non-detects.
General Quality of Data	Qualitatively evaluate the performance of the laboratory based on completeness evaluation, the quality of data generated, and other intangible factors. Summarize qualitative evaluation in writing.	Completeness of data should range between 90 and 100 percent complete.	Review completeness data and discuss results with testing laboratory in a qualitative manner to determine if reanalysis or modification of procedures should be performed to meet desired objectives.

Data Validation Qualifiers

U - The analyte was analyzed for, but not detected above the reported sample quantitation limit.
J - The analyte was positively identified; the associated numerical value is an estimated quantity.
UJ - The analyte was not detected above the reported sample quantitation limit. The associated quantitation limit is estimated.
N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a 'tentative identification.'
NJ - The analysis indicates the presence of an analyte that has been 'tentatively identified' and the associated numerical value is an estimated quantity.
R - The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Figures



REFERENCED FROM : USGS 7.5 MINUTE QUARDRANGLE
<EVERETTE, WA & MARYSVILLE, WA, 2023>

LEGEND

0 2,000 4,000 6,000'

SLR

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
APPENDIX A - UPLAND SAP AND QAPP

Drawing
SITE LOCATION MAP

Date MARCH 2024	Scale AS SHOWN	Fig. No. 1
File Name	Project No. 108.V20689.00001	

LEGEND

- EXISTING BUILDINGS
- REMOVED BUILDINGS
- SITE SURVEY AREA

SLR

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

AERIAL PHOTO FROM GOOGLE EARTH PRO, JULY 2019

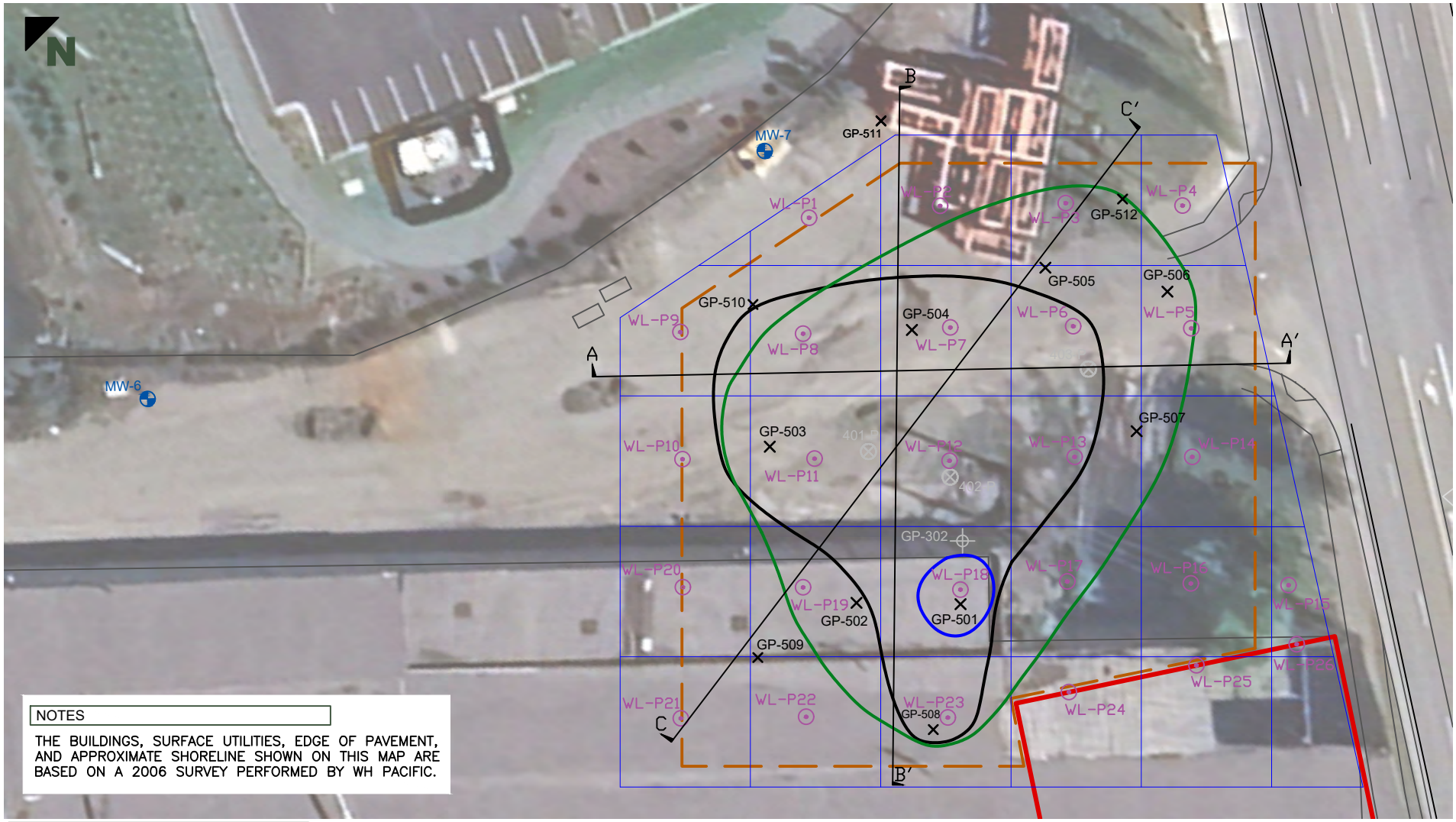
0 200 400 600'

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
APPENDIX A - UPLAND SAP AND QAPP

Drawing
SITE PLAN AND SURVEY SCOPE OF WORK

Date	MARCH 2024	Scale	AS SHOWN	Fig. No.
File Name		Project No.	108.V20689.00001	2



NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

LEGEND

- GEOPROBE SAMPLING LOCATION, SLR 2012
- GEOPROBE SAMPLE LOCATION, SLR 2009
- SURFACE SOIL SAMPLE LOCATION, SLR 2009
- NEAR SURFACE SOIL SAMPLE LOCATION, SLR 2009
- EXISTING MONITORING WELL
- GEOPROBE SAMPLING LOCATION, SLR 2013
- PROPOSED SOIL BORING LOCATION
- HOTSPOT REMOVAL AREA (100 FT X 350 FT)
- WOODLIFE SOIL REMOVAL AREA
- ESTIMATED EXTENT OF IMPACTS AT 1' bgs
- ESTIMATED EXTENT OF IMPACTS AT 3' bgs
- ESTIMATED EXTENT OF IMPACTS AT 5' bgs
- 40'x40' SAMPLING GRID

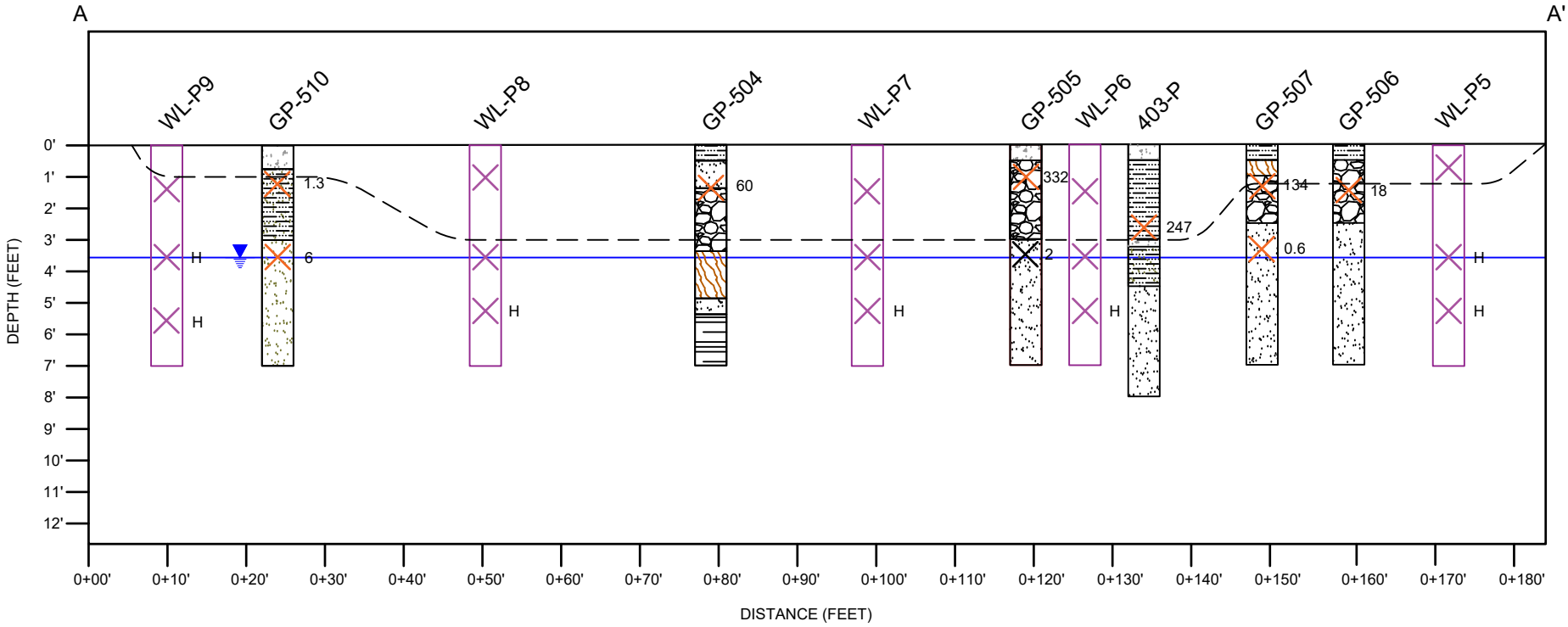
0 45 90 135'

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
APPENDIX A - UPLAND SAP AND QAPP

Drawing
WOODLIFE AREA PROPOSED SAMPLE LOCATIONS

Date January 23, 2024
Scale AS SHOWN
Fig. No. 3
File Name
Project No. 108.V20689.00001



LEGEND

- ASPHALT/CONCRETE
- SAND
- GRAVEL
- SILT
- CLAY
- WOODY DEBRIS
- APPROXIMATE WATER LEVEL
- GEOPROBE GROUNDWATER SAMPLING LOCATION, SLR 2013
- 60 DIOXINS TEQ VALUE (pg/g)
- ESTIMATED EXTENT OF EXCAVATION
- PROPOSED SOIL BORING
- GEOPROBE SAMPLING LOCATION
- H SAMPLE INTERVAL TO BE HELD BY LABORATORY PENDING RESULT OF SHALLOWER SAMPLE

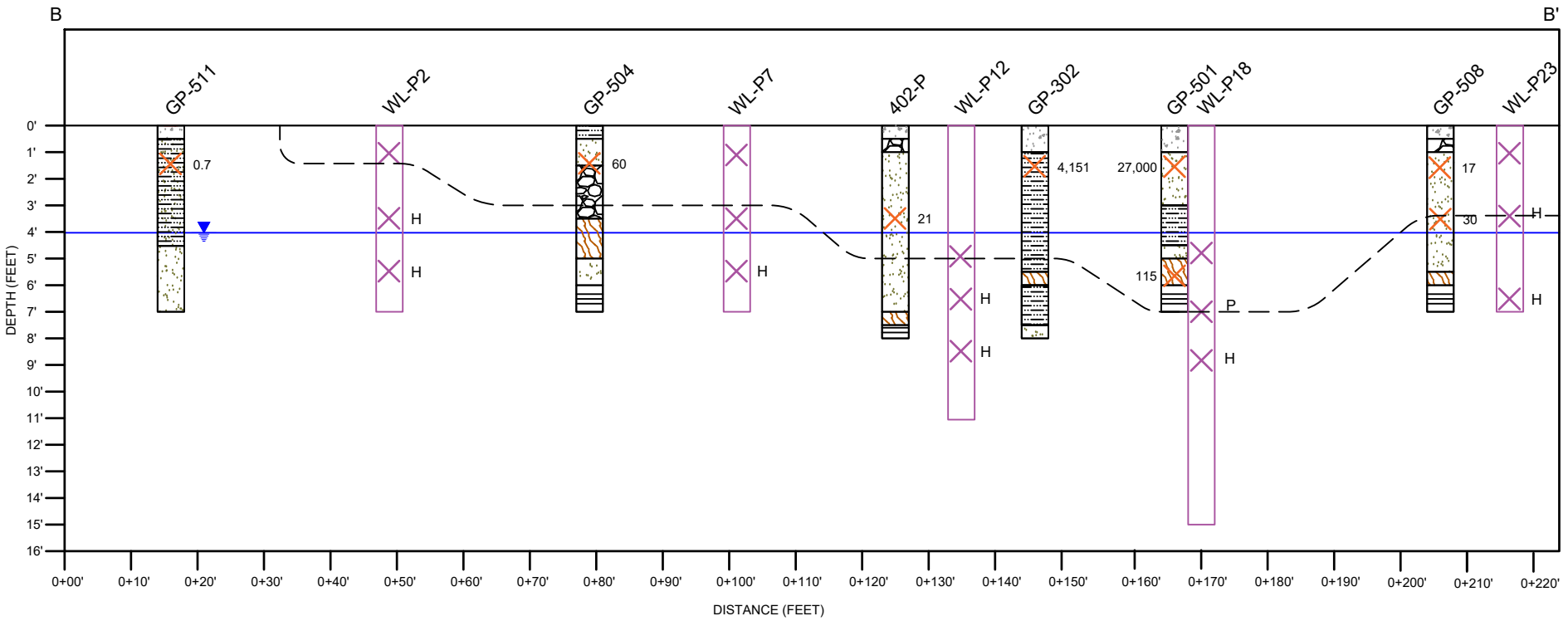
SLR

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
APPENDIX A - UPLAND SAP AND QAPP

Drawing
CROSS-SECTION A - A'

Date January 23, 2024
Scale AS SHOWN
Fig. No. 4A
File Name
Project No. 108.V20689.00026



LEGEND

- ASPHALT/CONCRETE
- SAND
- GRAVEL
- SILT
- CLAY
- WOODY DEBRIS
- APPROXIMATE WATER LEVEL
- GEOPROBE GROUNDWATER SAMPLING LOCATION, SLR 2013
- 60 DIOXINS TEQ VALUE (pg/g)
- ESTIMATED EXTENT OF EXCAVATION
- PROPOSED SOIL BORING
- GEOPROBE SAMPLING LOCATION
- H SAMPLE INTERVAL TO BE HELD BY LABORATORY PENDING RESULT OF SHALLOWER SAMPLE
- P ACTUAL DEPTH INTERVAL TO BE DETERMINED IN FIELD BY HIGHEST PID MEASUREMENT

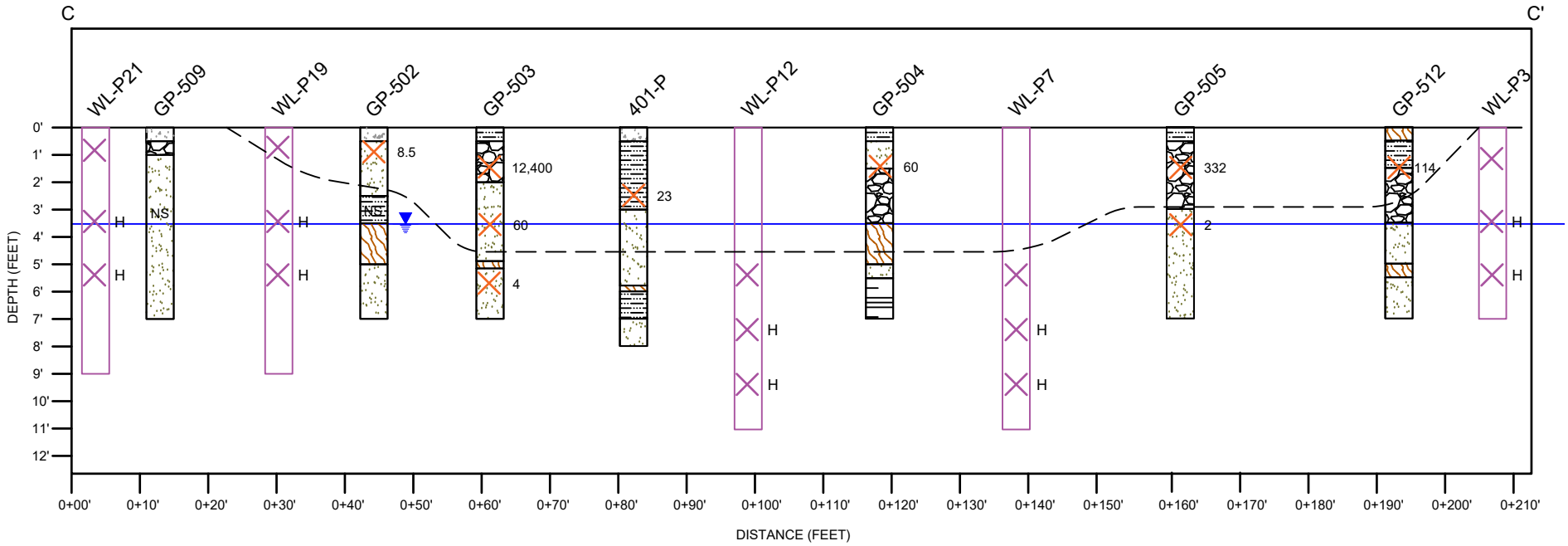
SLR

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
APPENDIX A - UPLAND SAP AND QAPP

Drawing
CROSS-SECTION B - B'

Date January 23, 2024
Scale AS SHOWN
Fig. No. 4B
File Name
Project No. 108.V20689.00001



LEGEND

- ASPHALT/CONCRETE
- SAND
- GRAVEL
- SILT
- CLAY
- WOODY DEBRIS
- APPROXIMATE WATER LEVEL
- GEOPROBE GROUNDWATER SAMPLING LOCATION, SLR 2013
- 60 DIOXINS TEQ VALUE (pg/g)
- ESTIMATED EXTENT OF EXCAVATION
- PROPOSED SOIL BORING
- GEOPROBE SAMPLING LOCATION
- H SAMPLE INTERVAL TO BE HELD BY LABORATORY PENDING RESULT OF SHALLOWER SAMPLE

SLR

NOTES

NS = NOT SAMPLED

CLEANUP LEVEL (CUL) FROM CAP IS 5.2 pg/g FOR DIOXINS TEQ.

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
APPENDIX A - UPLAND SAP AND QAPP

Drawing
CROSS-SECTION C - C'

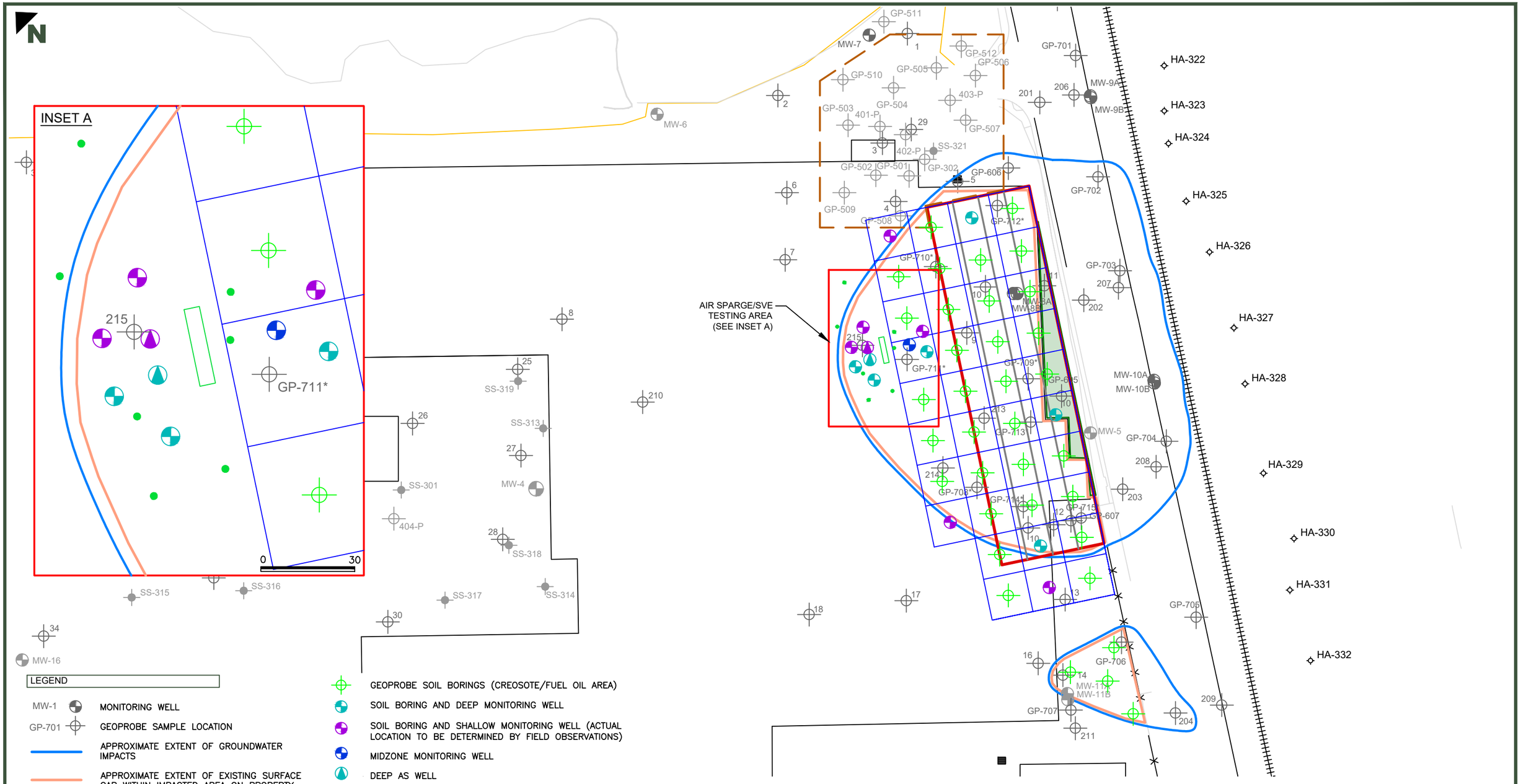
Date January 23, 2024

Scale AS SHOWN

Fig. No. 4C

File Name

Project No. 108.V20689.00001



LEGEND

MW-1	MONITORING WELL
GP-701	GEOPROBE SAMPLE LOCATION
	APPROXIMATE EXTENT OF GROUNDWATER IMPACTS
	APPROXIMATE EXTENT OF EXISTING SURFACE CAP WITHIN IMPACTED AREA ON PROPERTY
	APPROXIMATE EXTENT OF UNPAVED GROUND SURFACE ON PROPERTY (3,700 SQ FT)
	HOTSPOT REMOVAL AREA (100 FT X 350 FT)
	PROPOSED SHORING (25 FT SPACING)
	WOODLIFE SOIL REMOVAL AREA
	GEOPROBE SOIL BORINGS (CREOSOTE/FUEL OIL AREA)
	SOIL BORING AND DEEP MONITORING WELL
	SOIL BORING AND SHALLOW MONITORING WELL (ACTUAL LOCATION TO BE DETERMINED BY FIELD OBSERVATIONS)
	MIDZONE MONITORING WELL
	DEEP AS WELL
	SHALLOW AS WELL
	DEEP PUMPING WELL AND GEOTECHNICAL BORING
	SHALLOW PUMPING WELL
	VAPOR PIN
	SVE HORIZONTAL WELL
	40'x40' SAMPLING GRID

NOTES

THE BUILDINGS, SURFACE UTILITIES, EDGE OF PAVEMENT, AND APPROXIMATE SHORELINE SHOWN ON THIS MAP ARE BASED ON A 2006 SURVEY PERFORMED BY WH PACIFIC.

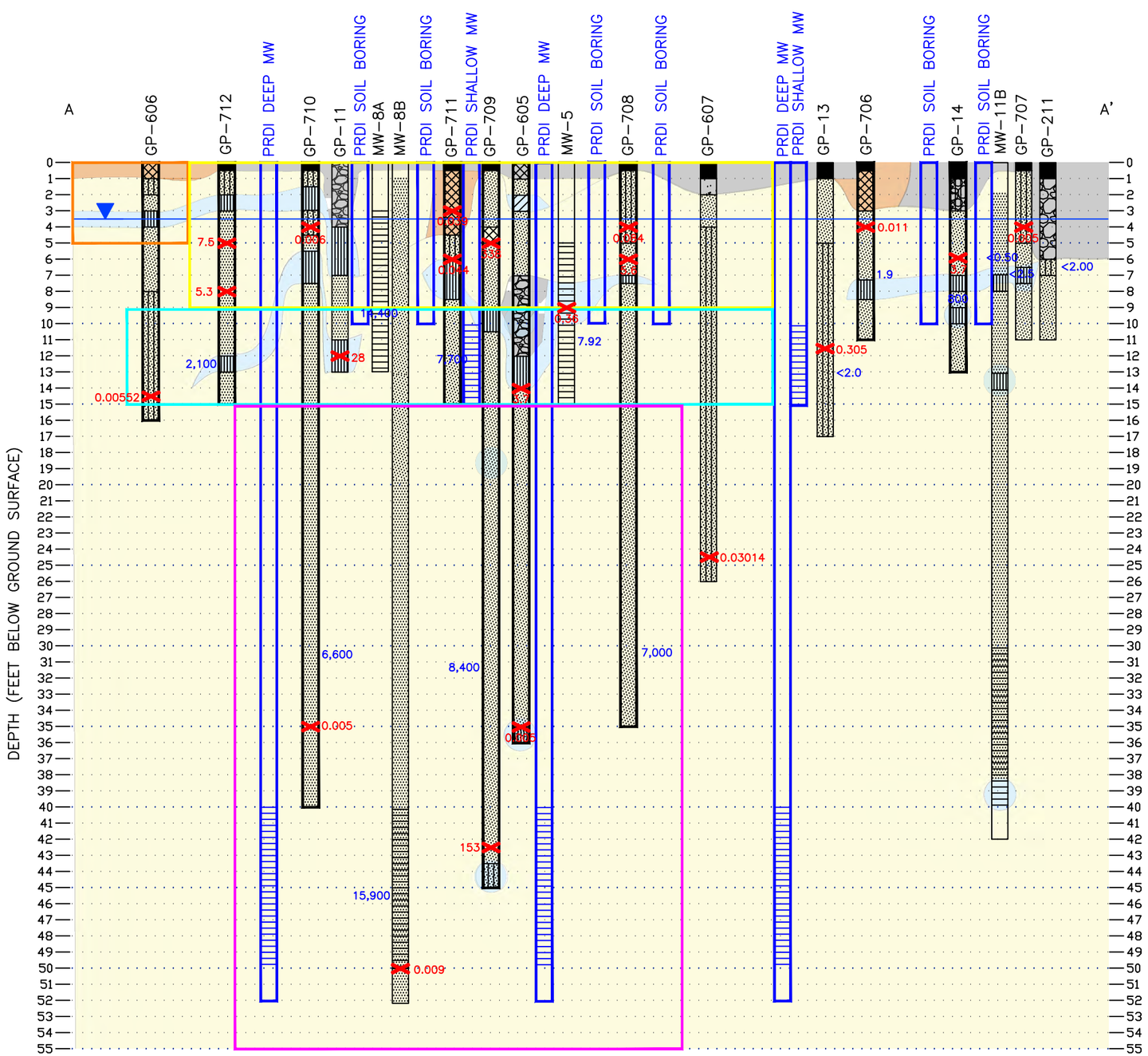
SLR

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
APPENDIX A - UPLAND SAP AND QAPP

Drawing
CREOSOTE/FUEL OIL AREA PROPOSED SAMPLE LOCATIONS

Date	MARCH 2024	Scale	AS SHOWN	Fig. No. 5
File Name		Project No.	108.V20689.00001	



APPROXIMATE HORIZONTAL SCALE

0 75 150 225'

APPROXIMATE VERTICAL SCALE

0 7.5 15 22.5'

NOTES

NOT ALL SAMPLE LOCATIONS PRESENTED ON THIS CROSS SECTION

NOT ALL SAMPLE ANALYTICAL RESULTS PRESENTED (LIMITED TO SOIL AND GROUNDWATER SAMPLES FOR TPH-Dx (DIESEL RANGE))

PCLs
2,000 MG/KG FOR SATURATED SOIL
500 UG/L FOR GROUNDWATER

LEGEND

- APPROXIMATE GROUNDWATER LEVEL
- PROPOSED BORING/MW
- AS ASPHALT
- CL CLAY
- CONCRETE
- GM GRAVEL WITH SILT
- GP GRAVEL AND SAND
- PT PEAT
- ML SILT
- SM SILTY SAND
- SP SAND
- TOPSOIL
- SAND/SILTY SAND
- SILT
- TOPSOIL
- GRAVEL/CEMENT
- ESTIMATED WOODLIFE REMOVAL AREA
- ESTIMATED CREOSOTE/FUEL OIL AREA HOT SPOT REMOVAL
- ESTIMATED CREOSOTE/FUEL OIL AREA SHALLOW GROUNDWATER BIO TREATMENT AREA
- CREOSOTE/FUEL OIL AREA DEEP GROUNDWATER BIO TREATMENT AREA
- GEOPROBE SOIL SAMPLE LOCATION
- 200 SOIL ANALYTICAL RESULTS (cPAH TEQ, MG/KG)
- 700 GROUNDWATER ANALYTICAL RESULTS (NAPHTHALENE, ug/L)

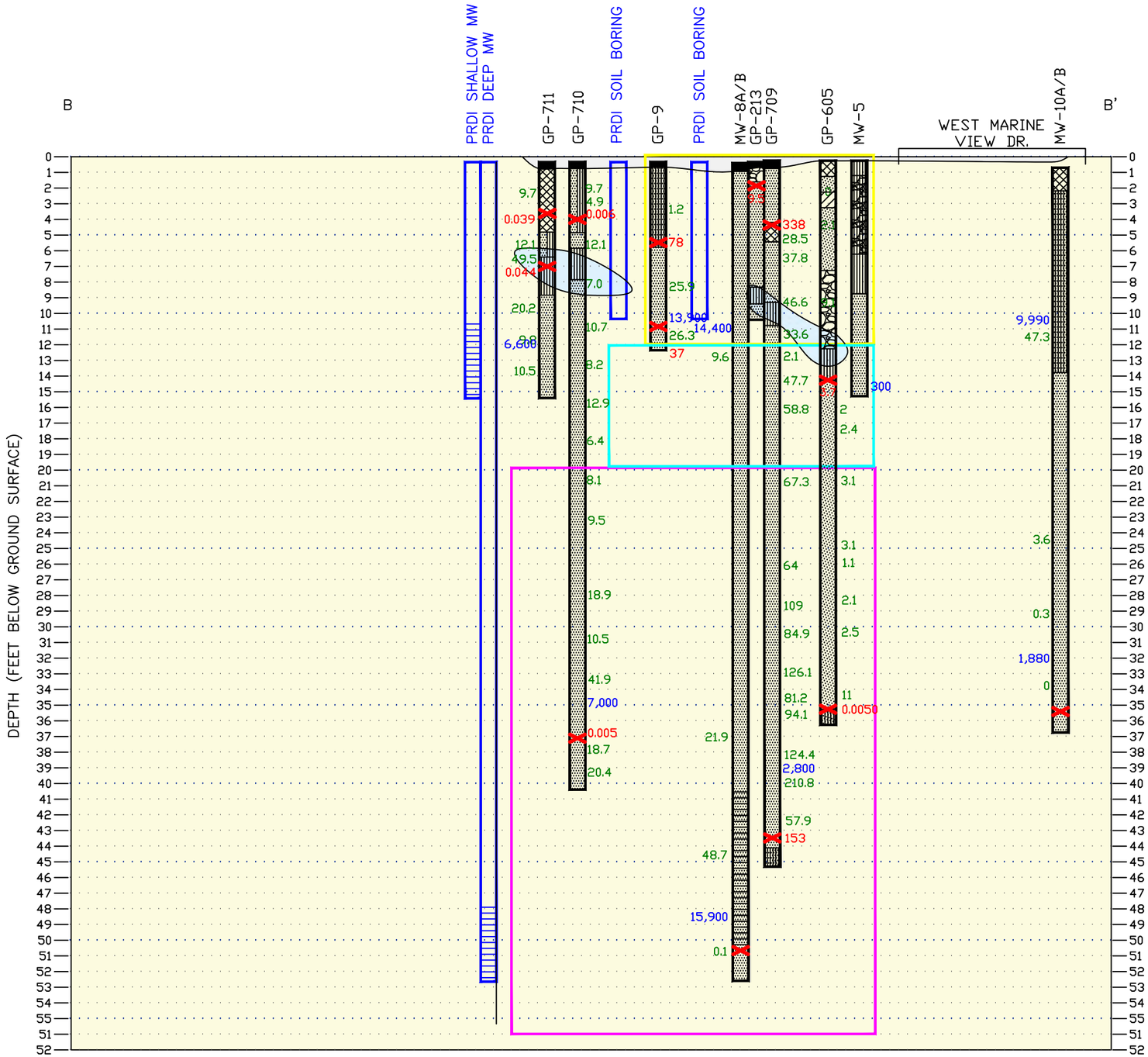
JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
APPENDIX A - UPLAND SAP AND QAPP

Drawing
CREOSOTE/FUEL OIL AREA
CROSS SECTION A-A'

Date	March 13, 2024	Scale	AS SHOWN	Drawing No.
File Name		Project No.	108.V20689.00001	6

SLR



NOTES

NOT ALL SAMPLE LOCATIONS PRESENTED ON THIS CROSS SECTION

NOT ALL SAMPLE ANALYTICAL RESULTS PRESENTED (LIMITED TO SOIL AND GROUNDWATER SAMPLES FOR TPH–Dx (DIESEL RANGE))

PCLs
2,000 MG/KG FOR SATURATED SOIL
500 UG/L FOR GROUNDWATER

LEGEND

- APPROXIMATE GROUNDWATER LEVEL
- PROPOSED BORING/MW
- AS ASPHALT
- CL CLAY
- CONCRETE
- GM GRAVEL WITH SILT
- GP GRAVEL AND SAND
- PT PEAT
- ML SILT
- SM SILTY SAND
- SP SAND
- TOPSOIL
- SAND/SILTY SAND
- SILT
- TOPSOIL
- GRAVEL/CEMENT
- ESTIMATED WOODLIFE REMOVAL AREA
- ESTIMATED CREOSOTE/FUEL OIL AREA HOT SPOT REMOVAL
- ESTIMATED CREOSOTE/FUEL OIL AREA SHALLOW GROUNDWATER BIO TREATMENT AREA
- CREOSOTE/FUEL OIL AREA DEEP GROUNDWATER BIO TREATMENT AREA
- GEOPROBE SOIL SAMPLE LOCATION
- 58.8 PID READINGS
- 3.7 cPAH TEQ VALUES (mg/kg)
- 300 NAPTHALENE VALUES IN GROUNDWATER (µg/L)

JELD WEN SITE
300 WEST MARINE VIEW DRIVE
EVERETT, WASHINGTON

Report
APPENDIX A - UPLAND SAP AND QAPP

Drawing
CREOSOTE/FUEL OIL AREA
CROSS SECTION B-B'

Date	March 13, 2024	Scale	AS SHOWN
File Name		Project No.	108.V20689.00001

Drawing No. 7

SLR

Appendix A Example Field Forms

SAMPLE CHAIN OF CUSTODY

Report To_____

Company_____

Address_____

City, State, ZIP_____

Phone_____Email_____

SAMPLERS (*signature*)	
PROJECT NAME	PO #
REMARKS Project Specific RLs - Yes / No	INVOICE TO

Page # _____ of _____

TURNAROUND TIME
Standard Turnaround
RUSH_____
Rush charges authorized by:
_____

SAMPLE DISPOSAL
Dispose after 30 days
Archive Samples
Other_____

						ANALYSES REQUESTED											
Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	NWTPH-Dx	NWTPH-Gx	BTEX EPA 8021	VOCs EPA 8260	PAHs EPA 8270	PCBs EPA 8082						Notes

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:				
Received by:				
Relinquished by:				
Received by:				

Friedman & Bruya, Inc.
5500 4th Avenue S
Seattle, WA 98108
Ph. (206) 285-8282

Project:		**Boring/Well Name:**
Boring Location:	**Job #:**	
Drilling Company:	**Logged by:**	
Equipment:	**Start Date/Time:**	
Sampling Method:	**Finish Date/Time:**	
Hammer Weight:	**Monitoring Device: PID**	
	First Water (bgs):	

Sample I.D.	Sample Interval	Recovery (%)	PID (ppm)	Blow Counts	Depth (feet bgs)	USCS Code	Graphic Log	Lithologic Description	Boring Abandonment or Well Construction Details

Depth of Boring (bgs):	**Filter Pack:**
Depth of Well (bgs):	**Annulus Seal:**
	Surface Seal:

LOW-FLOW GROUNDWATER SAMPLING FIELD DATA SHEET

Project No. _____ Purged By: _____ Well I.D.: _____

Project Name: _____ Sampled By: _____ Sample I.D.: _____

Location: _____ QA Samples: _____

Date Purged: _____ Start (2400hr): _____ End (2400hr): _____

Date Sampled: _____ Sample Time (2400hr): _____

Casing Diameter:	2" ____	3"____	4"____	5" ____	6" ____	8" ____	Other ____
Casing Volume: (gallons per foot)	(0.17)	(0.38)	(0.67)	(1.02)	(1.50)	(2.60)	( )

Total depth (feet) = _____ Casing Volume (gal) = _____

Depth to water (feet) = _____ Minimum Purge (gal) = _____

Water column height (feet) = Actual Purge (gal) =

FIELD MEASUREMENTS

Volume (Gal)	Time (2400hr)	Temp. (degrees C)	Conductivity (mS/cm)	TDS (g/L)	DO (mg/L)	pH (units)	ORP (mV)	Turbidity (Visual)	Color (Visual)

PURGING & SAMPLING EQUIPMENT

___ Well Wizard Bladder Pump
___ Active Extraction Well Pump
___ Submersible Pump
___ Peristaltic Pump
___ Bailer (disposable)
___ Bailer (PVC)
___ Bailer (Stainless Steel)
___ Dedicated _____
Other: _____
Pump Intake Depth: _____ (feet)

SAMPLE VESSELS

___ 40mL VOA
___ 40mL VOA w/ HCL
___ ____mL amber glass
___ ____mL amber glass w/ HCl
___ ____mL HDPE
___ ____mL HDPE w/ HNO3
___ ____mL HDPE w/ H2SO4
_____
_____
_____
_____
_____

Well Integrity: _____ Odor: _____

Remarks: _____

Signature: Page of __

Soil Sampling Form

Site Name:	**Location/Area:**
Sampled By:	Sample ID:
Approx. Air Temperature (C)	Sample Time: Sample Date:
Weather Conditions:	Duplicate ID:
	MS/MSD ☐ Yes ☐ No Trip Blank Required: ☐ Yes ☐ No

Location Information

☐ Surface ☐ Boring ☐ Test Pit (floor / sidewall) ☐ Excavation (floor / sidewall) | Sample Depth (ft bgs):

Water level Depth (ft bgs)_____ Frozen Soil Depth (ft bgs)_____

Note- If not known at sample location, list as not determined "ND"

Sample Description - circle applicable classification(s)

GRAVEL (3 – 0.08 IN)	SAND (0.08 – 0.003 IN)	SILT (< 0.003 IN)	CLAY (NO GRAINS VISIBLE)	ORGANIC SOIL	PEAT
GW GP GM GC	SW SP SM SC	ML MH	CL CH	OL/OH	PT

Color_____ %Coarse_____ %Fines_____ Peat/Organic Soil Likely Present (Y/N)_____

Moisture (Dry, Moist, Wet/Saturated)_____ Stained _____ Odor_____

PID_____ppm ☐ Headspace ☐ In-Sampler ☐ In-Situ

Analyses	Check Applicable	Analyses	Check Applicable	Analyses	Check Applicable	Analyses	Check Applicable
VOCs		DRO/RRO		RCRA Metal			
BTEX		PAHs		Lead (only)			
GRO		PCBs					

Equipment Used: PID/FID(Model\SN)_____Collection Method_____

Notes/Comments (indicate general location, and possible other relevant conditions not listed above)**:**

_____

_____

_____

_____

Site Name:	**Location/Area:**
Sampled By:	Sample ID:
Approx. Air Temperature (C)	Sample Time: Sample Date:
Weather Conditions:	Duplicate ID:
	MS/MSD ☐ Yes ☐ No Trip Blank Required: ☐ Yes ☐ No

Location Information

☐ Surface ☐ Boring ☐ Test Pit (floor / sidewall) ☐ Excavation (floor / sidewall) | Sample Depth (ft bgs):

Water level Depth (ft bgs)_____ Frozen Soil Depth (ft bgs)_____

Note- If not known at sample location, list as not determined "ND"

Sample Description - circle applicable classification(s)

GRAVEL (3 – 0.08 IN)	SAND (0.08 – 0.003 IN)	SILT (< 0.003 IN)	CLAY (NO GRAINS VISIBLE)	ORGANIC SOIL	PEAT
GW GP GM GC	SW SP SM SC	ML MH	CL CH	OL/OH	PT

Color_____ %Coarse_____ %Fines_____ Peat/Organic Soil Likely Present (Y/N)_____

Moisture (Dry, Moist, Wet/Saturated)_____ Stained _____ Odor_____

PID_____ppm ☐ Headspace ☐ In-Sampler ☐ In-Situ

Analyses	Check Applicable	Analyses	Check Applicable	Analyses	Check Applicable	Analyses	Check Applicable
VOCs		DRO/RRO		RCRA Metal			
BTEX		PAHs		Lead (only)			
GRO		PCBs					

Equipment Used: PID/FID(Model\SN)_____Collection Method_____

Notes/Comments (indicate general location, and possible other relevant conditions not listed above)**:**

_____

_____

_____

_____

SLR

Pumping Test Log

Recorded by: _____
Pumping Well ID: _____
Well Location: _____
Static Depth to Water (ft): _____
Stick-up from Datum (ft): _____
Well Screen Interval (ft): _____
Screen Diameter (in): _____
Casing Interval (ft): _____
Casing Diameter (in): _____
Pump Depth (ft): _____

Start Pump: Date: _____ Time: _____
Stop Pump: Date: _____ Time: _____

Notes:

Date/Time	Drawdown Elapsed Time (min)	Recovery Elapsed Time (min)	Downhole Pressure (PSI)	Drawdown or Residual Drawdown (ft)	Flow Meter #1 Rate (gpm)	Flow Meter #1 Total (gal)	Flow Meter #2 Rate (gpm)	Flow Meter #2 Total (gal)	Sounder Depth to Water (ft TOC)	Surface Discharge Pressure (PSI)	Comments

Air Sparging Pilot Test Field Data Form

Date: _____

Site Name: _____

SLR Employee: _____

Monitoring Equipment: _____ Compressor Model No.: _____

Notes and Pilot Test Layout Sketch (with measurements):

FIELD MEASUREMENTS

	Compressor Status			Location _____			Location _____			Location _____			Location _____			Location _____		
Date / Time	On / Off	Pressure (PSI)	Flow (cfm)	D.T.W (feet)	D.O.		D.T.W (feet)	D.O.		D.T.W (feet)	D.O.		D.T.W (feet)	D.O.		D.T.W (feet)	D.O.	

ADDITIONAL INFORMATION / COMMENTS: _____

Soil Vapor Extraction Test Field Data Form

Site Name: _____ Date: _____

SLR Employee: _____ SLR Project # : _____

Monitoring Equipment: _____ Blower Model: _____

Pilot Test Layout Sketch (with measurements):

FIELD MEASUREMENTS

	Blower Status			PID (ppm)		Location:	Location:	Location:	Location:	Location:	Location:	Location:
Date / Time	On / Off	Vacuum (inches W.C.)	Flow (cfm)	INF	EFF	Vacuum (inches W.C.)	Vacuum (inches W.C.)	Vacuum (inches W.C.)	Vacuum (inches W.C.)	Vacuum (inches W.C.)	Vacuum (inches W.C.)	Vacuum (inches W.C.)

ADDITIONAL INFORMATION/COMMENTS: _____

Appendix B Health and Safety Plan

HEALTH AND SAFETY PLAN (HASP)	SLR

Project Name: Jeld-Wen Site PRDI Activities	
Client: JELD-WEN, INC.	Location: 300 West marine View Dr, Everett, WA
SLR Project No: 108.00228.00065	HASP Effective Period: 2024
HASP Approvals	
Project Manager (name/signature): Chris Kramer	
Principal in Charge (name/signature): Scott Miller, P.E.	
H&S Reviewer (name/signature): Clayton Blackburn	

HASP must be updated if there are any significant changes in the scope of work

1.0 Project Emergency Contact List

Local Emergency Numbers	Name	Telephone Numbers (Include Area Code)	
For life threatening injuries call 911 to summon emergency responders. For non-life-threatening injuries call XstremeMD (XMD) – **(800) 600-9015.** Report all injuries, regardless of severity, to your supervisor or Project Manager as soon as it is safe to do so (within 1-hour of occurrence).			
Hospital / Ambulance Services	Providence Regional Medical Center	911 / (425) 261-2000	
First Aid Facilities		XstremeMD – (800) 600-9015	
Police	Everett Police Department	911 / (425) 257-8100	
Fire	Everett Fire Department	911 / (425) 257-8100	
Public utility locate services	Public One-Call service	(800) 424-5555	
Private utility locate services	GPRS	(253) 796-5637	
Client Contacts	**Name**	**Telephone Numbers**	
Corporate Contact	Eric Rapp, Jeld-Wen	Office	(304) 742-5180
		Cell	(304) 644-7222
Site Contact	Eric Rapp, Jeld-Wen	Office	(304) 742-5180
		Cell	(304) 644-7222
SLR Contacts	**Name**	**Telephone Numbers**	
Project Manager	Chris Kramer	Office	(503) 723-4423
		Cell	(503) 341-2187
Site Safety Officer	Emily Hernandez	Office	(425) 402-8800
		Cell	(910) 200-7539
Technical Discipline Manager	Scott Miller	Office	(503) 723-4423
		Cell	(503) 572-1124
Local HSE Coordinator	Mel Bocianowski	Office	(503) 723-4423
		Cell	(503) 720-4870
US Region HSE Management / Incident Reporting	Michael Coon, HSE Manager, or	Cell	(203) 271-1773
	Patrick Moore, HSE Advisor	Cell	(206) 478-6464
Subcontracted Company Role	**Name**	**Telephone Numbers**	
TBD			

2.0 Incident Response and Reporting Guidelines

If an incident or near miss occurs the SLR Site Safety Officer (SSO) will assume charge of the situation in regard to coordination of notification of site emergency response personnel. By default, the SSO is the highest ranking SLR employee on site. The SLR SSO will access the incident situation and make a determination concerning the need to seek medical attention for any injured or ill personnel, and any potential need to shut down the job task to assess work practices/procedures, PPE usage, etc.

DEFINITIONS:
Incident – Any occurrence or event that caused injury, illness, environmental damage, or significant property damage.
Near Miss – Any occurrence or event that, with slightly different circumstances, could have resulted in an incident.

The following steps will be followed by the SLR SSO or their designee in the event of an incident or near miss:

1. Stop work and access the situation. This includes near misses as well as incidents.
2. If possible, move any injured personnel to a safe location if a hazard is still present. Do not attempt to move anyone with a head, neck, or spinal injury, or if they are unconscious unless it is necessary to prevent further injury.
3. Provide first aid and/or CPR within your level of training.
4. **For life-threatening injuries call 911 to summon emergency responders.**
5. For non-life-threatening injuries call the **24/7 nurse hotline** provided through XstremeMD (XMD) – **(800-600-9015)**. They will help to assess the injury, provide first aid recommendations, and directions to an off-site medical facility near you if warranted.
6. Another SLR employee, preferably the injured employee's Supervisor, should accompany them to the hospital or other medical facility and provide information to the medical staff about the incident as requested, especially if the injured employee is unconscious or otherwise unable to property communicate the details of the incident.
7. Report any injuries or near misses to your supervisor or Project Manager as soon as it is safe to do so (within 1 hour of occurrence).
8. Supervisors/Project Managers to promptly report the incident to HSE Management and the appropriate TDM and SLOM.
9. Report the incident to the SLR client representative in accordance with their incident reporting requirements, or as soon as practical.
10. Do not restart work until discussing the circumstance of the incident or near miss with Project Management and HSE Management.
11. Provide a written report by entering all incidents into SLR's online Incident / Pro-active Reporting System (IEX).

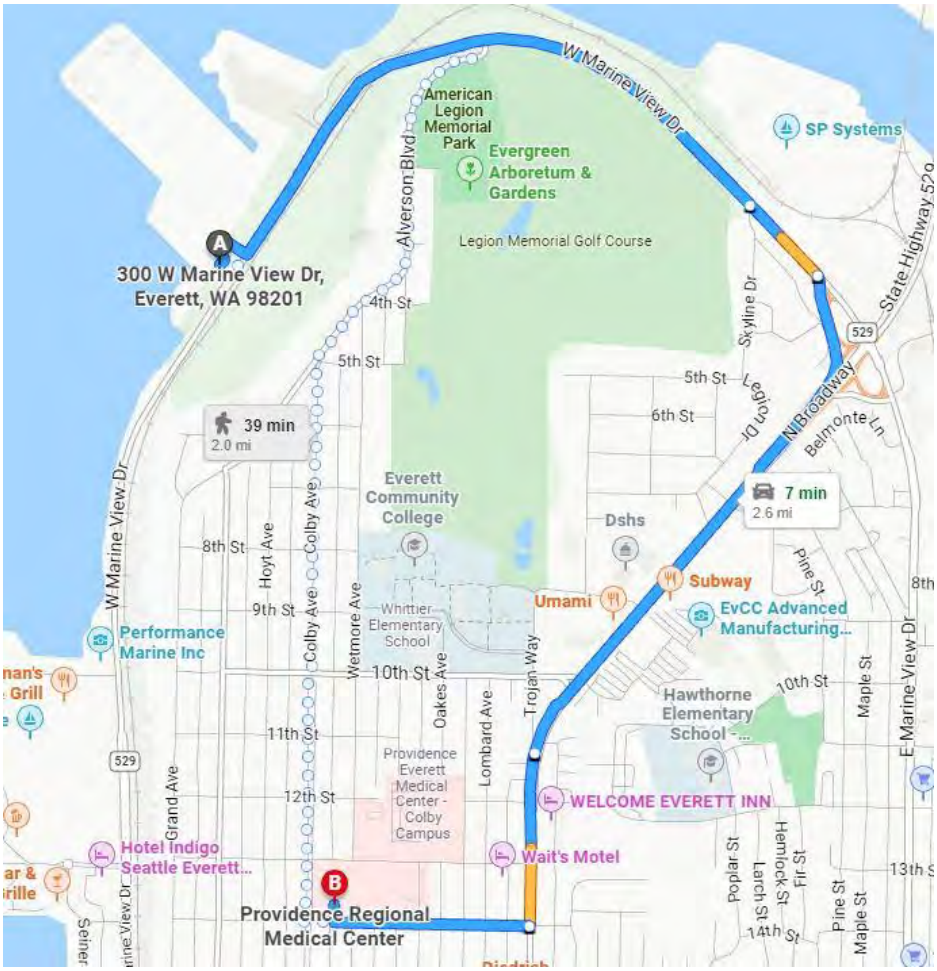
Refer to SLR HSE Manual, *Section 16 – Incident Reporting* for additional incident reporting guidance.

2.1 Hospital Name, Address & Route Map

Name: Providence Regional Medical Center **Address:** 1700 13th Street, Everett, WA 98201

Directions and map from site to hospital:

- **Depart from 300 West Marine View Dr. site entrance (northeast)**
- **Turn left out of the site onto WA-529 / W Marine View Dr.**
- **For 1.0 mi keep right to stay on WA-529 / E Marine View Dr.**
- **In 0.1 mi take the ramp on the right for N Broadway**
- **In 0.9 mi road name changes to Broadway**
- **In 0.3 mi turn right onto 14th street**
- **In 0.3 mi turn right**
- **In 135 ft reach your destination Providence Regional Medical Center**



3.0 Scope of Work

3.1 SLR and Subcontractor Work Tasks:

SLR Field Work Scope: Groundwater monitoring and sampling, product bailing, Geoprobe drilling oversight, well installation oversight, groundwater pump testing, Air Sparge (AS) / Soil Vapor Extraction (SVE) pilot testing
Does this project involve a SLR Subcontractor(s)? Yes ☒ No ☐ If "Yes", provide a description of their work scope(s): Geoprobe drilling, Hollow-stem Auger drilling, well installation, waste handling and disposal

3.2 Utility Contact Prevention Measures

Does this project involve ground disturbance activities? Yes ☒ No ☐ If "Yes," complete the SLR Utility Clearance Log and Ground Disturbance Checklist (see Appendix B),	
Utility Contact Prevention Measures include:	
Review Existing Plans	☒ Required ☐ H&S Manager Variance Received
One-Call 8-1-1 Service utilized	Ticket Number: TBD
Private Locate Contractor utilized. **Name: GPRS** **Phone #: (253) 796-5637**	☒ Required ☐ H&S Manager Variance Received
'Soft Dig' Clearance to at least 5-feet below ground surface (bgs)	☐ Required ☐ H&S Manager Variance Received

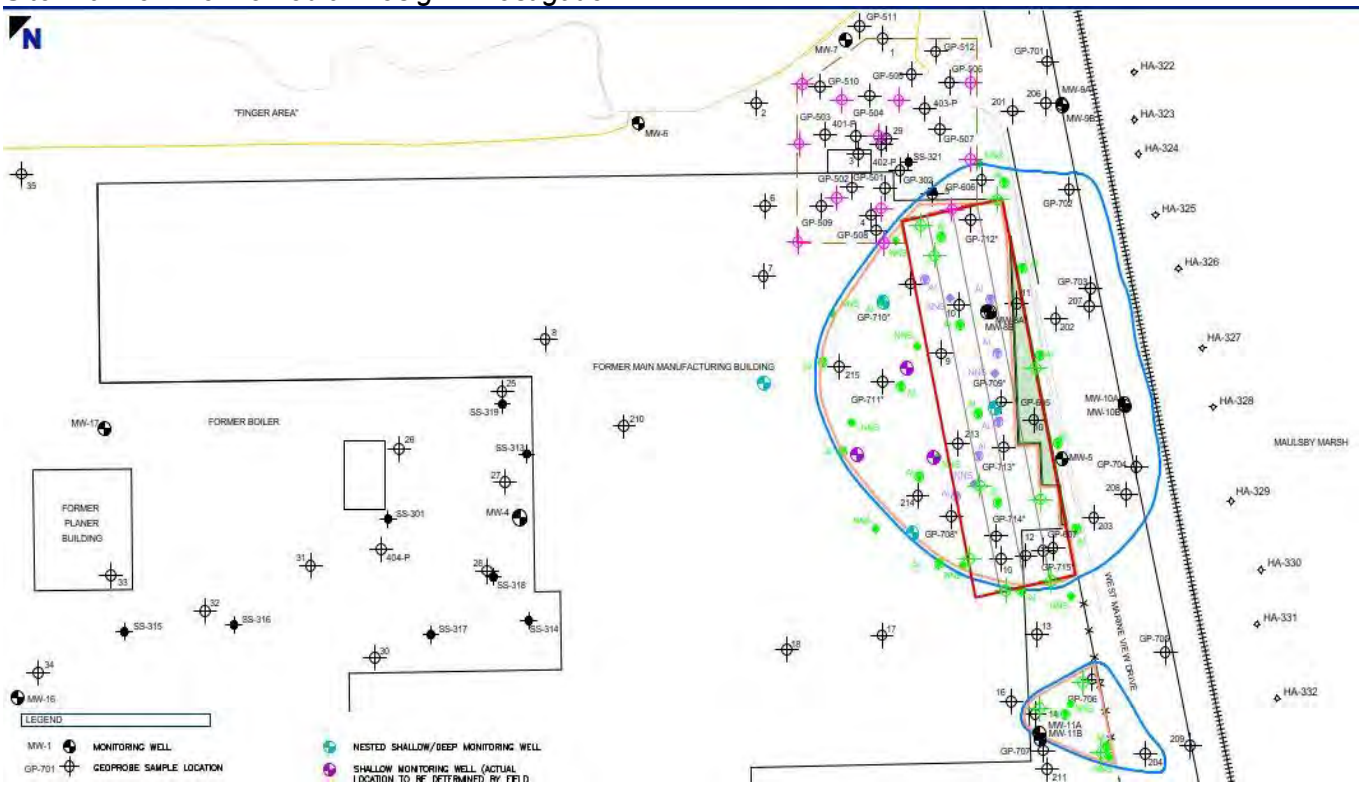
3.3 Site Characteristics:

Past/Present Site Use: The former E.A. Nord facility is a former wood products plant. Currently, portions of the site are leased to various non-mill related operations.
Expected Contaminants of Concern and Concentrations: TPH-Dx, cPAHs, VOCs (benzene and naphthalene), dioxins/furans, Creosote NAPL

Worst Case Vapor Exposure Calculations (if applicable, will be conducted by HSE Manager): N/A
Unusual Site Features (e.g., cell phone coverage, remote site, high onsite traffic, etc.): Some monitoring wells are adjacent to West Marine View Drive (public roadway), one monitoring well is located on portion of Site leased to Cemex (asphalt plant), and also some monitoring wells are adjacent to on-site private roadways. In addition, some monitoring wells are located inside the former main building (limited access, poor lighting, unknown occupants, etc).
Are there site work activities occurring other than SLR activities? Describe any work occurring onsite that SLR is not prime contractor for: Various portions of the Site are leased.

3.4 Site Plan:

Site Plan for Pre-Remedial Design Investigation



4.0 H&S Guiding Principles

The following HSE guiding principles are paramount on SLR projects:

- Injuries and occupational illnesses are preventable.

- Safety is fundamental to the conduct of our business.
- Employee involvement, feedback, and recognition are fundamental to safety.
- Safe behavior is doing the job right.
- Workplace risk will be reduced in the following priority:
  1. Engineering controls.
  2. Administrative controls and operating practices.
  3. Personal protective equipment.
- Management is responsible for visibly and consistently establishing safety as a core value.
- Management is responsible and accountable for the safety of employees, contractors, and the general public.
- Employees and contractors are responsible and accountable for their actions.
- Employees and contractors have an obligation, without fear of reprisal, to notify management of apparent hazards, and they have the right to receive timely and adequate responses.

5.0 Safe Operating Procedures

- All SLR employees and contractors working under this HASP must follow safe procedures and operations
- Report all near-miss events, unsafe conditions, unsafe behaviors, and injuries immediately, regardless of severity, through SLR's incident reporting system (InfoExchange - IEX).
- If an injury is not life-threatening (9-1-1), contact XMD (800.600.9015) as soon as possible for immediate evaluation and care measures.
- If you do not know the proper and safe way to complete your work, stop and contact the Project Manager or Technical Discipline Manager.
- Always assist others at identifying potential hazards.
- Wear clothes suited to the tasks and conditions.
- No dangling or loose clothing or jewelry can be worn around moving machinery.
- No shoes with thin or badly worn soles shall be worn.
- Inspect, use, and store all Personal Protective Equipment (PPE) in accordance with the manufacturer's requirements. If you are unsure of the proper requirements, ask your Project Manager or Technical Discipline Manager before use.
- Required PPE includes:
  - Hard hats
  - safety-toed boots,
  - safety eyewear,
  - hearing protection, and
  - task-appropriate gloves.
- Know the weight of an object before you attempt to lift it.

- The maximum amount of weight SLR employees may lift by themselves is 40 lbs. Never lift anything greater than 40 lbs. without additional help. When lifting:
    - Bend knees
    - Keep back erect
    - Keep the object close to the body
    - Avoid twisting or changing directions while carrying a load.
- Do not throw anything from a height unless there is a chute or ramp to guide it.
- Keep tools, materials, hoses, cords, pumps, meters, and other field devices out of walkways.
- No “horseplay” while at work. To do so may lead to injury.
- Inspect all ladders before use. Use ladder only for its intended purpose as prescribed by the manufacturer.
- Make sure ladders are placed such that they are stable and level.
- Straight ladders should be set at a 4:1 angle.
- Never carry anything in your hands while ascending or descending a ladder.
- Always face the ladder and maintain 3 points of contact at all times when ascending, descending, or working from a ladder.
- Do not ride or get under loads that are being carried by cranes, construction equipment, or powered industrial trucks (forklifts, telehandlers, etc.).
- Obey all warning signs.
- Proper use of both Safety Glasses and a Face Shield are required when grinding or chipping.
- Use of Safety Glasses, Face Shield, cut-resistant gloves and cut resistant chaps are required for any chainsaw use.
- Inspect all tools prior to use. Immediately tag Out-of-Service any damaged tools.
- Do not work if you are not fit for duty or your ability or alertness is impaired by fatigue, heat illness, medication, substance use, or other causes.
- Employees shall not enter confined spaces such as manholes, underground vaults, chambers, tanks, silos, or other similar places that receive little or no ventilation, unless:
    - It has been determined by direct-reading instruments that the atmosphere is safe to enter,
    - Employee has received and SLR has documented proof of user-level Confined Space Entry training,
    - Entry is made under proper CSE procedures including a verified plan for rescue, and
    - Employee has received the direct approval from the SLR US Region Health & Safety Manager for that entry at that time.

- Ensure all guards, handles, and other protective devices are in proper places and adjusted. Do not use equipment with broken or missing guards. Report deficiencies promptly to the Project Manager or the Technical Discipline Manager.
- Gasoline shall never be used for cleaning purposes.
- No burning, welding, or other source of ignition shall be applied to any enclosed tank or vessel, even if there are some openings, until it has first been determined that no possibility of explosion exists, and authority for the work is obtained from the Project Manager or Technical Discipline Manager.
- A proper seal must be achieved with respiratory devices. Employees must be clean shaven, and no facial hair may touch any part of the sealing surface of the respirator.
- No SLR employe may wear a respirator without:
    - Current Medical Clearance,
    - Current Fit Test,
    - Annual Training, and
    - Authorization of the Project Manager or Technical Discipline Manager
- Periodic (at least daily) safety briefings will be held to discuss current site conditions, field tasks being performed, planned modifications, and work concerns.
- Site conditions may include uneven, unstable, or slippery work surfaces. Substantial care and personal observation are required on the part of each employee to prevent injuries from slips, trips, and falls.
- Employees will maintain good housekeeping practices during field activities to establish a working environment free of slip/trip/fall hazards. The work site will be kept free of debris, waste, and trash.
- The “buddy system” will be used whenever possible. If employees must work alone, proper procedures for safety and communication must be established with the Project Manager or Technical Discipline Manager.
- Site personnel will wear high-visibility safety vests for field activities.
- Maintain site control so persons who may be unaware of site conditions are not exposed to hazards. Access inside the specified work area will be limited to authorized personnel. Control measures may include:
    - Erecting barricades using caution tape.
    - High-visibility cones
    - Posting warning signs
- Minimum emergency equipment maintained on site will include:
    - Fully charged 10-pound type ABC dry chemical fire extinguisher
    - Adequately stocked first aid kit

6.0 Risk Assessment and Mitigation

Identification and mitigation of hazards is essential to safe project completion. SLR implements a three-tiered approach to hazard identification and mitigation:

- Job Safety Analysis
- Safe Work Plan
- Daily Tailgate Conversations

The SSO is responsible for ensuring that the Project JSAs and Safe Work Plan form adequately address all potential hazards to project personnel and that they are properly mitigated and documented.

6.1 Job Safety Analysis

Select any of the following risk activities denoted in the JSA Table (Table 6.1) that apply to the planned scope of work (includes SLR's subcontractor(s) as well).

Include the linked JSAs for any identified risks as part of the HASP Risk Assessment documents (Appendix A of this HASP).

If new work tasks develop and/or are encountered that cannot be adequately addressed in the existing JSA documents or the Safe Work Plan, then a field JSA can be developed using the Job Safety Analysis Form (Attachment 9C) provided in Appendix A of this HASP.

Table 6.1 – Job Safety Analysis List
☒ Potential exposure to hazardous chemicals or substances (e.g., inhalation, skin or eye contact, etc.) – JSA #1 Link
☐ Potential need for respiratory protection devices – JSA #2 Link
☒ Elevated noise sources (e.g., working around heavy equipment, industrial sources, etc.) – JSA #3 Link
☒ Unknown industrial or contractor hazards encountered during site visits – JSA #4 Link
☒ Working near moving or rotating parts (e.g., drilling operations, pumps, fans, belts, etc.) – JSA #5 Link
☒ Working near vehicle traffic / heavy equipment (includes work next to roadways, at construction sites, in parking lots, near forklifts, excavators, bulldozers, etc.) – JSA #6 Link
☒ Work near or within the right-of-way of railway tracks – JSA #7 Link
☐ Work adjacent to aircraft runway operations – JSA #8 Link
☐ Potential for entry into excavations, trenches or test pits – JSA #9 Link
☐ Confined space entry (includes tanks, sumps, manholes, etc.) – JSA #10 Link
☒ Pressure washing activities (includes high-pressure water and steam) – JSA #11 Link
☐ Potential for work underground (shafts, tunnels, etc.) – JSA #12 Link

Table 6.1 – Job Safety Analysis List
☒ Exposure to underground or overhead utilities (hazard of electric shock, gas/explosions, etc.) – JSA #13 Link
☐ Work on or around hazardous energy sources – LOTO needed (electric, hydraulic, pneumatic, etc.) – JSA #14 Link
☐ Working from a boat – JSA #15 Link
☒ Working on or near water (e.g. on a pier, in marshland or mudflat, bank of a river/pond, etc.) – JSA #16 Link
☐ Work that requires travel by a small fixed wing plane – JSA #17 LInk
☐ Work that requires travel by helicopter – JSA #18 Link
☐ Use of fixed or portable ladders – JSA #19 Link
☐ Use of Fall Protection Systems (fall arrest or restraint equipment, safety nets, etc.) – JSA #20 Link
☐ Use of Scaffolds (fall protection) – JSA #21 Link
☐ Use of Elevated Work Platforms (aerial lifts, scissor lifts, articulated-boom lifts, etc.) – JSA #22 Link
☐ Working at locations greater than 8,000 feet in elevation – JSA #23 Link
☐ Working near suspended loads (e.g., crane operations and other lifting activities) – JSA #24 Link
☐ Conducting hot work (flame, spark producing or use of non-intrinsically safe equipment) – JSA #25 Link
☐ Exposure to significant heat stress conditions – JSA #26 Link
☐ Exposure to significant cold stress conditions – JSA #27 Link
☐ Anticipated severe weather conditions (tornado season, local flooding, hurricanes, etc.) – JSA #28 Link
☐ Encounters with significant wildlife hazards (bears, foxes, snakes, etc.) – JSA #29 Link
☐ Encounters with significant insect hazards (mosquitoes, ticks, etc.) – JSA #30 Link
☐ Encounters with poisonous plant or other contact dermatitis hazards – JSA #31 Link
☐ Performance of Remote or Lone Work activities (i.e., limited access to people and emergency services) – JSA #32 Link
☐ Potential to encounter unexploded ordinance – JSA #33 Link
☒ Conducting concrete saw cutting, drilling or grinding activities – JSA #34 Link
☐ Conducting fuelling operations – JSA #35 Link

Table 6.1 – Job Safety Analysis List
☐ Hand and power tool usage – JSA #36 Link
☐ Nuclear Density Gauge usage – JSA #37 Link
☐ Working at night / low visibility – JSA #38 Link

6.2 Safe Work Plan

SLR's Safe Work Plan process will be implemented upon initial mobilization to the project site to identify any hazards not already addressed and mitigated by this plan. A copy of the Safe Work Plan is included in Appendix A of this HASP. The Safe Work Plan is a 4-step process for identification and mitigation of hazards in the workplace.

- Step 1 - Identify Hazards & Initial Risk. Identify if any of the hazards noted in this section are associated with your work. If other potential hazards are identified, list them in the 'Other Potential Hazards' section under Step 1.
- Step 2 - Determine Level of Risk. Determine the initial Risk Ranking (risk without controls in place) based on the probability of the hazard taking place and its potential consequence.
- Step 3 - Identify and implement appropriate Hazard Controls & perform a Final Risk Ranking. The Final Risk Ranking is an assessment of the risk with the controls in place.
    - NOTE: As denoted in Section 2 of the Safe Work Plan, additional review, approvals, and controls may be necessary.
- Step 4 - Post-Work Review. Upon completion of the work/project record any Key Learnings (i.e., hazards identified that were not anticipated, hazards that were found to be more dangerous or different than anticipated, additional hazard controls needed, etc.) The Safe Work Plan is then submitted to the PM for review. Completed Safe Work Plans should be maintained in the project file and used to communicate hazards and controls for future mobilizations or similar work.

6.3 Daily Tailgate Conversation

Field team members will meet at least daily to discuss, and document planned activities, hazards, and prescribed mitigations. The conversations will be documented on the Daily Safety Meeting Form provided in Appendix A, or similar document. Copies of safety meeting documentation will be reviewed by the PM and kept in the project file.

7.0 Chemical Hazard Information

NOTE: For any chemicals brought on site by SLR or our Subcontractors be sure to gather Safety Data Sheets (SDS) on the chemicals involved and have them either included in this HASP or otherwise available on site for personnel to reference.

7.1 Contaminants of Concern Information

Compound	Physical/Chemical Characteristics (Target Organs/ Route of Entry)	OEL (STEL)	Odor Threshold	LEL (%)	IP (eV)
Volatile Organic Compounds					
Benzene (71-43-2) 1 ppm = 3.19 mg/m3	Skin, eye, inhalation, and ingestion hazard. Colorless liquid with an aromatic odor. Prolonged skin contact with Benzene or excessive inhalation of its vapor may cause headache, weakness, loss of appetite, and lassitude. A human carcinogen. Extremely flammable, keep sources of ignition away. Incompatible with fluorides, chlorides, oxygen, permanganates, acids, and peroxides.	0.1 ppm TWA_8 (1 ppm) Skin IDLH: 500 ppm (CA)	61 ppm	1.2	9.25
Semi-Volatile Organic Compounds					
Diesel and Lube Oil Range Organics	Skin and inhalation hazard. Skin irritation; headache, nausea, and confusion. Central nervous system depressant. Long term exposure may result in liver damage.	100 mg/m^3 TWA_8 (as diesel fuel)	0.7 ppm (as diesel fuel)	0.7	N/A
Polycyclic aromatic hydrocarbons (PAHs) – as coal tar pitch volatiles. (Includes benzo(a)pyrene, chrysene, phenanthrene, fluoranthene, pyrene, acenaphthene, methylnaphthalenes, and anthracene)	Skin, eye, inhalation, and ingestion hazard. The pitch of coal tar is black or dark brown amorphous residue that remains after the redistillation process. Odor thresholds vary. Direct contact or exposure to the vapors may be irritating to the eyes. Direct contact can be highly irritating to the skin and can cause dermatitis. Exposure to high vapor concentrations may cause headaches, nausea, vomiting, and other symptoms. Includes human carcinogens. Reacts with acids and oxidizers; produces acrid smoke, toxic gases when involved in fires, and thermal decomposition. Exposure to all routes should be carefully controlled to levels as low as possible. Confirmed Animal Carcinogen.	0.2 mg/m^3 TWA_8 0.1 mg/m^3 TWA (Cyclohexane-extractable fraction)	N/A	N/A	Not known
Naphthalene	Skin eye, ingestion, and inhalation hazard. Over exposure may cause	10 ppm TWA_8 (15 ppm)	<0.3 ppm	0.9	8.12

Compound	Physical/Chemical Characteristics (Target Organs/ Route of Entry)	OEL (STEL)	Odor Threshold	LEL (%)	IP (eV)
(91-20-3) 1ppm = 5.24 mg/m^3	headache, nausea, diaphoresis, hematuria, fever, anemia, liver damage, vomiting, convulsions, and coma. Flammable when exposed to heat or flame reacts with oxidizing materials. Reacts violently with CrO3; aluminum chloride + benzoyl chloride.	Skin IDLH: 250 ppm			
Polychlorinated Compounds					
Dioxins/Furans	Inhalation, skin adsorption, ingestion skin and/or eye contact. Colorless to white needle-like crystals. Acute effects including irritation to eyes, in animals: liver and kidney damage, hemorrhage. Chronic health effects include allergic dermatitis, chloracne, porphyria, gastrointestinal disturbance, teratogenic effects, damage to liver, kidneys, and reproductive system, potential occupational carcinogenic.	None	UK	UK	UK

OEL – Occupational Exposure Limit STEL – Short Term Exposure Limit (usually 15-minutes) LEL – Lower Explosive Limit IP – Ionization Potential eV – electron volt TWA_8 – 8-hour Time Weight Average C – Ceiling limit (concentration that cannot be exceeded at any time [or for indicated time frame]) IDHL- Immediate Danger to Life or Health concentration Ca – Known or Suspected human carcinogen Skin – indicates significant exposure risk from skin exposure

7.2 Air Monitoring Action Levels for Field Activities

Task	*Monitoring Instrument*	*Monitoring Frequency*	*Action Levels* [1]	*Required Action*
These action levels apply to any work that involves the potential contact or inhalation of chemicals present at this site (e.g., drilling, excavation, soil, or groundwater sampling, opening tanks / drums, etc.)	FID or PID Meter (11.7 eV Lamp)	Use an FID or PID to conduct exposure monitoring whenever product odors or visible sheens are present.	0 to 10 ppm above background in the BZ	Wear Level D protection at a minimum. Use chemical protective gloves and other PPE as necessary to prevent skin contact with contaminants. Work upwind from chemical sources when possible.
		Continuously when VOCs are > 10 ppm in employee's BZ	10 ppm or greater in the BZ for > 15 minutes[1]	Upgrade to Level C respiratory protection or evacuate the work area until BZ concentrations are < 10 ppm.

Task	*Monitoring Instrument*	*Monitoring Frequency*	*Action Levels* [1]	*Required Action*
		Continuously when VOCs are > 10 ppm in employee's BZ	> 30 ppm in the BZ for any period of time.	Regardless of respirator usage, stop work and evacuate work area until concentrations in BZ are < 10 ppm. Use of fans or other engineering controls may be necessary to continue work. Contact HSE Management for assistance.
			> 0.5 ppm	Stop work required. Leave work area and contact PM and HSE Management for guidance.
			> 1 ppm	Stop work required. Leave work area and contact PM and HSE Management for guidance.
			> 5 ppm	Stop work required. Leave work area and contact PM and HSE Management for guidance.
			O_2 < 19.5% or > 22% LEL > 10% H_2S > 1 ppm CO > 25 ppm	Stop work; Evacuate area; determine source of readings and take corrective actions such as installing general ventilation and working upwind. Contact HSE Management for assistance.
Conducting work that produces airborne visible dust (e.g., drilling, test pitting, excavation, etc.)	Dust Monitor (respirable fraction)	Conduct monitoring when dusty conditions are encountered in areas with potentially contaminated soil. Monitor the employees BZ and general areas. Monitor initially and every 15 minutes while dusty conditions persist.	< 0.5 mg/m^3 in the employee's BZ	Continue work. Apply wet methods for dust reduction if concentrations exceed 0.45 mg/m^3 over an 8-hour period
		Monitor continuously	0.5 to 5 mg/m^3 in the employee's BZ	Upgrade to Level C respiratory protection or evacuate the work area until BZ concentrations are < 0.5 mg/m^3
		Monitor continuously	> 5 mg/m^3 in the employee's BZ or general area	Stop dust producing activities if levels cannot be maintained < 5 mg/m^3. Move support zone to upwind location. Contact HSE Management for assistance.

O_2 – Oxygen LEL – Lower Explosive LimitH_2S – Hydrogen Sulfide CO – Carbon Monoxide

[1]Five excursions above the action level in any 15-minute period or a sustained reading in excess of the action levels for five minutes will trigger a response.
[2] For example, the OSHA permissible exposure limit (PEL) for gasoline is 300 ppm, therefore the action level for upgrading to Level C could be adjusted (to 1/2 of the PEL - 150 ppm) if you are certain that gasoline is the only contributor to the VOC measurement. Contact HSE Management for details concerning compound-specific sampling options.
Note: LEL readings should be taken at the point of operation (top of drill stem, well head, etc.). PID, O2, and H2S readings should be taken in the worker's breathing zone (BZ).

8.0 Physical Hazard Information

The following are common physical hazards employees should be alert to during activities at the site:

- Overhead Hazards and/or Suspended Loads
- Underground Utilities
- Heavy Equipment (Drill Rig, Excavator, Front-End Loader, Backhoe, Bulldozer, etc.)
- Vehicle Traffic
- Falls
- Flame or Spark Producing Work (Hot Work)
- Stored Energy (Mechanical, Electrical, Pneumatic, Steam, etc.)
- Weather (Lightning, Tornado, Flood, Heat Stress/Cold Stress, etc.)
- Remote Locations with Limited Communication
- Working Alone
- Material and Equipment Handling
- Live Electrical Conductors
- Excavations and Trenching
- Wildlife and Biological Hazards
- Fire and Explosion
- Hand and Power Tools

8.1 Heavy Equipment Operations

SLR employees are not authorized to operate heavy equipment, but often work near heavy equipment like excavators, powered industrial trucks, backhoes, front end loaders, and drilling equipment. Heavy equipment operation poses many potential physical hazards. The following precautions should be observed whenever heavy equipment is in use:

- Stay out of the path of moving equipment. Limit travel and standing/working locations to areas outside of the travel path of heavy equipment.
- Remain outside of the complete swing radius of an excavator or backhoe until:
  - Eye contact is established with the operator,
  - Operator has grounded the bucket, and
  - Operator's hands and feet are off the controls.
- Never approach, cross behind, or cross in the path of heavy equipment without alerting and receiving the approval of the operator.

- Nonessential personnel must remain outside the work area.
- Overhead and underground utilities must be identified prior to intrusive work through the SLR Utility Contact Prevention Program. Utilities must be precisely located and protected during excavation and backfilling.
- Drilling rigs may not be moved without first fully lowering and securing all cables and tools.
- SLR employees are not permitted to enter any excavation until it has been inspected and determined safe to enter by a Competent Person.
- Heavy equipment and drill rigs may not be positioned or operated where any part of the equipment or tooling is within, or could be within the following standoff distances:

TABLE A—Overhead Electrical Minimum Clearance Distances

Voltage - Nominal (AC)	Minimum clearance distance (feet)
up to 50 kv	10
over 50 kv to 200 kv	15
over 200 kv to 350 kv	20
over 350 kv to 500 kv	25
over 500 kv to 750 kv	35
over 750 kv to 1,000 kv	45
over 1,000 kv	Per utility owner/operator or qualified registered professional engineer

- The minimum PPE requirements when working around heavy equipment include:
  - Safety-Toed Boots
  - Safety Glasses,
  - Hard Hat
  - Task-Appropriate Gloves
  - High Visibility Vest

8.2 Excavation and Trenching

SLR may perform work near or in excavations and trenches. A "Competent Person" is required for all activities where an SLR employee or contractor will or may enter a trench or excavation. A "Competent Person" is defined as someone:

> ***"capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees. The Competent Person must be authorized to promptly take corrective action to eliminate unsafe conditions."***

SLR does not provide "Competent Person" services. The excavation Competent Person must be provided by the excavation contractor, client, or by contracting a third party.

SLR employees operating under this HASP may not enter excavations where there is the potential for oxygen deficient or toxic atmospheres or where flammables may be present. Work on such contaminated sites is done under SLR's Hazardous Waste Operations and Emergency Response (HAZWOPER) program.

Whenever possible, employees should collect required samples from the bucket rather than entering an excavation. Employees may never enter excavations greater than 5 feet in depth, or where the possibility of injury from collapse exists regardless of depth, without appropriate protective systems such as benching, sloping, or shoring in accordance with the requirements in 29 CFR 1926 Subpart P. The depth of an excavation is determined at the deepest point below grade.

Excavated material will be placed far enough from the edge of the excavation (a minimum of 2 feet) so that it does not fall back into the opening or cause undue stress to the sidewalls. At the end of each day's activities, open excavations will either be completely backfilled, or be clearly marked and secured to prevent people from entering.

8.3 Material and Equipment Handling

The movement and handling of equipment and materials poses several risks to those working on site. These risks include:

- Cuts and abrasions from manual material handling.
- Crush injuries, muscle strains, back injuries, and joint soft tissue injuries from material handling.
- Being struck by material falling or sliding if not properly placed.
- Being struck by equipment where material or equipment obscures visibility or where excessive noise impairs hearing.

Means to mitigate these risks include:

- Where practical, using mechanical devices to assist in the movement of equipment and materials. Keep hands, feet, and other body parts out of the line of fire.
- Using safe handling practices, proper lifting techniques, and proper personal safety equipment such as safety-toed boots and sturdy work gloves.
- Employees should not attempt to move heavy objects by themselves without using appropriate mechanical aids such as drum dollies, hydraulic lift gates, or additional people.
- Assuring shelving has adequate capacity for the load and is on solid, flat footing.
- Assuring piles of excavated material, fill material, etc. are set back from excavations and trenches.
- Assuring piles of material are positioned where critical visibility is not obscured.

8.4 Electrical Safety

SLR does not normally perform work that would require isolation of hazardous energy sources. However, in rare cases SLR employees may perform such work if they:

- Are authorized to do so,
- Are properly trained,
- Have the appropriate equipment, and
- Perform the work in accordance with SLR's Standard Operating procedure 039 – Hazardous Energy Isolation.

SLR activities are commonly limited to use of consumer electrical equipment and custom-built electrical equipment. Equipment to be used during field activities will be suitably grounded and insulated. Ground fault circuit interrupters (GFCI), or equivalent, will be used with cord-plugged electrical tools and equipment to reduce the potential for electrical shock. If SLR employees must work in proximity to live electrical conductors, a Qualified Person for electrical work must be provided by a contractor or the client to protect SLR employees from electrical hazards.

Additional electrical safety guidelines include:

- Work on new and existing energized (hot) electrical circuits is prohibited until all power is shut off, properly grounded, and deenergized state is tested and confirmed.
- An effective Lockout/Tagout system must be in place whenever employees are exposed to stored energy.
- Frayed, damaged, or worn electrical cords must be promptly replaced.
- All extension cords must be undamaged and have grounding prongs in place.
- Extension cord sets that are used with portable electric tools and appliances must be the three-wire type and designed for hard or extra-hard service. (Look for some of the following letters imprinted on the casing: S, ST, SO, STO).
- All electrical tools and equipment must be maintained in safe condition and inspected regularly for defects. If defects are identified, the equipment must be tagged "Out-of-Service" and taken out of use.
- Never connect multiple extension cords together. Never connect a surge protector to an extension cord.
- Do not remove any guards or bypass any protective system or device designed to protect employees from contact with electrical energy.
- All electrical tools must be properly grounded unless they are double insulated.
- Multiple Plug adapters (power strips) are prohibited in construction activities.

8.5 Fire/Explosion

Site workers should maintain continual awareness concerning potential fire or explosion hazards. This is especially critical when working with or near flammable materials or performing any activity that may generate sparks, flames, or other sources of ignition. Intrinsically safe equipment is required when working in or near environments with the potential for an explosive atmosphere.

Flammable materials will be kept away from sources of ignition. In the event of fire, work will cease, the area will be evacuated, and the local fire response team will be notified immediately. Only trained, experienced fire fighters should attempt to extinguish substantial fires at the site. Site personnel should not attempt to fight fires unless properly trained and equipped to do so. A fully charged ABC dry chemical fire extinguisher will be readily available for use during field activities.

8.6 Wildlife and Biological hazards

Biological hazards may be encountered at the site include possible exposure to:

- Fur-bearing animals. Animals may potentially carry the rabies virus or ticks that may transmit Lyme disease to humans. Avoid contact. Do not attempt to feed or touch.
- Poisonous reptiles. Primarily snakes (rattlesnake, water moccasin, and copperhead). Avoid contact and areas that may harbor snake populations including high grass, shrubs, and crevices.
- Stinging insects. Common examples include bees, wasps, and mosquitoes. Avoid contact with insects and their hives.
- Spiders. The black widow and brown recluse spiders are the most venomous. Avoid contact with spiders and areas where they may hide.
- Poisonous plants. Common examples include poison ivy and poison oak. Avoid contact. Long-sleeved shirts and pants will allow some protection against inadvertent contact.

If any biological hazards are identified at the site, workers in the area will immediately notify the SSO and other site personnel. Refer to Section 34 Wildlife and Biological Hazards in the 2011 SLR HSE Manual for more detail about SLR management of these hazards.

9.0 Personal Protective Equipment (PPE) Requirements

In general, SLR fieldwork will require the following mandatory PPE.

- ANSI Z41-1991 approved safety toe boots
- ANSI Z87.1-1989 approved safety glasses with side shields
- Reflective / High visibility vest (or included stitched onto coveralls)
- Work gloves providing appropriate protection for the hazards

Additional PPE that may be necessary based on project risks or client requirements.

- Hearing protection (ear plugs or earmuffs required for drilling, excavations, etc.)
- ANSI Z89.1-1986 approved hardhat with side impact protection

- Chemical Resistant Gloves (appropriate to the chemical hazards present)
- Chemical Resistant Coveralls or Apron (appropriate to the chemical hazards present)
- Puncture Resistant Gloves (when handling sharp objects)
- High Temperature Rated Gloves (when working near hot surfaces or handling hot materials)
- Boots equipped with meta-tarsal protection (when working where falling / rolling objects are present)
- Boots equipped with steel shanks (when walking on sharp objects)
- Personal Fall Protection System (including full body harness, lanyard, deceleration device, and anchorage)
- NIOSH approved ½ face air purifying respirator with Organic/HEPA cartridges
- Other NIOSH approved respirators (filtering face-piece, tight-fitting full-face, powered-air-purifying, etc.)
- Fire-retardant coveralls (i.e., Nomex)
- Personal Floatation Device (when working in or around water deep enough for the PFD to work)
- Cold Weather Gear (Required on the Alaska North Slope between October 1st and May 1st)
- Traction spikes for Boots (when walking in icy conditions)
- Knee Pads (any functions the require crawling or consistent kneeling)
- Hip or Chest Waders

10.0 HSE Forms / References to be included in the Field:

Included in the HASP:

☒ Tailgate Safety Meeting Form

☒ Vehicle Inspection Form (Attachment 20J)

☒ Safety Observation/Conversation Form (Attachment 5A)

☒ Incident/Near Miss/Hazard Identification Report Form (Attachment 5B)

☒ Utility Clearance Mark-out Log (Attachment 10A)

☒ Ground Disturbance Checklist (Attachment 10B)

☒ Job Safety Analysis Form (Attachment 9C)

☒ Vehicle Accident Reporting Form (Attachment 16C)

☒ Witness Statement Form (Attachment 17C)

☒ Project Site Checklist

Optional (Dependent upon work scope, copies to be added to this document or kept in field binder.)

☐ Traction Device Selection and Use (Attachment 13H)

☐ Journey Management Plan Form (Attachment 20A)

☐ Contact Schedule Form (Attachment 20B)

☐ Vehicle Operations Guidelines (Attachment 20C)

☐ All-Terrain Vehicles – Off Road Vehicle Operation Guidelines (Attachment 20D)

☐ Snowmobile Operation Guidelines (Attachment 20E)

☐ Helicopter Use Guidelines (Attachment 20F)

☐ Small Aircraft Use Guidelines (Attachment 20G)
☐ Small Vessel-Working Near Water Guidelines (Attachment 20H)
☐ HSE Requirements for Working Abroad (Attachment 20I)
☐ Hand Tool Use (Attachment 21E)
☐ Proper Lifting – Manual Material Handling (Attachment 21F)
☐ Walking on Uneven or Low Traction Surfaces (Attachment 21G)
☐ Heat Stress (Attachment 22A)
☐ Cold Stress (Attachment 22B)
☐ Storm Conditions (Attachment 22C)
☐ Personal Fall Arrest System Requirements (Attachment 23B)
☐ Portable Ladder Use Requirements (Attachment 23C)
☐ Working at Height Tool Management Requirements (Attachment 23D)
☐ Proper Stair Use Requirements (Attachment 23E)
☐ Fall Protection Plan Template (Attachment 23F)
☐ Working at Heights Rescue Plan (Attachment 23G)
☐ Working at Heights Equipment Inspection Forms (Attachment 23H)
☐ Typical Unplanned Prolonged Stay Supplies (Attachment 25A)
☐ Energy Hazard Assessment Form (Attachment 39B)
☐ LOTO Log (Attachment 39C)
☐ LOTO for Electrical Equipment (Attachment 39D)
☐ LOTO for Compressed Air and Gases (Attachment 39E)
☐ LOTO for Steam, Water and Fluid Lines (Attachment 39F)
☐ LOTO for Hydraulic Equipment (Attachment 39G)

11.0 Acknowledgement

(All onsite SLR and SLR subcontractor personnel must sign)

I acknowledge I have reviewed the health and safety plan for this project, understand it, and agree to comply with all of its provisions. I acknowledge that I have participated in the Job Safety Analysis identification of hazards and safety controls and agree to comply with the indicated steps/procedures. I understand that I may be prohibited by the Site Safety Officer or other SLR personnel from working on the project for not complying with any aspect of this Health and Safety Plan.

NAME	SIGNATURE	COMPANY AFFILIATION	DATE

Important Notice to Subcontractor(s):

This Health & Safety Plan (HASP) has been prepared solely for the use of SLR personnel. It is supplied to you for informational purposes only and may not be relied upon for protection of your employees. The Subcontractor is responsible for providing, at its cost, all personal protective clothing and equipment required for its employees to perform their work in a safe manner and in compliance with all applicable state and federal OSHA regulations. The Subcontractor is responsible for ensuring that such equipment is

in good condition and is properly inspected and maintained. Subcontractors must, at a minimum, use the equipment and follow the procedures described in this HASP. Failure to do so may result in immediate termination of Subcontractor's services. This does not relieve Subcontractor of the responsibility to provide equipment and institute procedures affording a greater degree of protection than those specified in this HASP should Subcontractor determine such measures are necessary to protect the health and welfare of its employees, second-tier Subcontractors, or others under its control or direction.

Appendix A
Risk Assessment and Mitigation Documents

Step 1: Identify Workplace Hazards

- ☐ **Work involves overhead hazards or suspended loads**
- ☐ **Work involves moving vehicles or moving equipment -Trucks or heavy equipment, working in traffic, conveyors**
- ☐ **Work involves operation of equipment (forklifts, aerial lifts, telehandlers)**
- ☐ **Work involves working at heights - fall potential of over 4 feet or into dangerous equipment**
- ☐ **Work involves a ground disturbance**
- ☐ **Confined spaces**
- ☐ **Work involves flame or spark producing work (Hot Work) -**
- ☐ **Work involves stored energy (LOTO) - electrical, tension, pneumatic, hydraulic, steam, or gravity**
- ☐ **Work involves use of hand or power tools/equipment**
- ☐ **Working Alone**
- ☐ **Work involves hazardous atmospheres or chemical**
- ☐ **Work involves activities in, on, or over water**
- ☐ **Housekeeping/Jobsite Conditions**
- ☐ **Ergonomics**
- ☐ **Environmental factors – severe weather, extreme hot/cold, animals, poisonous plants, biting/stinging insects**

Step 2: Identify Hazard Controls

Overhead Hazards & Suspended Loads

Do not walk or stand under a suspended load

- ☐ Overhead hazards evaluated and controlled
- ☐ Area under load delineated and access restricted

Moving Vehicles or Moving Equipment

Stay out of the path of moving equipment

- ☐ Barriers or guardrails between traffic and people
- ☐ Hi-Viz vests worn (Class 3 if >50 mph)
- ☐ Travel paths identified for people and equipment
- ☐ Spotters used when backing vehicles
- ☐ Backup alarms functional

Operation of Equipment

Stay out of the path of moving equipment

- ☐ Barriers or guardrails between traffic and people
- ☐ Hi-Viz vests worn (Class 3 if >50 mph)
- ☐ Travel paths identified for people and equipment
- ☐ Spotters used when backing vehicles
- ☐ Backup alarms functional
- ☐ Equipment inspected prior to use
- ☐ Aerial lift operator trained
- ☐ Forklift Operator Cert Expiration Date: _____

Working at Heights

Clip on and tie-off when working at height

- ☐ Work includes possible fall of >4 feet
- ☐ Work includes possible fall into dangerous equipment

Fall Protection Method: _____

- ☐ Plan for rescue

Ground Disturbance

- ☐ 811 Ticket #: _____
- ☐ Utility Contact Prevention Program Implemented
- ☐ Reviewed and Implemented JSA for Excavation
- ☐ Reviewed and Implemented JSA for Drilling

Confined Spaces

All SLR Entries Require US H&S Manager Approval

- ☐ Approval of US Region H&S Manager obtained

Flame or Spark Producing Work (Hot Work)

No Hot Work Until Fire Risks are Eliminated

- ☐ Hot Work Permit
- ☐ Work area inspected and combustibles removed

Stored Energy

Verify There is No Live Energy Before Starting Work

- ☐ Authorized employees performing LOTO
- ☐ Lockout/tagout permit in place
- ☐ All energy brought to zero and verified

Hand and Power Tools/Equipment

- ☐ Proper tools identified for the job
- ☐ Tools equipment inspected & in good condition
- ☐ Ground fault protection in place
- ☐ Pinch points identified

Working Alone

- ☐ Communication Method: _____
- ☐ Communication Frequency: _____
- ☐ Cell Service Works and Verified?
- ☐ Plan for Summoning Aid?

Buddy system required for Work in Watercraft

Hazardous Atmospheres or Chemicals

- ☐ HASP Developed and Reviewed?
- ☐ Suspected/known chemicals and materials identified
- ☐ Work involves asbestos, lead, benzene, silica, or H2S

Work In/On/Over Water

- ☐ PFD inspected and worn –If Necessary
- ☐ Ring buoy with 90 ft of line need evaluated
- ☐ Rescue skiff need evaluated
- ☐ Waders worn with wading belt

Housekeeping/Jobsite Conditions

- ☐ Work area clearly delineated
- ☐ Trip hazards removed, marked, or protected
- ☐ Clutter/debris kept minimal and picked up

Ergonomics

- ☐ Personnel understand proper lifting techniques
- ☐ Mechanical lifting devices identified for heavy loads
- ☐ Work breaks defined to prevent overexertion

Environmental Conditions & Weather

- ☐ Forecast of severe weather reviewed
- ☐ Surveyed work area for biological hazards
- ☐ Heat/cold stress controls implemented
- ☐ Tick protection measures implemented
- ☐ Work area noise levels known or estimated
- ☐ Work area dust levels known or estimated

Job Safety Analysis (JSA) Document - #1

POTENTIAL EXPOSURE TO HAZARDOUS CHEMICALS and/or SAMPLING PRESERVATIVES				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
Potential for acute or chronic injury from chemical exposure	High Risk (6)	• Pre-plan work activities in conjunction with HSE Management to determine appropriate risk mitigation methods for the determined chemicals-of-concern (e.g., sampling meters, respirators, etc.). • Determine and implement any necessary engineering or administrative controls to minimize worker exposure to hazardous chemicals (e.g., ventilation, dust suppression, work area isolation, etc.) • Coordinate with HSE Management concerning the need for any specific chemical hazard controls – protective clothing, exposure monitoring, medical surveillance, respiratory protection, employee training, etc. • In general, wear disposable chemical-protective gloves and ANSI Z87.1-approved safety glasses. Refer to Attachment 13D for specifics concerning hand protection options, specifically: o Table 13D-1: Glove Selection Guide o Table 13D-2: Chemical Glove Selection Guide • Review hazardous properties of site contaminants with workers before operations begin. • Maintain applicable Safety Data Sheets on site for hazardous chemicals that employees may come into contact with. • Apply water spray if dust is generated during drilling or sampling activities.	HSE Manual, Section 13 – Personal Protective Equipment HSE Manual, Section 15 – Chemical Product Hazards Communication and Control HSE Manual, Section 35 – Chemical and Biological Hazards	Low Risk (2)

Job Safety Analysis (JSA) Document - #3

HIGH NOISE LEVELS				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
High Noise Levels	High Risk (6)	• Address the potential for elevated noise sources as part of your project risk assessment process. Inquire with your client as necessary to identify any potential loud noise sources that will be present. • Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period). • Wear hearing protection devices (i.e., plugs or muffs) if you have difficultly hearing someone talk at a normal volume at a distance of about 3 feet (approximates the 85 dBA action level). • Ear plugs need to be inserted properly to work. For expanding foam ear plugs insert as follows: o With clean hands, roll the entire ear plug into the narrowest possible crease-free cylinder. o Reach over your head with a free hand, pull your ear up and back, and insert the earplug well inside your ear canal. o Hold for 30-40 seconds until the earplug fully expands in your ear canal. • Wear 'double' hearing protection (combination of plugs and muffs) if exposed to noise levels that meet or exceed 100 dBA. • Employees who are exposed to excessive noise on a regular basis should be enrolled in SLR's Hearing Conservation program (includes annual audiograms and training). • Notify your Supervisor and H&S Management if you believe that you qualify for SLR's Hearing Conservation program.	HSE Manual, Section 37 – Hearing Conservation Program	Low Risk (2)

Job Safety Analysis (JSA) Document - #4

UNKNOWN INDUSTRIAL OR CONTRACTOR HAZARDS ENCOUNTERED DURING SITE VISITS				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
Unknown Industrial hazards encountered during site visits (chemicals, fall hazards, mobile equipment, etc.)	High Risk (6)	• Client will provide a site orientation that describes anticipated hazards, controls and emergency response actions. • SLR employees will be escorted at all times. • If an injury / exposure occurs the client will arrange for emergency medical services (e.g., on-site clinic, or off-site emergency services). • Provide the client with emergency contacts for notifying SLR employee supervisor(s) if necessary.	HSE Manual, Section 20 – Journey Management Attachment 20A - SLR Journey Management Plan Form	Low Risk (2)

Job Safety Analysis (JSA) Document - #5

WORKING NEAR MOVING OR ROTATING PARTS				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
Working near moving or rotating parts (e.g., drilling operations, pumps, fans, belts, use of hand tools, etc.)	High Risk (6)	• Keep hands away from moving/rotating parts. • Take extreme care against fingers, hands, and feet from becoming trapped or pinched by rotating pulleys, belts or gears. • Do not wear gloves around moving/rotating parts if entanglement presents a bigger hazard then cuts, punctures and abrasions. • Loose or frayed clothing, loose long hair, necklaces, chains, watches, bracelets, or hanging earrings will not be worn when using power tools or working around rotating or moving equipment. • Never approach the auger string of a drill rig unless the drill rig's transmission is in neutral, or the engine is off, and the augers have stopped rotating. • Never place hands, finger, or feet below or behind drill rig rotating augers (crushing or entanglement hazards). • Use a long-handled shovel to remove auger cuttings away from the auger. Never use hands or feet to move auger cuttings. • Ensure guards are installed and correctly adjusted for all moving/rotating parts to prevent accidental contact and to prevent entraining loose clothing and other items. • Rotating or reciprocating portable power tools will have a constant pressure switch that will shut off the power when the tool is released by the operator. • Do not remove safety guards from equipment unless properly deenergized and hazardous energy control safeguards are in place.	HSE Manual, Section 26 – Hand Tools and Equipment HSE Manual, Section 30 – Environmental Drill Rig Safety Program	Low Risk (2)

Job Safety Analysis (JSA) Document - #6

WORKING NEAR VEHICLE TRAFFIC / HEAVY EQUIPMENT				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
Vehicle traffic / Working near heavy equipment (Struck by hazards and associated injuries)	High Risk (6)	• Maintain situational awareness. • Work away from moving forklifts and other vehicles when possible. • Wear high-visibility clothing. • Delineate work area with high-visibility reflective cones or other means (work vehicle, barricades, etc.) • Implement a traffic control plan and associated traffic control devices (i.e., barricades, cones, qualified flaggers, etc.) as necessary to keep vehicle traffic out of the work area. • Implement and share communication methods to be used between equipment operators and field workers on the ground. • Do not approach construction equipment (excavators, backhoes, dozers, etc.) without first making eye contact and getting a positive response from the operator that you can approach, and the equipment is in a safe condition. • Construction equipment shall have operating back-up alarms and/or spotters when they have an obstructed view while backing. • No work is allowed under an elevated load. • Stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.	HSE Manual, Section 28 – Working Near Heavy Equipment	Low Risk (2)

Job Safety Analysis (JSA) Document - #7

WORKING NEAR OR WITHIN THE RIGHT-OF-WAY OF RAILWAY TRACKS				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
Working near or within the right-of-way of railway tracks (Struck by hazards and associated injuries)	High Risk (6)	• Contact the associated railroad prior to beginning any work within their right-of-way (within 15-feet of the tracks). • No work to commence until all SLR employees and subcontractors are trained in railway safety per the individual railroad company requirements. • Meet whatever additional requirements that the railroad may have (i.e., drug testing, background checks, etc.). • Always assume that the track is “live” as opposed to abandoned or “dead” until verified otherwise. • Work on the tracks or within the right-of-way of an active railroad line will most likely require the use of a qualified railroad flag person (confer with the railroad company). • Do not “fowl” the tracks (i.e., placement of individuals, materials, equipment, etc. on or within 4-feet of the tracks) within specific permission from the railroad. • Notify the flag person each time it is necessary to foul the tracks, and then proceed only with flag person permission. • Any excavations on the tracks or within the right-of-way will need to be carefully planned with the applicable railroad, including determining the presence of any underground utilities. Excavations within the right-of-way must be filled in at the end of each day. • Vehicles and other materials/equipment shall not be parked or stored within 15 feet of the tracks. • Work area is to be inspected at the end of each work day to ensure no materials are left on the tracks or within the right-of-way. • Check with the applicable railroad concerning any specific PPE requirements as they may require specific hardhat or safety vest colors. • When crossing tracks look in both directions every time as train directions can vary. • When crossing more than one set of tracks, stop after the first set, and look again each way before crossing the second set. • Do not cross directly in front or behind, or lean on, a standing train.	Refer to railroad safety training and documents provided by each individual railroad.	Low Risk (2)

WORKING NEAR OR WITHIN THE RIGHT-OF-WAY OF RAILWAY TRACKS				
		• Do not crawl under stopped cars, or cross tracks between cars.		

Job Safety Analysis (JSA) Document - #11

PRESSURE WASHING ACTIVITIES				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
Pressure Washing activities (high-pressure water / steam hazards – injection, cutting, burns, equipment failure, etc.)	High Risk (6)	• Wear proper gloves, face shield/safety goggles, shin and toe guards, and splash suits to protect workers from skin burns and injury when operating laser (high pressure washers) • Ensure all fittings and hoses have the correct pressure rating and are in good operating condition • Protect all electrical equipment from water and splash • Ensure equipment not in use is properly stored • Inspect all equipment according to manufacturer's specifications • Pressure test the unit with water at the maximum operating pressure • Check the dump system to ensure it is operating properly (Will it dump when released?)	Follow manufacturer operating instructions HSE Manual, Section 13 – Personal Protective Equipment	Low Risk (2)

Job Safety Analysis (JSA) Document - #13

UNDERGROUND AND/OR OVERHEAD UTILITIES				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
Underground Utilities (Electrical, chemical, and explosion hazards)	High Risk (6)	• Prior to the start of work review potential underground utility hazards and control measures with site workers. • Conduct utility locates. Utilize both the municipal One Call Center and a private locating firm. • Mark locations of utilities and types of services in the work area. • Document utility mark-outs by using either SLR's Utility Clearance Mark-Out Log (Attachment 10A) or a similar document provided by the line locate service. • Conduct a site survey prior to ground disturbance (GD) operations to search for signs of other buried or overhead utilities. Record the results of the survey on SLR's Ground Disturbance Checklist (Attachment 10B). • Cease work immediately if unknown utility markers are uncovered. • Prior to GD each location must be exposed to a minimum of 5 feet bgs by either hand-digging, vacuum excavation, hand tools that use air or water under pressure, or other non-mechanical methods. • Submit a clearance variance if any of the above requirements cannot be met. • During excavation activities only hand-digging is permitted within 3 feet of underground high voltage, product, or gas lines. • Do not conduct GD work within 50 feet of a fiber optic cable without documented agreement from the fiber optic company.	HSE Manual, Section 10 – Utility Contact Prevention Program Attachment 10A – Utility Clearance Mark-Out Log Attachment 10B – Ground Disturbance Checklist Clearance Variance Requests – see Section 10.4.3.5 of the SLR program.	Low Risk (2)
Overhead Utilities (Electrical hazards) Overhead Utilities	High Risk (6) High Risk (6)	• Inspect the site to identify potential overhead utility hazards based on anticipated work activities and equipment usage. • Mark overhead utilities (e.g., warning tape, flags, etc.) where heavy equipment, or other equipment, has the potential for contact. • Maintain a minimum clearance of 10 feet between the overhead lines and employees and other conductive materials (e.g., mechanical equipment, vehicles, drill rig structures, etc.)	HSE Manual, Section 10 – Utility Contact Prevention Program Table 10-1: Overhead Utility Clearance Distances	Low Risk (2) Low Risk (2)

UNDERGROUND AND/OR OVERHEAD UTILITIES				
(Electrical hazards)		• If voltage of the overhead line is unknown, remain at least 20 feet away from the line. • Refer to Table 10-1 for specific clearance distances based upon line voltages. • Utilize a Spotter when it is possible to violate the minimum clearance distance requirements. Pre-plan communications between the Spotter and equipment operators. • If having to perform work within a restricted distance to an overhead line then actions should be taken, such as de-energizing and grounding the line or installation of protective line insulators.		

Job Safety Analysis (JSA) Document - #16

WORKING NEAR, IN, OR OVER WATER SOURCES				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
General water work hazards - Drowning	High Risk (6)	• Conduct a risk assessment based on project scope and anticipated hazards (e.g., frequency and duration of exposure to water sources; distance to and depths of water sources; speed and temperature of the water source, etc.) • A buddy system should be maintained in areas with water related hazards. • NOTE: If workers are protected by standard guardrails or other appropriate fall protection systems at all times to prevent water entry then personal flotation devices (PFDs) and the Buddy System are not required. • PFDs shall be worn when on board any water craft. • Appropriate PFDs must be available and must be used when employees are exposed to water sources where the danger of drowning exists. Inspect PFDs before each use. • PFDs shall be worn when working within 6-feet of an unprotected edge that is adjacent to a body of water into which a worker could fall and reasonably drown while carrying out the intended work. See Attachment 20H for examples. • PFDs shall be fitted with a whistle or other noise making device. • When worn at night, PFDs shall have reflective tape/materials. • In hypothermia conditions insulating suits (i.e., “mustang suites” or dry suits) will also be used.	HSE Manual, Section 20 – Journey Management and Vehicle Use Attachment 20H - Small Vessel / Working Near Water Guidelines	Low Risk (2)
Working at Heights above water sources (fall impact injuries / drowning)	High Risk (6)	• Refers to situations where employees are working over water and exposed to falls from heights (> 6-feet) that could make them unconscious or otherwise injure or incapacitate them upon hitting the water, shoreline, pier pilling, etc. • NOTE: If workers are protected by standard guardrails or other appropriate fall protection systems at all times to prevent falls and water entry then the described rescue equipment would not be required. • Provide employees with ring buoys (i.e., life rings / throwing rings, etc.) that are readily available for emergency use.	Attachment 20H - Small Vessel / Working Near Water Guidelines	Low Risk (2)

WORKING NEAR, IN, OR OVER WATER SOURCES				
		• Ring buoys shall be equipped with at least 90 feet of retrieval line and the distance between staged ring buoys will not exceed 200 feet (if applicable – such as on a pier or other structure). • A life-saving boat will be immediately available for emergency rescue use. The boat shall be properly maintained and equipped with at least one ring buoy and enough life preservers to support the boat crew and the anticipated number of person(s) to be rescued. • If a life-saving boat is not practicable due to a swift flowing current or other reason then other options such as safety lines strung downstream shall be utilized.		
Working in Marshes, mudflats or other tidal areas (risk of getting stuck in the mud / ergonomic injuries / drowning)	High Risk (6)	• Always travel with a partner when entering or working in these conditions (use the Buddy System). • Watch for hidden channels and holes in the marsh/mudflat plain as you traverse the area. Such channels can be quite deep, and may result in a sprain or pulled muscle, and/or getting stuck in the mud. • Use a probe (walking staff or similar) to check the path ahead for unseen channels and their depths. • If the potential exists for encountering deep water (> 2 feet) then PFDs shall be worn by workers. • Use appropriate footwear (e.g., mudders) of other protective equipment when working in marshes/mudflats or other location where getting stuck in muddy working conditions is possible. • If you become stuck in the mud – DO NOT violently struggle to free yourself as this can lead to muscle and ligament injuries. Attempt to extract yourself by spreading your weight over the mud by laying or crawling on the muddy surface. Twisting your ankles within your boots or waders also works to extract your feet from the mud. • If boots or waders get stuck, slip one foot out gradually, rest the leg on the surface and gradually free the other leg. Lying on the surface and spreading your weight can avoid sinking. • Move to firm ground using a “leopard crawl” (spread eagle, face down, keeping the maximum area of body in contact with the ground at all times). • All workers in the march/mudflat shall be made aware of the tidal schedule prior to work in the intertidal area. • Usually, work should commence on an ebb tide and cease on the incoming tide or earlier.	Attachment 20H - Small Vessel / Working Near Water Guidelines	Low Risk (2)

WORKING NEAR, IN, OR OVER WATER SOURCES				
		• Allow ample time to return to non-tidal areas before the incoming tide starts to advance across the work site. • Be aware of any potential for the march/mudflat to have been a historic dump site for hazardous materials, or other potential hazards – building materials or other potentially dangerous / sharp object that could cause injury. • In areas where there are known concentrations of toxic or hazardous substances, a site-specific HSE plan shall be prepared that details appropriate PPE to be utilized and other controls (e.g., work site controls, decontamination stations, etc.)		

Job Safety Analysis (JSA) Document - #34

CONCRETE SAW CUTTING / DRILLING / GRINDING OPERATIONS				
Potential Hazards	**Initial Risk Ranking**	**Hazard Controls (including PPE requirements)**	**Applicable Policy or Procedures**	**Final Risk Ranking**
Sharp Objects (Cuts to the hands or other body parts)	High Risk (6)	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects. Refer to Table 13D-1: Glove Section Guide for assistance. • Maintain all hand and power tools in a safe condition. • Inspect tools frequently; use the right tool for the job; keep guards in place; and do not modify tools. • Refer to the PPE program when selecting gloves for use with power tools that may produce projectiles, cuts or abrasions, dust, fumes, or mists or which pose a risk of harm to arms, legs, or feet if dropped. • Position your hands and body to avoid pinch points or strikes should a tool come loose. • Use of open bladed knives is not allowed. Refer to the Cutting Tool Selection Guide (Table 26-1) for information concerning the proper type of cutting tool for the activity.	HSE Manual, Section 13 – Personal Protective Equipment Attachment 13D – Hand Protection HSE Manual, Section 26 – Hand Tools and Equipment HSE Manual, Section 21 – Ergonomic Program Attachment 21E - Hand Tool Use	Low Risk (2)
High noise levels	High Risk (6)	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period). • Wear hearing protection if you have difficultly hearing someone talk at a normal volume at a distance of about 3 feet (approximates the 85 dBA action level). • Employees who are exposed to excessive noise on a regular basis should be enrolled in SLR's Hearing Conservation program (includes annual audiograms and training).	HSE Manual, Section 37 – Hearing Conservation Program	Low Risk (2)
Impact / contact with dust particles (eye injury)	High Risk (6)	• Review potential risk for flying debris (concrete chips, dust particles, etc.) • Utilize proper eye and face protection based on the risk assessment (i.e., safety glasses with side shields, face shield, goggles, etc.)	HSE Manual, Section 13 – Personal Protective Equipment	Low Risk (2)
General Controls for Exposure (inhalation) of	High Risk (6)	• Determine and implement any necessary engineering or administrative controls to minimize worker exposure to hazardous concentrations of silica dust (e.g., ventilation, dust suppression, work are isolation, working upwind, etc.).	HSE Manual, Section 35 – Chemical and Biological Hazards	Low Risk (2)

CONCRETE SAW CUTTING / DRILLING / GRINDING OPERATIONS				
hazardous Crystalline Silica		• Apply water spray if visible dust is generated during cutting activities.		
Silica exposure controls when using Stationary masonry saws	High Risk (6)	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Respirator Protection Requirements: None (if above controls are in place).	OSHA Silica Standard	Low Risk (2)
Silica exposure controls when using hand-held power saws (any blade diameter)	High Risk (6)	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Respirator Protection Requirements (NOTE: APF = Assigned Protection Factor of the chosen respirator): o When used outdoors ≤ 4 hours/shift – None o When used outdoors > 4 hours/shift – APF 10 • When used indoors for any time period – APF 10	OSHA Silica Standard HSE Manual, Section 14 – Respiratory Protection Program	Low Risk (2)
Silica exposure controls when using Walk-behind saws	High Risk (6)	• Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Respirator Protection Requirements: o When used outdoors for any time period – None • When used indoors for any time period – APF 10	OSHA Silica Standard HSE Manual, Section 14 – Respiratory Protection Program	Low Risk (2)
Silica exposure controls when using Drivable saws	High Risk (6)	This type of saw is only allowed for cutting tasks performed outdoors. • Use saw equipped with integrated water delivery system that continuously feeds water to the blade. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Respirator Protection Requirements: • When used outdoors for any time period – None	OSHA Silica Standard	Low Risk (2)
Silica exposure controls when using Rig-mounted core saws or drills	High Risk (6)	• Use saw equipped with integrated water delivery system that continuously feeds water to the cutting surface. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Respirator Protection Requirements: None	OSHA Silica Standard	Low Risk (2)

CONCRETE SAW CUTTING / DRILLING / GRINDING OPERATIONS				
Silica exposure controls when using Hand-held and Stand-mounted drills (including impact and rotary hammer drills)	High Risk (6)	• Use a drill equipped with commercially available shroud or cowling with dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. • Use a HEPA-filtered vacuum when cleaning holes. Respirator Protection Requirements: None (if above controls are in place).	OSHA Silica Standard	Low Risk (2)
Silica exposure controls when using Vehicle-mounted drilling rigs for rock and concrete	High Risk (6)	• Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector. • Respirator Protection Requirements: None (if above controls are in place). OR • Operate from within an enclosed cab and use water for dust suppression on the drill bit. • Respirator Protection Requirements: None (if above controls are in place).	OSHA Silica Standard	Low Risk (2)
Silica exposure controls when using Jackhammers and hand-held powered chipping tools	High Risk (6)	• Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact. • Respirator Protection Requirements: o When used outdoors ≤ 4 hours/shift – None o When used outdoors > 4 hours/shift – APF 10 o When used indoors or in an enclosed area for any time period – APF 10 OR • Use tool equipped with commercially available shroud and dust collection system. • Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. • Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. • Respirator Protection Requirements: o When used outdoors ≤ 4 hours/shift – None o When used outdoors > 4 hours/shift – APF 10 o When used indoors or in an enclosed area for any time period – APF 10	OSHA Silica Standard HSE Manual, Section 14 – Respiratory Protection Program	Low Risk (2)

CONCRETE SAW CUTTING / DRILLING / GRINDING OPERATIONS				

Silica exposure controls when using Hand-held grinders for mortar removal (i.e., tuck-pointing)	High Risk (6)	• Use grinder equipped with commercially available shroud and dust collection system.
		• Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.
		• Dust collector must provide 25 cfm or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.
		• Respirator Protection Requirements: None (if above controls are in place).
		• Respirator Protection Requirements:
		  o When used for ≤ 4 hours/shift – APF 10
		  o When used for > 4 hours/shift – APF 25
			OSHA Silica Standard
			
			HSE Manual, Section 14 – Respiratory Protection Program
				Low Risk (2)

Silica exposure controls when using Hand-held grinders for use other than mortar removal	High Risk (6)	The following applies to tasks performed outdoors only.
		• Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface.
		• Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.
		• Respirator Protection Requirements: None (if above controls are in place).
		
		OR
		• Use grinder equipped with commercially available shroud and dust collection system.
		• Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.
		• Dust collector must provide 25 cfm or greater air flow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.
		• Respirator Protection Requirements:
		  o When used outdoors for any time period – None
		  o When used indoors for ≤ 4 hours/shift – None
		• When used indoors for > 4 hours/shift – APF 10
			OSHA Silica Standard
			
			HSE Manual, Section 14 – Respiratory Protection Program
				Low Risk (2)

Other Potential Hazards and Controls:

Personal Protective Equipment (PPE) to be Used:

Head: _____

Feet: _____

Eye/Face: _____

Hearing: _____

Respiratory: _____

Hi-Viz Vest: _____

Other:

Step 3: Post-Work Review

Key Learnings:

Close-Out Signatures

Team Lead: _____

PM/PIC: _____

Date: _____

Emergency Contacts

XstremeMD – 800.600.9015

Michael Coon, US Region H&S Manager
203.444.4069

Pat Moore, US Region H&S Advisor
206.478.6464

Project Contact Numbers:

PM: _____

TDM: _____

Client Contact: _____

Gas: _____

Electric: _____

Water: _____

Sewer: _____

Other: _____

SAFE WORK PLAN

Today's Date: _____ Time: _____

Team Lead: _____

Team Members:

Contractors:

Task Location: _____

Expected Task Duration: _____

Task Description:

Team Lead Signature:

_____

Team Signatures:

_____

_____

_____

_____

SLR TAILGATE SAFETY MEETING FORM

Section 1: General Information		
Date:	**Time:**	**Project #:**
Project Name:		
Project Location:	☐ Remote ☐ Urban ☐ Other_____	
Type of Work: ☐ Sampling ☐ Excavation ☐ Construction ☐ Other (describe below)		
HSE Documents: ☐ SLR JHA (HIRAC) ☐ SLR Site-Specific HSE Plan ☐ Client JHA/JSA ☐ Work Permit ☐ Other:_____ None (explain):_____		

Section 2: Task Description / Health and Safety Discussion

Section 3: Hazard Identification & Control (check all applicable)		
Environmental:	**Chemical Exposure Routes:**	**Physical:**
☐ Remote Travel	☐ Ingestion	☐ Slip/trip/fall
☐ Driving	☐ Inhalation	☐ Heavy Machinery
☐ Temperature Extremes	☐ Dermal Contact	☐ Classified (FRC) areas
☐ Wildlife (bears, moose, etc.)	**Chemical Type**	☐ Noise
☐ Insects (mosquitoes, etc.)	☐ Hydrocarbon/VOC	☐ Dust
☐ Poisonous plants	☐ Metals/PCB/PFAS	☐ Repetitive stress
☐ Other: _____	☐ Asbestos/Lead	☐ Other: _____
☐ Other: _____	☐ Other: _____	☐ Other: _____

Section 4: Personal Protective Equipment (check all applicable)		
General:	**Gloves:**	**Miscellaneous:**
☐ Safety Glasses (required)	☐ Nitrile (disposable)	☐ LEL/VOC/H_2S Monitor
☐ Hardhat	☐ Chemical resistant (e.g. neoprene)	☐ Dust mask (N95)
☐ Safety toe boots	☐ Cut-resistant (e.g. Kevlar®)	☐ ½ Face respirator
☐ Reflective clothing	☐ Abrasion-resistant (e.g. leather)	☐ Fall protection
☐ Hearing protection	☐ Insulating (hot/cold)	☐ Bear Spray
☐ Arctic Gear (boot/jacket/pant)	☐ Other:_____	☐ Other: _____
☐ Flame-resistant (FRC) outerwear		

ATTENDEES:

Name / Signature	Name / Signature

Attachment 9C: Job Safety Analysis Form

Job Name: _____ Job No. _____

Supervisor: _____ Date: _____

The Job Safety Analysis (JSA) will be developed in collaboration with the field work crew with their input on the necessary job steps, associated hazards and control measures necessary to perform the work safely. If the job steps are found to be different than originally anticipated or additional hazards are noted the work shall be stopped and a new JSA conducted.

	Job Steps	Hazards	Controls
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			

All field work crew members shall review the contents of the JSA and sign below acknowledging their understanding of its contents.

Company Name	**Attendee Name**	**Signature**

Appendix B
Field Documents

Project Site Checklist

Project Activities: _____

Checklist Items	Yes	No	N/A
Written HSEP is on-site			
Addendums to the HSEP are documented on-site			
Information in the HSEP matches conditions and activities at the site			
HSEP has been read and signed by all site personnel, including visitors			
Daily tailgate safety meetings have been held and documented			
Site personnel have appropriate training and medical clearance			
Air monitoring is performed as described in the HSEP			
Air monitoring equipment has been calibrated daily			
Site zones are set up and observed where appropriate			
Access to the work area is limited to authorized personnel			
Decontamination procedures are followed and match the requirements of the HSEP			
Decontamination stations (including hand/face wash) are set up and used			
Personnel protective equipment used matches HSEP requirements			
Hearing protection used where appropriate			
Respirators are properly cleaned and stored			
Overhead utilities do not present a hazard to field equipment/personnel			
Traffic control measures have been implemented			
Emergency and first aid equipment is on-site as described in the HSEP			
Drinking water is readily available			
Accessible phone is readily available for emergency use			
Proper drum and material handling techniques are used			
Drums and waste containers are labeled appropriately			
Extension cords are grounded and protected from water and vehicle traffic			
Tools and equipment are in good working order			
Other:			
Other:			
Other:			

Notes: (All "no" answers must be addressed and corrected immediately. Note additional health and safety observations here).

_____

_____

_____

Conducted by: _____ Signature: _____ Date: _____

ATTACHMENT 20J: VEHICLE INSPECTION FORM

The following vehicle inspection must be performed and documented for all field projects where vehicles (company owned, rented, leased or personal-owned) are utilized on a constant or periodic basis. Inspections shall be conducted at the beginning of the project and per the following schedule.

Remember to perform a 360-degree walk around of the vehicle before each operation.

Project Name: _____ Project #: _____

Vehicle ID Info. (make/model/license #, etc.): _____

Vehicle Inspection Components	Condition		Comments
	Ok	Not Ok	
Weekly Checks			
Tires (legal tread depth, bald spots, sidewall damage, punctures)	☐	☐	
Windshield and windows (cracks)	☐	☐	
Windshield wipers (present, functional, worn)	☐	☐	
Seatbelts (missing, frayed, does not snap)	☐	☐	
Horn (operational)	☐	☐	
Head lights and taillights (all functional, cracks)	☐	☐	
Brake lights and turn signals (all functional)	☐	☐	
Backup lights and four-way flashers (functional)	☐	☐	
Brakes (solid feel, squealing, no warning light)	☐	☐	
Mirrors (present, functional, appropriate to use (trailer)	☐	☐	
Monthly Checks			
Spare Tire (inflated, jack, lug wrench present)	☐	☐	
Windshield wiper fluid (present, appropriate type for conditions)	☐	☐	
Bumpers (missing, lose, broken, dented)	☐	☐	
Body panels (newly dented or scraped)	☐	☐	
Climate control (cabin heat, defrost)	☐	☐	
Oil level	☐	☐	
Battery (color indicator, terminals clean and tight, secured)	☐	☐	
Hoses (cuts, cracks, leaks, bulges, chaffing, deterioration)	☐	☐	
Clutch (engages well, not slipping)	☐	☐	
Fuel tank (leaks, odor)	☐	☐	
Exhaust system (leaks)	☐	☐	
Coolant system (leaks)	☐	☐	
First aid kit (Either sealed or appears to be fully stocked)	☐	☐	
Portable Fire Extinguisher (Proper pressure; maintenance tag up to date)	☐	☐	

Inspected By: _____ Date: _____

Attachment 10A: Utility Clearance Mark-out Log

This log is to be completed by SLR personnel prior to initiation of ground disturbance activities (e.g., boring, excavations, staking, etc.) to assess the potential for underground structures, underground utilities, and aboveground power lines in the area selected for disturbance.

Contact the appropriate local utility locating service (One Call, Miss Dig, etc.) or a local utility locator contractor to have sub grade utilities located and marked. NOTE: Boring locations on private property (out of the public right-of-way) are typically not marked out by the One Call public utility mark-out service, and a private utility locate service must be used.

Utility Service Name	Telephone #	Service Confirmation #	Date / Time Notified

Belowground Services					
Utility	Company Name	Telephone #	Present or Unknown	Not Present	Markings (flags, paint, stakes / colors used)
Bldg. foundation					
Cable/Internet					
Electric					
Gas					
Fiber Optic					
Fire System					
Irrigation					
Landscaping					
Sewer / Septic					
Storm water					
UST					
Water					

If overhead lines could be potentially impacted by site activities, then use the following table to document information for the utilities involved, and contact them as necessary to de-energize or otherwise protect the lines from contact in accordance with Table 10-1.

Aboveground Services					
Utility	Company Name	Telephone #	Present	Not Present	Markings (flags, stakes / colors used)
Cable/Internet					
Electric					
Overhead supports					
Telephone					
Traffic light cables					

Attachment 10B: Ground Disturbance Checklist
(Page 1)

Prior to conducting ground disturbance activities, the SS must conduct a site survey for signs of underground and overhead utilities. If any of the questions below are answered "no," then the Project Manager must be contacted regarding concerns/issues. Document the reason(s) for any "no" answers on page 2 of this form and retain in the project files.

Pre-Ground Disturbance Considerations	Yes	No
1. Has the public One Call Center been contacted?		
2. Are as-built drawings available that show the location of utilities?		
3. Has a visual inspection of the work area(s) been completed?		
4. If One Call is not available or does not completely address the planned work area, has a private locating service been contacted?		
5. Have all utility locating service providers notified by the One Call Center marked out their facilities in the vicinity of the GD operations or otherwise notified SLR that they do not have facilities near the proposed locations?		
6. Have identified utilities been marked on the site plan/drawings?		
7. Were the utility markings conducted no more than 48 hours from the time of the GD activity?		
8. Are any fiber optic cables at least 50 feet away from the GD locations?		
9. If fiber optic cables are within 50 feet of the GD locations, has an agreement been made for the fiber optic company to be present during work?		
10. Does each GD location allow for clear entry and exit, adequate workspace, and a clear path for raising and lowering all equipment?		
11. Are all planned GD locations at least 3 feet from any surface and identified subsurface utility?		
12. Has the site representative indicated no knowledge of any subsurface utilities within 3 feet of the proposed GD locations?		
13. Are all proposed GD locations at least 3 feet from any visual line (straight line) indicators of a potential utility? Examples would be manhole covers, water, gas, and/or electrical meters and visible aboveground lines/poles.		
14. Are all proposed locations for pavement cutting clear of pavement joints, curbs, crash posts, or other engineered structures?		
15. Does the pavement lack signs of previous excavation (e.g., no pavement subsidence, differences in pavement texture or color, or pavement patching)?		
16. Does the soil encountered at the GD location appear to be native material? (Non-native materials would include materials free of gravel, clean sand, aggregate base, etc.)		
17. Have all expected utilities been identified and all missing utilities explained?		
18. Has a pre-job tailgate safety meeting been conducted for site personnel?		
19. Has a pre-job tailgate safety meeting been conducted for site personnel?		

Attachment 10B: Ground Disturbance Checklist

(Page 2)

Document any "no" answers from the Ground Disturbance Checklist below and the conclusions from the discussions held with the Project Manager for mitigating the identified concerns.

NOTE: This form can be used if you do not have access to SLR's IEX reporting system.

Attachment 5A: Safety Observation/Conversation Form

Event Classification(s) – Mark all that apply

☐ Safety Observation ☐ Safety Conversation

Date _____ Time _____

Location _____

Client name _____ Project # _____

Safety Observations					
At Risk	Human Behaviors	Safe	At Risk	Working Conditions	Safe
☐	Attention to Work	☐	☐	Ambient Conditions	☐
☐	Communications	☐	☐	Condition of Tools and Equipment	☐
☐	Housekeeping Behavior	☐	☐	Housekeeping Conditions	☐
☐	Job Setup/Sequence	☐	☐	Guards and Barriers	☐
☐	Use of PPE	☐	☐	Workplace Design	☐
☐	Following HSEP/JSA/HSE Manual	☐	☐	Walking/Working Surfaces	☐
☐	Proper use of Tools/Equipment	☐	☐	Working at Heights	☐
☐	Recognition of Change of Conditions	☐	☐	Chemical Exposures	☐
☐	Body Position/Mechanics	☐	☐	Biological Exposures	☐
☐	Other:	☐	☐	Other:	☐
Comments					

Safety Conversations
What topic(s) were discussed? Employee behaviors? Working Conditions? LMRA? JSA?
Follow up action – Any corrective actions needed? HSEP or JSA revision needed? Positive feedback?

Any new hazards identified? ☐ Yes ☐ No If Yes, complete and submit Incident/Near Miss/Hazard ID form

Completed By: _____ _____ _____
(Print) (Signature) (Date)

Project Manager/Supervisor: _____ _____ _____
(Print) (Signature) (Date)

NOTE: This form can be used if you do not have access to SLR's IEX reporting system.

Attachment 5B: Incident/Near Miss Hazard Identification Report Form

Event Classification

- ☐ Incident – Injury or Illness
- ☐ Near Miss
- ☐ First Aid Case
- ☐ Incident – Significant Property Damage
- ☐ Hazard Identification
- ☐ Stop Work Action
- ☐ Incident – Environmental Damage
- ☐ Vehicle Accident (complete Vehicle Accident Form)

Date _____ Time _____

Location _____

Client name _____ Project # _____

Names of Known Witnesses _____

Notifications: Verbal notification within 1 hour for Incidents (if possible) / Provide written report within 24 hours

Function	Time	Contact Name	Contact number
☐ Emergency Responders			
☐ Medical Facility			
☐ PM or Supervisor			
☐ HSE Director			
☐ Office HSC or Manager			
☐ Regional Ops Manager			
☐ Client			
☐ Government agency(ies)			

Event Description (what happened, how, who was involved; provide diagram on back or photos.)
Immediate Response to the Event (Response on site and within next 8 hrs):
Recommendations for further actions:

Completed By: _____ _____ _____
(Print) (Signature) (Date)

Project Manager/Supervisor: _____ _____ _____
(Print) (Signature) (Date)

This report must be completed by the employee's supervisor or Site Safety Officer immediately upon learning of the incident. The completed report must be reviewed and signed by the Project Manager and e-mailed within 24 hours of the incident to Area HSE Manager e-mail: pmoore@slrconsulting.com

ATTACHMENT 16-C: Vehicle Accident Reporting Form

This report is to be initiated by the employee involved in the accident or his/her direct supervisor. Please answer all questions completely. This report must be forwarded to the appropriate HSE Director within **24 hours** of the accident. **Attach Police Report**.

Accident Description

Accident Date: Time: ☐ A.M. or ☐ P.M.

Location of Accident (City, State):

Description of Accident:

Witness: Phone No.

Address: City: State: ZIP:

Police Officer's Name and Badge #: Department:

Work Vehicle Description

Driver: Drivers' License No. State:

Address: City: State: ZIP:

Work Phone No. Project Name: Project No.

Vehicle No. Year: Make: Model: License Plate No.

State: Vehicle Owner: ☐ Company ☐ Rented/Leased ☐ Private Vehicle

Vehicle Type: ☐ Commercial Motor Vehicle ☐ Non-Commercial

If not Company-owned: Owner: Phone No.

Address: City: State: ZIP:

Vehicle Damage Description:

No. of vehicles towed from scene: Number of Injuries: Number of Fatalities:

Were hazardous materials released? ☐ No ☐ Yes If Yes, describe materials:

Other Vehicle(s)

Driver: Drivers' License No. State:

Address: City: State: ZIP:

Phone No. Owner's Name (☐Check if same as Driver):

Address: City: State: ZIP:

Insurance Company: Policy Number:

Agent's Name: Phone Number:

Address: City: State: ZIP:

Vehicle Year: Make: Model: Plate No. State:

Vehicle ID No.

Vehicle Damage Description:

Passengers: ☐ No ☐ Yes Injuries: ☐ No ☐ Yes (if Yes, list names and telephones numbers below)

Attachment 16-C: Vehicle Accident Report (continued)

Weather: ☐ Clear ☐ Cloudy ☐ Fog ☐ Rain ☐ Sleet ☐ Snow Other:
Pavement: ☐ Asphalt ☐ Steel ☐ Concrete ☐ Wood ☐ Gravel/Dirt ☐ Brick/Stone Other:
Condition: ☐ Dry ☐ Wet ☐ Icy ☐ Pot Holes Other:
Traffic Control: ☐ Traffic Light ☐ Stop Sign ☐ Railroad ☐ No Intersection ☐ No Control
Roadway: No. of Lanes each direction: ☐ Residential ☐ Divided Hwy ☐ Undivided Hwy

Draw and name roadways showing each vehicle, direction of travel, and point of impact. Indicate travel before the accident with a solid line, and post-accident movement with a broke line.

SYMBOLS:

Your Vehicle: ①

Other Vehicle(s): ②, ③

Pedestrian:

Stop Sign:

Yield Sign:

Railroad track:

Additional Information: _____

Employee _____ _____ _____
(Print) (Signature) (Date)

Supervisor _____ _____ _____
(Print) (Signature) (Date)

HSE Representative _____ _____ _____
(Print) (Signature) (Date)

ATTACH POLICE REPORT TO VEHICLE ACCIDENT REPORT FORM

NOTE: This form can be used if you do not have access to SLR's IEX reporting system.

ATTACHMENT 17-C: Witness Statement Form

Witness Statement Form

This information is being solicited from you so that the company can accurately assess the reported incident to avoid similar occurrences in the future. Describe only the facts you have personal knowledge of.

Exact Location of Incident:

Date of Incident: Time: ☐ a.m. ☐ p.m.

Date of this Statement: Time: ☐ a.m. ☐ p.m.

Witness Information

Name: Phone No.

Company:

Did you see the Incident? ☐ Yes ☐ No

How Far From You (approx., in feet) Did the Incident Occur?

Stating only factual information, describe in detail what happened and include any applicable events leading to the incident.

Witness Signature / Date

Print Name

Appendix C
Additional HSE Documentation

The National Institute for Occupational Safety and Health (NIOSH)

Coal tar pitch volatiles

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONCENTRATIONS (IDLH) MAY 1994

CAS number: 65996–93–2

NIOSH REL: 0.1 mg/m^3 (cyclohexane-extractable fraction) TWA; NIOSH considers coal tar pitch volatiles to be potential occupational carcinogens as defined by the OSHA carcinogen policy [29 CFR 1990].

Current OSHA PEL: 0.2 mg/m^3 (benzene-soluble fraction) TWA

1989 OSHA PEL: Same as current PEL

1993-1994 ACGIH TLV: 0.2 mg/m^3 (benzene-soluble fraction) TWA, A1

Description of Substance: Black or dark-brown amorphous residue.

LEL: . . Unknown

Original (SCP) IDLH: 700 mg/m^3 [*Note: "Effective" IDLH = 400 mg/m^3 — see discussion below.]

Basis for original (SCP) IDLH: Redmond et al. [1972] have shown that the major health effects resulting from long-term repeated exposure to coal tar pitch volatiles (CTPV) are cancer of the lung, kidney, and skin; however, no studies have been made on carcinogenic effects by any route from single short-term exposure to CTPV that could relate to a 30-minute IDLH. Therefore, reliance must be placed on comparative data of single versus repeated carcinogenic doses of benzo(a)pyrene [B(a)P], a known component of CTPV. Bingham [1971] reported that B(a)P applied in a single dose of 2 mg to the skin of mice yielded tumors in 10% to 20% of the animals whereas 0.01 mg B(a)P applied in a noncarcinogenic solvent applied to the skin 3 times/week for 50 weeks yielded tumors in 50% of the animals. Thus, a single dose producing about 1/3 the number of tumors was 200 times the repeated 3 times/week dose. Using this factor and the value of 0.6 mg/m^3 CTPV reported by Mazumdar et al. [1975] as safe for coke oven workers, a total dose IDLH of 120 mg CTPV (as benzene solubles) is calculated; by using 7.5 liters as the minute volume of coke oven workers and a 75% lung retention of CTPV a 30-minute IDLH is calculated to be about 700 mg/m^3 (as benzene solubles). However, because of the assigned protection factor afforded by each device, 400 mg/m^3 (i.e., 2,000 × the PEL) is the concentration above which only the "most protective" respirators are permitted.

Short-term exposure guidelines: None developed

ACUTE TOXICITY DATA

Lethal concentration data:

Species	Reference	LC_{50} (ppm)	LC_{Lo} (ppm)	Time	Adjusted 0.5-hr LC (CF)	Derived value
Pyrene Rat	Potapova et al. 1971	170 mg/m^3	-----	?	?	?

Lethal dose data:

Species	Reference	Route	LD_{50} (mg/kg)	LD_{Lo} (mg/kg)	Adjusted LD	Derived value
Pyrene						
Rat	Potapova et al. 1971	oral	2,700	-----	18,900 mg/m^3	1,890 mg/m^3
Mouse	Potapova et al. 1971	oral	800	-----	5,600 mg/m^3	560 mg/m^3
Anthracene						
Mouse	Nogochy 1969	oral	-----	>17,000	>119,000 mg/m^3	>11,900 mg/m^3
Phenanthrene						
Mouse	Rakhmanina 1964	oral	700	-----	4,900 mg/m^3	490 mg/m^3

Other animal data: The major health effects resulting from long-term repeated exposure to coal tar pitch volatiles (CTPV) are cancer of the lung, kidney, and skin [Redmond et al. 1972]; however, no studies have been made on carcinogenic effects by any route from single short-term exposure to CTPV that could relate to a 30-minute IDLH. Therefore, reliance must be placed on comparative data of single versus repeated carcinogenic doses of benzo(a)pyrene [B(a)P], a known component of CTPV. It has been reported that B(a)P applied in a single dose of 2 mg to the skin of mice yielded tumors in 10% to 20% of the animals whereas 0.01 mg B(a)P applied in a noncarcinogenic solvent applied to the skin 3 times/week for 50 weeks yielded tumors in 50% of the animals [Bingham 1971]. Thus, a single dose producing about 1/3 the number of tumors was 200 times the repeated 3 times/week dose. Using this factor and the value of 0.6 mg/m^3 CTPV reported as safe for coke oven workers [Mazumdar et al. 1975], a total dose IDLH of 120 mg CTPV (as benzene solubles) is calculated; by using 50 liters as the minute volume of workers and 100% lung retention of CTPV, a 30-minute IDLH is calculated to be about 80 mg/m^3 (as benzene solubles).

Human data: None relevant for use in determining the revised IDLH.

Revised IDLH: 80 mg/m^3 (as the benzene-soluble fraction)
Basis for revised IDLH: The revised IDLH for coal tar pitch volatiles is 80 mg/m^3 (as the benzene-soluble fraction) based on toxicity data in animals [Bingham 1971; Mazumdar et al. 1975; Redmond et al. 1972] (see discussion above). [Note: NIOSH recommends as part of its carcinogen policy that the "most protective" respirators be worn for coal tar pitch volatiles at concentrations above 0.1 mg/m^3 (cyclohexane-extractable fraction).]

REFERENCES:

1. Bingham E [1971]. Thresholds in cancer inductions. If they do exist, do they shift? Arch Environ Health *22*:692-695.

2. Mazumdar S, Redmond C, Sollecito W, Sussman N [1975]. An epidemiological study of exposure to coal tar pitch volatiles among coke oven workers. J Air Pollut Control Assoc *25*(4):382-389.

3. Nagochy PA [1969]. Comparative study of the toxicity of pure and technical anthracene. Gig Tr Prof Zabol *13*(5):59 (in Russian).

4. Potapova AN, Kapitulsky VB, et al. [1971]. Toxicological evaluation of pyrene. Gig Tr Prof Zabol *15*(2):59 (in Russian).

5. Rakhmanina NL [1964]. Establishing standards for the phenanthrene and pyrene contents in water bodies. Gig Sanit *29*(6):19-23 (translated).

6. Redmond CK, Ciocco A, Lloyd JW, Rush HW [1972]. Long-term mortality study of steel workers. VI. Mortality from malignant neoplasms among coke oven workers. J Occup Med *14*(8):621-629.

Page last reviewed: December 4, 2014

Centers for Disease Control and Prevention

The National Institute for Occupational Safety and Health (NIOSH)

Promoting productive workplaces through safety and health research NIOSH

2,3,7,8-Tetrachloro-dibenzo-p-dioxin

SYNONYMS & TRADE NAMES

Dioxin, Dioxine, TCDBD, TCDD, 2,3,7,8-TCDD [Note: Formed during past production of 2,4,5-trichlorophenol, 2,4,5-T & 2(2,4,5-trichlorophenoxy)propionic acid.]

CAS NO.

1746-01-6

RTECS NO.

HP3500000

DOT ID & GUIDE

FORMULA

$C_{12}H_4Cl_4O_2$

CONVERSION

IDLH

Ca [N.D.]
See: IDLH INDEX

EXPOSURE LIMITS

NIOSH REL
Ca See Appendix A
OSHA PEL
none

MEASUREMENT METHODS

None available
See: NMAM or OSHA Methods

PHYSICAL DESCRIPTION

Colorless to white, crystalline solid. [Note: Exposure may occur through contact at previously contaminated worksites.]

MOLECULAR WEIGHT

322.0

BOILING POINT

Decomposes

MELTING POINT

581°F

SOLUBILITY

0.00000002%

VAPOR PRESSURE

(77°F): 0.000002 mmHg

IONIZATION POTENTIAL

?

SPECIFIC GRAVITY

?

FLASH POINT

?

UPPER EXPLOSIVE LIMIT

?

LOWER EXPLOSIVE LIMIT

?

INCOMPATIBILITIES & REACTIVITIES

UV light (decomposes)

EXPOSURE ROUTES

inhalation, skin absorption, ingestion, skin and/or eye contact

SYMPTOMS

irritation eyes; allergic dermatitis, chloracne; porphyria; gastrointestinal disturbance; possible reproductive, teratogenic effects; In Animals: liver, kidney damage; hemorrhage; [potential occupational carcinogen]

TARGET ORGANS

Eyes, skin, liver, kidneys, reproductive system

CANCER SITE

[in animals: tumors at many sites]

PERSONAL PROTECTION/SANITATION

(See protection codes)
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated/Daily
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

FIRST AID

(See procedures)
Eye: Irrigate immediately
Skin: Soap flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

RESPIRATOR RECOMMENDATIONS

NIOSH

At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration:
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape:
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having an N100, R100, or P100 filter.
Click here for information on selection of N, R, or P filters.
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection

SEE ALSO

INTRODUCTION ICSC CARD: 1467

Page last reviewed: October 30, 2019

Appendix C Inadvertant Discovery Plan (IDP)

Inadvertent Discovery Plan

Plan And Procedures for the Discovery of Cultural Resources and Human Skeletal Remains

To request materials in an alternative format, call the Washington State Department of Ecology at (206) 594-0000. People with impaired hearing may call Washington Relay Service at 711. People with a speech disability may call TTY at 877-833-6341.

Project Name: Jeld Wen Site	Location: 300 West Marine View Drive, Everett, WA 98201
Project Primary Contact: Chris Kramer, SLR	County: Snohomish
Email: ckramer@slrconsulting.com	
Direct Line: (503) 905-3205	

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

1.0 Introduction

The IDP outlines procedures to perform in the event of a discovery of archaeological materials or human remains, in accordance with applicable state and federal laws. An IDP is required, for all grants and loans, for any project that creates disturbance above or below the ground. An IDP is not a substitute for a formal cultural resource review (Executive Order 21-02 or Section 106 of the National Historic Preservation Act of 1966).

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

2.0 Cultural Resource Discoveries

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

- An accumulation of shell, burned rocks, or other food related materials.
- Bones, intact or in small pieces.
- An area of charcoal or very dark stained soil with artifacts.
- Stone tools or waste flakes (for example, an arrowhead or stone chips).
- Modified or stripped trees, often cedar or aspen, or other modified natural features, such as rock drawings.
- Agricultural or logging materials that appear older than 50 years. These could include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, and many other items.
- Clusters of tin cans or bottles, or other debris that appear older than 50 years.

- Old munitions casings. **Always assume these are live and never touch or move.**
- Buried railroad tracks, decking, foundations, or other industrial materials.
- Remnants of homesteading. These could include bricks, nails, household items, toys, food containers, and other items associated with homes or farming sites.

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

3.0 On-Site Responsibilities

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

STEP A: Stop Work.

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

STEP B: Protect the Discovery.

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

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

STEP C: Notify Project Archaeologist (if applicable).

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

STEP D: Notify Ecology contacts.

Ecology Contacts are provided in **Appendix A**. Once notified, the Ecology contact will contact DAHP to report and confirm the discovery. To avoid delay, the Project Primary Contact will contact DAHP if they are not able to reach Ecology. DAHP contacts are also provided in **Appendix A**.

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

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

4.0 Tribal Contacts

In the event cultural resources are discovered, the tribes identified in **Appendix A** will be contacted. See Section 10 for Additional Resources.

Please provide contact information for additional tribes within your project area, if needed, in **Appendix A**.

5.0 Special Procedures for the Discovery of Human Skeletal Remains

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

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

Guy Tasa, PhD State Physical Anthropologist

Guy.Tasa@dahp.wa.gov

(360) 790-1633 (Cell/Office)

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

1. Notify law enforcement and the Medical Examiner/Coroner using the contacts in **Appendix A**. Do not call 911 unless it is the only number available to you.
2. The Medical Examiner/Coroner (with assistance of law enforcement personnel) will determine if the remains are human or if the discovery site constitutes a crime scene and will notify DAHP.
3. **DO NOT speak with the media, allow photography or disturbance of the remains, or release any information about the discovery on social media.**
4. If the remains are determined to be non-forensic, cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and to shield them from being photographed by others or disturbed.

Further activities:

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

If the project occurs on federal lands (such as a national forest or park or a military reservation) the provisions of the Native American Graves Protection and Repatriation Act of 1990

(NAGPRA) apply and the responsible federal agency will follow its provisions. Note that state highways that cross federal lands are on an easement and are not owned by the state.

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

6.0 Documentation of Archaeological Materials

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

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

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

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

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

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

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

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

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

7.0 Proceeding with Work

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

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

8.0 Organization Responsibility

The Project Lead/Organization is responsible for ensuring:

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

9.0 Additional Resources

Informative Video

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

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

Informational Resources

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

Washington State Archeology (DAHP 2003) (https://dahp.wa.gov/sites/default/files/Field%20Guide%20to%20WA%20Arch_0.pdf)

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

Potentially Interested Tribes

Tribal Contacts: Interactive Map of Tribes by Area (https://dahp.wa.gov/archaeology/tribal-consultation-information)

Tribal Contacts - WSDOT Tribal Contact Website (https://wsdot.wa.gov/tribal/TribalContacts.htm)

10.0 Additional Information

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

Appendix A – Contact Information

Ecology Contacts:

Primary Contact:

Name: Frank Winslow

Phone: (509) 424-0543

Email: Frank.Winslow@ecy.wa.gov

Alternate Contact:

Name: Ryan Hardwick

Phone: (360) 407-6913

Email: ryha461@ECY.WA.GOV

DAHP Contacts:

Name: Guy Tasa

Title: State Physical Anthropologist

Cell: (360) 790-1633

Email: Guy.Tasa@dahp.wa.gov

Main Office

Human Remains/Bones:

Name: Guy Tasa

Title: State Physical Anthropologist

Cell: (360) 790-1633

Email: Guy.Tasa@dahp.wa.gov

Tribe Contact Information:

Tribe:	Tulalip Tribes of Washington
Name:	Teri Gobin
Title:	Chair
Phone:	(360) 716-4500
Email	trgobin@tulaliptribes-nsn.gov

Tribe:	Swinomish Indian Tribal Community
Name:	Steve Edwards
Title:	Chair
Phone:	(360) 466-3163
Email	sedwards@swinomish.nsn.gus

Tribe:	Stillaguamish Tribe of Indians
Name:	Eric White
Title:	Chairman
Phone:	(360) 652-7362
Email	ewhite@stillaguamish.com

Tribe:	Snoqualmie Indian tribe
Name:	Ginger de los Angeles
Title:	Culture Department Director
Phone:	(425) 888-6551
Email	ginger@snoqualmietribe.us

Law Enforcement and the Medical Examiner/Coroner Contacts:

Local Medical Examiner or Coroner	Local Law Enforcement	Local Non-Emergency
Name: Snohomish Medical Examiner	Main Name: Everett Police Department	Phone Number: (425) 407-3999
Phone: (425) 438-6200	Phone: (425) 257-8400	(911 if without a non-emergency number)

Implement the IDP if you see…

Chipped stone artifacts.

Examples are:

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

Stone artifacts from Oregon.

Stone artifacts from Washington.

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

Implement the IDP if you see…

Ground stone artifacts.

Examples are:

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

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

Artifacts from unknown locations (left and right images).

Implement the IDP if you see…

Bone or shell artifacts, tools, or beads.

Examples are:

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

Upper Left: Bone Awls from Oregon.

Upper Center: Bone Wedge from California.

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

Above: Tooth Pendants.

Right: Bone Pendants. Both from Oregon and Washington.

Implement the IDP if you see…

Culturally modified trees, fiber, or wood artifacts.

Examples are:

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

Left and Below: Culturally modified tree and an old carving on an aspen (Courtesy of DAHP). These are examples of above ground cultural resources.

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

Implement the IDP if you see…

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

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

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

Shell Midden pocket in modern fill discovered in sewer trench.

Underground oven. Courtesy of DAHP.

Shell Midden with fire cracked rock.

Hearth excavated near Hamilton, WA.

Implement the IDP if you see…

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

Examples are:

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

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

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

Implement the IDP if you see…

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

Examples are:

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

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

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

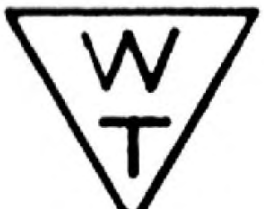
Implement the IDP if you see…

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

Far Left: .303 British cartridge found by a WCC planting crew on Skagit River. Don't ever touch something like this!

Left: Maker's mark on bottom of old bottle.

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



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

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

Implement the IDP if you see…

Historic foundations or buried structures.

Examples are:

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

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

Implement the IDP if you see…

Potential human remains.

Examples are:

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

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

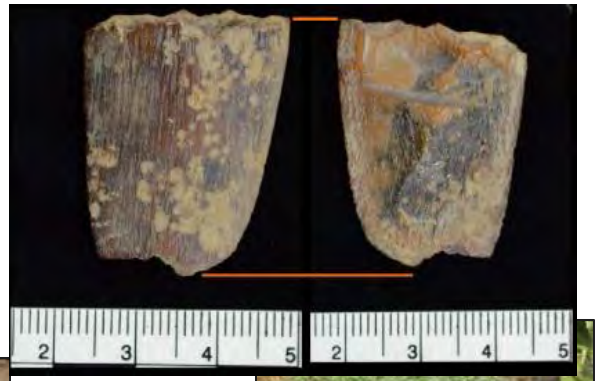
What would you do if you found these items at a site? Who would be the first person you would call?

Hint: Read the plan!

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

Other images (Top Right, Bottom Left, and Bottom)

Center: Courtesy of DAHP.



Attachment 1 BIO Deferral Letter

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47600, Olympia, WA 98504-7600 • 360-407-6000

February 23, 2024

Eric Rapp
Director Environmental Compliance
JELD-WEN, Inc
500 JELD-WEN Road
Craigsville, WV 26205

Re: Clarification on Creosote Area Cleanup Plans at the Jeld Wen Site

- **Site Name:** Jeld Wen
- **Site Address:** 300 W Marine View Drive, Everett, WA 98201-1030
- **Facility/Site No.:** 2757
- **Cleanup Site No.:** 4402
- **Agreed Order No.:** DE 5095

Dear Eric Rapp:

As we have discussed, the Washington State Department of Ecology (Ecology) has suggested a modification in the approach of developing and implementing the Step 2 pre-remedial design investigation (PRDI) for the Creosote Area. The Step 2 investigations are intended to gather data to support design of the remedial systems defined within the Cleanup Action Plan (CAP), dated August 2023. Components of the selected cleanup alternative for the Creosote Area portion of the Site detailed within the CAP are as follows:

1. Shallow Soil Excavation and Offsite Disposal
2. Enhanced In-Situ Bioremediation (BIO)
    a. Air Sparge (As) and Soil Vapor Extraction (SVE)
    b. Nitrate, Nutrients, and Surfactant (NNS) Recirculation
3. Monitored Natural Attenuation (MNA)
4. Contingency Measures (Thermal Treatment)

Success of the remedial measures implemented in the Creosote Area will be ultimately determined through performance and compliance monitoring activities.

Ecology has determined that there is a reasonable likelihood of achieving the cleanup objectives stated within the CAP by implementation of components 1, 2a, and 3. Hence, Ecology is suggesting that component 2b, NNS recirculation can be considered a contingency measure in case components 1, 2a, and 3 do not result in cleanup objectives being met.

Therefore, the collection of data to support design of NNS recirculation can be deferred until such time that Ecology has made a determination that components 1, 2a, and 3 are unlikely to result in achieving cleanup objectives. Such a determination could be made following either 1) review of data following implementation of Step 2 PRDI work plan activities, or 2) following implementation of CAP cleanup components. The timeframe for such a determination would solely be at Ecology's discretion; however, Ecology is optimistic that the execution of cleanup components 1, 2a, and 3 will result in cleanup objectives being met, and no need for NNS being identified. Ecology notes that the existing contingency measure within the CAP of thermal treatment is unchanged; however, thermal treatment essentially becomes a second contingency measure should a primary contingency measure of NNS recirculation (if needed) fail to result in achieving cleanup objectives.

The above change is not considered to be a significant change to the CAP, but rather primarily results in a modification of the sequencing of the cleanup components specified within the CAP. No modification to Agreed Order DE 5095 appears to be warranted at this time.

Please contact me at (509) 424-0543 or frank.winslow@ecy.wa.gov with any questions regarding this letter.

Sincerely,

Frank P. Winslow, LHG
Cleanup Site Manager
Toxics Cleanup Program
Headquarters Cleanup Section

fpw: af

Attachment 2 Response to Comments Letter

Technical Memorandum

To:	Frank Winslow, LHG	**From:**	Eric Rapp
Company:	Department of Ecology		JELD-WEN, Inc.
cc:	Scott Miller, P.E., SLR Chris Kramer, SLR	**Date:**	March 8, 2024
		Project No.	108.00228.00065

RE: Formal Response to Ecology Revised Comments on Pre-Remedial Design Investigation Work Plan, Upland Areas of Jeld Wen Site

JELD-WEN received revised comments on the draft Pre-Remedial Design Investigation (PRDI) Work Plan – Upland Areas of the Jeld Wen Site from the Washington Department of Ecology (Ecology) on February 21, 2024. In addition, Jeld-Wen received a formal deferral letter from Ecology regarding the selected BIO remedy on February 23, 2024. Ecology suggested the PRDI Work Plan be modified to elect installation and pilot testing of air sparge (AS) and soil vapor extraction (SVE) as the remedial action for the Creosote/Fuel Oil Area following hotspot excavation and disposal, while deferring various components of BIO testing activities that were presented in the 2023 Cleanup Action Plan (including Nitrate, Nutrients, and Surfactant [NNS] injection and recovery).

Per Ecology's request, this document has been prepared with responses to each comment below summarizing the revisions to be made and their proposed location in the final work plan, a notice of "comment acknowledged", or reasonable justification against making the requested change(s). As mentioned above, universal changes reflecting the BIO deferral letter will be made to the final Work Plan and all those individual changes are not detailed in this response letter.

Comments – Woodlife Area Proposed Investigation

A1 - Woodlife Area – Section 3.3.1 - Basis for depth of borings

The report refers to Figure 5, which shows estimated depth of contamination, but not boring depths, though the SAP discusses boring depths in greater detail. **Please add reference to the SAP for more detail on this subject in this section.**

Jeld-Wen Team Response:

Reference to the SAP to be included in text of Section 3.3.1.

Note that Ecology expects that the total depth of the boring should allow for soil samples that clearly demonstrate that all remaining soils following excavation have DF concentrations below the selected cleanup level (CUL). This means that soils should be excavated to a depth where concentrations are below the CUL based on data rather than based on interpolation. Ecology understands that there will apparently be no opportunity to collect confirmation soil samples and conduct additional excavation if those confirmation soil samples had DF concentrations exceeding CULs. **Hence, interpolation-based excavation total depths are not considered**

appropriate to demonstrate sufficiency of cleanup. The collection of sufficient reserve samples (and analyzing them, as needed) is anticipated to address this concern.

Jeld-Wen Team Response:

Section 3.3.1 does not propose interpolation-based excavation depths. Post-excavation confirmation sampling will be completed during remedial action activities. PRDI data will be used to establish the excavation depths. Interpolation, if any, may be used with Ecology approval and that will be presented in the PRDI data report. As shown on Figures 6a to 6c, a system of reserve sampling is proposed for the Woodlife Area. The terminus of these borings will be based on field observations and findings from historical adjacent borings.

No change to the Work Plan text is proposed.

A2 - Woodlife Area – Section 3.3.1 - Basis for selection of samples for analysis

Preliminary sampling depths shown on cross sections (Figures 6 a, b, and c). The SAP discusses sampling depths and field screening in greater detail. **Please add reference to the SAP for more detail on the subject in this section.**

Jeld-Wen Team Response:

Reference to the SAP to be included in text of Section 3.3.1.

To ensure that all locations have a bottom sample that will be below CULs, **Ecology recommends that additional soil samples should be collected and held in reserve pending results from other depths.** This approach is anticipated to reduce laboratory analyses while ensuring that the bottom depth of the excavation is well delineated.

Jeld-Wen Team Response:

Comment acknowledged. It should be noted that laboratory analysis for high resolution methods such as method 1613 for dioxins can take as long as 2 months to receive results, and also require additional data review and validation than standard methods. The method recommended holding time is 1 year for method 1613. While we recognize the benefits of archiving and reserving sample aliquots, we anticipate a maximum of 2 rounds of follow-up analysis for dioxins will be completed during the PRDI activities in order to remain within laboratory method holding time requirements and to stay on schedule for production of the PRDI Data Report and subsequent remedial design.

Section 3.3.1 of the Work Plan and Section 2.3 of the SAP will be revised to reflect this.

A3 - Woodlife Area – Section 3.3.1 - Anomalous PID Reading Location at GP-501

During previous investigations, anomalous PID readings of 1,620 ppm at 4.5 ft bgs and 1,202 ppm at 5.5 ft bgs were found at location GP-501. The soil exhibited “strong chemical like odor”. Soil from this depth was not analyzed for VOCs (a sample from a depth of 3 ft bgs with a PID reading of 2.1 ppm was). The cause of these very high PID readings at 4.5-5.5 ft bgs were not identified, although CPAHs, diesel, and heavy oil range petroleum, and PCP were detected at a depth of 3.0 ft bgs. This is also the location where DFs were detected in groundwater and a very high concentration of DFs was found in soil at 1.0 ft bgs.

Ecology requests that an offset boring close to GP-501 be conducted, and a sample from the 4.5 to 5.5 ft bgs interval be analyzed for VOCs. Understanding this contamination concern is important since a volatile solvent could potentially be a carrying agent for other site contaminants (e.g. DFs).

SLR Response:

A deeper boring will be completed at GP-501 area. This boring location is shown on Figure 5. This is discussed with the response to Comment A2 and A3 above. The boring will be completed to a depth of at least 15 feet bgs and may extend deeper if field observations show lithology or field instrumentation measurements inconsistent with surrounding borings.

Soil sampling for VOCs will be completed from 4.5 to 5.5 feet bgs at this boring location and from the depth interval with the highest PID reading from the recovered soil core in the Geoprobe. Anomalous elevated PID readings from the Woodlife Area may also be submitted for laboratory analysis of VOCs, pending discussion with Ecology (if conversations are delayed, field samples will be collected and held by the laboratory). Section 2.3 of the SAP will be revised to include potential VOC analysis in the Sample Analyses and Methods section.

Ecology requests that the boring offsetting GP-501 be drilled to a sufficient depth to define the maximum vertical extent of contamination. Boring GP-501 was drilled to 7.0 ft bgs, and still had evidence of contamination at 7.0 ft (PID reading of 41.6 ppm). The targeted depth of 10 ft bgs for borings in this area within the work plan may not be sufficient to define the vertical extent of contamination. We suggest that the offset boring at GP-501 be drilled to a greater depth to provide for better understanding of the maximum vertical extent of contamination prior to drilling other locations in the Woodlife Area. Care should be taken during drilling at this location to ensure that a conduit for downward contamination migration is not created.

Jeld-Wen Team Response:

A deeper boring is warranted and will be completed at GP-501 area. As presented in the Work Plan cross-section figures (6A, 6B, 6C) soil assessment greater than 10 feet bgs in the other areas of the Woodlife Area does not appear to be warranted. The sampling design presented in Section 3.3.1 includes depth intervals to be collected and held in reserve.

The language in Section 3.3.1 will be updated with:

"… Sampling in the Woodlife Area will include 27 soil boring locations with most borings completed to 10 feet bgs. The boring completed near the former sampling location GP-501 will be completed to a depth of at least 15 feet bgs and may extend deeper if field observations show lithology or field instrumentation measurements inconsistent with surrounding borings."

Borings will be completed using direct push methods; recovering the soil core, and the boreholes will be backfilled with bentonite. Dioxins & furans tend to partition onto soil; the proposed drilling methods, boring backfilling techniques, and relatively shallow investigation depth significantly reduce potential for creating a conduit for downward contaminant migration. The soil lithology throughout the fill area of the site is consistent (dredge sands) and a significant confining layer has not been encountered.

Ecology notes that PID readings should be taken and recorded at all Wood Life boring locations unless a case can be made that the readings at GP-501 were in error.

Jeld-Wen Team Response:

PID readings will be collected at all boring locations. Section 2.3 of the SAP will be revised to include PID screening protocol in the Sample Procedures section.

A4 - Woodlife Area – Section 3.3 - Water Levels

Please discuss the depth to groundwater data from the Woodlife Area within the work plan. Depth to water data from MW-7 and MW-9A/B data from 2015 to 2019 ranged from 1.6 to 5.7 feet below top of casing (ft btoc) in these monitoring wells. Hence, a significant amount of water could seep into the excavation, planned for up to about 7.0 feet below ground surface [ft bgs] at GP-501, and a significant amount of dewatering may be needed. Testing may be

warranted to assess potential water production in this excavation in this area to appropriately design dewatering measures.

Jeld-Wen Team Response:

In the PRDI Data Report, the PRDI data will be reviewed with the groundwater data and survey data (Section 3.2) to assess the need for aquifer testing in this area. More specifically, the PRDI data and the elevation survey will be used to assess the area, depth, and volume of soil below the groundwater table (if any) that will be removed. The lithology from the Woodlife area and location of the aquifer pump test (Section 3.4.5) will be reviewed to assess if the lithology is adequately similar to use the aquifer pump test data to assess dewatering in the Woodlife Area, or if alternate methods would achieve data quality objectives (i.e., slug test at existing monitoring well MW-7). This assessment of the lithology, the soil sampling data from the Woodlife Area, and the survey data will be discussed with Ecology prior to the performance of the aquifer pump test. Appropriate adjustment to the scope and location(s) of the aquifer pump test will be made from this consultation with Ecology.

A5 - Woodlife Area – Section 3.3 - Stormwater Management

We understand that currently, stormwater from West Marine View Drive flows into the area of the planned Woodlife excavation. **Please discuss within the workplan this stormwater concern**, and if information will be needed during Step 2 investigations to design appropriate mitigation measures for this concern.

Jeld-Wen Team Response:

Portions of the Woodlife Area are the main access driveway for the asphalt batch plant located on the west end of the property. It has been repeatedly documented that stormwater runoff from West Marine View Drive flows onto the former Nord Door facility property at this access driveway. Survey data (Section 3.2) and the soil removal delineation assessment data (Section 3.3.1) will be used to design the soil removal plan for this area that will include re-routing of traffic and redirecting potential surface water flow during the soil removal. Additionally, during the engineering design, JELD-WEN will work with the property owner regarding the backfilling, grading/recontouring, and surface paving of the Woodlife Area excavation.

The language in Section 3.3 will be updated to include the following:

This section describes the soil removal delineation assessment scope for the Woodlife Area. The data from this scope along with the data from the Survey (Section 3.2) will allow for the design of the Woodlife Area soil removal; design of traffic/pedestrian controls during the soil excavation, design of dewatering systems to be used during the soil excavation (if needed), design of surface run-on/run-off controls and erosion control BMPs, and the design of a backfilling and surface grading/paving plan. It is anticipated that the backfilling and surface grading/paving plan will involve the property owner and may involve the City of Everett for changes to the driveway access that would redirect surface water run-on.

A6 - Woodlife Area – General Comment - Health and Safety

The DFs in soil in this area are a significant health & safety concern. Ecology notes that meticulous adherence to health and safety plan requirements to prevent dermal contact, incidental ingestion, and dust inhalation are critical for these highly carcinogenic substances.

Jeld-Wen Team Response:

Comment acknowledged. The HASP (Appendix B) is being revised and the HASP is provided to and acknowledged by contractors performing invasive work.

Comments – Creosote Area Proposed Investigation

B1 - Creosote Area – General Comment - Cross Sections

No cross sections were provided for the Creosote Area within the work plan. **A minimum of two cross Sections (E-W and N-S) would appear to be warranted** and appropriate to support the work planning. Such cross Sections should include lithologies, existing borings and monitoring well screened intervals, and the estimated area of “hot spot” contamination.

Jeld-Wen Team Response:

Comment acknowledged. Cross sections of the Creosote/Fuel Oil Area will be included in the final PRDI Work Plan.

B2 - Creosote Area – General Comment - Field Screening

Ecology understands that the Creosote Area excavation is targeting hot spots where contamination is clearly apparent in the field, both during borehole sampling and during excavation work. We understand that such clearly apparent hot spots are based on visual free product and such soils are expected to have very strong odors.

Ecology recommends that recording of field observations including product observations be reported on borehole logs and then compiled in a tabular format since such observational data may be more valuable for defining the excavation than laboratory analytical data. The descriptions of product should include descriptors such as “product saturated”, “some product present”, “significant grain staining”, “some grain staining”.

The CAP included RELs for “hot spots” in the Creosote Area as follows:

- Soil – visible NAPL and PID readings > 100 ppm
- Groundwater – mobile NAPL and > 500 ug/L naphthalene in shallow groundwater

It is appropriate to more clearly define what constitutes the presence of visible NAPL in soil and mobile NAPL in groundwater to define a hot spot. Please add discussion within the work plan that includes definitions of free and residual NAPL, and the distinction between product saturation and product staining. **The discussion should propose what constitutes visible NAPL in soil and mobile NAPL in groundwater.**

Ecology notes that previous data suggest that the PID threshold of 100 ppm may only have relevance in selected areas, since high contaminant concentrations were apparently commonly found with PID readings significantly lower than 100 ppm. However, PID reading should be taken and recorded at all boring locations in the creosote area.

Jeld-Wen Team Response:

Recording of field observations will be reported on borehole logs and then compiled in tabular format. Section 3.3.6, Data Management, of the SAP/QAPP will be revised to reflect this.

The presence, saturation, or staining of NAPL will be defined as follows. Descriptions of product in soil matrix from the recovered Geoprobe cores will be described: Product Saturated Soil – Interval (i.e., 3-3.5'); Some Product Present in Soil Matrix (e.g., blebs) - Interval; Significant Grain Staining (e.g., >50% soil particles coated with product) - Interval; Some Grain Staining (e.g., <50% soil particles coated with product) - Interval. Mobile NAPL will be defined as the discovery of NAPL in new sentry wells or in existing wells that previously had not had product present. Additionally, PID readings will be recorded at all boring locations in the Creosote Area per Section 2.4 of the SAP.

B3 - Creosote Area – General Comment - Health and Safety

It will be critical to prevent inhalation exposure to such contamination both during investigations and during excavation work. Use of institutional controls such as large fans and staying upwind are important, as well as appropriate PPE and health and safety monitoring. Keeping non-project personnel out of the work area will also be important. Ecology wishes to emphasize the importance of health and safety to all personnel during this work.

Jeld-Wen Team Response:

Comment acknowledged. The HASP (Appendix B) is being revised and options for institutional controls (exclusion zones) and engineering controls (large fans) are being considered.

B4 - Creosote Area – Section 2.2.2 - Reference to "CPOC" on Page 12

The text in this section states:

> *Conceptually, excavation of contaminated soil will proceed after completion of the PRDI and engineering design. Site conditions could easily lead to flowing sands that could quickly destabilize a shored excavation and additional data will be collected during the*

PRDI to support a detailed design of the shoring system necessary for soil removal to the CPOC of 9 feet bgs.

The reference to 9 ft bgs (the target excavation depth) in this section as a CPOC is not correct and should be corrected. The CAP states:

A CPOC for the surface water protection COCs (cPAH is used here as IHS) in the Creosote/Fuel Oil Area of the Site may be allowed at the downgradient edge of the applicable COC plume within the upland area as determined from the RI after active remedy has been completed and the performing PLPs have demonstrated through a study that it would not be practicable to meet CUL throughout the plume area.

Therefore, the only potential CPOC for the creosote area is for monitoring wells, after completion of the cleanup work.

Jeld-Wen Team Response:

Section 2.2.2 will be revised to match language of the CAP (use of term alternate POC instead of CPOC in this case).

B5 - Creosote Area – Section 3.4 - Water Levels and Dewatering Assessment

Please discuss depth to groundwater data from the creosote area within the work plan. Depth to water data from MW-8A/B and MW-10A/B data from 2015 to 2019 ranged from 1.3 to 4.2 ft btoc in these monitoring wells. Hence a significant amount of water may seep into the excavation and a significant amount of dewatering may be required.

We understand that free product floating on water within the excavation is not currently anticipated; however, if free product is generated within the excavation, then it should be properly removed and disposed of. Ecology notes that the area of pump testing is to the west of the area where product may be found, hence boring data within the product area are anticipated to be more pertinent to assess the potential for product floating on water generation during excavation.

Jeld-Wen Team Response:

Historical groundwater level measurements will be included as an attachment to the revised PRDI Work Plan. Precautions will be taken for all groundwater-generating activities during the PRDI activities, including containment (via Baker Tanks, or similar) with oil-water separation chambers, solids filtering, and contaminant filter (i.e., activated carbon vessels) prior to discharge, pending approved permitting and requirements. Section 2.13, Residuals Management, of the SAP/QAPP will be revised to reflect this.

B6 - Creosote Area – Section 3.4.5 - Aquifer Pump Test

Ecology notes that the proposed pumping tests will be performed in part to assess dewatering needs during excavation. **Ecology suggests that the proposed shallow pumping well and monitoring wells screened interval be consistent with the anticipated depth of excavation to better assess dewatering needs.**

The representativeness of the pumping test on contaminated areas to the east is dependent on how laterally consistent the lithologies are in this area. The inclusion of boring logs from this area within the work plan as well as the cross Sections discussed above, would be appropriate to allow for assessing the amount of lateral heterogeneity in subsurface media.

Jeld-Wen Team Response:

The shallow pumping well will be installed deeper than the anticipated depth of excavation to account for the expected cone of depression created in the vicinity of the pumping well during the pump test. This is also the likely configuration needed during the excavation dewatering during remedial action.

Boring logs and the cross sections will be included as attachments to the Final PRDI Work Plan.

Shallow groundwater monitoring wells will be installed to approximately 13’ bgs to allow for the shallow groundwater surface to contact the 10’ section of screen for the majority of the time and allows for monitoring of LNAPL, as well as characterization of the shallow groundwater zone.

B7 - Creosote Area – Section 3.4 - Resilience to Climate Change

The new MTCA rule includes a requirement that cleanup alternatives be sufficiently resilient to potential climate change. We understand that a portion of the peninsula that the Property is on currently gets flooded under very high tides (i.e. king tides). As previously evaluated for the Site, climate change may bring rising sea levels. Ecology is concerned that if flooded, the proposed remedial system within the creosote area could be damaged or put out of operation. Hence, an assessment of potential flooding with high tides and potential sea level rise within the planned period of operation is warranted. **Please add discussion to the work plan regarding assessing this potential concern**. Elevation of land surface data in the creosote area, historical king tide elevations, and potential elevation rises should be included in this analysis. **This should also include presenting a preliminary map of the peninsula within the work plan showing the extent of current ~~and potential future~~ inundation, based on this analysis.** We understand that a detailed survey will be conducted at a later date, and hence the anticipated area of inundation will be refined following the surveying work (i.e. within the Step 2

PRDI report). An analysis of potential future inundation should be included within the Step 2 PRDI report.

Jeld-Wen Team Response:

Survey elevation data that will be obtained as part of PRDI activities is needed to perform this assessment and a summary of the findings will be included in the PRDI Data Report. A preliminary map of the peninsula with the extent of current inundation will be provided in the final PRDI Work Plan.

B10 - Creosote Area – Section 3.4.6.3 SSD Pilot Testing – Vadose zone lithologies

As discussed above, the vadose zone thickness in the creosote area historically ranged from 1.3 to 4.2 ft btoc. Hence, there appears to be limited thickness available for installing and testing horizontal piping for assessing sub-slab depressurization (SSD)system. Ecology notes that typical building construction would include placing an aggregate layer underneath the slab of a building. Also, due to potential flooding concerns and an expectation that a new structure would likely have additional fill materials brought it, it would appear that an SSD system would likely be constructed within such new materials (as opposed to within the existing vadose zone). Hence, Ecology is not clear on the rationale for installing and testing for SSD within the current vadose zone materials. **Please clarify the specific data needs that are anticipated to result from the proposed SSD testing.**

Ecology notes that a sub-slab depressurization system (SSDS) is typically installed for the purpose of protection of human health within structures by blocking the vapor intrusion pathway. By creating a negative pressure beneath the slab, no pressure gradient exists that could result in vapor intrusion.

Soil vapor extraction (SVE), on the other hand, can have multiple purposes. When coupled with air sparging (AS), SVE can be an effective alternative to removing volatile contaminant mass from groundwater and the vadose zone. An SVE system can also provide for protection of the vapor intrusion pathway, although an SVE system is commonly installed more deeply than an SSDS.

The Cleanup Action Plan (CAP) dated August 2023 includes AS coupled with SVE within the selected alternative (Alternative 7). According to the CAP, the SVE “will reduce potential exposures through vapor intrusion.” This coupling of AS with SVE is particularly important in proximity to buildings, since AS systems can result in significant mass transfer of volatile contaminants to the vadose zone. But removal of this contaminant mass within the vadose zone is a significant portion of the effectiveness of AS as a remedy.

Ecology suggests that reference to “SSD” within the work plan should be changed to “SVE”, consistent with the CAP. Testing is commonly needed for SVE design, but is not commonly done for SSDS design, since the permeability of the sub-slab aggregate in a new building would

be known, and the effectiveness of an SSDS should generally be assured. SVE, on the other hand, can have success limited by insufficient permeability within the vadose zone.

Ecology has not concluded that SVE is not warranted, but rather that an SVE system must be installed within vadose zone soil and there is a significant concern that the depth to groundwater within the creosote area is currently very limited (as shallow as 1.3 ft btoc). Hence, an SVE system may not be practicable prior to first bringing in additional fill. Another concern would be too shallow an SVE system with no concrete or asphalt “cap” may result in short circuiting tot eh surface. Hence Ecology is skeptical regarding conducting SVE testing at this time prior to additional fill being brought into this area. An SSD system installed within sub-slab aggregate may have potential to meet the needs of the project for an SVE system (removing vadose zone mass and protection from vapor intrusion) without testing, but of course, such a system would generally be installed as part of a new building slab construction.

Another possibility is to install a SVE system at a depth that may become occasionally saturated—presumably, a SVE system could be shut down if the perforated PVC used for vapor collection was under the water table, and the system brought back online after water levels dropped. I am not aware of any SVE systems operating in this manner, but I would assume that this approach would not be desirable.

Ecology requests the installation of a pressure transducer/data logger in a monitoring well within the Creosote area as soon as possible to start collecting long-term monitoring data to assess the depth to groundwater that could affect the success of a SVE system.

Jeld-Wen Team Response:

Use of the term SVE will be employed throughout the report to be consistent with the CAP. The SVE test methodology (horizontal extraction wells) was selected due to the notable shallow groundwater table in this area on occasion. The test method along with lower than usual induced vacuum during the pilot test should allow for proper assessment of this technology for the current site conditions. As the future configuration of the building or Site in general is unknown, the only feasible design consideration is that of current site conditions.

Pressure transducers will be installed in select monitoring wells in advance of the PRDI activities to build a database of long-term monitoring data to assess depth to groundwater in the proposed SVE system area.

B11 - Creosote Area – Section 3.4.6.3 Air Injection Testing – ROI Testing

A key element for the air injection testing is defining the radius of influence (ROI) and thus appropriate design spacing for air sparge wells. In addition to the measurements proposed to define the ROI, **Ecology recommends use of pressure transducer/data loggers during such testing.** Such loggers typically also record temperature, which in addition to pressure can provide valuable data for estimating ROIs.

Jeld-Wen Team Response:

Comment acknowledged. Section 3.4.6.3 of the work plan will be revised and associated sections of the SAP will be revised to include transducer assessments during ROI testing.

Sections related to the Air Injection Testing will also be universally revised to account for the deferral of full BIO System pilot testing, and the proposed PRDI activities will be represented as traditional Air Sparging methodology.

B10 – Creosote Area – Section 2.2.3 Remediation Levels

The cleanup levels (CULs) and remediation levels (RELs) presented in the Work Plan Section 2.2.3, including the tables on page 13, are not consistent with the remediation levels presented within the final Cleanup Action Plan (CAP) dated August 2023. **Please revise this section and the tables on page 13 to be consistent with the tables in the CAP (page 23).** This includes, but is not limited to:

- Addition of the CUL of 0.015 ug/L cPAHs in groundwater which was included within the CAP.
- Deletion of the REL of 4,900 ug/L for naphthalene (4,900 ug/L for naphthalene in shallow groundwater with IC and EC or no structures) which was not included within the CAP.

We suggest copying the text in these tables verbatim from the CAP to avoid potential confusion.

Jeld-Wen Team Response:

Comment acknowledged. Section 2.2.3 and other text will be revised to match language from the CAP.

Comments – Permitting and Reporting

C1 - Permitting – Section 3.5.1 Archeology

As discussed in a Site meeting, Ecology's new rule requires development of a Tribal Engagement Plan as well as requirements for consultation with the tribes. Ecology plans to submit a request for a tribal consultation for the proposed work. Other requirements for cultural resource compliance could follow. **Please mention tribal consultation within the work plan.**

Jeld-Wen Team Response:

Comment acknowledged. Section 3.5 will be revised to reflect this.

C2 - Permitting – Section 3.5.2 Air Emissions

As discussed above, Ecology is questioning the need for SSD testing at this time, although we note that the design and operation of an SSD should include meeting all air emission requirements. **Noting the highly noxious nature of the contamination in the creosote area, treatment of an SSD discharge may be warranted and appropriate.**

Jeld-Wen Team Response:

Comment acknowledged. Section 3.5.2 will be revised to remove the assumption that an air emissions permit will not be required, and instead will state that permitting will be dependent upon discussions with the regional clean air agency.

C3 - Permitting – Section 3.5.3 Water Quality

Ecology notes that all water discharges must comply with state and local requirements. Pretreatment of dewatering water and pumping test water prior to discharge (e.g. to the sanitary sewer may be necessary) and potentially required. Use of an oil/water separator may be needed if there is sheen or product on top of the excavation water. Ecology requests to be copied on all correspondences related to water discharges. No discharge of investigation-derived waters to the surface, stormwater features, or the marine environment should occur.

Jeld-Wen Team Response:

Comment acknowledged. See response to Comment B5. Section 3.5.3 will be revised to indicate that Ecology will be included on correspondence related to water discharges.

C4 - Permitting – Section 3.5.4 Waste Management

Ecology requests documentation of disposal of investigation derived wastes (IDW) within the report to be prepared documenting the PRDI Step 2 Upland work (see following comment regarding reporting).

Jeld-Wen Team Response:

Comment acknowledged. Section 3.5.4 will be revised to reflect this.

C5- Reporting – Section 4

As discussed in the Agreed Order, Second Amendment, Task C1 is the preparation and submittal of a draft PRDI data report. **Ecology requests addition of Section 4, Reporting, to the work plan.** We anticipate it may facilitate both preparation and review to separate the uplands from the sediments PRDI work into two separate reports.

The uplands report should include maps showing sampling locations, tables presenting data, and analysis of the data (e.g. delineated excavation lateral extent and depth, and the derived radius of influence for later use in design). Appendices should include, but not be limited to boring logs, laboratory analytical reports, data quality review, field data forms, and disposal documentation for IDW.

When presenting tables with results for soil and groundwater sampling, please include all historical and current results. As discussed above, for the creosote area, please also include tabulation of field observations used to delineate the “hot spot” area(s).

The data quality review appendix should discuss any laboratory qualified data, review field and laboratory quality controls samples (e.g. blanks, duplicates, laboratory control samples [LCS], matrix spikes [MS], and discuss the overall usability of the acquired data.

For the investigations in the Woodlife area, we anticipate that stormwater controls will be needed to prevent runoff from West Marine View Drive. Please include within the report, documentation of the mitigation measures employed to prevent runoff from entering the investigation area during the Step 2 investigations.

For the resiliency to climate change requirement in the new rule, please include in the report an aerial map showing the current inundation area under king tides, and the anticipated future inundation area taking into account anticipated sea level rise from the previously provided sea level rise analyses.

Jeld-Wen Team Response:

Comment acknowledged. Section 4, Reporting, will be added to the work plan that details the abovementioned elements of the PRDI Report.

C6 - Professional License Stamp

Please include appropriate professional license stamps and signatures on the revised work plan.

Jeld-Wen Team Response:

Comment acknowledged. Professional license stamp will be applied to the final Work Plan.

Comments – Appendix A – SAP and QAPP

D1 - General Comment

Please adjust the language within the SAP and QAP, as appropriate, to be consistent with the above work plan comments.

Jeld-Wen Team Response:

Comment acknowledged.

D2 - SAP Section 2.1

Please adjust the language as follows (inserted text in bold):

> *Groundwater and soils will be analyzed by **Washington State**-accredited laboratories using ~~U.S.~~ ~~Environmental Protection Agency (EPA)~~ **Ecology**-approved analytical methods with appropriate detection limits. **Detection limits must be lower than cleanup levels defined in the Cleanup Action Plan (CAP).** Laboratory quality objectives are shown in Table 2.*

Jeld-Wen Team Response:

Comment acknowledged. Text edits will be made as suggested.

D3 - SAP Section 2.1

The document states:

> *Final specifications of soil borings and well constructions will be dependent upon conversations with the drilling subcontractors and field observations.*

Ecology notes that depths are commonly adjusted by field geologists based on field observations.

Drilling subcontractors should generally not be adjusting installation specifications outside of ensuring compliance with well construction regulations. Any adjustments beyond those that are typically done by field geologists (e.g. adjustments in monitoring well screened intervals) should be communicated to Ecology prior to implementation.

Jeld-Wen Team Response:

SAP Section 2.1 will be revised to remove ambiguity that drilling subcontractors will be making investigation-related decisions. Text in the SAP will also be revised to indicate procedure for communication with Ecology on field alterations to the sampling plan.

D4 - SAP Page 5, Sample Procedures (Woodlife)

Please adjust the language as follows (inserted text in bold):

> *1.Soil borings will be advanced with a direct push (i.e. Geoprobe) drilling rig operated by a Washington-licensed drilling subcontractor to an initial depth of 10 feet bgs. The soil cores are typically completed as 5-foot intervals* ***(continuous soil sampling)****. Areas with concrete surface will be cored prior to Geoprobe drilling and areas with asphalt pavement will be driven through the asphalt with the Geoprobe drilling rig.*

Jeld-Wen Team Response:

Comment acknowledged. Text will be revised as suggested.

D5 - SAP Page 5, Sample Procedures (Woodlife)

The document states:

> *4.Sample intervals for laboratory analysis will be based on the CSM presented in the Upland PRDI WP, field observations, and previous investigation findings, and per the following procedure as shown on SAP Figure 4a to 4c.*

Please note Ecology's above comments A1 and A2. Soil sample results below CULs must define the base of the excavation, not by interpolation. Reserve samples should be collected and run to ensure that the deepest soil sample at each location is below CULs for DFs (noting the anticipated constructability limit of 9 ft bgs stated in the SAP). Note that field screening may be of limited utility for assessing the potential presence of DFs at concentrations above the CUL.

Jeld-Wen Team Response:

Comment acknowledged. See previous responses to comments A1 and A2.

D6 - SAP Page 5, Sample Procedures (Woodlife)

The very high PID readings at GP-501 may drive field screening for excavation and offsite disposal for a separate contaminant release in this area. Please add PID screening to the sample procedures for the Woodlife area borings. If the requested boring offset at GP-501 does not show elevated PID readings (demonstrating that the report PID readings at this location were in error), then there may be potential for discontinuing PID measurements in this area.

Jeld-Wen Team Response:

Comment acknowledged. See previous response to comment A3.

D7 - SAP Page 6, Sample Procedures (Woodlife)

The document states:

> *5.Soil borings will be backfilled with bentonite chips to the approximate ground surface and hydrated and the surrounding surface material will be patched with like material.*

Ecology anticipates that the stormwater concern discussed above will be addressed such that no ponding occurs in the Woodlife area. However, if there is any potential for ponding to occur subsequent to drilling and before excavation work, then asphalt patch should be applied to the surface at each boring location.

Jeld-Wen Team Response:

Comment acknowledged.

D8 - SAP Page 9, Sample Procedures, Shallow Zone Groundwater Assessment

The document states:

> *1. Following completion of the Geoprobe drilling, the soil boring will be overdrilled with an auger using a hollow-stem auger drilling rig (or auger attachment for the Geoprobe rig) to approximately 15' bgs. No split spoons or soil sampling/screening will be performed; however, the soil cuttings will be visually observed for significant field impacts not observed in the Geoprobe cores.*
>
> *2. A 2-inch diameter 10-foot Section of slotted well screen will be installed with blank PVC risers to above the ground surface. The annulus of the well screen interval will be backfilled with a silica sand filter pack to approximately one-foot above the well screen, followed by a hydrated bentonite seal to approximately one-foot bgs. A concrete surface seal and traffic-rated flush mount well box will be installed at the surface and allowed to set for a minimum of 48 hours.*

As discussed above, to assess the zone where excavation and dewatering will take place, Ecology recommends that the shallow monitoring wells be installed to a depth no greater than 10 ft bgs. Drilling to 15 feet and backfilling to 10 ft bgs with bentonite would be acceptable such that additional characterization of the soils immediately below the excavation bottom is done. We recognize that the shallow pumping well may need to be screened deeper so that it does not dry up during pumping.

Jeld-Wen Team Response:

Comment acknowledged. See previous responses to comments B5 and B6.

D9 - SAP Page 9, Sample Procedures, Shallow Zone Groundwater Assessment

No well screen slot size was specified in the SAP. In Ecology's experience, a 0.010 slot size can be a barrier to product entering a monitoring well, whereas a 0.020 slot size can more easily allow product to enter. However, minimizing turbidity can be important, if characterizing dissolved phase contamination is the primary objective. Ecology also notes that the potential presence of LNAPL also necessitates the top of the well screen to extend above the water table. In some cases, it can be challenging to install a shallow enough well screen and meet well construction regulations. Hence, one option, if groundwater is very shallow, is to complete some wells to a depth of less than 10 feet, which is less than the limit required for registration of wells in Washington State (and thus the surface seal minimum thickness requirement is not invoked. If there is any potential for product within in the excavation, the installation of one or more shallower point to assess this concern may be warranted. An added benefit of this would be not needing to file well decommissioning paperwork for wells less than 10 feet deep within the excavation area, as well as not needing to install a surface installation (other than to temporarily protect the PVC point).

Jeld-Wen Team Response:

Due to concerns with NAPL, screen sizes will be 0.020 slot. References to screen slot size will be revised throughout the document. Text in the SAP will be revised with protocol for product measurements, including no recording of measurements if groundwater level is above top of screen (which is expected to be infrequent, even if well is screened at 5 feet bgs).

D10 - SAP Page 10, Section 2.6 Deep Zone Groundwater Assessment

The document states:

> *Five deep groundwater monitoring wells will be co-located with soil borings completed as part of the Hot Spot delineation assessment and their location will be based on an estimate of whether they will remain outside of the excavation footprint, but still within the deep groundwater zone area of impacts (see proposed locations on SAP Figure 5). As opposed to the shallow monitoring well installations, it is not feasible to advance every soil boring that is part of the Hot Spot soil delineation to the deep zone.*

Ecology notes that in order to characterize worst-case conditions, one of the deep zone monitoring wells may need to be within the anticipated excavation area. Although Ecology concurs with the goals of the preservation of the monitoring wells to the extent possible, this should not be done to the degree that results could be inappropriately biased. If a location is installed within the excavation area, then such a well would need to be properly decommissioned by a licensed well driller prior to excavation.

Jeld-Wen Team Response:

As shown on Figure 5, there is a deep zone well proposed for within the excavation area.

D11 - SAP Page 10, Section 2.6 Deep Zone Groundwater Assessment

Similar to shallow zone monitoring wells, no proposed well slot size was given in the work plan for deep monitoring wells. A 0.010 slot well screen will likely impede entry of DNAPL into the wells. Even a 0.020 slot could potentially impede entry of a highly viscous DNAPL product. Hence, proper design of monitoring wells to characterize DNAPL should be closely examined.

If any measurable thickness of LNAPL or DNAPL is found in any site monitoring wells, Ecology recommends collecting a product sample(s) for laboratory analysis for chemical composition as well as density.

Ecology also notes that an interface probe should be used for water level and depth to product measurements if any LNAPL or DNAPL is encountered.

Jeld-Wen Team Response:

Comment acknowledged. See previous response to comment D9.

If sufficient product for sample collection is encountered, a sample will be collected for chemical composition and density. Sections in the SAP will be revised to include potential analysis of NAPL, if encountered.

D12 - SAP Page 12, Section 2.7 Geotechnical Assessment

The document states:

> *If very loose sands are encountered, an alternate drilling method (i.e., mud rotary drilling) may be needed.*

Ecology highly recommends sonic drilling in case of heaving sand problems rather than mud rotary drilling. Unlike mud rotary drilling, sonic drilling generally results in excellent and continuous soil sample recovery.

Jeld-Wen Team Response:

Comment acknowledged.

D13 - SAP Page 14, Section 2.8 Aquifer Pumping Test

Please note Ecology's above comments regarding shallow pumping and monitoring well screened intervals. These wells should be designed to provide data targeting the excavation maximum depth of 9.0 ft bgs. Therefore, a shallow pumping well screened from 15 to 20 ft bgs does not make sense to Ecology (a screened interval from 5 to 15 feet would make better sense). Although a permanent water supply well typically has a pump set above the well screen (or installed with shroud), it is not uncommon for pumping tests to be conducted with the pump set within the well screened interval.

For the deep pumping wells, a well screen longer than 5.0 feet may be advisable, since aquifer materials may not have sufficient yield. Ecology recommends a significantly larger screened interval (e.g. 35-50 ft bgs) to ensure that target pumping rates can be achieved.

Jeld-Wen Team Response:

Comment acknowledged. This section will be revised in light of the deferral of full BIO System pilot testing and will be presented as focused on obtaining excavation dewatering data.

D14 - SAP Page 15, Aquifer Testing Procedures

The document includes:

a. Background data will be collected for approximately two weeks.

b. Manual soundings will be made when the pressure transducers are installed and before the aquifer test begins. Data from the pressure transducers will be downloaded before every test to ensure that data is being recorded properly.

c. The background data will be used if correcting water levels for tidal or barometric effects is warranted. Tidal fluctuations in the estuary will be monitored by installing a temporary well that extends into the adjacent surface water at the end of the property.

Manual water level readings should also be taken prior to pulling the pressure transducer/data loggers and are suggested for several points in between. This allows for corrections to be applied to the pressure transducer data, if stray occurs, or even rejection of the data, if failure occurs.

In addition to tidal effects, Ecology requests that the heads in the monitored wells be compared with the marine head measurements in order to assess gradients during the course of the background monitoring. This means that pressure transducer data be transformed to elevation data from all locations, including the temporary well installed in surface water. The top of casing of the temporary surface water well and all new monitoring wells therefore need to be surveyed. This gradient data can be assessed by overlaying the groundwater head data with the marine head data within the report prepared for the Step 2 PRDI. These data are anticipated to allow significantly better understanding of the interconnectivity of the groundwater system with the adjacent marine system.

Monitoring wells MW-4, MW-5, MW-6, MW-7, MW-8A/8B, MW-9A/9B, MW-10A/10B, MW-11A/11B, the new shallow and deep monitoring wells to be installed as part of the Upland PRDI activities, and the new pumping wells are proposed for installation of pressure transducer/data loggers during the background monitoring. Ecology concurs with the selection of these monitoring wells and appreciates that this proposed background monitoring will be a thorough assessment.

Jeld-Wen Team Response:

Comment acknowledged.

D15 - SAP Page 16, Aquifer Testing Procedures

The document includes:

> *6. Groundwater pumped during the testing will be containerized pending disposal or discharge.*

Please add additional discussion regarding the capacity of water container(s) that will be needed, and anticipated pretreatment and discharge requirements.

Jeld-Wen Team Response:

Comment acknowledged. See previous response to comment B5.

D16 – SAP Section 2.13 Residuals Management

Ecology highly recommends keeping soils and water potentially contaminated with DFs separate from the Creosote Area contaminated soil and groundwater. In addition, properly separating potentially contaminated soil, water, and other wastes (e.g. PPE and disposable investigation materials) is advised.

Jeld-Wen Team Response:

Comment acknowledged. Section 3.5.4 will be revised to reflect this.

Attachment 3 Historical Boring Logs – Creosote/Fuel Oil Area

SLR
SLR International Corp
22122 20th Avenue SE
Bothell, Washington 98021
Telephone: 425.402.8800
Fax: 425.402.8488

BORING NUMBER GP-9

CLIENT JELD-WEN, inc
PROJECT NAME Former Nord Door
PROJECT NUMBER 008.0228.00013
PROJECT LOCATION Everett, WA
DATE STARTED 5/1/06 **COMPLETED** 5/1/06
GROUND ELEVATION ___ **HOLE SIZE** 3.25
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▽ **AT TIME OF DRILLING** 6.0 ft
LOGGED BY B. Johnson **CHECKED BY** ___
AT END OF DRILLING ---
NOTES ___
AFTER DRILLING ---

DEPTH (ft)	INTERVAL	TYPE	NAME	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0				AS		0.3 0 to 0.25 feet: ASPHALT.	
		GP	NS	SM		0.25 to 5.5 feet: SAND with SILT (SM): light to dark brown, fine to coarse sand, little fines, moist, no odor.	1.2
5		GP	GP9-6 GP9-GW*	SP		5.5 ▽ 5.5 to 12 feet: SAND (SP): medium gray, fine to coarse sand, few fines, wet, hydrocarbon-like odor, visible product on acetate liner, sheen on soil.	25.9
10		GP	GP9-12*			12.0	26.3

Boring completed at 12 feet.

Temporary well was installed with screen at depths from approximately 7 to 12 feet below ground surface.

REMARKS

* = Soil and groundwater sample was submitted for laboratory analysis.
PID = photoionization detector readings in parts per million (ppm).
GP = Soil samples were collected with Geoprobe by using a 4-foot long, 1.5-inch diameter closed-piston sampling device with new acetate liners.
NS = No sample collected.
▽ Water level at time of drilling.

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BORING NUMBER GP-10

CLIENT JELD-WEN, inc
PROJECT NAME Former Nord Door
PROJECT NUMBER 008.0228.00013
PROJECT LOCATION Everett, WA
DATE STARTED 5/1/06 **COMPLETED** 5/1/06
GROUND ELEVATION ____ **HOLE SIZE** 3.25
DRILLING CONTRACTOR Cascade Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▽ **AT TIME OF DRILLING** 6.5 ft
LOGGED BY B. Johnson **CHECKED BY** ____
AT END OF DRILLING ---
NOTES ____
AFTER DRILLING ---

DEPTH (ft)	INTERVAL	TYPE	NAME	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0				AS		0.3 0 to 0.25 feet: ASPHALT.	
		GP	GP10-3	SM		0.25 to 5 feet: SAND with SILT (SM): light to dark brown, fine to coarse sand, few fines, few orgainc s (wood pieces), moist, no odor.	4.9
5						5.0	
		GP	GP10 -GW*	SP		5 to 9 feet: SAND (SP): light to dark gray, fine to coarse sand, trace fines, moist to wet, hydrocabon-like odor, sheen on soil. ▽	5.8
						9.0	
				ML		9.5 9 to 9.5 feet: SILT (ML): medium gray, trace fine sand, wet, slight hydrocarbon-like odor.	
10		GP	GP10-11*	SP		9.5 to 11.75 feet: SAND (SP): medium gray, fine to coarse sand, trace fines, wet, hydrocarbon-like odor, sheen on soil.	28.3
						11.8	
				ML		12.0 11.75 to 12 feet: SILT (ML): medium brown, trace organics (roots), wet, slight hydrocarbon-like odor.	

Boring completed at 12 feet.

Temporary well was installed with screen at depths from approximately 7 to 12 feet below ground surface.

REMARKS

* = Soil and groundwater sample was submitted for laboratory analysis.
PID = photoionization detector readings in parts per million (ppm).
GP = Soil samples were collected with Geoprobe by using a 4-foot long, 1.5-inch diameter closed-piston sampling device with new acetate liners.
NS = No sample collected.
▽ Water level at time of drilling.

SLR
SLR International Corp
22122 20th Avenue SE
Bothell, Washington 98021
Telephone: 425.402.8800
Fax: 425.402.8488

BORING NUMBER GP-213

CLIENT JELD-WEN, inc
PROJECT NAME Former Nord Door
PROJECT NUMBER 008.0228.00013
PROJECT LOCATION Everett, WA
DATE STARTED 9/12/06 **COMPLETED** 9/12/06
GROUND ELEVATION _____ **HOLE SIZE** 3.25
DRILLING CONTRACTOR Boart Longyear
GROUND WATER LEVELS:
DRILLING METHOD Direct Push
▽ **AT TIME OF DRILLING** 2.5 ft
LOGGED BY K Saganski **CHECKED BY** _____
AT END OF DRILLING —
NOTES _____
AFTER DRILLING —

DEPTH (ft)	INTERVAL	TYPE	NAME	U.S.C.S.	GRAPHIC LOG		MATERIAL DESCRIPTION
0				AS		0.3	0 to 0.25 feet: **ASPHALT.**
				GP		1.0	0.25 to 1 feet: **Sandy GRAVEL (GP):** brown, fine to coarse subrounded gravel, some fine to coarse sand, little silt, moist, no odors.
				SP			1 to 2.5 feet: **Gravelly SAND (SP):** dark brown, fine to coarse sand, some fine to coarse gravel, little silt, moist, no odors.
		GP	GP213-3.5*				▽ 2.5 to 8 feet: **SAND (SP):** grey to dark grey, fine to medium, trace coarse sand, trace fines, wet, strong chemical odors.
5							
		GP	GP213-P*			8.0	
				ML		9.0	8 to 9 feet: **SILT (ML):** dark brown, trace fine sand, moist, chemical odors.
10				SP		10.0	9 to 10 feet: **SAND (SP):** dark grey, fine to medium, trace coarse sand, some fines, wet, strong chemical odors, visible sheen, trace wood pieces.

Boring completed at 10 feet.

Temporary well was installed with screen at depths from approximately 5 to 10 feet below ground surface.

REMARKS

* = Soil and groundwater sample was submitted for laboratory analysis.
PID = photoionization detector readings in parts per million (ppm).
GP = Soil samples were collected with Geoprobe by using a 4-foot long, 1.5-inch diameter closed-piston sampling device with new acetate liners.
NS = No sample collected.
▽ Water level at time of drilling.

Project: Former Nord Door										**Boring/Well Name:**
Boring Location:								**Job #: 008.0228.00013**		
Drilling Company: Cascade Drilling								**Logged by: Beau Johnson**		MW-5
Equipment: HAS								**Start Date/Time: 10-2-06 @ 1405**		
Sampling Method: Split Spoon								**Finish Date/Time: 10-2-06**		
Hammer Weight: 300								**Monitoring Device: PID**		
Screened Interval (bgs): 5 - 15								**First Water (bgs): 9.5**		

Sample I.D.	Sample Interval	Recovery (%)	PID (ppm)	Blow Counts	Depth (feet bgs)	USCS Code	Graphic Log		Lithologic Description	Well Construction Details
					0	ML		0 - 0.25	SILT: Dark brown, trace fine sand, moist, no odors, lots of organics.	Concrete
										Bentonite
NS		80	3.2	4 5 4		GM		2.5 - 4	Silty GRAVEL: Dark brown to black, fine to coarse gravel, some fines, trace coarse sand, moist, no odors, burnt wood pieces	
					5					Sand
NS		50	2.4	5 3 3		GM		5 - 6	Silty GRAVEL: Dark brown to black, fine to coarse gravel, some fines, trace coarse sand, moist, no odors.	
						ML		6 - 6.5	Sandy SILT: Dark brown, some fine to med sand, moist, slight hydrocarbon-like.	
MW5-8.5 @1440		100	4.9	1 4 7		ML		7.5 - 8.5	SILT: Gray, trace fine sand, moist, hydrocarbon-like odors, trace organics	
						SP		8.5 - 9	SAND: Gray, fine to coarse sand, moist, hydrocarbon-like odors.	
					10					
NS		100	12.7	5 8 11		SP		10 - 11.5	SAND: Dark Gray, fine to coarse sand, trace fines, wet, strong hydrocarbon-like odors, visible sheen on soil, a large wood piece.	
NS		100	5	17 25 40		SP		12.5 - 14	SAND: Dark Gray, fine to coarse sand, trace fines, wet, strong hydrocarbon-like odors.	
					15					
NS		100	4.3	50 for 6"		SP		15 - 16.5	SAND: Dark Gray, fine to coarse sand, trace fines, wet, strong hydrocarbon-like odors.	
					20				Well: 2" PVC Screen: .010"	

Depth of Boring (bgs): 16.5	**Filter Pack: 3.5 - 16.5**
Depth of Well (bgs): 15	**Annulus Seal: 2 - 3.5**
	Surface Seal: 0 - 2

BORING NUMBER GP-605

SLR International Corporation
405 East 12450 South, Suite K
Draper, Utah 84020

CLIENT JELD-WEN, inc. **PROJECT NAME** Former Nord Door

PROJECT NUMBER 108.00228.00048 **PROJECT LOCATION** Former Nord Door Facility

DATE STARTED 12/18/13 **COMPLETED** 12/18/13 **DRILLING METHOD** Direct Push

DRILLING CONTRACTOR ESN-NW **GROUNDWATER ENCOUNTERED AT (feet):** 2.5

LOGGED BY C. Lee **CHECKED BY** M. Coracci

NOTES North of office building on front of plant, screened interval 30-35 feet

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0					0.5 SOD	
		50	SP		1.5 SAND, dark brown, fine-grained, damp, no odors or staining	0
			CL		2.5 CLAY, red, damp, no odors or staining	
			SP		SAND, brown, fine to medium-grained, few fines, wet, no odors or staining	
5		50			@ 4.5 feet: moderate creosote odor	2.1
					6.0	
		90	GP		GRAVEL, gray, fine to medium, few fine to medium- grained sand, damp to wet, moderate to strong creosote-like odor	6.3
					@ 9.0 feet: becomes wet	
10		90			@9.5 feet: creosote-like odor becomes strong, creosote coating on the soil	9.1
		95			11.0	
			ML		SILT, brown, trace organics, wet, moderate creosote-like odor	
					13.0	2.1
	GB		SP		SAND, gray, fine to medium-grained, fines, wet, moderate creosote like odor, crosote coating on the soil	
15					@15-20 feet: sample liner was stuck in sampler; hammer used to loosen sample liner from sampling rod	2.0
					@20-25 feet: sample liner was stuck again	
20					@30-35 feet: sample liner was stuck again	2.4
						3.1
25						
						1.1
						2.1
30						
						2.5
					34.5	
35	GB		ML		35.0 @ 35 feet: SILT, clean grey, no odor or staining	11.0

Bottom of boring at 35.0 feet.

Notes

BASIC GEOPROBE TEMPLATE W/ RECOVERY NORD DOOR FACILITY.GPJ GINT US.GDT 2/10/14

WELL NUMBER GP-709

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc.
PROJECT NAME Former E.A. Nord
PROJECT NUMBER 108.00228.00048
PROJECT LOCATION 300 West Marine View Dr, Everett, WA
DATE STARTED 7/7/15 **COMPLETED** 7/7/15
DRILLING METHOD Direct Push
DRILLING CONTRACTOR Cascade Drilling
GROUNDWATER ENCOUNTERED AT (feet): 5.5
LOGGED BY P. LeDoux **CHECKED BY** C. Kramer
NOTES Temporary boring abandoned with bentonite

DEPTH (ft)	SAMPLE NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
0					0.5 ASPHALT		
		50	SP		SAND with gravel, little to no fines, moist, fine sand, fine subangular gravel, dark gray, weak creosote odor, no staining	0.4	
					4.0		
5	GP-709-5				5.0 CONCRETE (crushed), dry, moderate hydrocarbon odor, no staining		
					SAND, little to no fines, black, wet, fine sand, moderate to strong creosote odor, black staining, trace organics (roots) throughout	28.5	
		100	SP			37.8	
		100			9.0	46.6	
10			ML		Organic SILT, dark gray, wet, moderate creosote odor, light staining		
					10.5		
		100			SAND, little to no fines, wet, black, fine sand, strong creosote odor, black staining	33.6	1" PVC temporary well
		100				47.7	
15							
		90	SP			58.8	
20							
		90				67.3	
25							
		90			27.0	64.0	
			SP		28.0 SAND, product observed in water in core		
		90			SAND	109	
30							
		90	SP			84.9	
		90				126.1	
35		90				81.2	

REMARKS

(Continued Next Page)

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

WELL NUMBER GP-709

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc. **PROJECT NAME** Former E.A. Nord

PROJECT NUMBER 108.00228.00048 **PROJECT LOCATION** 300 West Marine View Dr, Everett, WA

DEPTH (ft)	SAMPLE NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
35					SAND *(continued)*		
		60	SP			94.1	
		60				124.4	
40							
	GP-709-42	90				210.8	
		90			43.5	57.9	
45			SM		Silty SAND, dark gray, very fine sand, wet, strong creosote odor, no staining 45.0		
					Bottom of boring at 45.0 feet.		

REMARKS

WELL NUMBER GP-710

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc.
PROJECT NAME Former E.A. Nord
PROJECT NUMBER 108.00228.00048
PROJECT LOCATION 300 West Marine View Dr, Everett, WA
DATE STARTED 7/8/15 **COMPLETED** 7/8/15
DRILLING METHOD Direct Push
DRILLING CONTRACTOR Cascade Drilling
GROUNDWATER ENCOUNTERED AT (feet): 4.5
LOGGED BY P. LeDoux **CHECKED BY** C. Kramer
NOTES Temporary boring abandoned with bentonite

DEPTH (ft)	SAMPLE NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
0					0.5 ASPHALT		
	GP-710-4	70	SP-SM		1.5 SAND with silty fines, dark brown, moist, fine sand, no odor, no staining	9.7	
			ML		2.5 Sandy SILT, gray, moist, no odor, no staining		
			SP-SM		SAND with silty fines, brown, moist, fine sand, no odor, no staining		
5					4.5 ▽	4.9	
			SP		5.5 SAND, little to no fines, dark gray, wet, trace organics (small roots) throughout, weak organic odor, no staining		
		95	ML		SILT, gray, wet, trace organics (small roots) throughout, weak organic odor, no staining	12.1	
					7.5		
		95	SP		SAND with gravel, little to no fines, gap-graded sand, fine subangular gravel, dark gray, wet, weak creosote odor, no staining	7.0	
10		80				10.7	
					12.5		
		80	SP		SAND, little to no fines, dark gray, wet, weak creosote odor, no staining	8.2	← 1" PVC temporary well
15		95				12.9	
		95				6.4	
20		85				8.1	
					23.0		
		85	SP		24.0 SAND, creosote odor becomes moderate	9.5	
25					SAND		
		90				13.8	
		90				18.9	
30			SP				
		90				10.5	
35		90				41.9	

REMARKS

(Continued Next Page)

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

WELL NUMBER GP-710

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc. **PROJECT NAME** Former E.A. Nord

PROJECT NUMBER 108.00228.00048 **PROJECT LOCATION** 300 West Marine View Dr, Everett, WA

DEPTH (ft)	SAMPLE NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
35							
	GP-710-35	60	SP		SAND *(continued)*	18.7	
		48				20.4	
40					40.0		
					Bottom of boring at 40.0 feet.		

REMARKS

WELL NUMBER GP-711

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc.
PROJECT NAME Former E.A. Nord
PROJECT NUMBER 108.00228.00048
PROJECT LOCATION 300 West Marine View Dr, Everett, WA
DATE STARTED 7/8/15 **COMPLETED** 7/8/15
DRILLING METHOD Direct Push
DRILLING CONTRACTOR Cascade Drilling
GROUNDWATER ENCOUNTERED AT (feet): 4
LOGGED BY P. LeDoux **CHECKED BY** C. Kramer
NOTES Temporary boring abandoned with bentonite

DEPTH (ft)	SAMPLE NAME	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
0					0.5 ASPHALT		
	GP-711-3	70			FILL, sand with gravel and silty fines, dark brown, fine sand, fine subangular gravel, moist to wet, weak creosote odor, no staining	12.9	1" PVC temporary well
					4.5 ▼		
5	GP-711-6	70	SP-SM		SAND, little to no fines, dark gray, wet, fine sand, weak to moderate creosote odor, no staining	7.5	
		90			6.0		
		90	ML		SILT, gray, wet, trace organics (small roots) throughout, weak creosote odor, no staining	49.2	
					8.5		
		90			SAND, little to no fines, dark gray, wet, fine sand, weak creosote odor, no staining	20.2	
10		70	SP			9.8	
		70				10.5	
15					15.0		
					Bottom of boring at 15.0 feet.		

REMARKS

WELL NUMBER MW-8A

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc.
PROJECT NAME Former E.A. Nord
PROJECT NUMBER 108.00228.00048
PROJECT LOCATION 300 West Marine View Dr, Everett, WA
DATE STARTED 8/12/15 **COMPLETED** 8/12/15
DRILLING METHOD Hollow Stem Auger
DRILLING CONTRACTOR Cascade Drilling
GROUNDWATER ENCOUNTERED AT (feet):
LOGGED BY P. LeDoux **CHECKED BY** C. Kramer
NOTES Logged from HSA cuttings

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
0						0.5 ASPHALT SANDS, moderate to strong creosote odor		Cement Seal Bentonite Seal
5				SP				
10								Screen with Sand Filter
	SS	80	13	SP		11.5 SAND, dark gray no fines, moderate creosote odor, no staining 13.0	9.6	
						Bottom of hole at 13.0 feet.		

WELL NUMBER MW-8B

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc.
PROJECT NAME Former E.A. Nord
PROJECT NUMBER 108.00228.00048
PROJECT LOCATION 300 West Marine View Dr, Everett, WA
DATE STARTED 8/12/15 **COMPLETED** 8/12/15
DRILLING METHOD Hollow Stem Auger
DRILLING CONTRACTOR Cascade Drilling
GROUNDWATER ENCOUNTERED AT (feet):
LOGGED BY P. LeDoux **CHECKED BY** C. Kramer
NOTES Logged from HSA cuttings

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
0						Strong creosote odor, abundant treated wood		Cement Seal
8.0								
				SP		Strong creosote odor, SAND, visible free product		Bentonite Seal
22.0								
				SP		Moderate to strong odor, soupy, SAND		
29.0								
				SP		Weak odors, SAND		
35								

GENERAL BH / TP / WELL FORMER EA NORD.GPJ GINT US.GDT 9/3/15

(Continued Next Page)

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

WELL NUMBER MW-8B

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc. **PROJECT NAME** Former E.A. Nord

PROJECT NUMBER 108.00228.00048 **PROJECT LOCATION** 300 West Marine View Dr, Everett, WA

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
35								
				SP		Weak odors, SAND *(continued)*		
40						40.0		
	SS	80	11	SP		SAND, gray, no fines, fine grained, wet, weak to strong creosote odor, visible product @ 41' to 41.5'	21.9	
						41.5 SAND		
				SP				
45						46.5		Screen with Sand Filter
	SS	70	30	SP		SAND, gray, no fines, fine grained, weak creosote odor, no staining	48.7	
						48.0 SAND		
50								
				SP				Sump
						53.5		
	SS	90	18	SP		SAND, gray, no fines, fine grained, wet, very weak odor, no staining	0.1	
55						55.0 Bottom of hole at 55.0 feet.		

WELL NUMBER MW-10A

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc.
PROJECT NAME Former E.A. Nord
PROJECT NUMBER 108.00228.00048
PROJECT LOCATION 300 West Marine View Dr, Everett, WA
DATE STARTED 8/13/15 **COMPLETED** 8/13/15
DRILLING METHOD Hollow Stem Auger
DRILLING CONTRACTOR Cascade Drilling
GROUNDWATER ENCOUNTERED AT (feet):
LOGGED BY P. LeDoux **CHECKED BY** C. Kramer
NOTES Logged from HSA cuttings

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
0						Sandy GRAVEL, little silt, dry, light gray, fill		Cement Seal
						1.5		Bentonite Seal
				SP		SAND, visible product pulled from auger @ 8' with moderate creosote odor		
5								
10								Screen with Filter Sand
						11.5		
	SS	138	7	SP		SAND, dark gray, fine to medium grained, little organics, wet, strong creosote odor, visible product	47.3	
						13.0		
						Bottom of hole at 13.0 feet.		

WELL NUMBER MW-10B

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc. **PROJECT NAME** Former E.A. Nord

PROJECT NUMBER 108.00228.00048 **PROJECT LOCATION** 300 West Marine View Dr, Everett, WA

DATE STARTED 8/13/15 **COMPLETED** 8/13/15 **DRILLING METHOD** Hollow Stem Auger

DRILLING CONTRACTOR Cascade Drilling **GROUNDWATER ENCOUNTERED AT (feet):**

LOGGED BY P. LeDoux **CHECKED BY** C. Kramer

NOTES Logged from HSA cuttings

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
0								
						Sandy GRAVEL, little silt, dry, fill		Cement Seal
						1.5		
				SM		Weak to moderate creosote odor in silty SAND, black, abundant organics		
5								
10						12.0		
				SP		SANDS, moderate to strong creosote odor		Bentonite Seal
15								
						19.0		
20				SP		Product being pulled to surface by auger @ 20', strong odor		
						25.0		
25	SS	60	50	SP		SAND, dark gray, fine medium grained, little organics, weak creosote odor, no staining, wet	3.6	
						26.5		
				SP		SAND		
30						30.0		
	SS	55	23	SP		SAND, dark gray, fine to medium grained, no fines, wet, very weak creosote odor, no staining	0.3	Screen with Filter Sand
						31.5		
				SP		SAND		
35	SS	75	18	SP		34.5	0.0	

(Continued Next Page)

SLR International Corporation
1800 Blankenship Rd; Suite 440
West Linn, OR 97068

WELL NUMBER MW-10B

CLIENT E.A. Nord, Inc, as and through its successor, JELD-WEN, inc. **PROJECT NAME** Former E.A. Nord

PROJECT NUMBER 108.00228.00048 **PROJECT LOCATION** 300 West Marine View Dr, Everett, WA

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	BLOW COUNTS (N VALUE)	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)	WELL DIAGRAM
35				SP		36.0 SAND, dark gray, fine to medium grained, no fines, wet, no dor, no staining *(continued)*		
						Bottom of hole at 36.0 feet.		

Attachment 4 Historical Groundwater Levels

Attachment 4: Historical Groundwater Elevations

Monitoring Well (TOC Elevation)	Date	Depth to Water (Feet Below TOC)	Groundwater Elevation (Feet Above MSL)
Creosote/Fuel Oil Area			
MW-5 (11.87)	9/9/2015	4.24	7.63
	12/11/2015	2.31	9.56
	3/29/2016	2.27	9.60
	10/6/2016	4.33	7.54
	1/30/2017	3.32	8.55
	4/25/2017	3.12	8.75
	6/28/2017	3.87	8.00
	10/23/2017	4.04	7.83
	1/15/2018	2.75	9.12
	4/10/2018	2.79	9.08
	7/9/2018	4.07	7.80
	10/24/2018	4.42	7.45
	1/17/2019	3.45	8.42
	4/15/2019	3.55	8.32
	7/30/2019	5.55	6.32
	2/18/2020	2.81	9.06
	8/12/2020	4.04	7.83
	2/10/2021	2.79	9.08
	8/18/2021	4.44	7.43
	2/28/2022	3.42	8.45
	8/1/2022	4.33	7.54
	8/9/2023	4.55	7.32
MW-8A (11.45)	9/9/2015	3.76	7.69
	12/11/2015	2.00	9.45
	3/28/2016	1.82	9.63
	10/6/2016	4.05	7.40
	1/30/2017	3.05	8.40
	4/25/2017	2.84	8.61
	6/28/2017	3.45	8.00
	10/23/2017	3.93	7.52
	1/15/2018	2.46	8.99
	4/10/2018	2.56	8.89
	7/9/2018	3.69	7.76
	10/24/2018	4.18	7.27
	1/17/2019	3.06	8.39
	4/15/2019	3.34	8.11
	7/30/2019	4.13	7.32
	2/18/2020	2.61	8.84
	8/12/2020	3.85	7.60
	2/10/2021	2.55	8.90
	8/18/2021	4.13	7.32
	2/28/2022	3.23	8.22
	8/1/2022	4.01	7.44
	8/9/2023	4.36	7.09
MW-9A (11.57)	9/10/2015	3.94	7.63
	12/11/2015	1.80	9.77
	3/29/2016	2.04	9.53
	10/6/2016	3.85	7.72
	1/30/2017	2.99	8.58
	4/25/2017	2.80	8.77
	6/28/2017	3.37	8.20
	10/23/2017	3.75	7.82
	1/15/2018	2.20	9.37
	4/10/2018	2.25	9.32
	7/9/2018	3.65	7.92
	10/24/2018	4.03	7.54
	1/17/2019	2.94	8.63
	4/15/2019	3.11	8.46
	7/30/2019	4.01	7.56
	2/18/2020	2.45	9.12
	8/12/2020	3.80	7.77
	2/10/2021	2.16	9.41
	8/18/2021	4.04	7.53
	2/28/2022	3.05	8.52
	8/1/2022	4.12	7.45
	8/9/2023	4.28	7.29

Monitoring Well (TOC Elevation)	Date	Depth to Water (Feet Below TOC)	Groundwater Elevation (Feet Above MSL)
MW-10A (10.71)	9/10/2015	3.24	7.47
	12/11/2015	1.31	9.40
	3/29/2016	1.96	8.75
	10/6/2016	3.13	7.58
	1/30/2017	2.21	8.50
	4/25/2017	2.02	8.69
	6/28/2017	2.57	8.14
	10/23/2017	2.97	7.74
	1/15/2018	1.57	9.14
	4/10/2018	1.51	9.20
	7/9/2018	2.53	8.18
	10/24/2018	3.16	7.55
	1/17/2019	2.11	8.60
	4/15/2019	2.03	8.68
	7/30/2019	3.15	7.56
	2/18/2020	1.68	9.03
	8/12/2020	2.87	7.84
	2/10/2021	1.7	9.01
	8/18/2021	3.15	7.56
	2/28/2022	2.29	8.42
	8/1/2022	3.08	7.63
	8/9/2023	3.42	7.29
MW-11A (11.91)	7/30/2019	4.99	6.92
	7/30/2019	4.48	7.43
	2/18/2020	3.18	8.73
	8/12/2020	4.76	7.15
	2/10/2021	3.30	8.61
	8/18/2021	5.05	6.86
	2/28/2022	3.48	8.43
	8/1/2022	4.71	7.20
	8/9/2023	5.12	6.79
Woodlife Area			
MW-7 (12.53)	9/9/2015	5.26	7.27
	12/11/2015	1.63	10.90
	3/28/2016	1.72	10.81
	10/6/2016	4.70	7.83
	1/30/2017	3.77	8.76
	4/25/2017	3.20	9.33
	6/28/2017	4.63	7.90
	10/23/2017	3.76	8.77
	1/15/2018	2.55	9.98
	4/10/2018	1.96	10.57
	7/9/2018	5.11	7.42
	10/24/2018	5.68	6.85
	1/17/2019	4.04	8.49
	4/15/2019	4.54	7.99
	7/30/2019	5.55	6.98
	2/18/2020	3.31	9.22
	8/12/2020	5.30	7.23
	2/10/2021	3.42	9.11
	8/18/2021	5.46	7.07
	2/28/2022	5.18	7.35
	8/1/2022	6.61	5.92
	8/9/2023	6.71	5.82

Notes

Top of Casing (TOC) elevations surveyed by W&H Pacific in November 2006 and Signature Surveying & Mapping in October 2015 and July 2019

Attachment 5 Sea Level Rise Considerations (from RI/FS Report)

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ANCHOR QEA

Memorandum

March 29, 2021

To: Nathan Soccorsy, Anchor QEA. LLC

From: Sam Giannakous, Anchor QEA, LLC

Re: Sea Level Rise Considerations
Jeld-Wen/Nord Door Site, Everett, Washington

Introduction

For the purpose of the evaluating future environmental conditions, this memorandum evaluates the effect of global climate change relative to the Jeld-Wen/Nord Door Site (Site) in Everett, Washington. The effects of climate change have been assessed in accordance with Washington State Department of Ecology (Ecology) guidance. Relatively recent Everett-specific projections (Miller et al. 2018) and Federal Emergency Management Agency (FEMA) floodplain information were reviewed to determine Site-specific projections and evaluations to inform the future environmental setting and considerations relative to remediation.

Washington Department of Ecology Guidelines for a Site Vulnerability Assessment

A report prepared for the Washington Department of Ecology (Ecology) titled *Adaptation Strategies for Resilient Cleanup Remedies: A Guide for Cleanup Project Managers to Increase the Resilience of Toxic Cleanup Sites to the Impacts from Climate Change* (Asher et al. 2017) provides guidelines to assess the vulnerability of a project site to several risk factors related to climate change. The following are the site-specific risk scenarios detailed by Ecology, including a summary of sea level rise and severe storm assumptions.

Low-risk scenario. Cleanup sites to be remediated via full removal in the near future (1 to 2 years) with no long-term monitoring. This scenario considers a remedy with no further action. Future climate projections need not be addressed. For this scenario, 0.5 to 1 foot of sea level rise atop the mean higher high water (MHHW) elevation may need to be considered to account for flooding.

Short-term risk. Cleanup sites to be remediated within the next 10 years, including full removal, with or without post-construction monitoring or short-term natural attenuation. It may be appropriate to consider near-term climate projections (mid-century), 1 to 2 feet atop MHHW at a minimum. Current 100-year storm events will occur more frequently, becoming a 25-year storm. Extreme precipitation events will occur more frequently, with more frequent erosion likely in vulnerable areas.

Long-term or high risk. Remedial cleanup of sites involving contamination being left in place, long-term monitored natural recovery, cleanup levels taking more than 10 years to meet, or where

damage potential is high, even if there is a low probability of that event happening. A sea level rise at the high end of the projections assumed for the end of the century (4 to 6 feet) may be appropriate to consider, as well as inundation under both the base flood elevation and MHHW. These sites may need to consider that a 100-year storm event will occur at least every 10 years.

Site Assessment

In order to address the many uncertainties in climate projections, the remedy timeframe, consequences of a failed remedy, and adaptive management should be taken into consideration. Long term remedies will involve more uncertainty because they depend more heavily on long-term climate projections that are not as reliable. Failed remedies of higher risk sites, particularly those where contamination is left in place, can have more severe impacts resulting from inundation even if the probability of such inundation is lower. Lastly, repair cost and/or adaptive management should be considered in the case that climate change consideration proves to be underestimated or sea level rise were to accelerate. Each specified remedial alternative should be suited to handle this magnitude of sea level rise depending on the risk scenario to which it can be applied.

The eight remedial alternatives outlined as potential cleanup actions range from source control, to capping, to full or partial removal. Based on the eight remedial alternatives, the low-risk scenario does not apply to this site, and thus climate change and sea level rise considerations need to be addressed.

Short-term and long-term risk scenarios may both apply to the site depending on the remedial alternative selected. Each alternative should be carefully considered in determining which risk scenario to apply. Design should account for the potential impacts of climate change as detailed by Ecology.

Remedial alternatives that include some degree of contamination left in place (capping or partial removal) should be classified as long-term or high-risk scenarios and consider the appropriate climate change projections for high-risk sites.

Sea Level Rise Estimates

A report prepared for the Washington Coastal Resiliency Project (WCRP) in 2018 provided an updated assessment of projected sea level rise and the associated hazards for Washington state. The updated projections for sea level rise are more comprehensive than past estimates, taking into consideration recent research, land movement, and greenhouse gas emissions. Greenhouse gas emission projections depend on a variety of factors related to human behavior. Therefore, probabilistic projections for sea level rise have been made based on both low and high greenhouse gas scenarios.

Climate projections are made for two greenhouse gas emissions scenarios in this report: Representative Concentration Pathway (RCP) 4.5 and RCP 8.5. RCP 4.5 is a low estimate in which greenhouse gas estimates stabilize by mid-century and decrease thereafter. RCP 8.5 is a high scenario in which there is continued increase in greenhouse gasses until the end of the 21st century (Mauger 2015). Tables C-1 and C-2 present the probability of exceedance of sea level rise, in feet, for the RCP 4.5 and RCP 8.5 greenhouse gas scenarios. Highlighted rows indicated mid-century (50-year) and end of century projections (100-year). These projections were estimated for the coastal area in Snohomish County where the project site is located. Vertical land movement of -0.1 ± 0.2 foot per century is factored into these projections.

Table C-1
Assessed Likelihood (in Percentages) of Sea Level Reaching or Exceeding a Threshold for Different Sea Levels (in feet) and Dates for RCP 4.5 Scenario

19-year period centered on:	0	0.5	1	1.5	2	2.5	3	4	5	6	7	8	9	10
2010	97	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	99	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	100	11	0	0	0	0	0	0	0	0	0	0	0	0
2040	100	54	0	0	0	0	0	0	0	0	0	0	0	0
2050	100	82	10	0	0	0	0	0	0	0	0	0	0	0
2060	100	93	36	3	0	0	0	0	0	0	0	0	0	0
2070	100	96	62	14	2	1	0	0	0	0	0	0	0	0
2080	100	98	77	33	8	2	1	0	0	0	0	0	0	0
2090	100	98	85	51	19	6	2	1	0	0	0	0	0	0
2100	100	98	90	65	34	13	5	1	1	0	0	0	0	0
2110	100	99	92	74	47	24	10	3	1	1	0	0	0	0
2120	100	99	94	79	57	33	17	5	2	1	1	0	0	0
2130	100	99	94	83	64	43	26	8	3	2	1	1	0	0
2140	100	98	94	85	69	51	34	12	5	3	1	1	1	0
2150	100	99	95	87	74	58	42	18	7	4	2	1	1	1

Source: WA Coastal Network; http://wacoastalnetwork.com/chrn/research/sea-level-rise/

Based on the low-level projections, by mid-century, it is likely the sea level will rise between 0.5 and 1 foot along the coastline in Everett, Washington. By the turn of the century and shortly thereafter, it is projected that sea level could increase up to 3 feet under the low greenhouse gas scenario.

Projections based on the RCP 8.5 high scenario suggest slightly more aggressive rates of sea level rise at the Jeld-Wen site. By middle to late century, the sea level could rise between 1 and 2 feet, and up to 5 feet after the turn of the century.

Table C-2
Assessed Likelihood (in Percentages) of Sea Level Reaching or Exceeding a Threshold for Different Sea Levels (in feet) and Dates for RCP 8.5 Scenario

19-year period centered on:	0	0.5	1	1.5	2	2.5	3	4	5	6	7	8	9	10
2010	95	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	100	0	0	0	0	0	0	0	0	0	0	0	0	0
2030	100	9	0	0	0	0	0	0	0	0	0	0	0	0
2040	100	59	1	0	0	0	0	0	0	0	0	0	0	0
2050	100	87	15	1	0	0	0	0	0	0	0	0	0	0
2060	100	96	48	5	1	0	0	0	0	0	0	0	0	0
2070	100	99	77	26	4	1	0	0	0	0	0	0	0	0
2080	100	99	90	54	18	5	2	0	0	0	0	0	0	0
2090	100	100	95	74	39	15	5	1	0	0	0	0	0	0
2100	100	100	97	85	61	34	15	3	1	0	0	0	0	0
2110	100	100	99	90	69	41	20	5	2	1	0	0	0	0
2120	100	100	99	94	80	59	36	10	4	2	1	0	0	0
2130	100	100	99	96	87	70	50	19	7	3	1	1	1	0
2140	100	100	100	98	91	78	62	29	12	5	3	1	1	1
2150	100	100	100	98	93	84	70	41	19	9	5	3	2	1

Source: WA Coastal Network; http://wacoastalnetwork.com/chrn/research/sea-level-rise/

Tidal datums recorded within the Port of Everett, just south of the Jeld-Wen site, are presented in Table C-3. LiDAR data taken for the Snohomish River Estuary provided elevation contours for the site. Based on the LiDAR elevation data, the majority of the Jeld-Wen site is at elevations ranging from 12 to 14 feet with select features up to elevation +17 feet MLLW.

Table C-3
Tidal Datums for NOAA Station 9447659 (Everett, WA)

Tide	Tide Level (feet MLLW)
Mean Higher High Water (MHHW)	11.09
Mean High Water (MHW)	10.21
Mean Tide Level (MTL)	6.51
Mean Sea Level (MSL)	6.48
Mean Low Water (MLW)	2.8
Mean Lower Low Water (MLLW)	0

Source: Center for Operational Oceanographic Products and Services; NOAA tides & Currents

Ecology guidance is to add feet of sea level rise to the MHHW datum to project potential inundation caused by high tides over the course of a day. The potential for mid-century sea level rise of 1 to 2 feet (RCP 8.5) results in a new MHHW elevation of up to 14 feet. Projections for sea level rise at the turn of the century of 5 feet would result in MHHW elevation over 16 feet. Figure C-1 highlights the inundation possible at the Jeld-Wen site resulting from this degree of sea level rise. Elevation contours of 13, 15, and 17 feet are highlighted to reflect 2, 4, and 6 feet of sea level rise.

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ANCHOR QEA

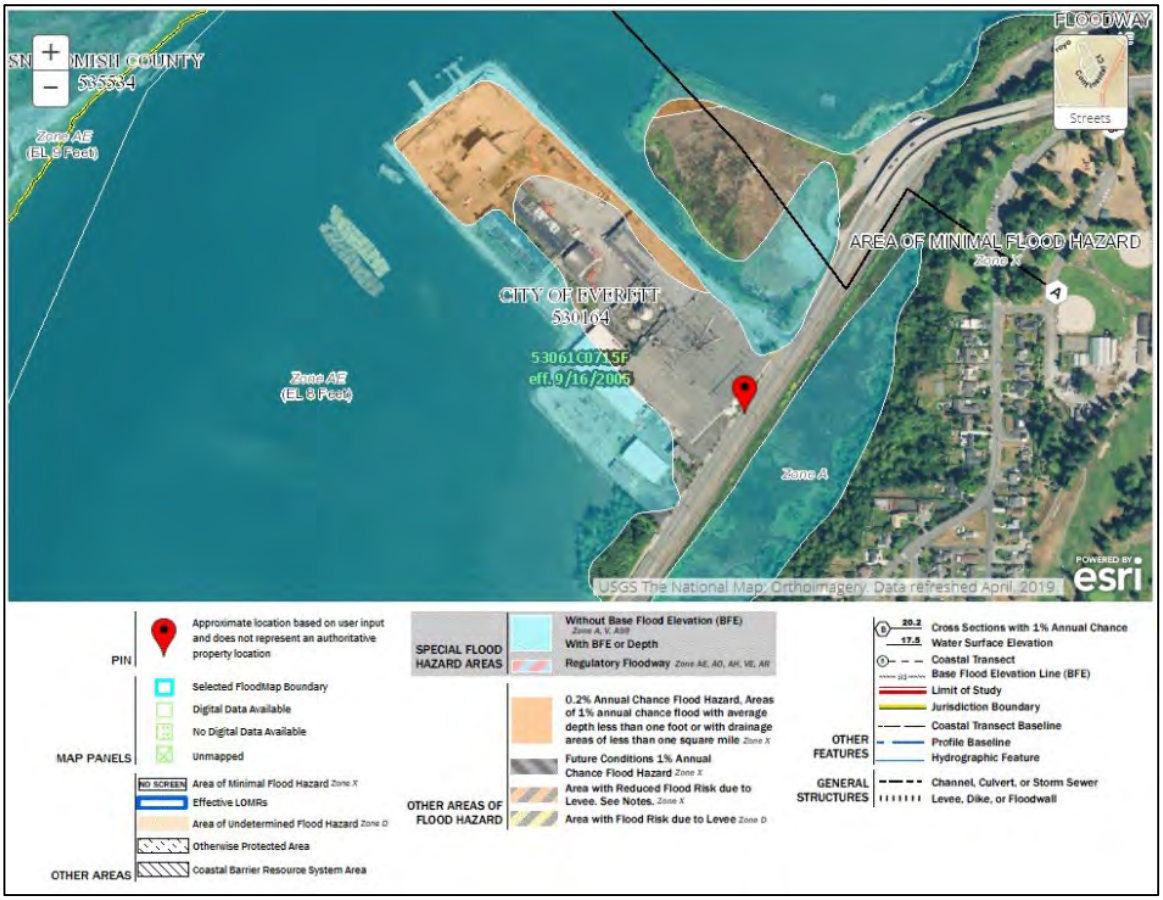
SLR

Figure C-1
Sea Level Rise
Jeld-Wen/Former Nord Door Facility

FEMA Flood Risk

The sea level rise estimates previously presented are not related to coastal flood risk assessments performed by FEMA (Miller et al. 2018). FEMA has created floodplain maps of visual inundation caused by a 100-year flood (also termed base flood elevation or BFE) as a risk assessment tool for insurance purposes. The current effective 100-year floodplain map is shown in Figure C-2.

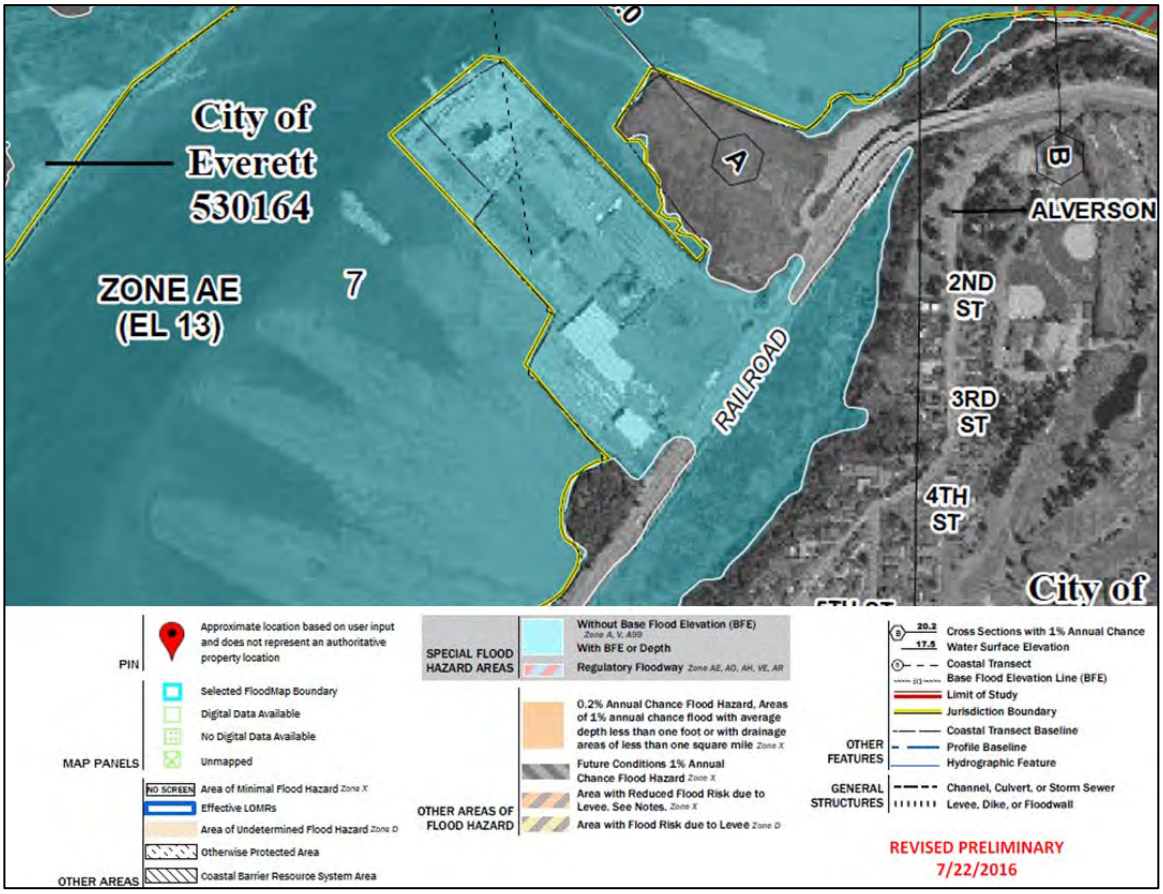
Figure C-2
Current Effective FEMA Floodplain Map



Source: FEMA Flood Map Service

Under the current effective BFE, most of the site is mapped as being inundated during a 100-year flood, with breaching of West Marine View Drive resulting in full inundation of the low-lying marshland landward of the Jeld-Wen site. FEMA's preliminary updated floodplain map is shown in Figure C-3. Although not yet approved, these preliminary data suggest that the site would be completely inundated under the future BFE.

Figure C-3
Preliminary FEMA Floodplain Map



Source: FEMA Flood Map Service

The impacts of the 100-year floodplain (the BFE), as the determination of the risk category for a project site, can result in the BFE becoming a 25-year or 10-year storm event. This level of inundation or impacts as severe as this level of inundation may occur on a more frequent time scale as a result of climate change.

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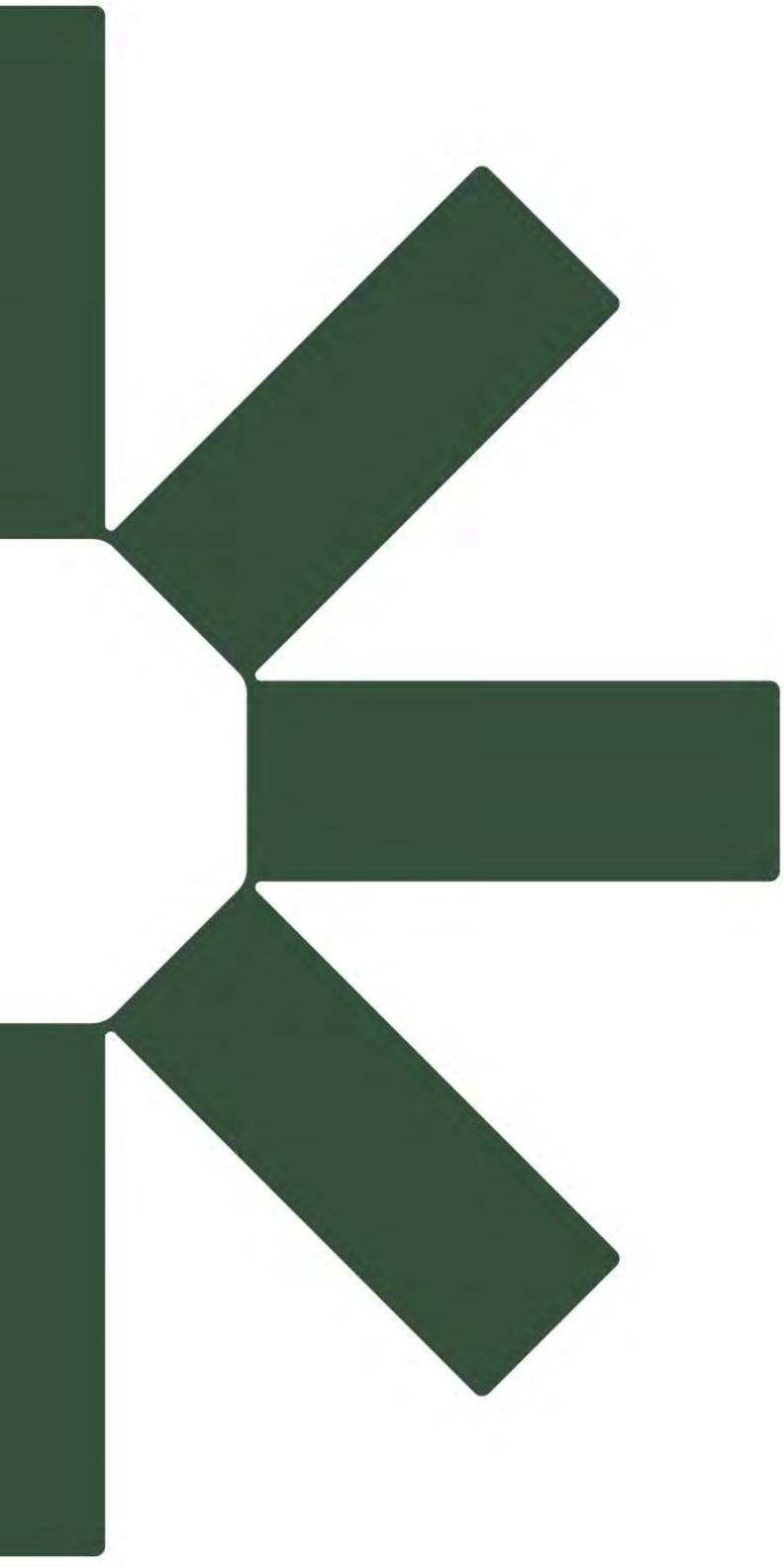

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