Cleanup Action and Site Restoration Completion Report

Irondale Iron and Steel Plant
Irondale, Washington

for
Washington State Department of Ecology

November 4, 2015

GeoEngineers
Earth Science + Technology

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File No. 0504-042-02

November 4, 2015

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

This Cleanup Action and Site Restoration Completion Report documents the cleanup action, site restoration and as-built conditions for the cleanup and restoration activities overseen by GeoEngineers, Inc. (GeoEngineers) on behalf of the Washington State Department of Ecology (Ecology) for the Irondale Iron and Steel Plant Site (Site, also known as Irondale Beach Park) in Irondale, Washington (Figure 1). This report also summarizes a unique habitat restoration component of the cleanup action that was completed between the north end of the Site and the Washington Department of Fish and Wildlife (WDFW) Chimacum Creek restoration site, located on neighboring property to the north. The Site is a 13-acre property located at 526 Moore Street in the town of Irondale, latitude 48°2' 38" N longitude 122° 45' 60" W, approximately 5 miles south of Port Townsend, Washington (see Vicinity Map, Figure 1). From 1881 to 1919, iron and steel were produced intermittently at the Site by various owners. Steel plant operations during this time resulted in metals, carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and/or petroleum contamination of soil, sediment and/or groundwater. The Site is owned by Jefferson County and is currently used as an undeveloped day-use park (Irondale Beach Park). It is bounded by Port Townsend Bay to the east, residential properties to the south, southwest and northwest, and parklands to the north. The Site includes both upland and aquatic land. The boundaries of the Site are shown on the Site Plan (Figure 2).

The Site is formally identified by the Ecology databases as facility Site No. 95275518. The cleanup action at the Site was completed by Ecology pursuant to the Model Toxics Control Act (MTCA) and associated implementing regulations (i.e., Chapter 173-340 of the Washington Administrative Code [WAC]). The Site is located on property owned by Jefferson County but the cleanup action is being conducted by Ecology.

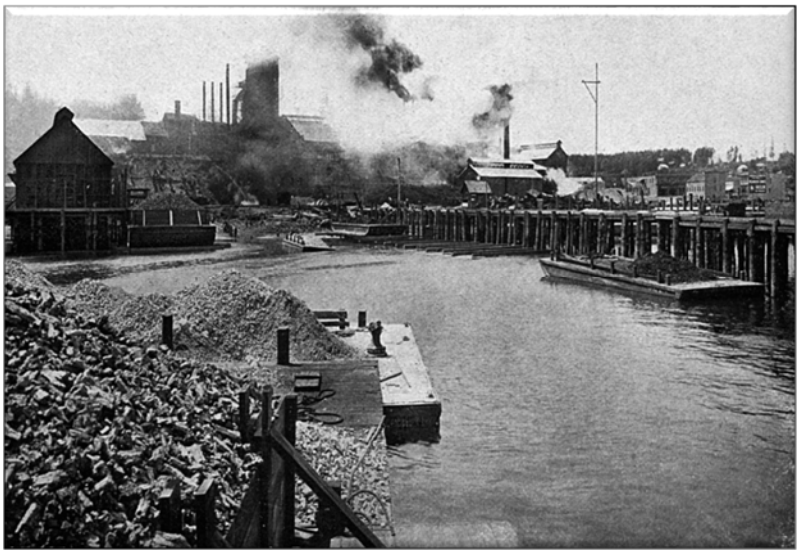
Cleanup action activities were completed in accordance with Ecology approved Revised Draft Cleanup Action Plan (CAP; GeoEngineers 2009a) and the Final Engineering Design Report (EDR; GeoEngineers 2012a) to address petroleum hydrocarbon contamination associated with the former 6,000 barrel aboveground storage tank (AST) and metals contamination associated with historic iron and steel plant operations. The primary purpose of the cleanup action was to: (1) remove petroleum- and metals-contaminated soil and sediment in the nearshore area, (2) cap metals-contaminated soil in the upland area, and (3) restore areas of the Site affected by the cleanup action. Major project elements discussed in this report include:

- site background;
- cleanup standards;
- description of cleanup action;
- permits and substantive requirements for exempt permits;
- site preparation activities;
- soil excavation and disposal activities;
- chemical analytical results of verification samples; and
- site restoration and revegetation activities.

2.0 BACKGROUND INFORMATION

2.1. Historical Operation and Site Use

Industrial activities took place at the Site from 1881 through 1919. The iron and steel plant produced the first batch of iron in 1881, and the steel production plant was operational beginning in 1909. The Irondale Iron and Steel Plant consisted of a blast furnace and cast house, steel production building (including three open-hearth furnaces and a steel rolling mill), boiler plant, eight charcoal kilns (also referred to as beehive kilns), miscellaneous support buildings (raw material warehouses, power house, machine shop, engine shop, and other supporting buildings), a 600-foot wharf and a 6,000-barrel AST for fuel oil. At its peak in 1910, the steel plant produced more than 700 tons of steel per day and employed 600 workers. The plant was closed in 1911 and was reopened between 1917 and 1919 because of the demand for steel during World War I. The estimated locations of former structures associated with the iron and steel plant are shown in Figure 2.



Historical Operations c. 1890

Since 1919, no other waste-generating industry has used the Site. From the mid-1970s until 1999, the beach area east of the former iron and steel plant was used as log storage for the Port Townsend Paper Company. A review of the history of the Site and potentially liable parties by Ecology (Ecology 2007a) states that Cotton Engineering and Shipbuilding Corporation, later known as the Cotton Family Limited Partnership, owned the property from 1943 until December 30, 2002, when the property was sold to Jefferson County. Jefferson County bought the property to use as a recreational area and has operated the Site as Irondale Beach Park since that time.

2.2. Current and Future Land Use

The current land use of the Site is that of Irondale Beach Park. The anticipated future land use is expected to remain as public park space. The Site is part of the Irondale National Historic District designated by the National Park Service and is also listed in the Washington State Heritage Register and the National Park Service Historic American Engineering Record. Preservation of historic Site components is expected to continue following completion of the cleanup action.

2.3. Summary of Environmental Conditions

The extent and nature of contamination was investigated in the upland and sediment portions of the Site during the remedial investigation (RI) activities completed between 2007 and 2009. The RI results show that on portions of the Site soil, sediment, and/or groundwater contain concentrations of arsenic, copper, iron, lead, nickel, zinc, cPAHs and petroleum hydrocarbons that pose a potential risk to human health and the environment. The greatest concentrations of metals are associated with debris and industrial process waste (slag) generally concentrated in areas around the former steel production building and the former

power house complex (that is, the power house, engine house, boiler house, blast furnace/cast house, and stock house buildings and the hot stoves). Petroleum hydrocarbon contamination is associated with the former 6,000-barrel AST located on the southeastern portion of the Site.

2.3.1. Sediment

Intertidal sediment is defined as sediment between mean lower low water (MLLW) and mean higher high water (MHHW). In the areas east of the former AST (toward Port Townsend Bay) and south of the Slag Outcrop, the near-shore surface sediments are generally medium to coarse sand with shell fragments, bricks and occasional slag. Sediments located farther bayward (into deeper water) generally consist of silty fine to medium sand with occasional shells and bricks. The surface sediment closer to the Slag Outcrop (see Figure 2) consist of coarse slag with sand and shell fragments, while surface sediment at the southern extent of the intertidal sediment total petroleum hydrocarbons (TPH) excavation area consist of brick and slag cobbles with medium to coarse sand and shells. Surface sediments north of the former wharf generally consist of fine to medium sand with silt, shell fragments, and slag. Fill was identified in four of five intertidal borings that were drilled offshore, to depths ranging from four to seven feet below the mudline. No fill was observed in the fifth intertidal boring.

Subtidal sediment is defined as sediment below MLLW. Subtidal sediments consist primarily of fine sand with silt with some shell debris, organic matter, and a slight to moderate sulfide odor. Sand generally constituted 52 to 72 percent of the subtidal sediment samples.

Prior to implementation of the remedial action, benzo(a)pyrene, chrysene, 2,4-dimethylphenol and TPH were detected at concentrations greater than site-specific cleanup levels in intertidal sediment at the Site.

2.3.2. Soil

The Site is underlain by a combination of fill and native soil. The fill varies in thickness from zero to approximately 15 feet and is present along all of the near-shore area and beneath former building areas (details of the composition of the fill are outlined below). Most of the upper foot or more of the Site has been disturbed by the prior industrial activities. Native soils underlie the fill and consist of unconsolidated landslide deposits (DNR 2005). Native soil encountered in explorations consisted of loose gray to brown sand with varying amounts of silt, shell fragments and gravel. Native soil exposed in the steeper portion of the Site consists of loose sand and silt. A thin layer of topsoil and/or forest duff covers most of the upland portion of the Site.

The fill material encountered beneath the Site is described below; although not all types are present everywhere. Listed in order of decreasing depth, from the ground surface, they are:

- Bricks and brick fragments from the former structures. These materials are found around most of the former buildings and the area where the charcoal kilns were located (see Figure 2). Brick fragments are also common along the beach below the former kilns and on several of the paths through the park. A layer of charcoal is present near the surface in the former kiln area.
- Loose grey sand with gravel and shell fragments with occasional chips of wood and coke fragments (coke was used as a fuel source at the former Irondale Iron and Steel Plant). Along the near-shore area where logs were formerly stored, there is a layer of woody material at the surface of the ground and/or mixed in with the granular material.

- Loose sand with slag and building debris, including some areas that are entirely slag. This fill layer was identified in most of the Site seaward of the former steel production building and former power house complex (see Figure 2).

Prior to implementation of the remedial action, site characterizations completed at the Site indicated that metals (arsenic, copper, iron, lead, nickel and zinc), cPAHs, and heavy-oil range petroleum hydrocarbons were detected in soil at concentrations greater than site-specific cleanup levels.

2.3.3. Groundwater

Static groundwater measurements obtained in monitoring wells MW05 through MW09 during 2013 quarterly monitoring and a Tidal Cycle Study conducted in February 2014 indicate that shallow groundwater occurs about 2.6 to 5.8 feet below the ground surface (bgs) in the near-shore area. These measurements are representative of changes in groundwater level due to low to high low tide conditions. Groundwater occurs in both fill material and native sediments.

As expected based on the site topography and confirmed through the groundwater monitoring results, groundwater flows from the upland to the east toward Port Townsend Bay, discharging into the intertidal area. It should be noted that the monitoring well data are not representative of steeper (western) portions of the upland because monitoring wells were not installed in these areas.

Precipitation is the main source of recharge to groundwater at the Site. Other sources of recharge may include septic drain fields and stormwater/irrigation runoff related to residences located upgradient of the Site.

As discussed in the Ecology approved Revised Draft Remedial Investigation/Feasibility Study (RI/FS; GeoEngineers 2009b), there are no groundwater supply wells located on, or within ½ mile of, the Site, and groundwater is not a current source of drinking water. Groundwater beneath the Site satisfies the criteria in MTCA (WAC 173-340-720) for classification as non-potable groundwater due to its proximity to marine surface water (see GeoEngineers 2009b for additional details).

Based on Site characterization results prior to implementation of the remedial action, copper, nickel, cPAHs and petroleum hydrocarbons were detected at concentrations greater than site-specific groundwater cleanup levels (see Section 3.2 for discussion of cleanup levels).

2.3.4. Surface Water

A surface water drainage swale exists along the northern boundary of the Site (Figure 2). This drainage swale enters the Site near the northwestern site boundary and discharges through a metal culvert on the beach near the northeastern corner of the Site. The length of the portion of the drainage swale that is located on the Site is about 500 feet. The sources of water contributing to this drainage are not known, although one property owner stated it was “spring fed.” The drainage swale course extends from the housing area upslope of the Site.

Two surface water samples, one upstream and one downstream from within the drainage swale along the north Site boundary, were analyzed for total and dissolved metals. Arsenic and copper were detected at concentrations greater than preliminary cleanup levels. However, the total and dissolved metal concentrations were similar in the downstream sample and the upstream sample; indicating that contamination at the Site is not impacting water in the surface drainage.

2.4. Critical Areas

The Site is partially encompassed within the boundaries of the Irondale National Historic District, which was listed in the National Register of Historic Places in 1983 because of the significance of the iron and steel plant to the development of the iron and steel industry on the west coast in the 1800s and early 1900s (NRHP 2010). Several Washington State laws and regulations address heritage resources of the Irondale Iron and Steel Plant. Under the provisions of the State Environmental Policy Act (SEPA), Ecology has prepared an Environmental Checklist, in which it acknowledged that the project was located within the Irondale Historic District. In 2009, Ecology issued a Determination of Nonsignificance (DNS) for the cleanup action construction. In 2011, Ecology prepared an Addendum to the Environmental Checklist and issued a revised DNS to include restoring the remaining portions of the park property between the remediation areas and the WDFW Chimacum Creek restoration site to the north.

A Condition Assessment of the Site was performed by Northwest Archaeological Associates, Inc. (now SWCA Environmental Consultants [SWCA]) in 2010 in anticipation of cleanup action construction (Appendix A of the Final EDR; GeoEngineers 2012a). A Condition Assessment is completed to evaluate cultural resources and historic features in advance of remediation. The Condition Assessment concluded that the general condition of the Site and the condition of significant historic features have not been degraded since the Historic American Engineering Record (HAER) survey was performed in 1983 in support of historic registration. Erosion occurring along the shoreline has had the greatest effect on historic features, particularly charcoal kiln foundations located along the shoreline. The Condition Assessment concluded that the degraded condition of Site features does not detract from the characteristics of the Site that contribute to the eligibility of the Irondale Historic District as a whole (NWAA 2011).

3.0 CLEANUP ACTION

The cleanup action at the Site consisted of:

1. Capping metals-contaminated soil in upland areas, and
2. Excavation and off-site disposal of TPH-contaminated soil and intertidal sediment and metals-contaminated soil.

Following the cleanup action the Site was restored and/or revegetated in the excavated/disturbed areas. In addition, the cleanup action also included removing slag inform a slag outcrop area located along the beach and regrading of the beach between the remediation areas and the WDFW Chimacum Creek restoration site to the north. This additional grading was completed at the request of stakeholders and did not involve contaminated soil or sediment, but was done to reestablish a naturalized beachfront setting.

3.1. Cleanup Action Objectives

This section presents cleanup action objectives (CAOs) and applicable regulatory requirements for the cleanup action. CAOs consist of chemical- and medium-specific (soil, water, air, biology) goals for protecting human health and the environment. The CAOs specify the media and contaminants of interest, potential exposure routes and receptors, and proposed cleanup goals. The CAOs for these areas are presented below.

An evaluation of the cleanup action alternatives and requirements for the Site is presented in the Revised Draft RI/FS Report (GeoEngineers 2009b) and Draft CAP (GeoEngineers 2009a). Cleanup standards for the Site as well as a summary of the cleanup action implemented are presented in Section 3.2.

3.1.1. Soil and Groundwater (Uplands)

The objective of the proposed uplands cleanup action was to eliminate, reduce, or otherwise control to the extent feasible and practicable, unacceptable risks to human health and the environment posed by hazardous substances in soil and groundwater in accordance with the MTCA Cleanup Regulation (WAC 173-340) and other applicable regulatory requirements (Ecology 2007b). Specifically, the objective of the uplands cleanup was to mitigate risks associated with the following potential exposure routes and receptors:

- contact (dermal, incidental ingestion, or inhalation) by visitors, workers (including excavation workers), and other Site users with hazardous substances in soil;
- contact (incidental ingestion) by terrestrial wildlife with hazardous substances in soil;
- contact by terrestrial plants and soil biota and/or food-web exposure to hazardous substances in soil;
- contact (dermal) by visitors, workers (including excavation workers), and other site users with hazardous substances in groundwater,
- contact by terrestrial plants (via root uptake) to hazardous substances in groundwater; and
- exposure by aquatic organisms to hazardous substances in soil that erodes, or groundwater that migrates, to the marine environment.

The cleanup goal for the uplands areas was to mitigate these risks by meeting the soil and groundwater cleanup standards identified below in Section 3.2.

3.1.2. Sediment (Marine Area)

The objective of the proposed marine area cleanup action was to eliminate, reduce, or otherwise control to the extent feasible and practicable, unacceptable risks to human health and the environment posed by Site-related hazardous substances in marine sediment in accordance with the MTCA Cleanup Regulation (WAC 173-340), Sediment management standards (SMS) regulations (WAC 173-204) and other applicable regulatory requirements. Specifically, the objective of the Marine Area cleanup was to mitigate risks associated with the following potential exposure routes and receptors:

- exposure of benthic organisms to Site-related hazardous substances in the biologically active zone of sediment (the upper 10 centimeters [cm] below the mudline);
- ingestion by aquatic organisms of benthic organisms contaminated by Site-related hazardous substances in sediment;
- contact (dermal) by Site visitors with hazardous substances in sediment; and
- ingestion by Site visitors of marine organisms contaminated by Site-related hazardous substances in sediment.

The cleanup goal for the marine area was to mitigate these risks by meeting the sediment groundwater cleanup standards identified below in Section 3.2.

3.2. Cleanup Standards

Cleanup standards for the Site consist of: (1) cleanup levels that are protective of human health and the environment, (2) the point of compliance at which the cleanup levels must be met, and (3) regulatory requirements established in applicable State and Federal laws. The final site-specific cleanup standards described below were developed in the Revised Draft CAP.

The site-specific cleanup levels, points of compliance and applicable regulatory requirements for the cleanup action are summarized below. A summary of the cleanup levels and points of compliance is presented in Table 1.

3.2.1. Soil

Based on existing and future land use as a Jefferson County Park the Site is considered to be "unrestricted" (a.k.a. residential) with regard to MTCA exposure evaluations. Accordingly, Method B cleanup levels apply to the human health exposure pathway for soil beneath the upland portion of the Site.

The standard point of compliance (upper 15 feet) is considered applicable to prevent exposure by direct contact to Site soil, as defined in WAC 173-340-740(6)(d).

For potential terrestrial ecological exposures, MTCA regulations allow a conditional point of compliance to be established from the ground surface to 6 feet bgs (the biologically active zone according to MTCA default assumptions), provided institutional controls are used to prevent excavation of deeper soil [WAC 173-340-7490(4)(a)]. Accordingly, in areas of the Site where potential ecological exposures are a concern, and where appropriate institutional controls can be implemented, a conditional point of compliance for soil concentrations protective of terrestrial ecological receptors will be used throughout the soil column from the ground surface to 6 feet bgs. The 6-foot conditional point of compliance is applicable in the metals excavation area.

3.2.2. Groundwater

The highest beneficial use of groundwater beneath the Site is based on the protection of surface water resources (Port Townsend Bay), as specified in WAC 173-340-720. Therefore, groundwater beneath the site is subject to the surface water standards. Because the groundwater cleanup levels are based on protection of marine surface water and not protection of groundwater as drinking water and as provided for in WAC 173-340-720(8)(i), the proposed conditional point of compliance for the groundwater cleanup levels is the point or points where groundwater flows into Port Townsend Bay.

In general, the most conservative (lowest) published numerical values selected from available state and federal surface water criteria as outlined in WAC 173-340-730(3) were selected as the cleanup level.

3.2.3. Sediment

Sediment cleanup levels were developed according to MTCA and SMS requirements and direction provided by Ecology. Two SMS criteria are promulgated by Ecology (WAC 173-204-320). These include the Sediment Quality Standard (SQS), the concentration below which effects to benthos are unlikely, and the cleanup screening level (CSL), the concentration above which more than minor adverse biological effects may be expected. The SQS and CSL values have been developed for a suite of chemicals that includes metals, polycyclic aromatic hydrocarbons (PAHs) and other semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and ionizable organic compounds (select phenols, benzyl alcohol, and benzoic acid). The SQS are the most stringent SMS criteria and were used as sediment cleanup levels for the SMS constituents detected in sediment at the Site.

There is no promulgated SMS criterion for petroleum hydrocarbons in sediment. Therefore, SAIC, under contract with Ecology, conducted an intertidal sediment study in 2009 and developed a site-specific cleanup level of 136 milligrams per kilogram (mg/kg) for total petroleum hydrocarbons based on sediment bioassays (see Appendix D of the RI).

For marine sediments potentially affected by Site-related hazardous substances, the point of compliance for protection of the environment is surface sediments within the biologically active aquatic zone, represented by samples collected across the top 10 cm (i.e., 0 to 4 inches) below the mudline. Since erosion may remove shallow sediment over time, effectively moving the bottom of the biologically active zone deeper compared to current conditions, Ecology determined that the vertical point of compliance in areas with petroleum hydrocarbons should be the vertical extent of sediment with diesel- and oil-range hydrocarbon concentrations greater than the cleanup level of 136 mg/kg. The vertical extent of petroleum-contamination ranged from 5- to 12 feet below the mudline.

3.2.4. Permitting

Because the Site cleanup action was performed pursuant to the MTCA, the cleanup action met the permit exemption provisions of MTCA (WAC 173-340-710[9]), obviating the need to follow the procedural requirements of most State and local laws that would otherwise apply to the action. The project did however require the following permits:

- **Hydraulic Project Approval (HPA) Permit** – The Washington Hydraulic Code (WAC 220-110) establishes regulations for the construction of any hydraulic project or the performance of any work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh water of the State. The code requires that an HPA permit (administered by WDFW) be obtained for any activity that could adversely affect fisheries and water resources. Although an HPA permit was not required for the planned cleanup action, an HPA permit was obtained due to the planned habitat restoration between the remediation areas and the WDFW Chimacum Creek restoration site to the north. WDFW issued the HPA permit on July 26, 2011 and a revised HPA on June 15, 2012. The HPA substantive requirements are detailed in the revised HPA, which is included in Appendix A of this report. The permit requirements specify that project work below the ordinary high water mark may only occur in the area north of the slag outcrop from July 15 through October 14 of any year and the area including and south of the slag outcrop from July 15 through February 14 of any year for the protection of migrating juvenile salmonids and sand lance spawning beds.
- **Nationwide Permit (NWP) 38** – The cleanup action required a U.S. Army Corp of Engineers (Corps) NWP 38 to complete the remedial actions and restoration work below the MHHW mark of Port Townsend Bay. Following Endangered Species Act consultation with the Federal Natural Resource Trustees, and incorporating Ecology's Section 401 Water Quality Certification, the Corps issued the letter acknowledging coverage under NWP 38 (Permit No. NWS-2011-604) on March 16, 2012. The documents related to the permit are included in Appendix C of the EDR (GeoEngineers 2012a). In an email dated October 22, 2012, the Corps identified additional permit stipulations regarding the inadvertent discovery of a catwalk/rail bed and a second, western, row of charcoal kiln foundations and the need for public outreach. These permit stipulation have been, or will be addressed, as summarized in a January 30, 2014 memorandum from SWCA Environmental Consultants/Northwest Archaeological Associates to Ecology. The October 22, 2012 email and the January 30, 2014 memorandum are included in Appendix A.

- **Construction Stormwater General Permit** – The cleanup action required coverage under the Construction Stormwater General Permit (CSWGP) because the remedial actions disturbed more than one acre of upland soil. On August 21, 2012, Ecology issued a letter acknowledging coverage under the CSWGP (Permit No. WAR-126067) to Anderson Environmental Contracting LLC (AEC) for the cleanup action. Following completion of the cleanup action, AEC submitted a notice of termination for CSWGP. The CSWGP coverage letter issued to AEC by Ecology and AEC's notice of termination submittal dated February 28, 2013 are presented in Appendix B.
- **Archaeology Excavation Permit** – The State of Washington Department of Archaeology and Historic Preservation (DAHP) issued an Archaeological Excavation Permit that covers monitoring of vegetation removal and capping in the upland area of the Site. This permit (No. 2011-43) outlines special conditions to be followed and is included in Appendix C of the EDR (GeoEngineers 2012a). As a condition of the permit, a Cultural Resources Monitoring report was submitted to DAHP on January 30, 2014 (SWCA 2014).

In addition to the permits listed above, the substantive requirements of applicable State and local laws and other applicable regulatory requirements were also followed during implementation of the Site cleanup activities, including:

- Substantive requirements of Jefferson County regarding substantial development within 200-feet of the shoreline.
- Substantive requirements of Jefferson County building and construction permits, including demolition, grading and drainage approvals.
- Washington State Dangerous Waste Regulations (WAC 173-303) for waste designation, storage, handling and disposal of non-dangerous waste soils and sediments generated at the Site.
- Requirements of the SEPA (Revised Code of Washington [RCW] 43.21C; WAC 197-11) and the SEPA procedures (WAC 173-802). In 2009, Ecology issued a DNS for the cleanup action construction. In 2011, Ecology issued a revised DNS to include restoring the remaining portions of the park property between the remediation areas and the WDFW Chimacum Creek restoration site to the north. A copy of the SEPA checklists and the 2009 DNS and the 2011 revised DNS are provided in Appendix B of the EDR (GeoEngineers 2012a).
- Northwest Clean Air Agency substantive restrictions for off-site transport of airborne particulates.
- Noise ordinance requirements under State environmental noise standards (WAC 173-60).
- Requirements of the Washington Industrial Safety and Health Act (RCW 49.17) and the Federal Occupational Safety and Health Act (29 CFR 1910, 1926) for health and safety during construction activities.
- Requirements of WAC 173-160 (minimum standards for construction and maintenance of wells) for groundwater monitoring well decommissioning and construction.

3.3. Site Preparation

3.3.1. Monitoring Well Abandonment

Eight monitoring wells MW-2 through MW-9 were abandoned by Washington State licensed drillers in accordance with Ecology requirements WAC 173-160-460. Monitoring well decommissioning records and Figure C-1, which shows the approximate locations of the decommissioned monitoring wells, are included in Appendix C.

3.3.2. Clear and Grub Vegetated/Forested Areas

Vegetated/forested areas were cleared and grubbed to the extent required to complete remedial excavation and capping at the Site, including construction of temporary access and/or haul routes. Trees and vegetation were maintained and preserved to the extent practicable. Other trees and vegetation removed from the Site were salvaged and chipped on site for reuse as mulch to top dress planting areas during restoration work. Trees and vegetation were removed from the Site in a manner that minimizes contact with contaminated soils. Stumps and root bases in contact with contaminated soil were disposed of with the associated contaminated soil.

3.3.3. Debris Removal/Relocation

Debris encountered during Site work and requiring removal to complete excavation and grading activities was set aside for observation and documentation by an archeological resources specialist due to the potential association with historic steel and iron production activities. Debris determined to have no archeological significance and suitable for disposal was stockpiled and transported off-site to an appropriate disposal facility.

3.3.4. Demolish Concrete Tank

The 6,000 barrel open-top concrete fuel tank located on the Site was demolished to complete remedial excavation and shoreline grading work. Demolished debris from the tank was transported from the Site to an appropriate construction debris receiving facility.

3.3.5. Portadam

The remediation contractor's (AEC) original shoring design, as outlined in their July 20, 2012 Excavation and Disposal Plan, for the removal of near-shore sediments called for the installation of sheet pile walls. AEC attempted to install 36 lineal feet of sheet piles on August 29 and August 30, 2012. These attempts were met with refusal; an impenetrable object was apparently encountered at depths of 8 to 10 feet below the mudline. Ecology approved the use of a Portadam shoring system on September 4, 2012. This alternate shoring design is outlined in AEC's September 5, 2012 Excavation and Disposal Plan (AEC 2012a). The Corps approved the use of a Portadam on September 5, 2012. WDFW had previously approved the use of a Portadam on August 15, 2012.

Portadam installed to complete nearshore sediment excavation

The Portadam was installed between September 10 and September 20, 2012 and was removed between October 8 and October 15, 2012.

3.3.6. Infiltration Ditch

AEC excavated a temporary infiltration ditch on the west side of the gravel access road that runs parallel to the shoreline, between the access road and the bluff. The ditch was completed to dispose of water collected during dewatering activities. This ditch was completed on August 28 and 29, 2012 and was consistent with AEC's August 22, 2012 Dewatering Plan and Stormwater Pollution Prevention Plan (SWPPP; AEC 2012b and c). Chemical analytical results for water samples obtained from the dewatering system are presented in Table 2.

Infiltration ditch

3.3.7. Temporary Site Controls

Temporary site controls including site access control, erosion control/stormwater pollution prevention, and dust and noise control were implemented in general accordance with the EDR (GeoEngineers 2012a), project drawings and specifications, SWPPP (AEC 2012c) and/or Temporary Facilities and Controls Work Plan (AEC 2012d).

3.4. Remedial Activities

Remedial excavation activities were completed at the Site between August 16, 2012 and December 28, 2012 in accordance with the Revised Draft CAP (GeoEngineers 2009a) and the EDR (GeoEngineers 2012a) to remove soil containing TPH and metals and sediment containing TPH and to cap upland soils containing metals at concentrations exceeding the cleanup standards for the Site (Section 3.2). The limits of remedial activities are shown relative to the Site on Figures 3 and 4. Cultural resources requirements associated with these remedial activities, discussed previously in this report, were completed in May 2015.

A GeoEngineers field representative was on Site to observe excavation activities, assist excavation contractor (AEC) in identifying and removing contaminated soil and sediment from the Site, and to perform field screening and obtain verification soil samples for chemical analysis. Verification soil and sediment samples were collected at the frequency specified by the EDR (GeoEngineers 2012a) and were submitted to Libby Environmental of Olympia to complete chemical analysis. Libby Environmental subcontracted metals and PAH analysis to Fremont Analytical of Seattle, Washington and fertility analysis to Twiss Analytical, Inc. of Poulsbo, Washington.

Chemical analytical results for verification soil and sediment samples obtained from the limits of the remedial excavations are summarized in Tables 1 through 4. Field screening and soil sampling procedures are described in Appendix D. Copies of the chemical analytical reports for verification soil and sediment samples obtained from the limits of remedial excavation are presented in Appendix E. Laboratory validation reports are presented in Appendix F.

Based on field screening results, visual observations and the results of verification samples obtained during remedial excavation activities, a total of 12,739 tons of contaminated soil and sediment, slag and debris was removed from the Site for permitted landfill disposal. Contaminated soil and sediment generated from the Site were not designated as Washington State dangerous waste according to Chapter 173-303 WAC. Contaminated soil and sediment, slag and debris were disposed at Weyerhaeuser Regional Landfill in Castle Rock, Washington and Waste Management's Columbia Ridge Landfill & Recycling Center in Arlington, Oregon. Copies of the Certificates of Disposal and detailed disposal logs from Weyerhaeuser and Waste Management are presented in Appendix G.

Table 5 presents results for soil samples submitted for toxicity characteristic leaching procedure (TCLP)-metals (arsenic and lead) and wet density testing. The TCLP analysis was completed on a soil sample from the metals excavation area; this sample (TP8-Stockpile) was required in the July 27, 2012 disposal authorization letter from the Weyerhaeuser Regional Landfill (Weyerhaeuser 2012). The wet density test was used to confirm the moisture content in excavated sediment prior to disposal.

Details regarding the TPH Area excavation and the Metals Area excavation are summarized in Sections 3.4.1 and 3.4.2. Details regarding the Metals Area soil caps are summarized in Section 3.4.3.

3.4.1. TPH Area Excavation and Chemical Analytical Results

The limits of remedial excavation shown on Figures 5 and 6 represent the limits of excavation completed to remove TPH-contaminated soil and sediment. The approximate locations of pre-existing clean soil and sediment samples defining the lateral limits of the remedial excavation and their chemical analytical results are documented in Revised Draft RI/FS (GeoEngineers 2009b) and/or EDR (GeoEngineers 2012a). For this discussion, soil and sediment are defined based on the historical ordinary high water mark (OHWM), which is shown on Figures 4 and 5. The "red" sample locations on Figures 5 and 6 indicate soil or sediment with TPH concentrations greater than the site-specific TPH cleanup level of 136 mg/kg that was overexcavated following the procedures described in the following paragraph.

In accordance with the EDR (GeoEngineers 2012a), remedial excavation activities were completed laterally and vertically to the preliminary excavation limits, which were established by visual and field screening soil and sediment from the excavation sidewalls and base. Once the preliminary limits were reached, verification soil and sediment samples were collected from the excavation sidewalls and base for laboratory chemical analyses. The soil and sediment verification samples were generally collected at depths ranging from 2 to 11 feet below ground surface or below mudline. Excavation activities continued, as necessary, until chemical analytical results of verification soil and sediment samples indicated that contaminant concentrations were less than site-specific soil and sediment cleanup levels.

TPH Area excavation. From left to right showing second and first rows of kilns
(Photo courtesy of SWCA Environmental Consultants)

3.4.1.1. TPH Results

A total of 155 base verification soil and sediment samples (including 31 laboratory duplicate samples) and two field duplicate sediment samples were obtained from the sidewalls or base of the remedial excavations at the frequency specified by the EDR (GeoEngineers 2012a) and were submitted to Libby Environmental for chemical analysis of TPH (diesel-range and heavy oil-range petroleum hydrocarbons) by Northwest Method NWTPH-Dx. Libby Environmental used a field laboratory to assess compliance with the site-specific TPH cleanup level and to minimize contractor standby time.

Diesel-range and heavy oil-range petroleum hydrocarbons were generally either not detected or detected at concentrations less than the site-specific cleanup level in each of the base verification soil and sediment samples submitted for chemical analysis. Heavy oil-range petroleum hydrocarbons were detected at concentrations greater than the site-specific cleanup level in 11 samples (these sample results are highlighted in red or orange on Table 2). Soil and sediment with heavy oil-range petroleum concentrations greater than site-specific cleanup levels was over-excavated to depths up to 11 feet to remove soil or sediment with visual and field screening evidence of petroleum-related contamination and resampled for chemical analysis. The exception is sample MRZ-B2-102212, which was collected at the old OHWM and below the current OHWM at depth of 11 feet below the mudline, and remains in-place.

Chemical analytical results for soil and sediment samples submitted for TPH analysis are summarized in Table 2. The approximate locations of these samples are shown on Figures 4 and 5.

3.4.1.2. PAHs and 2,4-dimethylphenol Results

Sixteen (16) sediment and seven soil base verification samples were obtained from the sidewalls or base of the remedial excavations at the frequency specified by the EDR (GeoEngineers 2012a) and were submitted to Fremont Analytical (subcontracted by Libby Environmental) for chemical analysis of PAHs and 2,4-dimethylphenol by US Environmental Protection Agency (EPA) Method 8270 SIM.

PAHs and 2,4-dimethylphenol were not detected in each of the base verification soil and sediment samples submitted for chemical analysis. The soil and sediment method reporting limits were less than the site-specific cleanup levels with the exception 2,4-dimethylphenol. The sediment method reporting limits (MRLs) for 2,4-dimethylphenol ranged from 25.7 micrograms per kilogram (µg/kg) to 31.7 µg/kg; the site-specific 2,4-dimethylphenol sediment cleanup level is 29 µg/kg. Because the 2,4-dimethylphenol MRL exceedances are minimal (the highest MRL of 31.7 µg/kg only slightly exceeds the sediment cleanup level of 29 µg/kg) and the majority of the sediment MRLs (11 of 16 sediment samples analyzed for 2,4-dimethylphenol) were less than the 2,4-dimethylphenol sediment cleanup level, the sediment excavation has met the sediment cleanup standard for 2,4-dimethylphenol.

Chemical analytical results for soil and sediment samples submitted for PAH and 2,4-dimethylphenol analyses are summarized in Table 3. The approximate locations of these samples are shown on Figures 4 and 5.

3.4.2. Metals Area Excavation and Chemical Analytical Results

The limits of remedial excavation shown on Figure 7 represent the limits of excavation completed to remove metals-contaminated soil. The approximate locations of pre-existing clean soil samples defining the lateral limits of the remedial excavation and their chemical analytical results are documented in Revised Draft RI/FS (GeoEngineers 2009b) and/or EDR (GeoEngineers 2012a). The “red” sample locations on Figure 7 indicate soil or sediment with metals concentrations greater than the site-specific soil cleanup levels that was overexcavated following the procedures described in the following paragraph.

In accordance with the EDR (GeoEngineers 2012a), remedial excavation activities in the metals excavation area were completed to the lateral and vertical limits presented in Sheets C1.0 through C1. Five of the Remedial Design Drawings (Appendix E of the EDR). Once the preliminary limits were reached, verification soil samples were collected from the excavation sidewalls and base for laboratory chemical analyses. Excavation activities continued, as necessary, until chemical analytical results of verification soil samples indicated that contaminant concentrations were less than site-specific soil cleanup levels or if the depth of excavation was at least 6 feet below the final grade (6 feet is the point of compliance in the metals excavation area [see Table 1]). The soil and sediment verification samples were generally collected at depths ranging from 4 to 11 feet below ground surface.

Northwest extent of Metals Area excavation (see Figure 7)

Thirty base verification soil samples were obtained from the sidewalls or base of the remedial excavations at the frequency specified by the EDR (GeoEngineers 2012a) and were submitted to Fremont Analytical (subcontracted by Libby Environmental) for chemical analysis of metals (arsenic, copper, iron, lead, nickel and zinc) by EPA Method 6020.

During work on the soil caps, exposed slag material was noted on north side of the access road leading to the Steel Production Building soil cap area (see Figures 3 and 8). One soil sample was obtained from this material and submitted to Fremont Analytical for chemical analysis of site-metals. Due to elevated metals concentrations in this sample, approximately 25 cubic yards of soil was removed from this area. Two verification soil samples were subsequently collected and submitted for chemical analysis of site-metals. Copper and iron were detected in one of these samples at concentrations greater than site-specific soil cleanup levels. However, because these metals only slightly exceed their respective soil cleanup levels, the area represented by these samples is only around 5- by 5-feet (thereby providing a limited area for potential plant and soil biota exposure to these slightly elevated concentrations), and the detected concentrations are protective of people and wildlife, no additional excavation was conducted.

Chemical analytical results for soil samples submitted for metals analysis are summarized in Table 3. The approximate locations of these samples are shown on Figures 6 and 7. Metals concentrations greater than site-specific soil cleanup levels are highlighted in Table 3. Red shading indicates that the soil was either over-excavated or the soil sampled remains in place and is below the conditional point of compliance (6 feet). Red bordering indicates that the soil sampled remains in place and is above the conditional point of compliance.

3.4.3. Metals Area Soil Caps

The limits of upland soil caps placed at the former power house complex and former steel production building are shown on Figures 3 and 8. Both upland cap areas were capped with a 3-foot-thick soil cap with a vegetated surface. The 3-foot-thick soil cap is comprised of the following:

- a geotextile layer consistent with Washington State Department of Transportation (WSDOT) Standard Specifications 9-33.2 on top of a sand leveling course;
- approximately two feet of beach sand and imported gravel borrow; and
- approximately one foot of imported top soil.

Cap thickness verification identified that the minimum requirements specified in the project plans and specifications had been met at the Site. The northern and western boundaries of the upland cap at the former Steel Production Building includes a shrub planting area that was planted with native plant species (see Appendix H, Sheet L1.2). Hydro-seed was applied across the remaining portion of the top soil surface of the larger upland cap and the entire smaller upland cap.

Metals Area soil cap at former steel production building (Photo courtesy of SWCA Environmental Consultants)

Soil cleanup levels for arsenic, copper, iron, lead, nickel and zinc were not met at the point of compliance at the metals area soil caps. However, the soil caps comply with the soil cleanup standard (Section 3.2) because the cleanup action meets the compliance criteria in WAC 173-340-740(6)(f), including protection of human health and terrestrial ecological exposures and development of institutional controls to protect the integrity of the soil cap.

3.5. Site Restoration

Site restoration activities began following confirmation that TPH-contaminated soil and sediment and metals-contaminated soil were removed from the Site in accordance with the EDR and completion of the upland soil caps. Site restoration activities were completed as per the requirements of the EDR (GeoEngineers 2012a) and project drawings and specifications. The following sections summarize activities completed to restore the Site. Construction details of the restored surface features are presented in the record (as-built) drawing included in Appendix I.

3.5.1. Backfilling and Grading

Backfilling and grading activities of excavated areas were completed to restore surface grades to the design elevations. Imported material which met the chemical analytical and geotechnical requirements for reuse was used as backfill. Backfill materials primarily included clean overburden and shoreline sandy soil, which was excess material generated during grading on the shoreline north of the remedial excavations. Imported fill was used to supplement the material obtained during grading activities. Chemical analytical results for the approved imported materials and stockpiled overburden, which were used as backfill on the Site, are presented in Tables 2 and 4.

Shoreline after grading activities

- Shoreline excavations were backfilled with clean overburden and shoreline sandy soil, which was obtained during grading on the shoreline north of the remedial excavations. This material was supplemented with imported fill material (identified as poorly graded sand with gravel) that was approved by GeoEngineers' Project Engineer. The fill material was imported from the Cape George Pit in Jefferson County, Washington.
- Disturbed upland areas along the shoreline and the upland cap areas were covered with approximately 1-foot of a clean topsoil mix consisting a mixture of plant waste compost and sand as specified in project specification. Topsoil material was imported from Vern's Organic Topsoil located at 22622 Bond Road NE, Poulsbo, Washington 98370.

Large wood debris between two rows of kilns (photo courtesy of SWCA Environmental Consultants)

Changes to the proposed beach grading were made at the southern end of Site after the second, western, row of charcoal kiln foundations was located. The revised plan was implemented to protect the second row of kilns and included centering the row of large woody debris (LWD) between the two rows of kilns and adjusting the beach grade by adding beach material below the LWD and topsoil above the LWD.

3.5.2. Habitat Restoration

Habitat restoration activities were completed at the Site following backfilling and grading activities to restore vegetation that was excavated and/or disturbed during cleanup action construction. Habitat restoration included installation of LWD above the new OHWM and within the two surface drainages, removal of invasive species and planting of native vegetation.

Dune grass plantings along restored shoreline. Additional habitat restoration photos in Appendix I.

The remedial design drawings (Appendix E of the EDR; GeoEngineers 2012a) originally called for native shrubs to be planted across both upland caps. At the request of Jefferson County Parks and Recreation, Sheet L1.2 of the project drawings, which includes landscape and restoration details, was revised so that most of the capped area was planted with grass (hydro-seeded). Following the revised Sheet L1.2, the northern and western boundaries of the larger upland cap area was planted with native shrubs and hydro-seed was applied across the remaining portion of the top soil surface of the larger upland cap and the entire smaller upland cap.

The original and revised Sheet L1.2 included a typical shoreline tree and shrub planting area layout. After discovery of the second row of kilns, GeoEngineers prepared an additional layout for the kiln area that called for shrubs only (no trees) that were to be installed around and inside of the kilns, but not directly over the kiln foundations. Ecology submitted a memorandum detailing this layout to the Corps and DAHP on December 18, 2012 (GeoEngineers 2012b).

Habitat restoration activities completed at the Site, the revised Sheet L1.2 and the modified planting layout in the kiln area are detailed in the As-Built Report, Shoreline Habitat Restoration included in Appendix I (GeoEngineers 2014f). Year-one post-construction habitat restoration monitoring was conducted on November 19, 2013 (GeoEngineers 2014g).

4.0 CONFIRMATIONAL (POST-CONSTRUCTION) GROUNDWATER MONITORING

In accordance with the Revised Draft CAP (GeoEngineers 2009b) and EDR (GeoEngineers 2012a), post-construction conformational groundwater monitoring was performed at the Site to monitor groundwater indicator hazardous substances (copper, nickel, cPAHs and TPH) to evaluate the long-term effectiveness of the cleanup action. The results of conformational groundwater monitoring have been reported to Ecology under separate cover (GeoEngineers 2014b, 2014c, 2014d and 2014e). In general, contaminants of concern were either not detected or were detected at concentrations less than the site-specific cleanup levels in groundwater and surface water samples with the exception of copper and nickel in MW-9. Monitoring well locations (MW-5 through MW-9) are shown on Figure 3.

In addition, GeoEngineers completed a Tidal Cycle Study on February 26, 2014 to evaluate potential factors associated with elevated copper and nickel concentrations that were unexpectedly detected in groundwater samples obtained from monitoring well MW-9 during the four quarters of confirmation groundwater monitoring between January and October 2013 (GeoEngineers 2014a). The results of this study showed that dissolved copper and nickel concentrations in groundwater at the Site, in particular MW-9, are unlikely to pose an unacceptable risk to ecological receptors in Port Townsend Bay because the groundwater concentrations of these two metals were either less than their respective site-specific groundwater cleanup levels or similar to levels detected in Port Townsend Bay during the Tidal Cycle Study.

5.0 CONCLUSIONS

The cleanup action completed at the Site successfully met the cleanup action objectives established in the Revised Draft CAP (GeoEngineers 2009a) and outlined in Section 3.0 of this report. The cleanup action mitigates risks at the Site associated with the following potential receptors and exposure routes by either remedial excavation or capping:

Upland

- Contact (dermal, incidental ingestion, or inhalation) by visitors, workers (including excavation workers), and other Site users with hazardous substances in soil;
- Contact (incidental ingestion) by terrestrial wildlife with hazardous substances in soil;
- Contact by terrestrial plants and soil biota and/or food-web exposure to hazardous substances in soil;
- Contact (dermal) by visitors, workers (including excavation workers), and other site users with hazardous substances in groundwater,
- Contact by terrestrial plants (via root uptake) to hazardous substances in groundwater; and
- Exposure by aquatic organisms to hazardous substances in soil that erodes, or groundwater that migrates, to the marine environment.

Soil cleanup levels for arsenic, copper, iron, lead, nickel and zinc were not met at the point of compliance at the metals area soil caps. However, the soil caps comply with the soil cleanup standard (Section 3.2) because the cleanup action meets the compliance criteria in WAC 173-340-740(6)(f), including protection of human health and terrestrial ecological exposures and development of institutional controls to protect the integrity of the soil cap.

Aquatic

- Exposure of benthic organisms to Site-related hazardous substances in the biologically active zone of sediment (the upper 10 cm below the mudline);
- Ingestion by aquatic organisms of benthic organisms contaminated by Site-related hazardous substances in sediment;
- Contact (dermal) by Site visitors with hazardous substances in sediment; and
- Ingestion by Site visitors of marine organisms contaminated by Site-related hazardous substances in sediment.

6.0 LIMITATIONS

This report has been prepared for the exclusive use of the Washington State Department of Ecology. No other party may rely on the product of our services unless we agree in advance and in writing to such reliance. Any use of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and written authorization by GeoEngineers, Inc., shall be at the user's sole risk. Any unauthorized use of (or reliance on) this report shall release GeoEngineers from any liability resulting from such use (or reliance). Within the limitations of scope, schedule, and budget, GeoEngineers, Inc.'s respective services have been provided in a manner consistent with that level of care and skill exercised by members of the profession currently practicing in the same locality under similar conditions as this project. GeoEngineers, Inc. assume no responsibility for any consequence arising from any information or condition that was concealed, withheld, misrepresented, or otherwise not fully disclosed or available.

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Please refer to Appendix J titled "Report Limitations and Guidelines for Use" for additional information pertaining to use of this report.

7.0 REFERENCES

AEC 2012a. Excavation and Disposal Plan, Irondale Iron and Steel Plant Cleanup Action, Irondale, Washington, IFB 1237 TCP. September 5, 2012.

AEC 2012b. Dewatering Plan, Irondale Iron and Steel Plant Cleanup Action, Irondale, Washington, IFB 1237 TCP. August 22, 2012.

AEC 2012a. Stormwater Pollution Prevention Plan, Irondale Iron and Steel Plant Cleanup Action, Irondale, Washington, IFB 1237 TCP. August 22, 2012.

AEC 2012a. Temporary Facilities and Controls Work Plan, Irondale Iron and Steel Plant Cleanup Action, Irondale, Washington, IFB 1237 TCP. August 17, 2012.

GeoEngineers, Inc. 2009a. Revised Draft Cleanup Action Plan, Irondale Iron and Steel Plant, Irondale, Washington. GEI File No. 0504-042-00, August 2009.

GeoEngineers, Inc. 2009b. Revised Draft Remedial Investigation/Feasibility Study, Irondale Iron and Steel Plant, Irondale, Washington, GEI File No. 0504-42-00, August 2009.

GeoEngineers, Inc. 2012a, Final Engineering Design Report, Irondale Iron and Steel Plant, Irondale, Washington. May 1, 2012.

GeoEngineers, Inc. 2012b. Revegetation and Fill Plan Around Historic Kilns, Irondale Remediation Project. December 17, 2012.

GeoEngineers, Inc. 2014a. February 2014 Groundwater and Surface Water Monitoring and Tidal Cycle Study, Former Irondale Iron and Steel Plant, Irondale, Washington. File No. 0504-042-02, June 4, 2014.

GeoEngineers, Inc. 2014b. January 2013 Groundwater Monitoring, Former Irondale Iron and Steel Plant, Irondale, Washington. File No. 0504-042-02, December 5, 2014.

GeoEngineers, Inc. 2014c. April 2013 Groundwater Monitoring, Former Irondale Iron and Steel Plant, Irondale, Washington. File No. 0504-042-02, December 5, 2014.

GeoEngineers, Inc. 2014d. July 2013 Groundwater Monitoring, Former Irondale Iron and Steel Plant, Irondale, Washington. File No. 0504-042-02, December 5, 2014.

GeoEngineers, Inc. 2014e. October 2013 Groundwater Monitoring, Former Irondale Iron and Steel Plant, Irondale, Washington. File No. 0504-042-02, December 5, 2014.

GeoEngineers, Inc. 2014f. As-Built Report, Shoreline Habitat Restoration, Irondale Iron and Steel Plant, Jefferson County, Washington. File No. 0504-042-02, November 17, 2014.

GeoEngineers, Inc. 2014g. Year-One Post-Construction Monitoring Report, Shoreline Habitat Restoration, Irondale Iron and Steel Plant, Jefferson County, Washington. File No. 0504-042-02, November 20, 2014.

National Register of Historic Places (NRHP), National Register of Historic Places Districts in Jefferson County, Washington State. Accessed December 2010 online at: www.nationalregisterofhistoricplaces.com/wa/Jefferson/districts.html.

Northwest Archeological Associates (NWAA). Condition Assessment of the Irondale Iron and Steel Plant, Jefferson County, Washington, April 2011.

SWCA Environmental Consultants (SWCA) 2014. Results of Cultural Resources Monitoring for the Irondale Iron and Steel Plant (45JE358) Historic District (DT 128) Remediation and Restoration Project, Jefferson County, Washington. January 21, 2014.

Washington Department of Natural Resources (DNR), 2005. Dr. Jerry F. Franklin. et al. Definition and inventory of Old Growth Forest on DNR State Managed Lands. http://www.dnr.wa.gov/ Publications/lm_ess_westside_oldgrowth_rpt.pdf (Accessed April 3, 2009) Washington State Department of Natural Resources.

Washington State Department of Ecology, 2007a. Summary of PLP Search and Site History Memorandum to project file by Steve Teel, February 13, 2007.

Washington State Department of Ecology, 2007b. Model Toxics Control Act Statute and Regulation, MTCA Cleanup Regulation, Chapter 173-340 WAC. Publication No. 94-06. Revised November 2007.

Weyerhaeuser 2012. Disposal Authorization for Former Irondale Iron and Steel Plant Contaminated Soils. July 27, 2012.

TABLES

GeoEngineers

Table 1

Overview of Cleanup Levels and Points of Compliance

Irondale Iron and Steel Plant

Irondale, Washington

Constituent	Cleanup Level and Media		
	Soil (mg/kg)	Groundwater (µg/L)[1]	Sediment (mg/kg)
Arsenic	18	Not a groundwater COC	Not a sediment COC
Copper	70	2.4	Not a sediment COC
Iron	58,700	Not a groundwater COC	Not a sediment COC
Lead	120	Not a groundwater COC	Not a sediment COC
Nickel	48	8.2	Not a sediment COC
Zinc	160	Not a groundwater COC	Not a sediment COC
cPAHs	0.137	0.018	Not a sediment COC
Benzo(a)pyrene	see cPAHs	see cPAHs	1.6
Chrysene	see cPAHs	see cPAHs	1.4
2,4-Dimethylphenol	Not a soil COC	Not a groundwater COC	0.029
TPH	136	500	136
Point of Compliance based on MTCA	Upper 6 feet (metals excavation area) and Upper 15 feet (TPH excavation area and metals area soil caps)[2]	Point of entry to Port Townsend Bay	Biologic active zone and vertical extent of TPH to 136 mg/kg

Notes:

[1] Groundwater cleanup levels are the most conservative (lowest) published numerical values selected from available state and federal surface water criteria as outlined in WAC 173-340-730(3).

[2] The point of compliance for soil is 6 feet for terrestrial ecological receptors at the Metals Excavation Area and 15 feet human health and terrestrial ecological receptors at the TPH Excavation Area and Metals Area Soil Caps.

mg/kg = milligrams per kilogram

µg/L = micrograms per liter

Table 2

Summary of Verification Soil, Sediment, and Water Sample Chemical Analytical Results - TPH[1]

Irondale Iron and Steel Plant

Irondale, Washington

Sample ID	Libby Environmental Sample Data Group	Date Collected	Matrix	In-place or overexcavated?	Sample Depth (for in-place material)[3]	Diesel-range	Heavy-oil range
Import Material							
Import-01-100112	L121001-30	10/1/2012	Soil	not applicable	not applicable	<25	<40
Stockpiled Overburden (from beach grading)							
STP-01-100112	L121001-30	10/1/2012	Soil	not applicable	not applicable	<25	<40
STP-02-100112	L121001-30	10/1/2012	Soil	not applicable	not applicable	<25	<40
STP-03-100112	L121001-30	10/1/2012	Soil	not applicable	not applicable	<25	<40
STP-04-100112	L121001-30	10/1/2012	Soil	not applicable	not applicable	<25	**164**
Soil and Sediment Remediation Areas							
SRZ-EB0-91012	L120910-30	9/10/2012	Sediment	In-place	3-feet	<25	63.8
SRZ-EB2-91012	L120910-30	9/10/2012	Sediment	In-place	3-feet	<25	40.5
SRZ-NSW1.5-91012	L120910-30	9/10/2012	Sediment	Overexcavated	1-foot	<150	**25,300**
SRZ-SSW4-91012	L120911-30	9/10/2012	Sediment	In-place	2-feet	<25	<40
SRZ-SSW3-91012	L120911-30	9/10/2012	Sediment	In-place	2-feet	<25	<40
SURZ-B01-91112	L120911-30	9/11/2012	Soil	In-place	10-feet	<25	<40
SRZ-0X1-91112	L120911-30	9/11/2012	Sediment	Overexcavated	3-feet	<25	**1,390**
SRZ-B02-91112	L120911-30	9/11/2012	Sediment	In-place	5-feet	<25	<40
SRZ-NSW01-91112	L120911-30	9/11/2012	Sediment	In-place	2-feet	<25	<40
SRZ-B03-91212	L120912-30	9/12/2012	Sediment	In-place	3-feet	<25	<40
SRZ-WSW01-91212	L120912-30	9/12/2012	Sediment	In-place	1-foot	<25	<40
SRZ-ESW01-91212	L120912-30	9/12/2012	Sediment	In-place	2-feet	<25	<40
SRZ-B04-91212	L120912-30	9/12/2012	Sediment	In-place	3-feet	<25	<40
SVRZ-WSW1-92112	L120921-30	9/21/2012	Soil	In-place	2-feet	<25	<40
SVRZ-SB1-92112	L120921-30	9/21/2012	Soil	In-place	3-feet	<25	<40
SVRZ-SB2-92112	L120921-30	9/21/2012	Soil	In-place	6-feet	<25	<40
SVRZ-SB3-92112	L120921-30	9/21/2012	Soil	In-place	5-feet	<25	<40
SVRZ-SB4-92112	L120921-30	9/21/2012	Soil	In-place	5-feet	<25	<40
IRZ-B1-92412	L120924-30	9/24/2012	Sediment	In-place	5.5 feet	<25	<40
IRZ-B2-92412	L120924-30	9/24/2012	Sediment	In-place	10-feet	<25	<40
IRZ-ESW1-92412	L120924-30	9/24/2012	Sediment	In-place	4-feet	<25	<40
IRZ-SSW1-92412	L120924-30	9/24/2012	Sediment	In-place	6-feet	<25	<40
IRZ-B3-92412	L120924-30	9/24/2012	Sediment	In-place	9-feet	<25	<40
IRZ-ESW2-92412	L120924-30	9/24/2012	Sediment	In-place	4.5-feet	<25	<40
IRZ-B4-92412	L120924-30	9/24/2012	Sediment	In-place	9-feet	<25	<40
IRZ-ESW3-92412	L120924-30	9/24/2012	Sediment	In-place	4-feet	<25	<40
IRZ-WSW1-92512	L120925-30	9/25/2012	Sediment	In-place	8-feet	<25	<40
IRZ-B1-92512	L120925-30	9/25/2012	Sediment	In-place	9-feet	<25	<40
IRZ-B2-92512	L120925-30	9/25/2012	Sediment	In-place	11-feet	<25	<40
IRZ-B3-92512	L120925-30	9/25/2012	Sediment	In-place	10-feet	<25	<40
IRZ-B4-92512	L120925-30	9/25/2012	Sediment	In-place	8-feet	<25	<40

Sample ID	Libby Environmental Sample Data Group	Date Collected	Matrix	In-place or overexcavated?	Sample Depth (for in-place material)[3]	Diesel-range	Heavy-oil range
IRZ-B5-92512	L120925-30	9/25/2012	Sediment	In-place	7-feet	<25	<40
IRZ-ESW1-92512	L120925-30	9/25/2012	Sediment	In-place	4-feet	<25	<40
IRZ-WSW1-92612	L120926-30	9/26/2012	Sediment	In-place	7-feet	<25	<40
IRZ-B1-92612	L120926-30	9/26/2012	Sediment	In-place	12-feet	<25	<40
IRZ-B2-92612	L120926-30	9/26/2012	Sediment	In-place	12-feet	<25	<40
IRZ-ESW1-92612	L120926-30	9/26/2012	Sediment	In-place	4.5-feet	<25	<40
IRZ-Dupe1-92612	L120926-30	9/26/2012	Sediment	In-place	4.5-feet	<25	<40
IRZ-B3-92612	L120926-30	9/26/2012	Sediment	In-place	10-feet	<25	<40
IRZ-WSW2-92612	L120926-30	9/26/2012	Sediment	In-place	7-feet	<25	<40
IRZ-B1-92712	L120927-30	9/27/2012	Sediment	In-place	6-feet	<25	<40
IRZ-ESW2-92712	L120927-30	9/27/2012	Sediment	In-place	3-feet	<25	<40
IRZ-ESW1-92712	L120927-30	9/27/2012	Sediment	In-place	3-feet	<25	<40
IRZ-ESW3-92712	L120927-30	9/27/2012	Sediment	In-place	3-feet	<25	<40
IRZ-B2-92712	L120927-30	9/27/2012	Sediment	In-place	12-feet	<25	<40
IRZ-B3-92712	L120927-30	9/27/2012	Sediment	In-place	10-feet	<25	<40
IRZ-B4-92712	L120927-30	9/27/2012	Sediment	In-place	8-feet	<25	<40
IRZ-Dupe1-92712	L120927-30	9/27/2012	Sediment	In-place	8-feet	<25	<40
IRZ-WSW1-92712	L120927-30	9/27/2012	Sediment	Overexcavated	6-feet	<640	**30,300**
IRZ-NESW1-92812	L120928-30	9/28/2012	Sediment	In-place	2-feet	<25	<40
IRZ-B1-92812	L120928-30	9/28/2012	Sediment	In-place	4-feet	<25	<40
IRZ-B2-92812	L120928-30	9/28/2012	Sediment	In-place	6-feet	<25	<40
IRZ-NWSW1-92812	L120928-30	9/28/2012	Sediment	Overexcavated	8-feet	<25	**1,860**
IRZ-NESW2-92812	L120928-30	9/28/2012	Sediment	In-place	4-feet	<25	<40
IRZ-NSW1-92812	L120928-30	9/28/2012	Sediment	In-place	4-feet	<25	<40
IRZ-NSW2-92812	L120928-30	9/28/2012	Sediment	In-place	5-feet	<25	<40
IRZ-B3-92812	L120928-30	9/28/2012	Sediment	In-place	10-feet	<25	<40
IRZ-01-100112	L121001-30	10/1/2012	Sediment	Overexcavated	0.5-feet	<25	**683**
IRZ-02-100112	L121001-30	10/1/2012	Sediment	In-place	0.5-feet	<25	<40
IRZ-COM1-100212	L121002-30	10/2/2012	Sediment	In-place	0.5-feet	<25	<40
SURZ-F14B1-100212	L121002-30	10/2/2012	Soil	In-place	4-feet	<25	<40
SURZ-F14B2-100212	L121002-30	10/2/2012	Soil	Overexcavated	6-feet	<25	**152**
SURZ-SSW1-10212	L121002-30	10/2/2012	Soil	In-place	2-feet	<25	<40
SURZ-WSW1-10212	L121002-30	10/2/2012	Soil	In-place	5-feet	<25	<40
F15B1-10212	L121002-30	10/2/2012	Soil	In-place	10-feet	<25	<40
F15NSW1-10212	L121002-30	10/2/2012	Soil	In-place	5-feet	<25	<40
F15B2-10212	L121002-30	10/2/2012	Soil	In-place	5-feet	<25	<40
SURZ-WSW2-10212	L121002-30	10/2/2012	Soil	In-place	5-feet	<25	<40
SURZ-NSW1-10412	L121004-30	10/4/2012	Soil	In-place	4-feet	<25	<40
SURZ-SSW1-10412	L121004-30	10/4/2012	Soil	In-place	4-feet	<25	**76**
SURZ-WSW1-10412	L121004-30	10/4/2012	Soil	In-place	4feet	<25	**64**
SURZ-WB1-10812	L121008-30	10/8/2012	Soil	In-place	9-feet	<25	<40
SURZ-NSW1-10812	L121008-30	10/8/2012	Soil	In-place	7-feet	<25	<40
SURZ-SSW1-10812	L121008-30	10/8/2012	Soil	In-place	7-feet	<25	<40
K18-B1-10812	L121008-30	10/8/2012	Soil	In-place	8-feet	<25	<40
K18-WSW1-10812	L121008-30	10/8/2012	Soil	In-place	6-feet	<25	**60**

Sample ID	Libby Environmental Sample Data Group	Date Collected	Matrix	In-place or overexcavated?	Sample Depth (for in-place material)[3]	Diesel-range	Heavy-oil range
SURZ-WSW2-10812	L121008-30	10/8/2012	Soil	In-place	8-feet	<25	<40
SURZ-B1-10812	L121008-30	10/8/2012	Soil	In-place	9-feet	<25	<40
K08-B1-10812	L121008-30	10/8/2012	Soil	In-place	10-feet	<25	**86**
SURZ-WSW3-10812	L121008-30	10/8/2012	Soil	In-place	8-feet	<25	<40
SURZ-ESW1-10812	L121008-30	10/8/2012	Soil	In-place	8.5-feet	<25	<40
SURZ-NSW2-10812	L121008-30	10/8/2012	Soil	In-place	8-feet	<25	<40
SURZ-B2-10812	L121008-30	10/8/2012	Soil	In-place	9-feet	<25	<40
K08-B1-10912	L121009-30	10/9/2012	Soil	In-place	5-feet	<25	**64**
K08-WSW1-10912	L121009-30	10/9/2012	Soil	In-place	9-feet	<25	<40
K08-SSW2-10912	L121009-30	10/9/2012	Soil	In-place	9-feet	<25	<40
K08-B2-10912	L121009-30	10/9/2012	Soil	In-place	10-feet	<25	<40
K08-ESW1-10912	L121009-30	10/9/2012	Soil	In-place	9-feet	<25	<40
K08-SSW1-10912	L121009-30	10/9/2012	Soil	In-place	9-feet	<25	**50**
K08-B1-101012	L121010-30	10/10/2012	Soil	Overexcavated	10-feet	<25	**1,800**
KILN-1-101012	L121010-30	10/10/2012	Soil	In-place	2-feet	<25	**44**
SURZ-ESW1-101012	L121011-30	10/10/2012	Soil	In-place	8-feet	<25	<40
IRZ-SSW1-101112	L121011-30	10/11/2012	Sediment	In-place	5-feet	<25	**58**
IRZ-ESW1-101112	L121011-30	10/11/2012	Sediment	In-place	5-feet	<25	**49**
IRZ-B1-101112	L121011-30	10/11/2012	Sediment	Overexcavated	10-feet	<25	**2,340**
K17-B1-101212	L121012-30	10/12/2012	Soil	In-place	9-feet	<25	<40
SURZ-B1-101512	L121015-30	10/15/2012	Soil	In-place	10-feet	<25	<40
SURZ-B2-101512	L121015-30	10/15/2012	Soil	In-place	9-feet	<25	<40
K17-B1-101512	L121015-30	10/15/2012	Soil	In-place	9-feet	<25	**90**
K17-B2-101512	L121015-30	10/15/2012	Soil	In-place	10-feet	<25	**84**
K17-WSW1-101512	L121015-30	10/15/2012	Soil	In-place	5-feet	<25	<40
K17-SSW1-101512	L121015-30	10/15/2012	Soil	In-place	5-feet	<25	<40
IRZ-B1-101712	L121017-30	10/17/2012	Sediment	In-place	10-feet	<25	**59**
IRZ-B2-101712	L121017-30	10/17/2012	Soil	In-place	9-feet	<25	<40
IRZ-ESW1-101712	L121017-30	10/17/2012	Sediment	In-place	5-feet	<25	<40
SURZ-WSW1-101712	L121017-30	10/17/2012	Soil	In-place	8-feet	<25	**57**
CON-01-101812	L121017-30	10/17/2012	Sediment	Overexcavated	2-feet	<25	**1,550**
W-Bulkhead-101812	L121018-30	10/18/2012	Sediment	Overexcavated	6-feet	<25	**9,860**
SURZ-SSWB-101912	L121019-30	10/19/2012	Soil	In-place	9-feet	<25	<40
MRZ-B1-102212	L121023-6	10/22/2012	Soil	In-place	11-feet	<25	<40
MRZ-NSW1-102212	L121023-6	10/22/2012	Soil	In-place	9-feeet	<25	<40
MRZ-WSW1-102212	L121023-6	10/22/2012	Soil	In-place	9-feet	<25	<40
MRZ-B2-102212	L121023-6	10/22/2012	Sediment	In-place	11-feet	<25	**545**
MRZ-B3-102212	L121023-6	10/22/2012	Sediment	In-place	11-feet	<25	<40
MRZ-B4-102212	L121023-6	10/22/2012	Sediment	In-place	10-feet	<25	<40
MRZ-NSW2-102212	L121023-6	10/22/2012	Sediment	In-place	9-feet	<25	<40
MRZ-B1-102310	L121023-6	10/23/2012	Sediment	In-place	10-feet	<25	<40
MRZ-NSW1-102310	L121023-6	10/23/2012	Soil	In-place	9-feet	<25	<40
MRZ-ESW1-102310	L121023-6	10/23/2012	Soil	In-place	8-feet	<25	<40
MRZ-B2-102312	L121024-8	10/23/2012	Sediment	In-place	11-feet	<25	<40

Sample ID	Libby Environmental Sample Data Group	Date Collected	Matrix	In-place or overexcavated?	Sample Depth (for in-place material)[3]	Diesel-range	Heavy-oil range
MRZ-B3-102312	L121024-8	10/23/2012	Sediment	In-place	11-feet	<25	<40
MRZ-ESW2-102312	L121024-8	10/23/2012	Sediment	In-place	8-feet	<25	<40
Tank 1-110112	L121105-2	11/1/2012	Soil	In-place	3-feet	<25	<40
Tank 2-110112	L121105-2	11/1/2012	Soil	In-place	3-feet	<25	<40
SURZ-NSW-112112	L121127-3	11/21/2012	Soil	In-place	3-feet	<25	<40
SURZ-WSW-112112	L121127-3	11/21/2012	Soil	In-place	3-feet	<25	<40
SURZ-SSW-112112	L121127-3	11/21/2012	Soil	In-place	3-feet	<25	<40
Site-Specific Soil and Sediment Cleanup Level						136	136
Dewatering Water (µg/L)							
DW1-091812	L120918-30	9/18/2012	Water	not applicable	not applicable	<200	<400
DW2-92512	L120925-30	9/25/2012	Water	not applicable	not applicable	<200	<400
DW3-92812	L120928-30	9/28/2012	Water	not applicable	not applicable	<200	<400
DW4-100212	L121002-30	9/28/2012	Water	not applicable	not applicable	<200	<400
DW5-100412	L121004-30	10/4/2012	Water	not applicable	not applicable	<200	<400
DW6-100912	L121009-30	10/9/2012	Water	not applicable	not applicable	<200	<400
DW7-101912	L121019-30	10/19/2012	Water	not applicable	not applicable	<200	<400
DW8-103112	L121031-11	10/29/2012	Water	not applicable	not applicable	<200	<400
MTCA Method A Cleanup Level						500	500

Notes:

[1]Chemical analyses performed by Libby Environmental of Olympia, Washington.

[2] Site-specific soil and sediment cleanup level is referenced from Table 1 of the Final Engineering Design Report (GeoEngineers, 2012).

Diesel- and heavy oil-range petroleum hydrocarbons were analyzed using Northwest Method NWTPH-Dx with acid/silica gel cleanup.

Red shading indicates soil or sediment concentration is greater than the site-specific cleanup level and was overexcavated.

Orange shading indicates sediment concentration is greater than the site-specific cleanup level and remains in place at a depth of 11 feet below mudline.

mg/kg = micrograms per kilogram

µg/L = micrograms per liter

Table 3

Summary of Verification Soil and Sediment Sample Chemical Analytical Results - PAHs[1]

Irondale Iron and Steel Plant

Irondale, Washington

Sample ID	Fremont Analytical Sample Data Group[1]	Date Collected	Matrix	Benz(a)anthracene (µg/kg)	Chrysene (µg/kg)	Benzo(b)fluoranthene (µg/kg)	Benzo(k)fluoranthene (µg/kg)	Benzo(a)pyrene (µg/kg)	Indeno(1,23,-cd)pyrene (µg/kg)	Dibenz(a,h)anthracene (µg/kg)	2,4-Dimethylphenol (µg/kg)
Soil and Sediment Remediation Areas											
SRZ-EB2-91012	1210080	9/10/2012	Sediment	--	<46.4 J	--	--	<46.4 J	--	--	<26.9 J
SRZ-WSW01-91212	1210080	9/12/2012	Sediment	--	<47.3 J	--	--	<47.3 J	--	--	<27.4 J
SRZ-ESW01-91212	1210080	9/12/2012	Sediment	--	<46.2 J	--	--	<46.2 J	--	--	<26.8 J
IRZ-B1-92412	1209149	9/24/2012	Sediment	--	<45.6	--	--	<45.6	--	--	<26.4
IRZ-ESW1-92412	1209149	9/24/2012	Sediment	--	<44.4	--	--	<44.4	--	--	<25.7
IRZ-WSW1-92512	1209174	9/25/2012	Sediment	--	<44.3	--	--	<44.3	--	--	<25.7
IRZ-B4-92512	1209174	9/25/2012	Sediment	--	<51.3	--	--	<51.3	--	--	<29.7
IRZ-B5-92512	1209174	9/25/2012	Sediment	--	<51.8	--	--	<51.8	--	--	<30.0
IRZ-ESW1-92512	1209174	9/25/2012	Sediment	--	<52.1	--	--	<52.1	--	--	<30.2
IRZ-WSW1-92612	1209172	9/26/2012	Sediment	--	<46.6	--	--	<46.6	--	--	<27.1
IRZ-WSW2-92612	1209172	9/26/2012	Sediment	--	<44.6	--	--	<44.6	--	--	<25.9
IRZ-ESW1-92712	1209173	9/27/2012	Sediment	--	<52.6	--	--	<52.6	--	--	<30.5
IRZ-B2-92712	1209173	9/27/2012	Sediment	--	<49.9	--	--	<49.9	--	--	<28.9
IRZ-B3-92712	1209173	9/27/2012	Sediment	--	<54.7	--	--	<54.7	--	--	<31.7
IRZ-NESW1-92812	1209190	9/28/2012	Sediment	--	<43.9	--	--	<43.9	--	--	<25.4
IRZ-B2-92812	1210030	9/28/2012	Sediment	--	<48.0	--	--	--	--	--	<27.9
Sediment Cleanup Levels				n/a	1,400	n/a	n/a	1,600	n/a	n/a	29
SURZ-F14B2-100212	1210029	10/2/2012	Soil	<52.6	<52.6	<52.6	<52.6	<52.6	<52.6	<52.6	--
F15-B2-10212	1210029	10/2/2012	Soil	<41.1	<41.1	<41.1	<41.1	<41.1	<41.1	<41.1	--
SURZ-B1-10812	1210089	10/8/2012	Soil	<51.0	<51.0	<51.0	<51.0	<51.0	<51.0	<51.0	--
K08-B1-10912	1210089	10/9/2012	Soil	<47.9	<47.9	<47.9	<47.9	<47.9	<47.9	<47.9	--
W-Bulkhead-101812	1210176	10/18/2012	Sediment[3]	<48.1 J	<48.1 J	<48.1 J	<48.1 J	<48.1 J	<48.1 J	<48.1 J	
CON-01-10181	1211093	10/18/2012	Sediment[3]	<45.3 J	<45.3 J	<45.3 J	<45.3 J	<45.3 J	<45.3 J	<45.3 J	--
MRZ-B2-102212	1211095	10/22/2012	Sediment[3]	<48.2 J	<48.2 J	<48.2 J	<48.2 J	<48.2 J	<48.2 J	<48.2 J	--
Soil Cleanup Levels				137	n/a	137	137	137	137	137	n/a

Notes:

[1]Chemical analyses performed by Fremont Analytical of Seattle, Washington. Sample data groups (SDGs) are inluded in Appendix E. The Fremont Analytical SDGs are included in Libby Environmental SDGs; see Table E-1 to identify the Libby Environmental SDGs associated with each Fremont Analytical SDG.

[2] Site-specific soil and sediment cleanup levels are referenced from Table 1 of the Final Engineering Design Report (GeoEngineers, 2012).

[3] Sample identified as soil during remedial activities, but was obtained below origninal ordinary highwater mark and is shown on sediment sample location figure (Figure 5).

Polycyclic Aromatic Hydrocarbons (PAH) were analyzed using EPA Method 8270 (SIM)

-- = not tested, analyte is not a contaminant of concern for that media

J = estimated

n/a = not applicable, analyte is not a contaminant of concern for that media

µg/kg = micrograms per kilogram

Table 4

Summary of Verification Soil and Sediment Sample Chemical Analytical Results - Total Metals[1]

Irondale Iron and Steel Plant

Irondale, Washington

Sample ID	Fremont Analytical Sample Data Group[1]	Date Collected	Matrix	In-place or overexcavated?	Sample Depth (for in-place material)[3]	Arsenic (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
Import Material											
Topsoil 091112	1209144	9/19/2012	Topsoil	n/a	n/a	2.19	11.9	12,600	3.17	43.2	35.6
Sand Import Profile	1209188	9/28/2012	Sand Import Fill	n/a	n/a	1.8	13.5	7,230	1.61	47.0	27.2
Road Excavation Area (near Steel Production Building Cap)											
Road 091112	1209144	9/19/2012	Soil	Overexcavated	n/a	98.4	549	37,400	1,320	135	1,820
ROAD-1-103012	1210265	10/30/2012	Soil	In-place	3-feet	6.73	58.7	27,700	6.19	59.9	49.2
ROAD-2-103012	1210265	10/30/2012	Soil	In-place	1-foot	14.80	155	44,300	38.40	54.2	44.6
Metals Remediation Area											
NRZ-NWB1-10312	1210029	10/3/2012	Soil	In-place	6-feet	6.71 J	60.2	9,080	3.20 J	20.1	27.3
NRZ-NWSW1-10312	1210029	10/3/2012	Soil	In-place	4-feet[4]	12.9 J	254	15,100	3.03 J	27.8	44.4
NRZ-SSW1-10312	1210029	10/3/2012	Soil	In-place	4-feet	3.31 J	16.2	7,280	1.98 J	43.8	26.8
NRZ-NSW1-10312	1210029	10/3/2012	Soil	In-place	4-feet[4]	26.9 J	898	17,700	6.81 J	14.5	55.4
NRZ-NSW2-10312	1210029	10/3/2012	Soil	In-place	4-feet	15.2 J	46.2	16,200	2.26 J	38.5	37.7
NRZ-SSW2-10312	1210029	10/3/2012	Soil	In-place	4-feet	2.66 J	14.8	8,730	1.48 J	44.5	26.7
NRZ-NWB2-10312	1210029	10/3/2012	Soil	In-place	6-feet	36.3 J	433	48,000	13.8 J	20.2	60.0
W-Bulkhead-101812	1210176	10/18/2012	Sediment	Overexcavated[5]	n/a (6-feet)	4.59	193 J	24,000	12.6	46.1	45.9
MRZ-B1-102312	1210200	10/23/2012	Sediment	In-place	10-feet	9.04	68.1	35,000	5.53	24.4	30.8
MRZ-NSW1-102312	1210200	10/23/2012	Soil	In-place	9-feet	2.19	19.3	14,200	3.89	31.4	35.2
MRZ-B3-102312	1210223	10/23/2012	Sediment	In-place	11-feet	8.09	177	35,900	15.3 J	19.0	51.1 J
MRZ-ESWZ-102312 (MRZ-ESW2-102312)	1210223	10/23/2012	Sediment	In-place	8-feet	1.71	21.2	16,800	5.85 J	43.2	38.6 J
MRZ-B2-102412	1210223	10/24/2012	Soil	In-place	7-feet	3.77	30.7	18,200	18.7 J	40.9	54.6 J
MRZ-B3-102412	1210223	10/24/2012	Soil	In-place	6-feet	1.91	10.8	13,300	1.75 J	42.4	25.5 J
MRZ-B1-102412	1210223	10/24/2012	Soil	Overexcavated (see MRZ-B1-102612)	n/a (6-feet)	21.70	777	33,800	6.05 J	7.43	48.0 J
MRZ-B1-102512	1210233	10/25/2012	Soil	Overexcavated (see MRZ-B1-102912)	n/a (5-feet)	42.9	343	37,900	3.10	20.3	27.2
MRZ-B2-102512	1210233	10/25/2012	Soil	In-place	6-feet	2.87	27.8	13,900	4.67	32.1	66.7
MRZ-B3-102512	1210233	10/25/2012	Soil	Overexcavated (see MRZ-B2-102912)	n/a (6-feet)	92.3	503	124,000	324	61.3	1,120
MRZ-B4-102512	1210233	10/25/2012	Soil	In-place	4-feet	2.72	17.6	7,520	4.30	14.0	26.6
MRZ-B5-102512	1210248	10/25/2012	Soil	In-place	6-feet	18.70	336	31,700	24.0	41.5	470
MRZ-B1-102612	1210248	10/26/2012	Soil	In-place	8-feet	1.87	14.9	15,500	2.50	45.1	37.5
MRZ-B2-102612	1210248	10/26/2012	Soil	In-place	7-feet	52.2	1,580	55,400	2.09	7.5	66.8
MRZ-B3-102612	1210248	10/26/2012	Soil	Overexcavated (to 6-feet)	n/a (4-feet)	9.10	254	20,300	7.49	51.4	51.5
MRZ-B4-102612	1210248	10/26/2012	Soil	In-place	6-feet	5.60	71.0	17,800	4.86	48.7	50.0

Sample ID	Fremont Analytical Sample Data Group[1]	Date Collected	Matrix	In-place or overexcavated?	Sample Depth (for in-place material)[3]	Arsenic (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Nickel (mg/kg)	Zinc (mg/kg)
MRZ-B5-102612	1210248	10/26/2012	Soil	In-place	6-feet	1.13	15.0	5,390	0.91	12.2	12.9
MRZ-B1-102912	1210265	10/29/2012	Soil	In-place	7-feet	3.61	43.6	16,800	2.27	29.4	68.8
MRZ-B2-102912	1210265	10/29/2012	Soil	In-place	8-feet	52.9	263	137,000	222	43.9	780
MRZ-B1-110312 (MRZ-B1-110112)	1211031	11/3/2012	Soil	In-place	7-feet	57.8	1,090	38,100	15.4	26.0	79.6
MRZ-B2-110312 (MRZ-B2-110112)	1211031	11/3/2012	Soil	In-place	7-feet	10.7	194	12,400	7.37	32.3	50.6
MRZ-B3-110312 (MRZ-B3-110112)	1211031	11/3/2012	Soil	In-place	7-feet	29.6	608	23,800	8.39	30.9	101
Site-Specific Soil Cleanup Levels[2]						**18**	**70**	**58,700**	**120**	**48**	**160**

Notes:

[1]Chemical analyses performed by Fremont Analytical of Seattle, Washington. Sample data groups (SDGs) are inluded in Appendix E. The Fremont Analytical SDGs are included in Libby Environmental SDGs; see Table E-1 to identify the Libby Environmental SDGs associated with each Fremont Analytical SDG.

[2] Site-specific soil cleanup levels are referenced from Table 1 of the Final Engineering Design Report (GeoEngineers, 2012).

[3] Sample depth refers to depth below pre-remedial action ground surface.

[4] Final grade elevation at least 2-feet higher than pre-remedial action ground surface elevation; therefore, soil represented by this sample is below the conditional point of compliance.

[5] Soil was overexcavated due to heavy oil-range petroleum hydrocarbons (see Table 1); original sample at conditional point of compliance.

Red shading indicates soil concentration is greater than the site-specific soil cleanup level and soil was overexcavated or is at or below the conditional point of compliance (6-feet); see Section 3.4.2 for further discussion.

Red bordering indicates soil concentration is greater than the site-specific soil cleanup level and soil remains in-place above the conditional point of compliance (6-feet); see Section 3.4.2 for further discussion.

mg/kg = micrograms per kilogram

MTCA = Model Toxics Control Act

n/a = not applicable, soil was overexcavated

Table 5

Summary of Verification Soil Sample Chemical Analytical Results - TCLP and Wet Density

Irondale Iron and Steel Plant

Irondale, Washington

Sample ID	Date Collected	Matrix	TCLP Arsenic[1] (mg/L)	TCLP Lead[1] (mg/L)	Wet Density[2] (kg/L)
IRZ-STOCKPILE A	10/18/2012	Soil	--	--	1.25
TP8-Stockpile	10/23/2012	Soil	<0.500	<0.500	--
TCLP Criteria			**5**	**5**	not applicable

Notes:

[1]Chemical analyses performed by Fremont Analytical of Seattle, Washington.

[2]Analyses performed by Libby Environmental of Olympia, Washington.

Total metals were analyzed using EPA Method 6020, extraction by EPA Method 1311.

kg/L = kilogram per liter

mg/L = milligram per liter

TCLP = toxicity characteristic leaching procedure

-- = not tested

FIGURES

GeoEngineers

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Data Sources: ESRI Data & Maps, Street Maps 2005

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

Vicinity Map

Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers

Figure 1

Map Revised: May 24, 2007

Path: P:\0505040421\00\GIS\0505040200_FIG-1.mxd

Office: SEA

Legend

- Site Boundary
- Former Structures
- Approximate Mean Lower Low Water (MLLW)
- Approximate Extent of Slag Outcrop
- Historical Ordinary High Water

100 0 100
FEET

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Monitoring well was not constructed at DD01 PC Draft RI/FS Work Plan (GeoEngineers, 2007A; i.e. MW01 does not exist).

Reference: Aerial photo (April 2003) from Jefferson County (http:maps.co.jefferson.wa.us, accessed May 2007). Former structures from "Environmental Assessment, Log Chipping Facility, Irondale, Washington" (Hart Crowser, 1996).

Site Plan: Pre-Remedial Action and Historical Building Locations

Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers | **Figure 2**

P:\0\0504042\02\CAD\Completion Report\Figure 2 Pre-Remedial Action Site Plan.dwg\TAB:Fig 2 modified by thichaud on May 14, 2015 - 13:39

Legend

- Site Boundary
- Ordinary High Water (Estimated at Elevation 10.5 feet)
- Metals Area - Excavation
- Metals Area - Cap
- TPH Area - Excavation
- Slag Outcrop - Removal
- MW-1 — Monitoring Well Location
- SW-2 — Surface Water Monitoring Location
- Assumed Groundwater Flow Direction

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

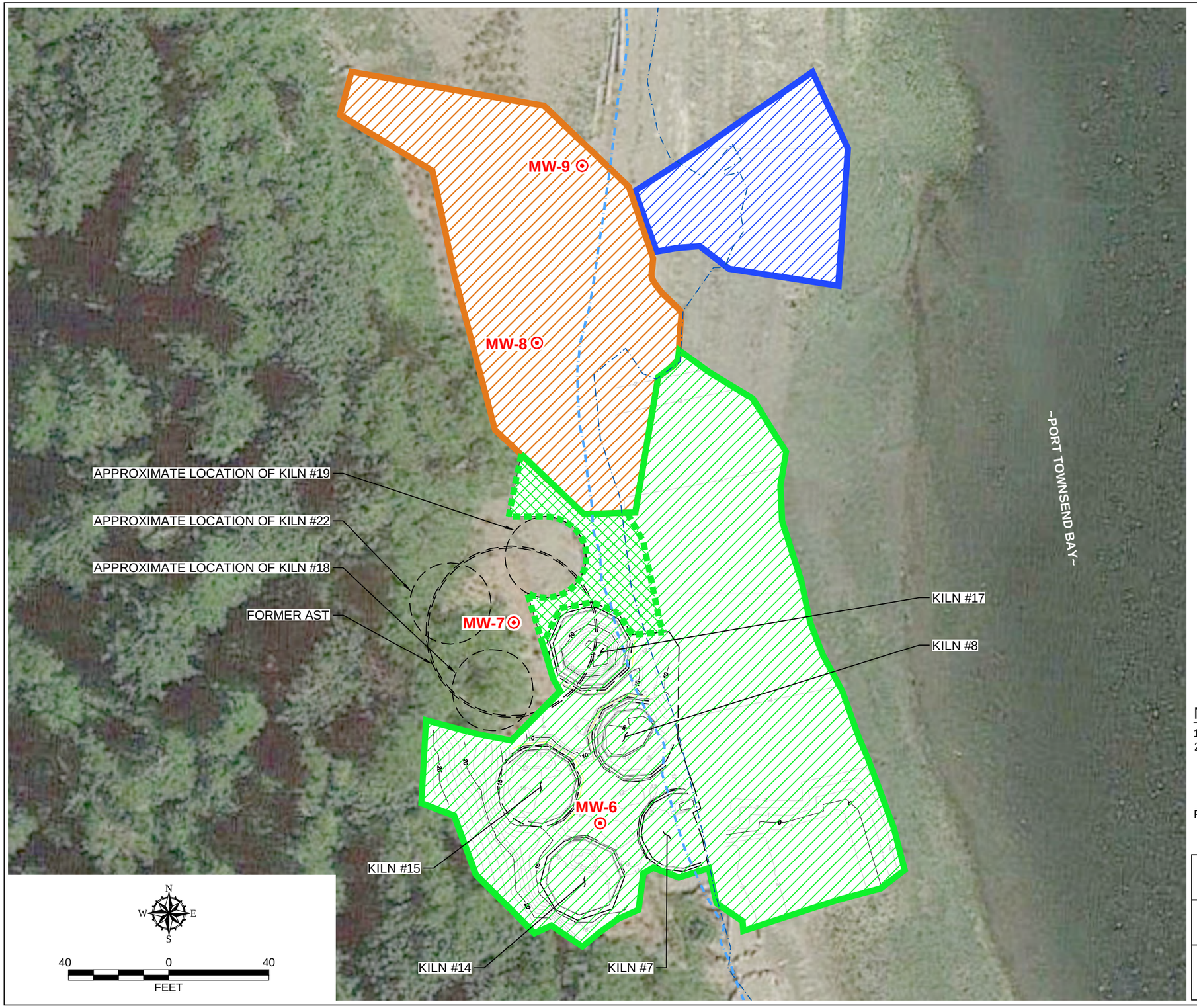
Reference: Aerial photo (July 2013) from Google Earth Pro.

Site Plan: Post-Remedial Action Conditions

Former Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers | **Figure 3**

P:\0\05040402\02\CAD\Completion Report\Figure 3 Site Plan.dwg\TAB:Fig 2 modified by tmichaud on May 14, 2015 - 9:23



Legend

- Site Boundary
- Ordinary High Water (Estimated at Elevation 10.5 feet)
- Historical Ordinary High Water
- Metals Area - Excavation
- TPH Area - Excavation
- Approximate Boundary of TPH Area that was not Surveyed
- Slag Outcrop - Removal
- MW-9 ⊙ Monitoring Well Location

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Aerial photo (July 2013) from Google Earth Pro. Kiln and Excavation Areas from As-Built Map by Van Aller Surveying surveyed in November 2012. Kilns 18, 19, and 22 were not surveyed.

TPH and Metals Excavation Areas

Former Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers

Figure 4

P:\105040\02\CAD\Completion Report\Figure 4.dwg\TAB:Fig 3 modified by tmichaud on May 14, 2015 - 9:25

P:\105040421021CAD\Completion Report\Figure 5 TPH Area Sediment Samples.dwg\TAB:Fig 4 modified by TMichaud on May 14, 2015 - 9:30

IRZ-NSW1-92812
IRZ-NESW2-92812
IRZ-B2-92812
IRZ-B1-92812
IRZ-NWSW1-92812
IRZ-NESW1-92812
MRZ-NSW1-102312
MRZ-B3-102312
IRZ-B3-92812
IRZ-ESW3-92712
MRZ-ESW2-102312
MRZ-B2-102312
MRZ-NSW2-102212
IRZ-ESW2-92712
MRZ-B1-102312
IRZ-B4-92712
IRZ-B1-92712
MRZ-B4-102212
IRZ-ESW1-92712
IRZ-B2-92712
MRZ-B3-102212
IRZ-B3-92712
MRZ-B2-102212
IRZ-ESW1-92612/
IRZ-B3-92612
IRZ-WSW1-92712
IRZ-B2-92612
IRZ-B5-92512
IRZ-WSW2-92612
W-Bulkhead-101812
IRZ-ESW1-92512
CON 01-101812
IRZ-ESW1-101712
IRZ-WSW1-92612
IRZ-B1-92612
IRZ-B1-101712
IRZ-B4-92412
IRZ-ESW3-92412
IRZ-B4-92512
IRZ-B3-92512
IRZ-B-1-101112
IRZ-B3-92412
IRZ-ESW1-101112
IRZ-ESW2-92412
IRZ-WSW1-92512
IRZ-SSW1-101112
IRZ-01-100112
IRZ-B2-92512
IRZ-COM1-100212
IRZ-ESW1-92412
IRZ-02-100112
IRZ-B2-92412
IRZ-B1-92512
IRZ-SSW1-92412
IRZ-B1-92412
SRZ-OX1-91112
SRZ-NSW1.5-91012
SRZ-ESW01-91212
SRZ-NSW01-91112
SRZ-B04-91212
SRZ-EB0-91012
SRZ-EB2-91012
SRZ-B02-91112
SRZ-WSW01-91212
SRZ-SSW4-91112
SRZ-B03-91212
SRZ-SSW3-91112

APPROXIMATE LOCATION OF KILN #19
APPROXIMATE LOCATION OF KILN #22
APPROXIMATE LOCATION OF KILN #18
FORMER AST
KILN #17
KILN #8
KILN #15
KILN #7
KILN #14

~PORT TOWNSEND BAY~

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Legend

- Ordinary High Water (Estimated at Elevation 10.5 feet)
- Historical Ordinary High Water
- Metals Area - Excavation
- Metals Area - Cap
- TPH Area - Excavation
- Approximate Boundary of TPH Area that was not Surveyed
- Slag Outcrop - Removal
- Sediment Sample Location
- TPH less than site-specific soil/sediment cleanup level (136 mg/kg)
- TPH greater than site-specific soil/sediment cleanup level (136 mg/kg). Affected sediment was overexcavated.
- TPH concentration of 766 mg/kg. Sample was collected at depth of 11-feet below the mudline and remains in place.

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Sediment samples generally collected at depths ranging from 5 to 11 feet below mudline.

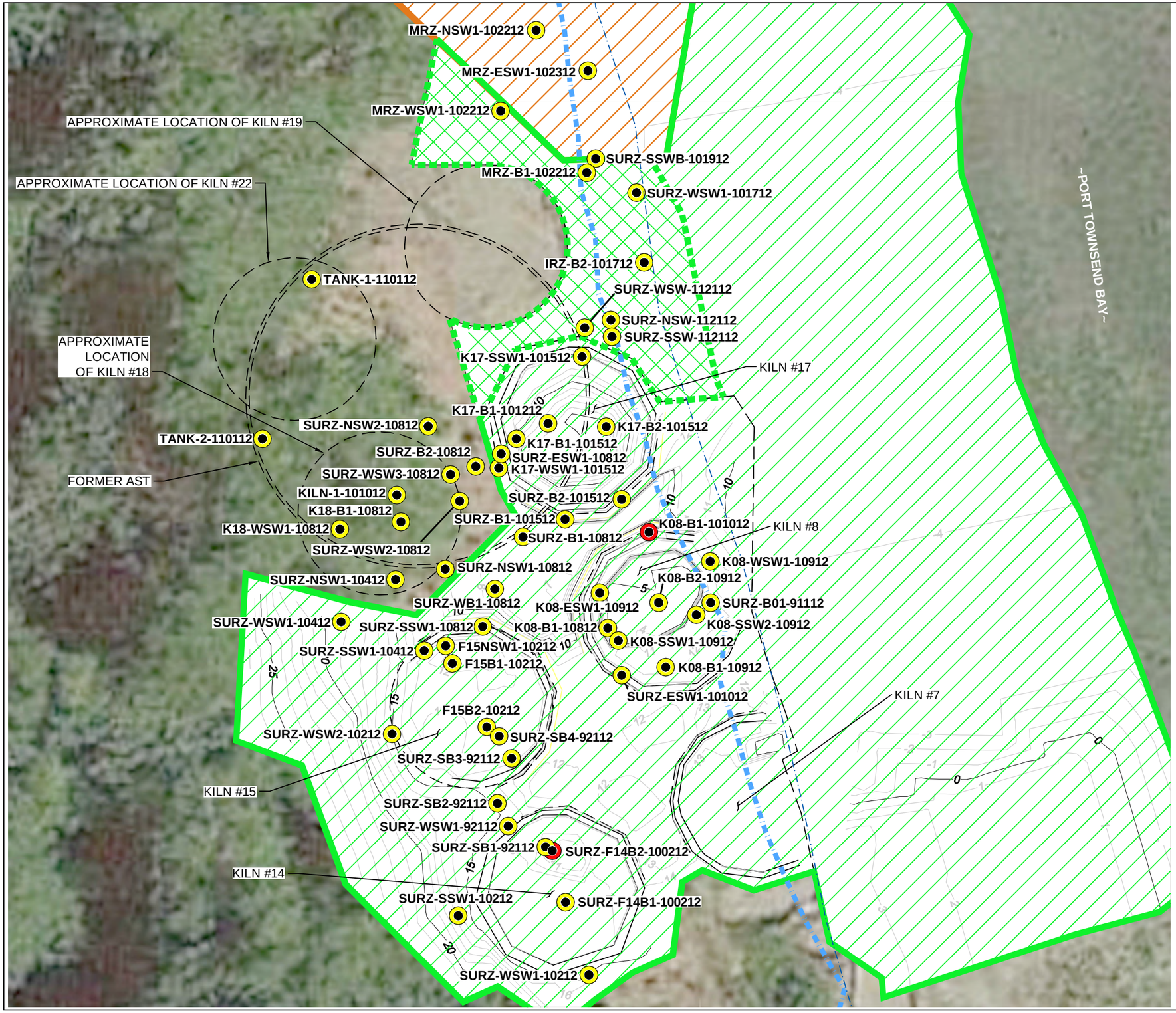
Reference: Aerial photo (July 2013) from Google Earth Pro. Kiln and Excavation Areas from As-Built Map by Van Aller Surveying surveyed in November 2012. Kilns 18, 19, and 22 were not surveyed.

TPH Area Sediment Samples

Former Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers

Figure 5



Legend

- Ordinary High Water (Estimated at Elevation 10.5 feet)
- Historical Ordinary High Water
- Metals Area - Excavation
- Metals Area - Cap
- TPH Area - Excavation
- Approximate Boundary of TPH Area that was not Surveyed
- Slag Outcrop - Removal
- Sediment Sample Location
- TPH less than site-specific soil/sediment cleanup level (136 mg/kg)
- TPH greater than site-specific soil/sediment cleanup level (136 mg/kg). Affected soil was overexcavated.

N W E S

20 0 20
FEET

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Soil samples were generally collected at depths ranging from 2 to 11 feet below ground surface.

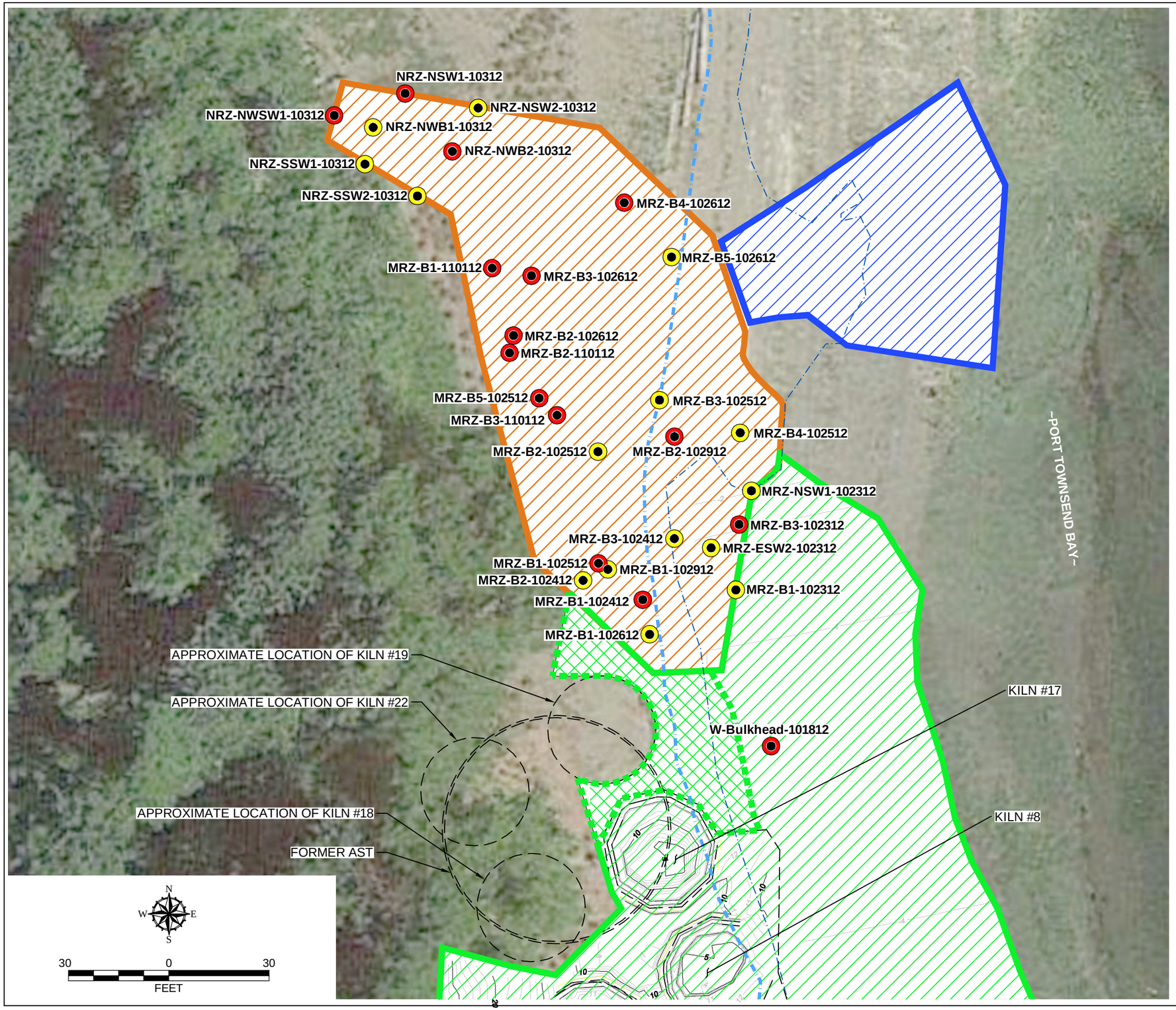
Reference: Aerial photo (July 2013) from Google Earth Pro. Kiln and Excavation Areas from As-Built Map by Van Aller Surveying surveyed in November 2012. Kilns 18, 19, and 22 were not surveyed.

TPH Area Soil Samples

Former Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers | **Figure 6**

P:\0\0504042\02\CAD\Completion Report\Figure 6 TPH Area Soil Samples.dwg\TAB:Fig 5 modified by tmichaud on May 14, 2015 - 9:55



Legend

- Ordinary High Water (Estimated at Elevation 10.5 feet)
- Historical Ordinary High Water
- Metals Area - Excavation
- Metals Area - Cap
- TPH Area - Excavation
- Approximate Boundary of TPH Area that was not Surveyed
- Slag Outcrop - Removal
- Sediment Sample Location
- Metal concentration(s) less than site-specific soil cleanup levels
- Metal concentration(s) greater than site-specific soil cleanup level(s). Affected soil was over excavated or below conditional point of compliance (6-feet)

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Soil samples were generally collected at depths ranging from 4 to 11 feet below ground surface.

Reference: Aerial photo (July 2013) from Google Earth Pro. Kiln and Excavation Areas from As-Built Map by Van Aller Surveying surveyed in November 2012. Kilns 18, 19, and 22 were not surveyed.

Metals Area Soil Samples

Former Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers

Figure 7

P:\0\0504042\02\CAD\Completion Report\Figure 7 Metals Area Soil Samples.dwg\TAB:Fig 6 modified by TMichaud on May 14, 2015 - 9:58

Legend

- Site Boundary
- Metals Area - Excavation
- Metals Area - Cap
- Sediment Sample Location
- Metal concentration(s) less than site-specific soil cleanup levels
- Metal concentration(s) greater than site-specific soil cleanup levels

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Aerial photo (July 2013) from Google Earth Pro. Excavation area from GeoEngineers field drawing.

Metals Area (Near Upland Cap) Soil Samples

Former Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers

Figure 8

P:\0105042\02\CAD\Completion Report\Figure 8 Metals Area - Near Upland Cap - Soil Samples.dwg\TAB:Fig 2 modified by tmichaud on May 14, 2015 - 9:59

APPENDICES

GeoEngineers

APPENDIX A
Permits

Washington Department of FISH and WILDLIFE

HYDRAULIC PROJECT APPROVAL

RCW 77.55.021 - See appeal process at end of HPA

Coastal
48 Devonshire Road
Montesano, WA 98563
(360) 249-4628

Issue Date: June 15, 2012
Project Expiration Date: March 14, 2014

Control Number: 123879-3
FPA/Public Notice #: N/A

PERMITTEE	AUTHORIZED AGENT OR CONTRACTOR
Washington State Department of Ecology	GeoEngineers Inc
ATTENTION: Steve Teel	ATTENTION: Joseph Callaghan
P.O. Box 47775	1101 S Fawcett Ave Ste 200
Olympia, WA 98504-7775	Tacoma, WA 98402
360-407-6247	253-383-4940
Fax: 360-407-6205	Fax: 253-383-4923

Project Name: Irondale Environmental Remediation & Habitat Rest.

Project Description: Environmental remediation and habitat restoration at the Irondale Beach Park site (location of the former Irondale Iron and Steel Plant).

PROVISIONS

1. Work below the ordinary high water line shall not occur from February 15 through July 14 of any year for the protection of migrating juvenile salmonids.

2. Work below the ordinary high water line shall not occur from October 15 through December 31 and from January 1 through March 1 of any year for the protection of Pacific sand lance spawning beds except that area including and south of the slag outcrop to the property boundary (remediation area).

3. Work shall be accomplished per plans and specifications approved by the Washington Department of Fish and Wildlife entitled Cross Section from AST through Beach and dated November 4, 2011, except as modified by this Hydraulic Project Approval. A copy of these plans shall be available on site during construction.

4. All manmade debris on the beach shall be removed and disposed of upland such that it does not enter waters of the state.

5. Beach area depressions created during project activities shall be reshaped to preproject beach level upon project completion.

6. Project activities shall not occur when the project area, including the work corridor is inundated by tidal waters.

7. Excavated materials containing silt, clay, or other fine grained soil shall not be stockpiled below the ordinary high water line.

8. If sand, gravel, and other coarse excavated material is to be temporarily placed where it will come into contact with tidal waters, this material shall be covered with filter fabric and adequately secured to prevent erosion and/or potential entrainment of fish.

Issue Date: June 15, 2012 | Control Number: 123879-3

Project Expiration Date: March 14, 2014 | FPA/Public Notice #: N/A

9. All excavated or stockpiled material shall be removed from the beach within 72 hours of construction. Upon removal of the excavated material, the beach shall immediately be returned to the preproject natural grade.

10. Project activities shall be conducted to minimize siltation of the beach area and bed.

11. If at any time, as a result of project activities, fish are observed in distress, a fish kill occurs, or water quality problems develop (including equipment leaks or spills), immediate notification shall be made to the Washington Military Department's Emergency Management Division at 1-800-258-5990, and to the Area Habitat Biologist listed below.

12. All debris or deleterious material resulting from construction shall be removed from the beach area and bed and prevented from entering waters of the state.

13. No petroleum products or other deleterious materials shall enter surface waters.

14. Wood treated with preservatives, trash, waste, or other deleterious materials shall not be burned below the ordinary high water line. Limited burning of untreated wood or similar material may be allowed at or above the mean higher high water line.

15. Project activities shall not degrade water quality to the detriment of fish life.

PROJECT LOCATIONS

Location #1 Irondale Beach Park

WORK START: July 16, 2012					WORK END: February 14, 2014	
WRIA:	Waterbody:				Tributary to:	
17.9090	Wria 17 Marine				Puget Sound	
1/4 SEC:	Section:	Township:	Range:	Latitude:	Longitude:	County:
SE 1/4	35	30 N	01 W	N 48.04453	W 122.76828	Jefferson

Location #1 Driving Directions

Jefferson county side of Hood Canal Bridge, turn right on WA 19 north, Beaver Valley Raod-11.6 miles turn right at Irondate Road 0.8 miles, turnleft at 4th street, 0.2 iles take second riht at Moore St. 0.2 miles site at end orfroad, gravel parking lot

Issue Date: June 15, 2012
Project Expiration Date: March 14, 2014

Control Number: 123879-3
FPA/Public Notice #: N/A

Location #2 Irondale Beach Park

WORK START: July 16, 2012					WORK END: February 14, 2014	
WRIA: 17.9090		Waterbody: Wria 17 Marine			Tributary to: Puget Sound	
1/4 SEC: NE 1/4	Section: 02	Township: 29 N	Range: 01 W	Latitude: N 48.04453	Longitude: W 122.76828	County: Jefferson
Location #2 Driving Directions						

APPLY TO ALL HYDRAULIC PROJECT APPROVALS

This Hydraulic Project Approval pertains only to those requirements of the Washington State Hydraulic Code, specifically Chapter 77.55 RCW (formerly RCW 77.20). Additional authorization from other public agencies may be necessary for this project. The person(s) to whom this Hydraulic Project Approval is issued is responsible for applying for and obtaining any additional authorization from other public agencies (local, state and/or federal) that may be necessary for this project.

This Hydraulic Project Approval shall be available on the job site at all times and all its provisions followed by the person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work.

This Hydraulic Project Approval does not authorize trespass.

The person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work may be held liable for any loss or damage to fish life or fish habitat that results from failure to comply with the provisions of this Hydraulic Project Approval.

Failure to comply with the provisions of this Hydraulic Project Approval could result in a civil penalty of up to one hundred dollars per day and/or a gross misdemeanor charge, possibly punishable by fine and/or imprisonment.

All Hydraulic Project Approvals issued under RCW 77.55.021 are subject to additional restrictions, conditions, or revocation if the Department of Fish and Wildlife determines that changed conditions require such action. The person(s) to whom this Hydraulic Project Approval is issued has the right to appeal those decisions. Procedures for filing appeals are listed below.

Requests for any change to an unexpired HPA must be made in writing. Requests for new HPAs must be made by submitting a new complete application. Send your requests to the department by: mail to the Washington Department of Fish and Wildlife, Habitat Program, 600 Capitol Way North, Olympia, Washington 98501-1091; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor.

APPEALS INFORMATION

If you wish to appeal the issuance, denial, conditioning, or modification of a Hydraulic Project Approval (HPA), Washington Department of Fish and Wildlife (WDFW) recommends that you first contact the department employee who

issued or denied the HPA to discuss your concerns. Such a discussion may resolve your concerns without the need for further appeal action. If you proceed with an appeal, you may request an informal or formal appeal. WDFW encourages you to take advantage of the informal appeal process before initiating a formal appeal. The informal appeal process includes a review by department management of the HPA or denial and often resolves issues faster and with less legal complexity than the formal appeal process. If the informal appeal process does not resolve your concerns, you may advance your appeal to the formal process. You may contact the HPA Appeals Coordinator at (360) 902-2534 for more information.

A. INFORMAL APPEALS: WAC 220-110-340 is the rule describing how to request an informal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete informal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request an informal appeal of that action. You must send your request to WDFW by mail to the Washington Department of Fish and Wildlife HPA Appeals Coordinator, 600 Capitol Way North, Olympia, Washington 98501-1091; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. WDFW must receive your request within 30 days from the date you receive notice of the decision. If you agree, and you applied for the HPA, resolution of the appeal may be facilitated through an informal conference with the WDFW employee responsible for the decision and a supervisor. If a resolution is not reached through the informal conference, or you are not the person who applied for the HPA, the HPA Appeals Coordinator or designee will conduct an informal hearing and recommend a decision to the Director or designee. If you are not satisfied with the results of the informal appeal, you may file a request for a formal appeal.

B. FORMAL APPEALS: WAC 220-110-350 is the rule describing how to request a formal appeal of WDFW actions taken under Chapter 77.55 RCW. Please refer to that rule for complete formal appeal procedures. The following information summarizes that rule.

A person who is aggrieved by the issuance, denial, conditioning, or modification of an HPA may request a formal appeal of that action. You must send your request for a formal appeal to the clerk of the Pollution Control Hearings Boards and serve a copy on WDFW within 30 days from the date you receive notice of the decision. You may serve WDFW by mail to the Washington Department of Fish and Wildlife HPA Appeals Coordinator, 600 Capitol Way North, Olympia, Washington 98501-1091; e-mail to HPAapplications@dfw.wa.gov; fax to (360) 902-2946; or hand-delivery to the Natural Resources Building, 1111 Washington St SE, Habitat Program, Fifth floor. The time period for requesting a formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, you may request a formal appeal within 30 days from the date you receive the Director's or designee's written decision in response to the informal appeal.

C. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS: If there is no timely request for an appeal, the WDFW action shall be final and unappealable.

ENFORCEMENT: Sergeant Henry (28) P2

Habitat Biologist Margie Schirato	360-427-2179	Margaret Schirato	for Director WDFW

CC:

From: Teel, Steve (ECY) <STEE461@ECY.WA.GOV>
Sent: Monday, October 22, 2012 11:06 AM
To: Lundquist, Lance NWS
Cc: Neil Morton; Christopher L. Bailey; Joe Callaghan; Paul D. Robinette; Jessie C. Piper; Michael V. Shong; Chris Miss; Rose, Scott (ECY); Lawson, Rebecca (ECY)
Subject: RE: Irondale Permit Stipulations (UNCLASSIFIED)

Lance -
Thanks again for all of your help in developing and finalizing these permit stipulations!
Steve

Steve Teel, LHG
Site Manager/Hydrogeologist
Washington State Department of Ecology
Toxics Cleanup Program, Southwest Regional Office
P.O. Box 47775
Lacey, WA 98504-7775
Phone (360) 407-6247
steve.teel@ecy.wa.gov
Street Address: 300 Desmond Drive, Lacey, WA 98503
Fax (360) 407-6305

-----Original Message-----
From: Lundquist, Lance NWS [mailto:Lance.A.Lundquist@usace.army.mil]
Sent: Monday, October 22, 2012 11:00 AM
To: Jordan, Jess NWS
Cc: Teel, Steve (ECY)
Subject: FW: Irondale Permit Stipulations (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Jess - These look to be the final stipulations for the permit.

Lance

-----Original Message-----
From: Griffith, Greg (DAHP) [mailto:Greg.Griffith@DAHP.WA.GOV]
Sent: Thursday, October 18, 2012 9:57 AM
To: Lundquist, Lance NWS; Houser, Michael (DAHP); Kramer, Stephenie (DAHP); Whitlam, Rob (DAHP); Jenkins, Chris NWS; Jordan, Jess NWS; Neil Morton (nmorton@geoengineers.com); Teel, Steve (ECY)
Subject: RE: Irondale Permit Stipulations (UNCLASSIFIED)

I am ok with this language, although I added another tweak to #5 under charcoal kilns. Otherwise, looks good to me.

Thanks Lance and Steve

-----Original Message-----
From: Lundquist, Lance NWS [mailto:Lance.A.Lundquist@usace.army.mil]
Sent: Thursday, October 18, 2012 9:46 AM
To: Griffith, Greg (DAHP); Houser, Michael (DAHP); Kramer, Stephenie (DAHP); Whitlam, Rob (DAHP); Jenkins, Chris NWS; Jordan, Jess NWS; Neil Morton (nmorton@geoengineers.com); Teel, Steve (ECY)
Subject: RE: Irondale Permit Stipulations (UNCLASSIFIED)
Importance: High

Classification: UNCLASSIFIED

Caveats: NONE

All:

I incorporated Steve's suggested change to Kiln 3, otherwise the text is the same. Please review and confirm that this works for you as the final permit language. Jess will add as a permit condition. Thanks everyone.

Lance

Catwalk/Railbed

1. Record the catwalk/railbed.

2. Sample the wood and analyze to determine what wood species was used.

3. Address questions about what and how catwalks/railbeds were used, how they were/are structured with regard to adjacent kilns, assess and relate (if feasible) information from historic photos/drawings that can be extracted to describe the catwalks/railbeds, how elevated they would have been in use, and perhaps describe, or attempt to describe or sketch how they would have looked when in use, related to the kilns and other features?

4. Prepare an addendum to the 1983 Historic American Engineering Record for the Irondale site to incorporate information from above.

5. A draft of the catwalk/railbed documentation shall be provided to DAHP for review and comment before final submittal to HAER in Washington DC. However, removal of the catwalk/railbed may proceed following completion of photo-documentation of the feature in situ. The completed documentation package shall be provided to DAHP as a permanent record of the catwalk/railbed. Copies will be provided to the Corps and Jefferson County Historical Society.

6. Steps 1-5 shall be implemented by a cultural resource professional meeting National Park Service Professional Qualifications in the appropriate field of expertise.

7. Should questions or issues arise during the implementation of steps 1-6, contact Corps Cultural Resource staff and DAHP staff for consultation.

Charcoal Kilns

1. Record kilns.

2. To the greatest extent possible, save the kilns in place and intact. Remove contaminated sediment and replace with clean sediment. All ground disturbing work in and around the kilns will be monitored by a professional archaeologist per the monitoring plan.

3. If the contaminated sediment is deeply buried under the kiln in such a way that it cannot be excavated without moving the kiln, use a concrete saw to cut the kiln in as few and unobtrusive places as possible (i.e. along the mortar joints of brick surfaces); minimize as much as possible cutting through intact bricks. However, sections of kiln may be moved without cutting if there are pre-existing breaks, cracks, or friable portions. Before removal, informally record the location of the kiln segment to aid in re-installation to original location after contaminated sediment is removed and replaced with clean sediment.

4. If kilns cannot be saved due to contamination, the Washington Department of Ecology (WDE) will set aside a mitigation fund. The mitigation cost of removing kilns is as follows: 1) a partial kiln is $400 per linear foot; 2) an entire kiln $10,000; and 3) the overall maximum cap for kiln removal is $50,000. The Corps and DAHP will consult on the use of any mitigation monies. To the extent possible, WDE will attempt to save as much of the original kiln as possible.

5. Prepare an addendum to the 1983 Historic American Engineering Record for the Irondale site to incorporate information about the kilns. A draft of the addendum document, including the catwalk/railbed documentation (as described in (4) under "Catwalk/Railbed," above), shall be provided to DAHP for review and comment before final submittal to HAER in Washington DC. The completed documentation package shall be provided to DAHP as a permanent record of the kilns. Copies will be provided to the Corps and Jefferson County Historical Society.

6. Upon completion of removal of contaminated soils and replacement with clean soils and when reconfiguring the site surface, to the greatest extent feasible, shape the surface to leave the kilns exposed (recommended to be not more than one foot in height of exposed brick coursing) such that visitors to the site can envision their dimensions, materials, placement and function.

7. Select and plant vegetation in regard to species that help convey the look and feel of the district and kilns, balanced to achieve sediment stabilization goals. Prepare a vegetation and fill plan for review and approval by DAHP and the Corps.

8. Should questions or issues arise during the implementation of steps 1-8, contact Corps Cultural Resource staff and DAHP staff for consultation.

Outreach

1. Present the results of the historic preservation aspect of the project at an event or meeting of cultural resource professionals.

2. Contact the Jefferson County Historical Society to afford it an opportunity to participate in the project. If the JCHS is interested, work with them to identify an appropriate level and format to participate in the project implementation and/or its outcome. Possible ideas include a site tour or public presentation.

Classification: UNCLASSIFIED
Caveats: NONE

SWCA Environmental Consultants

MEMO

TO: Steve Teel, LHG
Cleanup Project Manager/Hydrogeologist
Washington State Department of Ecology

FROM: Lorelea Hudson, PNW Cultural Resources Team Lead

DATE: November 10, 2015

RE: Irondale Cleanup Project – Status of US Army Corps of Engineers (USACE) Permit Stipulations

The following memo is a list of the US Army Corps of Engineers Permit Stipulations for the Irondale Cleanup Project, followed by a discussion of the tasks undertaken to comply with each item. The discussion incorporates information submitted in SWCA's memo of January 30, 2014**.**

Catwalk/Railbed

1. Record the catwalk/railbed.
The exposed portion of the central walkway structure (catwalk/railbed) was recorded by SWCA during the field monitoring; data are presented in the Irondale Cleanup Monitoring Report (Shong and Carrilho 2014) and was included in the Historic American Engineer Record Addenda that was submitted to and approved by the National Park Service (NPS) in 2015. Detailed description of this feature is also included in Washington State Archaeological Inventory Form 45JE358.

2. Sample the wood and analyze to determine what species was used.
Four wood samples were collected in the field; three were determined to be cedar; the fourth is probably also cedar but possibly is fir. This information is included in the Irondale Cleanup Monitoring Report.

3. Address questions about what and how catwalks/railbeds were used, how they were/are structured with regard to adjacent kilns, assess and relate (if feasible) information from historic photos/drawings that can be extracted to describe the catwalks/railbeds, how elevated they would have been in use, and perhaps describe, or attempt to describe or sketch how they would have looked when in use, related to the kilns and other features?
SWCA addressed the construction, elevation and use of catwalks, conveyors and rail links in the Part II. Architectural Information section of the HAER Addendum. No architectural plans were found, but historical photographs, journal articles, and an early diagram of the iron plant's layout provided sufficient documentation to describe in some detail the catwalk and railbed features and how they related to the kilns. A copy of an historic photograph of the catwalks and the kilns as well as the early plant diagram are included in the addendum.

A number of additional historic photographs of the kilns and other features were found and used as the basis for the discussion of these features, but the institutions that hold the copyright for these

photographs refused permission to reproduce them in the HAER documentation and thus give up their copyright.

4. Prepare an addendum to the 1983 Historic American Engineering Record (HAER) for the Irondale site to incorporate the information from above.
See number 5 below.

5. A draft of the catwalk/railbed documentation shall be provided to DAHP for review and comment before final submittal to HAER in Washington DC. However, removal of the catwalk/railbed may proceed following completion of photo-documentation of the feature in situ. The completed documentation package shall be provided to DAHP as a permanent record of the catwalk/railbed. Copies will be provided to the Corps and Jefferson County Historical Society.
The catwalk/railbed documentation, including description and photographs, was incorporated into the draft HAER Addendum that was submitted to DAHP for review on October 8, 2014. Comments were addressed and a revised document was submitted on May 4, 2015 for review by NPS historian Christine Avery, Pacific Region. The NPS acknowledged receipt of and accepted the final HAER documentation on May 7, 2015. Archival copies were also provided to DAHP, the USACE, Jefferson County Parks and Recreation, and the Jefferson County Historical Society**.** The NPS Pacific Region is responsible for submitting the HAER document to the National Archives in Washington D.C.

6. Steps 1-5 shall be implemented by a cultural resources professional meeting National Park Service Professional Qualifications in the appropriate field of expertise.
The Principal Investigator for Steps 1-5 was Christian J. Miss, MA, Register of Professional Archaeologists (RPA). Ms. Miss exceeds the Secretary of Interior Standards for archaeology. Project Manager was Jessie Piper, MA, and the archaeological crew included Ross Smith, MA, RPA, Kate Shantry, MA, RPA, Mike Shong, Yonara Carrilho, BA, Alicia Valentino, PhD, RPA, and Brian Boggs, MA. The HAER Narrative was prepared by Jessie Piper and Historian Sharon Boswell, MA and the large format photographs were taken by SWCA Staff Photographer Erik Anderson. Ms. Boswell exceeds the Secretary of Interior Standards for historians.

<u>Charcoal Kilns</u>

1. Record kilns.
The exposed kiln structures were recorded by SWCA archaeologists as they were exposed during field monitoring; HAER photography was also completed. This information and the photographs are presented in the Monitoring Report and are included in the HAER Addenda.

2. To the greatest extent possible save the kilns in place and intact. Remove contaminated sediment and replace with clean sediment. All ground disturbing work in and around the kilns will be monitored by a professional archaeologist per the monitoring plan.
Contaminated soils inside and outside were removed from kiln features in the western row. Structures were cleaned, covered in geotextile, and covered again with approximately two feet of clean sand. Logs were placed in front of the row of features to assist with soil stabilization and to protect the features from erosion. Kiln features in the eastern row were exposed and cleaned in a similar manner. Only one kiln required partial removal to eliminate slag and contaminated soils from the area; the removed section was replaced when work was completed. SWCA provided archaeological monitors for the duration of the cleanup project.

3. If the contaminated sediment is deeply buried under the kilns in such a way that it cannot be excavated without removing the kiln, use a concrete saw to cult the kiln in a few and unobtrusive places as possible (i.e. along the mortar joints of brick surfaces); minimize as much as possible cutting through intact bricks. However, sections of kiln may be moved without cutting if there are pre-existing breaks, cracks, or friable portions. Before removal, informally record the location of the kiln segment to aid in re-installation to original location after contaminated sediment is removed and replaced with clean sediment.

Only one structure required the temporary removal of a 43 linear feet section during the cleanup project. Workers were able to remove this portion of the structure in sections created by natural points of weakness and/or breakage that had previously occurred due to the friable condition of the mortar. The removed portion was cleaned and replaced after soils and slag cleanup.

4. If kilns cannot be saved due to contamination, the Washington Department of Ecology (WDE) will set aside a mitigation fund. The mitigation cost of removing kilns is as follows: 1) partial kiln is $400 per linear foot; 2) an entire kiln $10,000; and 3) the overall maximum cap for kiln removal is $50,000. The Corps and DAHP will consult on the use of any mitigation monies. To the extent possible, WDE will attempt to save as much of the original kiln as possible.

None of the kiln structures or portions of kiln structures had to be permanently dismantled or removed from their locations, as cleaning treatments were able to remove the contamination and render all kiln features suitable for leaving in place. During the field visit by DAHP on January 16, 2014, Deputy State Historic Preservation Officer Greg Griffith and Assistant State Archaeologist Stephanie Kramer inspected the kilns and verified the status of the kiln features. No mitigation fund was required because no kilns were removed from the site during cleanup project.

5. Prepare an addendum to the 1983 Historic American Engineering Record for the Irondale site to incorporate information about the kilns. A draft of the addendum document, including the catwalk/railbed documentation (as described in (4) above), shall be provided to DAHP for review and comment before final submittal to HAER in Washington DC. The completed documentation package shall be provided to DAHP as a permanent record of the kilns. Copies will be provided to the Corps and Jefferson County Historical Society.

The addendum to the 1983 HAER documentation was prepared by SWCA and submitted to DAHP for review and comment in October 2014. SWCA responded to DAHP's comments and subsequently submitted the document to the NPS in May 2015. This document included information about the catwalk/railbed as well as the results of archaeological monitoring. Copies of the HAER Addenda were provided to the USACE, DAHP, NPS, and the Jefferson County Historical Society.

6. Upon completion of removal of contaminated soils and replacement with clean soils and when reconfiguring the site surface, to the greatest extent feasible, shape the surface to leave the kilns exposed (recommended to be not more than one foot in height of exposed brick coursing) such that visitors to the site can envision their dimensions, material, placement, and function.

Kiln features in the outer (eastern) row were left exposed. Historical photos show that this row was subject to erosion for a number of decades. To prevent similar damage to the intact kiln features in the inner (western) row, the structures were covered with approximately 1-2 feet of clean sand. Logs were placed in front of the western row of kilns to assist with stabilization.

7. Select and plant vegetation in regard to species that help convey the look and feel of the district and kilns, balanced to achieve sediment stabilization goals. Prepare vegetation and fill plan for review and approval by DAHP and Corps.

A light cover of non-intrusive plants was placed in the center area of the buried kiln features where they would help with soil stabilization but not compromise the buried structures. This area is delineated by its openness from the backdrop of larger woody vegetation, including trees, on the side of the bluff behind the kiln area. This helps retain a sense of the former kiln footprint that can contribute to future interpretation. Ongoing vegetation management is addressed in the Cultural Resources Management Plan which has been reviewed and approved by DAHP and the USACE.

Outreach

1. Present the results of the historic preservation aspect of the project at an event or meeting of cultural resource professionals.

SWCA Archaeologist Michael Shong presented a paper on Irondale, "Finding Balance between Environmental Restoration and Protecting Historic Properties" at the Northwest Anthropological Meetings in March (Bellingham March 26-29, 2014) to fulfill this outreach goal.

2. Contact the Jefferson County Historical Society to afford it an opportunity to participate in the project. If the JCHS is interested, work with them to identify an appropriate level and format to participate in the project implementation and/or its outcome. Possible ideas include a site tour or public presentation.

The Department of Ecology and Jefferson County Parks and Recreation have included the Jefferson County Historical Society (JCHS) in discussions and meetings related to the Irondale Cleanup project as well as ongoing Irondale Park interpretive planning. JCHS Collections Manager/ Exhibit Designer Becky Schurmann participated in an onsite meeting on January 16, 2014 with DOE, SWCA, Tribal members, and others to share ideas for future interpretation and public involvement.

The Cultural Resources Management Plan prepared for the Irondale Beach Park included provision for Jefferson County Parks and Recreation to cooperate with Jefferson County and the Historical Society in development of public outreach. Documents that provide up-to-date information on the Irondale Iron and Steel Plant, including the 1983 and 2014 HAER documentation, the 2011 Conditions Report, and the National Register nomination form, were provided to the Jefferson County Parks and Recreation (July 2015) in conjunction with the CRMP. This material will serve as a resource to assist Parks and Recreation and the JCHS with development of presentations and site tours.

APPENDIX B
CSWGP Documents

DEPARTMENT OF ECOLOGY
State of Washington

Notice of Termination Form

Construction Stormwater General Permit

Use this form to request termination of permit coverage

Permit # WAR 126067

I. Operator/Permittee (Party with operational control over plans and specifications, or day-to-day operational control of activities which ensure compliance with SWPPP and permit conditions. Ecology will send correspondence and permit fee invoices to the permit holder on record.)

Name: Steve Anderson	Company: Anderson Environmental Contracting, LLC	
Business Phone: 360-577-9194 Ext.	Cell Phone (Optional):	Fax (Optional):
E-mail:stevea@aecllc.net		
Mailing Address: 705 Colorado Street		
City: Kelso	State: WA	Zip + 4: 98626-5506

II. Site Location/Address

Site name: Irondale Iron and Steel Plant Cleanup Action		Total area of soil disturbance for your site/project: 5 acres
Street address (or location description): 562 Moore St		
City (or nearest city): Port Hadlock	Zip: 98339	County: Jefferson

III. Construction Activity- The site is eligible for termination by one of the following methods:

☒ The site has undergone final stabilization. The operator has permanently stabilized all exposed soils, removed all temporary BMPs, and eliminated all stormwater discharges associated with construction activity.

☐ Permit coverage on all portions of the site that have not undergone final stabilization (Permit Condition S10.A.1) are being, or have been, transferred (Permit Condition G9), and the Permittee no longer has operational control of the construction activity.

We provided the new owner Transfer of Coverage paperwork on:

☐ All portions of the site that have not undergone final stabilization (Permit Condition S10.A.1) have been sold and the Permittee no longer has operational control of the construction activity. We will not be submitting Transfer of Permit coverage paperwork. (Optional).

Please provide new owner contact info:

IV. Certification of Permittees. Please read the certification statement carefully before signing.

"I certify under penalty of law that all stormwater discharges associated with construction activity from the identified site that are authorized by the National Pollution Discharge Elimination System (NPDES) and State Waste Discharge general permit have been eliminated, or that I no longer own or operate on this site. I understand that by submitting this Notice of Termination that I am no longer authorized to discharge stormwater associated with construction activity by the general permit, and that discharging pollutants in stormwater to waters of the State of Washington is unlawful under the Clean Water Act where the discharge is not authorized by a NPDES permit. I also understand that the submittal of this Notice of Termination does not release the permittee from liability for any violations of this permit or the Clean Water Act."

Steve Anderson
Operator printed name

President / Project Manager
Title

Steve Anderson
Operator signature

2-28-13
Date

Instructions for Notice of Termination Form

Submit a Notice of Termination Form to the Department of Ecology when
1.) All stormwater discharges from a construction site are eliminated, and the site has undergone final stabilization.
2.) The site has been sold or transferred to a different operator(s). The permit fees will continue until the permit is terminated.

I. Operator	Give the name, address, and telephone number of the person who is responsible for the permit. This person will also be sent the final fee invoice.
II. Site Location	Enter the street address or location description, including the city or nearest city and county for the construction site. Construction sites that do not have a street address must also provide a legal description in the space provided, or as an attachment.
III. Construction Activity	Indicate: 1. That all stormwater discharges associated with construction activity are eliminated and final stabilization of all exposed soils is completed. Final stabilization means the establishment of a permanent vegetative cover, or equivalent permanent stabilization measures, that prevents erosion. 2. That the permit has been transferred to another responsible party(ies) for management. ***(Provide the information required on the Transfer of Coverage form.)*** 3. That all portions of the site that have not undergone final stabilization have been sold.
IV. Certification of Permittee(s)	Read this statement carefully. The operator, or authorized representative of the operator, must print his or her name for clarity, then sign and date the document on the lines provided. (Refer to General Condition G2 in the permit for signatory requirements.)

Please sign and return this original document to the following address and retain a copy for your records:

Department of Ecology
Stormwater Unit – Construction
PO Box 47696
Olympia, WA 98504-7696

Note: Your site remains under permit and subject to all permit conditions until your termination is effective. Continue to comply with permit conditions until the earlier of the following two dates:

1) The date you receive written notification from Ecology that termination is effective.

2) The 31st day following Ecology's receipt of this form.

Questions?

Call:

- **360-407-7451 Josh Klimek** for city of Seattle or counties: Kitsap, Pierce, and Thurston.
- **360-407-6048 Clay Keown**for counties: King, Island, San Juan.
- **360-407-6442 Shawn Hopkins** for counties: Whatcom, Skagit, Snohomish, Ferry, Stevens, Pend Oreille, Lincoln, Spokane, Grant, Adams, Whitman, Franklin, Walla Walla, Columbia, Garfield, and Asotin.
- **360-407-6858 Joyce Smith** for counties: Okanogan, Chelan, Douglas, Kittitas, Yakima, Benton, Klickitat, Skamania, Clark, Cowlitz, Wahkiakum, Lewis, Pacific, Grays Harbor, Mason, Jefferson, and Clallam.

To ask about the availability of this document in a version for the visually impaired, call the Water Quality Program at 360-407-6401. Persons with hearing loss may call 711 for Washington Relay Service. Persons with a speech disability may call 877-833-6341.

APPENDIX C
Monitoring Well Decommissioning Records

October 16, 2012

Mr. Steve Teel, LHG
Washington State Department of Ecology
P.O. Box 47600
Olympia, Washington 98505

Dear Mr. Teel:

RE: PROJECT NUMBER: 12-050
IRONDALE IRON AND STEEL PLANT CLEANUP – MONITORING WELL ABANDONMENT
PORT HADLOCK, WASHINGTON

Introduction

Anderson Environmental Contracting, LLC (AEC) is working with the Washington State Department of Ecology (Ecology) on the cleanup of the above referenced site in Port Hadlock, Washington (Figure 1). Soil removal activities are planned at the site for the purpose of beach creation/shoreline restoration as well as remediation. Three monitoring wells used during the site investigation are located in the planned excavation area and needed to be properly decommissioned prior to the commencement of excavation activities. A discussion of field activities and well abandonment procedures are provided below.

Monitoring Well Decommissioning

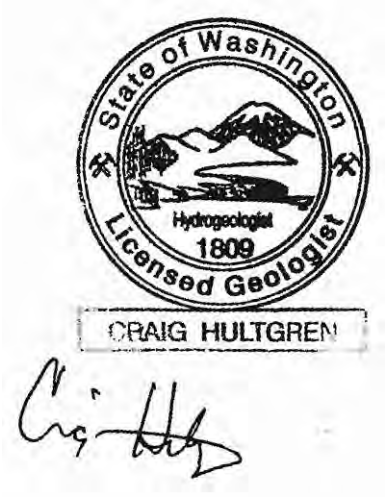
Pacific Soil and Water (PSW) was contracted to decommission three monitoring wells (MW02, MW03, and MW04) at the site following Ecology's rules for well abandonment found in WAC 173-160. PSW provided Ecology with a notice of intent to abandon the wells prior to initiating work at the site. The wells were abandoned by removing the protective steel monument and concrete seal from each well and placing hydrated bentonite chips inside the PVC well screen and riser pipe. An approximate 1-foot thick pad of concrete was placed over the top of each former well and the ground surface was finished to match existing surface materials. The original well log and abandonment well log for each respective well is included in Attachment A.

Disposal of Investigation Derived Waste

Investigation derived waste (IDW) generated during well decommissioning activities consisted of used well monuments, used locks, and concrete. The used well monuments were disposed at a metal recycling facility in Portland, Oregon. All other nonhazardous solid waste was placed in a dumpster at PSW's yard for disposal into a subtitle D landfill.

AEC appreciates the opportunity to assist you on this project. Please contact Mr. Steve Anderson at 360.577.9194 if you have any questions.

Regards,



Craig Hultgren, LHG
Senior Geologist

Figures
Figure 1 – Site Location Map

Attachments
Attachment A –Well Logs

APPENDIX A

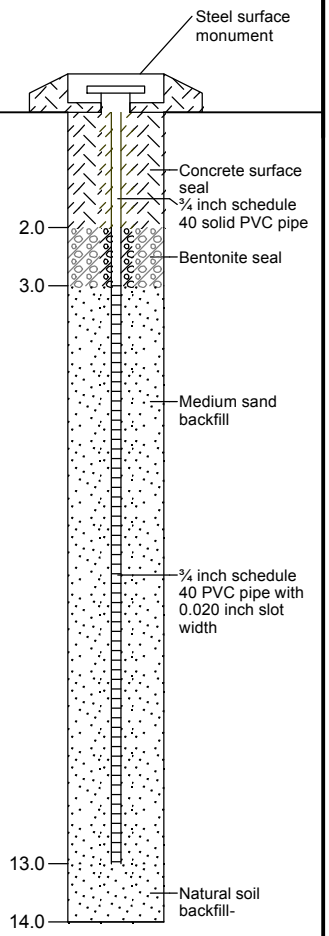
WELL LOGS

Drilled Start 6/25/2007 End	Total Depth (ft) 14	Logged By AJS / Checked By RMB	Driller ESN Northwest	Drilling Method Direct Push
Hammer Data		Drilling Equipment AMS Powerprobe 9630	A (in) well was installed on to a depth of 14 (ft). Well was developed on 6/25/2007.	
Surface Elevation (ft) Vertical Datum 13.6		Top of Casing Elevation (ft)	Groundwater: Date Measured 6/25/2007; Depth to Water (ft) 6.0; Elevation (ft) 7.55	
Latitude Longitude		System Datum N/A		

Notes:

Depth (feet)	Interval	Recovered %	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
0		92						SM	Dark brown silty fine to medium sand with occasional brick fragments (moist) (fill)		
								SP-SM	Brown fine to medium sand with silt and occasional brick fragments (moist)		
		92									
5						▼		SP-SM	Gray fine to medium sand with silt (wet) (native soil)		
					1					HS	31
		100									
10											
					2 CA			SP	Brown coarse sand with gravel (wet)	HS	15.9
		83			3 CA			ML	Dark gray silt (moist)	SS	14.6

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of MONITORING WELL MW02 (DP02)

GeoEngineers

Project: Irondale Iron and Steel Plant
Project Location: Irondale, Washington
Project Number: 0504-042-00

Figure A8
Sheet 1 of 1

Drilled Start 6/26/2007 End	Total Depth (ft) 19	Logged By AJS / Checked By RMB	Driller ESN Northwest	Drilling Method Direct Push
Hammer Data		Drilling Equipment AMS Powerprobe 9630	A (in) well was installed on to a depth of 19 (ft). Well was developed on 6/26/2007.	
Surface Elevation (ft) Vertical Datum 13.1		Top of Casing Elevation (ft)	Groundwater: Date Measured 6/26/2007; Depth to Water (ft) 6.5; Elevation (ft) 6.59	
Latitude Longitude		System Datum N/A		

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered %	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
	0											
			75			1			SP	Light brown and white medium to coarse sand (moist) (fill)	NS	0
0												
			92									
	5						▼					
						2 CA			SP	Brown coarse sand (wet)	NS	
-5			83								NS	0
	10								SP	Dark brown fine to medium sand (wet)		
						3 CA			SM	Gray brown and green silty fine sand (wet) Large piece of wood	NS	0
			100						SP	Dark brown fine to medium sand, trace silt (wet) (native soil)		
-10	15								SM	Dark gray silty fine sand with occasional shell fragments (wet)		
			100									
-15												

WELL LOG

Steel surface monument
Concrete surface seal
2.0
Bentonite seal
3.0
¾ inch schedule 40 solid PVC pipe
4.0
Medium sand backfill
¾ inch schedule 40 PVC pipewith 0.020 inch slot width
19.0

Note: See Figure A-1 for explanation of symbols.

Log of MONITORING WELL MW03 (DP03)

GeoEngineers

Project: Irondale Iron and Steel Plant
Project Location: Irondale, Washington
Project Number: 0504-042-00

Figure A9
Sheet 1 of 1

Drilled Start 6/25/2007 End	Total Depth (ft) 18	Logged By AJS Checked By RMB	Driller ESN Northwest	Drilling Method Direct Push	
Hammer Data		Drilling Equipment AMS Powerprobe 9630	A (in) well was installed on to a depth of 18 (ft). Well was developed on 6/25/2007.		
Surface Elevation (ft) Vertical Datum 14.6		Top of Casing Elevation (ft)	Groundwater Date Measured: 6/25/2007 Depth to Water (ft): 8.0 Elevation (ft): 6.57		
Latitude Longitude		System Datum N/A			

Notes:

Depth (feet)	Interval	Recovered %	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor
0		83						TS	Dark brown organic silty fine to coarse sand (topsoil)		
								GP	Gray rock fragments (fill)		
								SP	Dark brown wood layer with fine to medium sand, trace silt (moist)		
					1			SW	Light brown/gray fine to coarse sand with shell fragments (moist)	SS	30
5		100			2					SS	
		100			3 CA			SP	Gray fine to medium sand with shell fragments (wet) (native soil)	MS	
10		100			4			SP	Gray fine sand with silt and shell fragments (wet)	MS	50
								ML	Gray silt (wet)		
								SP	Gray fine sand with silt and shell fragments (wet)		
		100									
15								ML	Gray silt with sand (wet)		

WELL LOG

Steel surface monument

Concrete surface seal

2.5

3.0

¾ inch schedule 40 solid PVC pipe

¾ inch schedule 40 PVC pipe with 0.020 inch slot width

18.0

Note: See Figure A-1 for explanation of symbols.

Log of MONITORING WELL MW04 (DP04)

GeoEngineers

Project: Irondale Iron and Steel Plant
Project Location: Irondale, Washington
Project Number: 0504-042-00

Figure A10
Sheet 1 of 1

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE18680

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction

☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

R65246

Consulting Firm

Unique Ecology Well IDTag No. APF-859

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Kranz, Neil

Driller/Engineer /Trainee Signature

Driller or Trainee License No.

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner Jefferson County

Site Address 526 E. Moore St

City Port Hadlock

County Jeffeson

Location SW1/4-1/4 SE1/4 Sec 35 Twn 30N R 1W

EWM ☐ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____

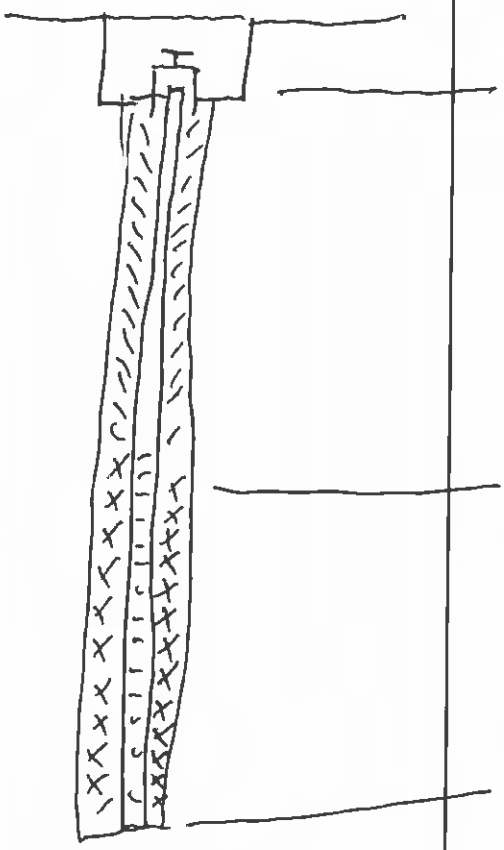
Long Deg ____ Min ____ Sec ____

Tax Parcel No.

Cased or Uncased Diameter .75 Static Level 6.7

Work/Decommission Start Date 8/24/12

Work/Decommission Completed Date 8/24/12

Construction Design	Well Data	Formation Description
	Flush surface Monument 3/4 in PreRock Well Total Depth - 17.6'	3/4 in Well Abandoned in Place With High Solids Grout.

SCALE: 1"= ____ PAGE ____ OF ____

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE18680

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction

☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

R65246

Consulting Firm

Unique Ecology Well IDTag No. APF-861

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Kranz, Neil

Driller/Engineer /Trainee Signature

Driller or Trainee License No.

If trainee, licensed driller's Signature and License Number:

Type **of Well** *("x in box)*

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner Jefferson County

Site Address 526 E. Moore St

City Port Hadlock

County Jeffeson

Location SW1/4-1/4 SE1/4 Sec 35 Twn 30N R 1W

EWM ☐ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____

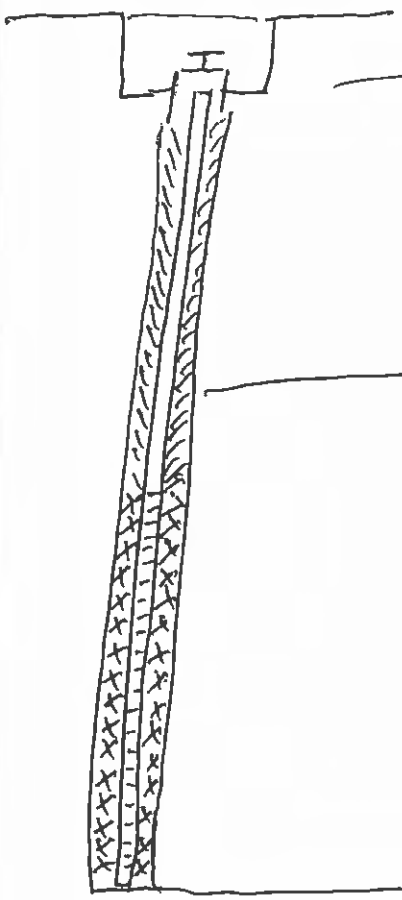
Long Deg ____ Min ____ Sec ____

Tax Parcel No.

Cased or Uncased Diameter .75 Static Level 8.1

Work/Decommission Start Date 8/24/12

Work/Decommission Completed Date 8/24/12

Construction Design	Well Data	Formation Description
	Flush Surface Monument 3/4in PVC Prepack Monument Total Depth - 18.9'	3/4in PVC Well Abandonment in Place with High Solids Bentonite Grout

SCALE: 1"= ____ PAGE ____ OF ____

Please print, sign and return to the Department of Ecology

RESOURCE PROTECTION WELL REPORT

CURRENT Notice of Intent No. AE18680

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

Construction/Decommission *("x" in box)*

☐ Construction

☒ Decommission

ORIGINAL INSTALLATION Notice of Intent Number:

R65246

Consulting Firm

Unique Ecology Well IDTag No. APF-862

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee

Name (Print Last, First Name) Kranz, Neil

Driller/Engineer /Trainee Signature

Driller or Trainee License No.

If trainee, licensed driller's Signature and License Number:

Type of Well *("x in box)*

☒ Resource Protection

☐ Geotech Soil Boring

Property Owner Jefferson County

Site Address 526 E. Moore St

City Port Hadlock

County Jeffeson

Location SW1/4-1/4 SE1/4 Sec 35 Twn 30N R 1W

EWM ☐ or WWM ☐

Lat/Long (s, t, r still REQUIRED) Lat Deg ____ Min ____ Sec ____

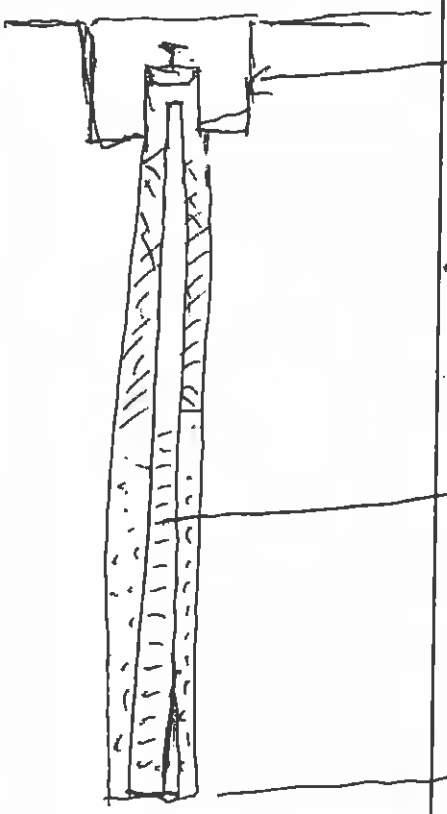
Long Deg ____ Min ____ Sec ____

Tax Parcel No.

Cased or Uncased Diameter .75 Static Level 5.7

Work/Decommission Start Date 8/24/12

Work/Decommission Completed Date 8/24/12

Construction Design	Well Data	Formation Description
	Flush Surface Monument 3/4in PrePack Well Total Depth – 12.8'	3/4in Well Abandoned in Place with High Solids Grout

SCALE: 1"= ____ PAGE ____ OF ____

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% RETAINED ON NO. 200 SIEVE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS
				SP	POORLY-GRADED SANDS, GRAVELLY SAND
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/ Quarry Spalls
	TS	Topsoil/ Forest Duff/Sod

Groundwater Contact

Measured groundwater level in exploration, well, or piezometer

Measured free product in well or piezometer

Graphic Log Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Material Description Contact

Distinct contact between soil strata or geologic units

Approximate location of soil strata change within a geologic soil unit

Sampler Symbol Descriptions

2.4-inch I.D. split barrel

Standard Penetration Test (SPT)

Shelby tube

Piston

Direct-Push

Bulk or grab

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

A "P" indicates sampler pushed using the weight of the drill rig.

Laboratory / Field Tests

%F	Percent fines
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
PPM	Parts per million
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen
NT	Not Tested

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

KEY TO EXPLORATION LOGS

GeoEngineers

FIGURE A-1

Drilled Start 6/26/2007 End	Total Depth (ft) 20	Logged By AJS Checked By RMB	Driller ESN Northwest	Drilling Method Direct Push
Hammer Data		Drilling Equipment AMS Powerprobe 9630	A (in) well was installed on to a depth of 20 (ft). Well was developed on 6/26/2007.	
Surface Elevation (ft) 14.57 Vertical Datum		Top of Casing Elevation (ft)	Groundwater: Date Measured 6/26/2007; Depth to Water (ft) 7.00; Elevation (ft) 7.57	
Latitude Longitude		Horizontal Datum N/A		

Notes:

Elevation (feet)	Depth (feet)	Interval	Recovered %	Blows/foot	Collected Sample	Sample Name	Water Level	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Sheen	Headspace Vapor (ppm)
	0		92			1			TS	Brown silty fine to coarse sand (moist) (topsoil)	NS	
									SP	Light brown fine to medium sand with trace silt (moist) (fill)		
									SP	Light brown fine to medium sand with occasional shell fragments (moist)		
	5		92								NS	
						2 CA	▼		SP	Dark gray/brown fine to medium sand with occasional shell fragments (wet) (native sediment)		
			92									
	10								SW	Gray/brown fine to coarse sand with trace silt and occasional shell fragments (wet)		
						3					SS	
			92						SP-SM	Brown/gray fine sand with silt and occasional shell fragments (wet)		
	15		92									
									SM	Gray silty fine sand (wet)		
	20											

WELL LOG

Steel surface monument
Concrete surface seal
2.0'
Bentonite seal
3.0'
¾ inch schedule 40 solid PVC pipe
4.0'
Medium sand backfill
¾ inch schedule 40 PVC pipe with 0.020 slot width
19.0'
Natural soil backfill
20.0'

Note: See Figure A-1 for explanation of symbols.

Log of MONITORING WELL MW05 (DP05)

GeoEngineers

Project: Irondale Iron and Steel Plant
Project Location: Irondale, Washington
Project Number: 0504-042-00

Figure A-2
Sheet 1 of 1

Seattle: Date:4/4/13 Path:R:\0\0504042\GINT\0504042OO.GPJ DBTemplate/LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start 12/14/2012	End 12/14/2012	Total Depth (ft) 12.5	Logged By FK / Checked By NFM	Driller Cascade Drilling, LP	Drilling Method Direct Push

Hammer Data	Drilling Equipment: Geoprobe 7730 DT	DOE Well I.D.: BHS 616 A 1 (in) well was installed on 12/14/2012 to a depth of 12.5 (ft).
Surface Elevation (ft) Vertical Datum: 17.52	Top of Casing Elevation (ft): 17.27	Groundwater: Date Measured 1/4/2013; Depth to Water (ft) 3.23; Elevation (ft) 14.04
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA: Interval Recovered (in); Blows/foot; Collected Sample; Sample Name; Water Level

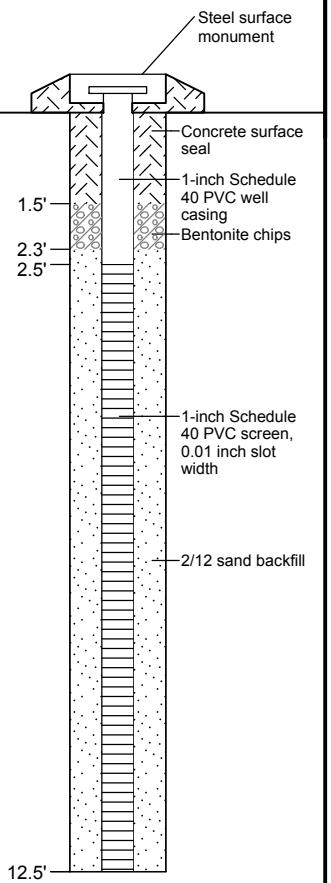
Elevation (feet); Depth (feet); Graphic Log; Group Classification; MATERIAL DESCRIPTION; Sheen; Headspace Vapor (ppm)

0
5
10
15

Groundwater encountered

Refusal encountered at 12.5 feet bgs. Above refusal backfill placed during the Dec 2012 remedial excavation was encountered. Backfill consisted of beach sand graded from the site, and imported sand.
No soil samples were obtained during well installation.

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well MW-6

GeoEngineers

Project: Irondale Former Iron and Steel Plant
Project Location: Port Hadlock, Washington
Project Number: 0504-042-02

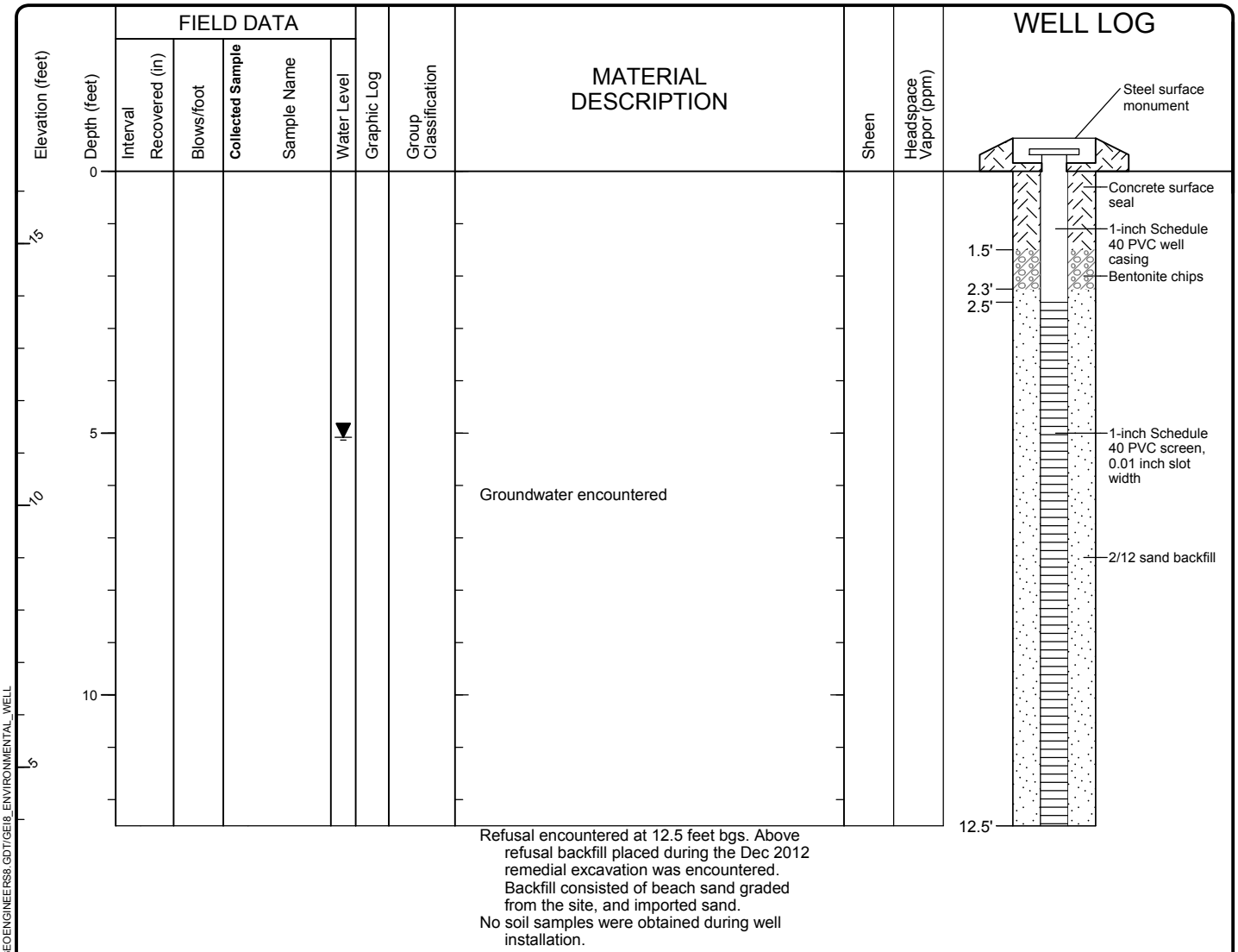
Figure A-3
Sheet 1 of 1

Seattle: Date:4/4/13 Path:C:\USERS\CVOSS\DESKTOP\050404202.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start 12/14/2012	End 12/14/2012	Total Depth (ft) 12.5	Logged By FK / Checked By NFM	Driller Cascade Drilling, LP	Drilling Method Direct Push

Hammer Data	Drilling Equipment: Geoprobe 7730 DT	DOE Well I.D.: BHS 439 A 1 (in) well was installed on 12/14/2012 to a depth of 12.5 (ft).
Surface Elevation (ft) Vertical Datum: 16.38	Top of Casing Elevation (ft): 16.13	Groundwater: Date Measured 1/4/2013; Depth to Water (ft) 5.08; Elevation (ft) 11.05
Easting (X) Northing (Y)	Horizontal Datum	

Notes:



Refusal encountered at 12.5 feet bgs. Above refusal backfill placed during the Dec 2012 remedial excavation was encountered. Backfill consisted of beach sand graded from the site, and imported sand.
No soil samples were obtained during well installation.

Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well MW-7

GeoEngineers

Project: Irondale Former Iron and Steel Plant
Project Location: Port Hadlock, Washington
Project Number: 0504-042-02

Figure A-4
Sheet 1 of 1

Drilled Start 12/14/2012	End 12/14/2012	Total Depth (ft) 14.5	Logged By FK / Checked By NFM	Driller Cascade Drilling, LP	Drilling Method Direct Push

Hammer Data	Drilling Equipment: Geoprobe 7730 DT	DOE Well I.D.: BHS 438 A 1 (in) well was installed on 12/14/2012 to a depth of 12.5 (ft).
Surface Elevation (ft) Vertical Datum: 12.28	Top of Casing Elevation (ft): 12.03	Groundwater: Date Measured 1/4/2013; Depth to Water (ft) 4.00; Elevation (ft) 8.03
Easting (X) Northing (Y)	Horizontal Datum	

Notes:

FIELD DATA: Interval Recovered (in); Blows/foot; Collected Sample; Sample Name; Water Level

Elevation (feet); Depth (feet); Graphic Log; Group Classification; MATERIAL DESCRIPTION; Sheen; Headspace Vapor (ppm)

0

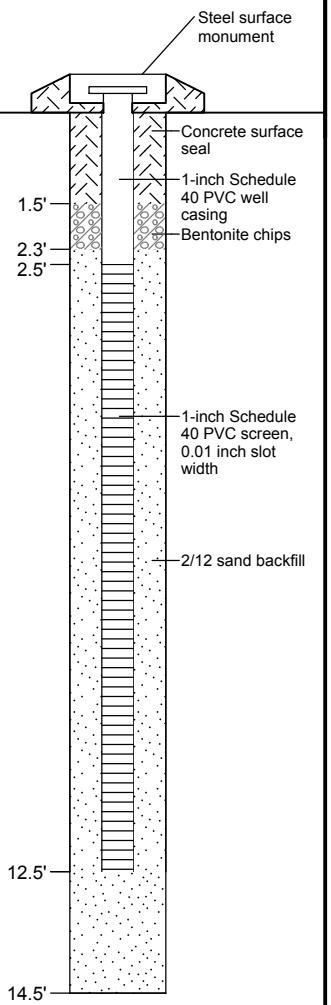
5

10

Groundwater encountered

Refusal encountered at 14.5 feet bgs. Above refusal backfill placed during the Dec 2012 remedial excavation was encountered. Backfill consisted of beach sand graded from the site, and imported sand.
No soil samples were obtained during well installation.

WELL LOG



Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well MW-8

GeoEngineers

Project: Irondale Former Iron and Steel Plant
Project Location: Port Hadlock, Washington
Project Number: 0504-042-02

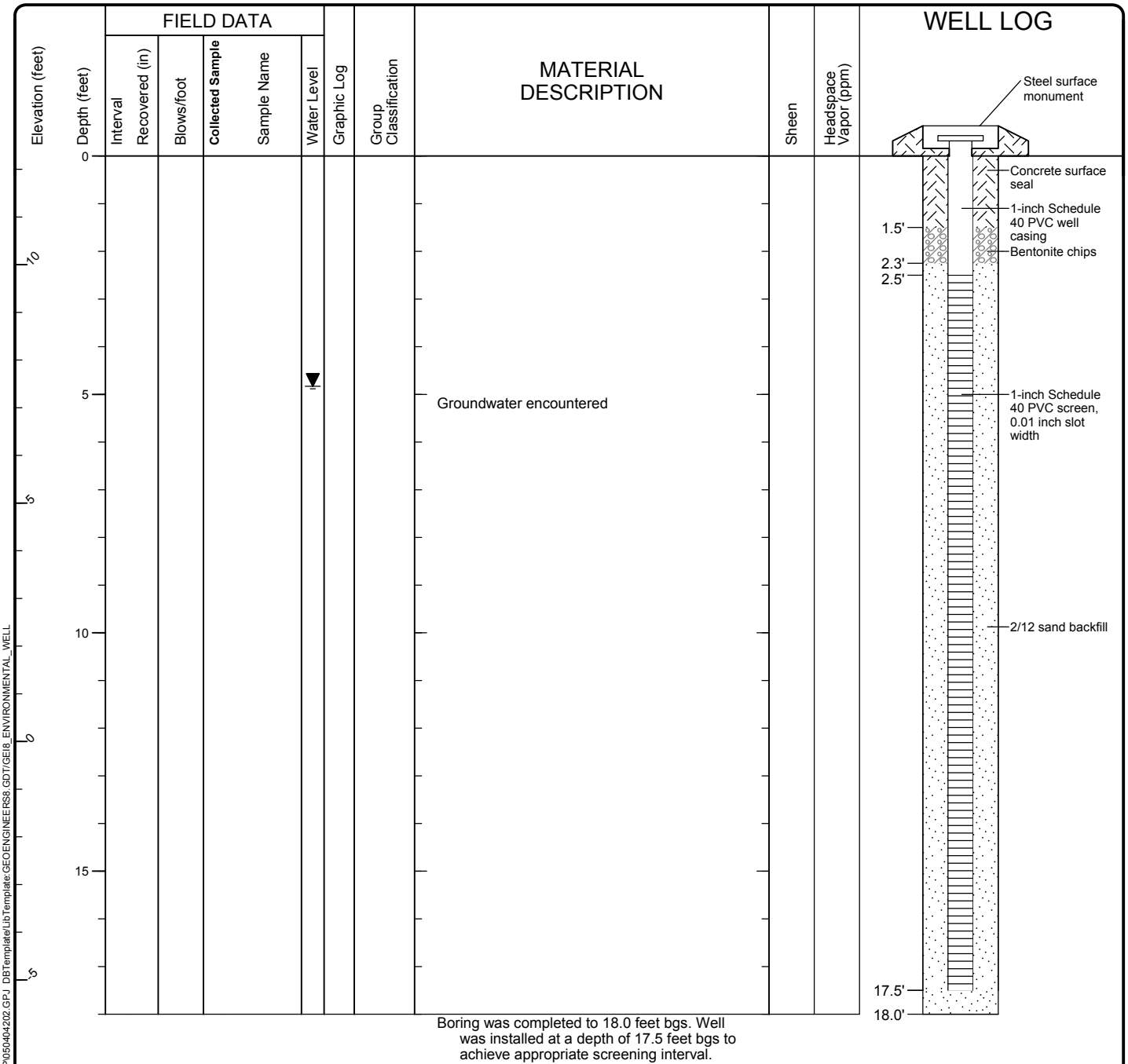
Figure A-5
Sheet 1 of 1

Seattle: Date:4/4/13 Path:C:\USERS\CVOSS\DESKTOP\050404202.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

Drilled Start 12/14/2012	End 12/14/2012	Total Depth (ft) 18	Logged By FK / Checked By NFM	Driller Cascade Drilling, LP	Drilling Method Direct Push

Hammer Data	Drilling Equipment: Geoprobe 7730 DT	DOE Well I.D.: BHS 437 A 2 (in) well was installed on 12/14/2012 to a depth of 17.5 (ft).
Surface Elevation (ft) Vertical Datum: 12.28	Top of Casing Elevation (ft): 12.03	Groundwater: Date Measured 1/4/2013; Depth to Water (ft) 4.83; Elevation (ft) 7.20
Easting (X) Northing (Y)	Horizontal Datum	

Notes:



Boring was completed to 18.0 feet bgs. Well was installed at a depth of 17.5 feet bgs to achieve appropriate screening interval.

Note: See Figure A-1 for explanation of symbols.

Log of Monitoring Well MW-9

GeoEngineers

Project: Irondale Former Iron and Steel Plant
Project Location: Port Hadlock, Washington
Project Number: 0504-042-02

Figure A-6
Sheet 1 of 1

Seattle: Date:4/4/13 Path:C:\USERS\CVOSS\DESKTOP\050404202.GPJ DBTemplate\LibTemplate:GEOENGINEERS8.GDT/GEI8_ENVIRONMENTAL_WELL

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. AE 33106

Construction/Decommission

☐ Construction

☒ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

☒ Resource Protection

☐ Geotechnical Soil Boring

Consulting Firm GeoEngineers - Redmond

Property Owner _____

Site Address 526 E. Moore St.

City Port Hadlock County 16-Jefferson

Unique Ecology Well ID

Tag No. _____

Location 1/4 ____ 1/4 ____ Sec ____ Twn ____ R ____ EWM or ____ WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

Tax Parcel No. _____

☒ Driller ☐ Trainee Name (Print) Frank Scott

Driller/Trainee Signature x _____

Driller/Trainee License No. 2549

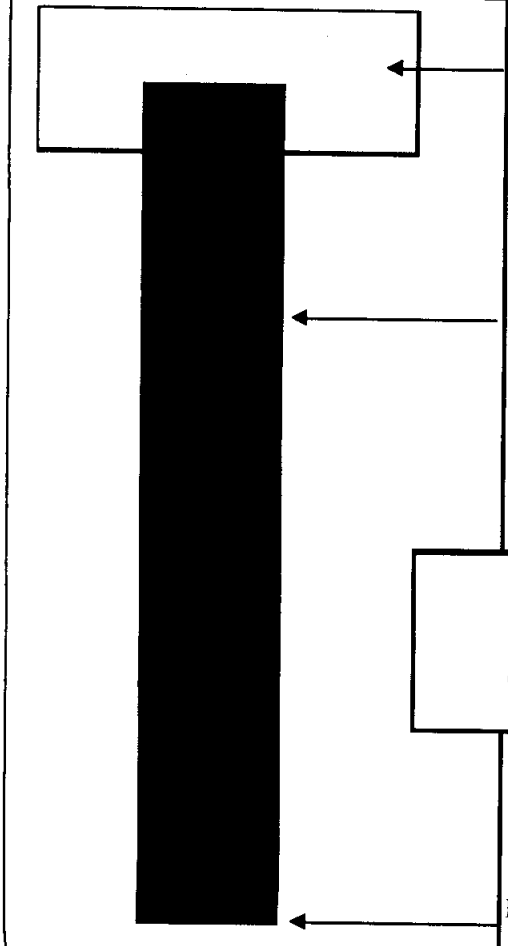
Cased or Uncased Diameter 3/4 11 Static Level _____

Work/Decommission Start Date 7-30-15

If trainee, licensed driller's Signature and License No. _____

Work/Decommission Completed Date 7/30/2015

Construction/Design — Well Data 103-15-0858 — Formation Description



CONCRETE SURFACE SEAL — 1 FT — 0 - ____ FT

BACKFILL — 18 FT (grout Bent. chips) — 0 - ____ FT

REQUIRED INFORMATION
(Must get one or both if available)

DEPT OF ECOLOGY WELL TAG #: APT 860

CLIENT WELL ID #: MW-5

DEPTH OF BORING 19 FT

Scale 1" = _____

Page ____ of ____

ECY 050-12 (Rev 2/01)

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. AE33106

Construction/Decommission

☐ Construction

☒ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

☒ Resource Protection

☐ Geotechnical Soil Boring

Property Owner _____

Site Address 526 E. Moore St.

Consulting Firm GeoEngineers - Redmond

City Port Hadlock County 16-Jefferson

EWM

Unique Ecology Well ID

Tag No. _____

Location 1/4 ____ 1/4 ____ Sec ____ Twn ____ R ____ or ____ WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s,t,r still Required) Lat Deg ____ Lat Min/Sec ____ Long Deg ____ Long Min/Sec ____

☒ Driller ☐ Trainee Name (Print) Frank Scott

Tax Parcel No. _____

Driller/Trainee Signature x _____

Cased or Uncased Diameter 3/4" Static Level ____

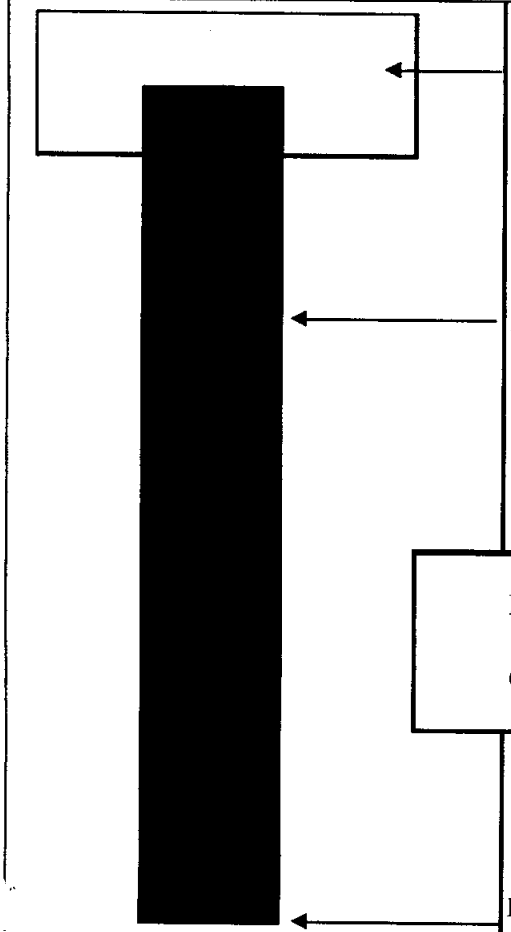
Driller/Trainee License No. 2549

Work/Decommission Start Date 7-30-15

If trainee, licensed driller's Signature and License No. _____

Work/Decommission Completed Date 7/30/2015

Construction/Design — Well Data 103-15-0858 — Formation Description



CONCRETE SURFACE SEAL	1 FT	0 -	FT
BACKFILL	11.5 FT	0 -	FT
Bent grout			
DEPTH OF BORING	12.5 FT		

REQUIRED INFORMATION
(Must get one or both if available)

DEPT OF ECOLOGY WELL TAG #: BHS 616

CLIENT WELL ID #: mw-6

Scale 1" = _____

Page ____ of ____

ECY 050-12 (Rev 2/01)

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. AE33106

Construction/Decommission

☐ Construction

☒ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

☒ Resource Protection

☐ Geotechnical Soil Boring

Property Owner _____

Site Address 526 E. Moore St.

Consulting Firm GeoEngineers - Redmond

City Port Hadlock County 16-Jefferson

EWM

Unique Ecology Well ID

Tag No. _____

Location 1/4 ____ 1/4 ____ Sec ____ Twn ____ R ____ or ____ WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

☒ Driller ☐ Trainee Name (Print) Frank Scott

Tax Parcel No. _____

Driller/Trainee Signature x _____

Cased or Uncased Diameter 3/4" Static Level _____

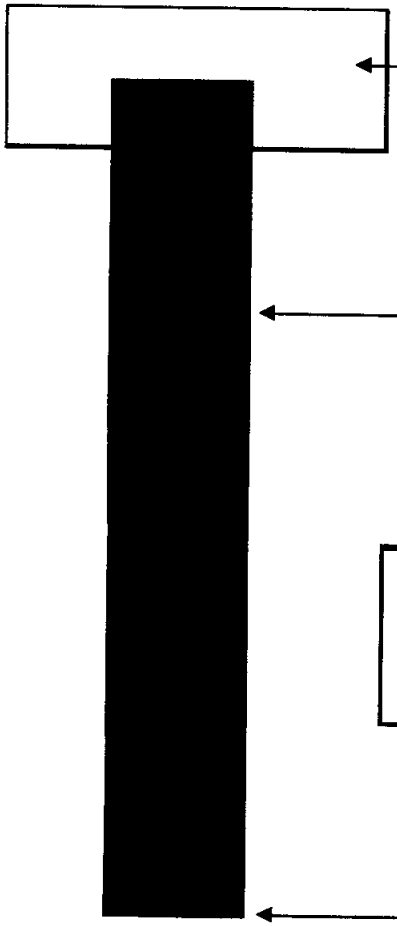
Driller/Trainee License No. 2549

Work/Decommission Start Date 7-30-15

If trainee, licensed driller's Signature and License No. _____

Work/Decommission Completed Date 7/30/2015

Construction/Design — Well Data 103-15-0858 — Formation Description



CONCRETE SURFACE SEAL — 1 FT — 0 - ____ FT

BACKFILL — 11.5 FT — 0 - ____ FT

Bent grout

REQUIRED INFORMATION
(Must get one or both if available)

DEPT OF ECOLOGY WELL TAG #: ~~BMC~~ BHS 739

CLIENT WELL ID #: MW-7

DEPTH OF BORING 12.5 FT

Scale 1" = _____

Page ____ of ____

ECY 050-12 (Rev 2/01)

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. AE33106

Construction/Decommission

☐ Construction

☒ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

☒ Resource Protection

☐ Geotechnical Soil Boring

Consulting Firm GeoEngineers - Redmond

Property Owner _____

Site Address 526 E. Moore St.

City Port Hadlock County 16-Jefferson

EWM

Unique Ecology Well ID

Tag No. _____

Location 1/4 ____ 1/4 ____ Sec ____ Twn ____ R ____ or ____ WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

☒ Driller ☐ Trainee Name (Print) Frank Scott

Tax Parcel No. _____

Driller/Trainee Signature x _____

Cased or Uncased Diameter 3/4" Static Level _____

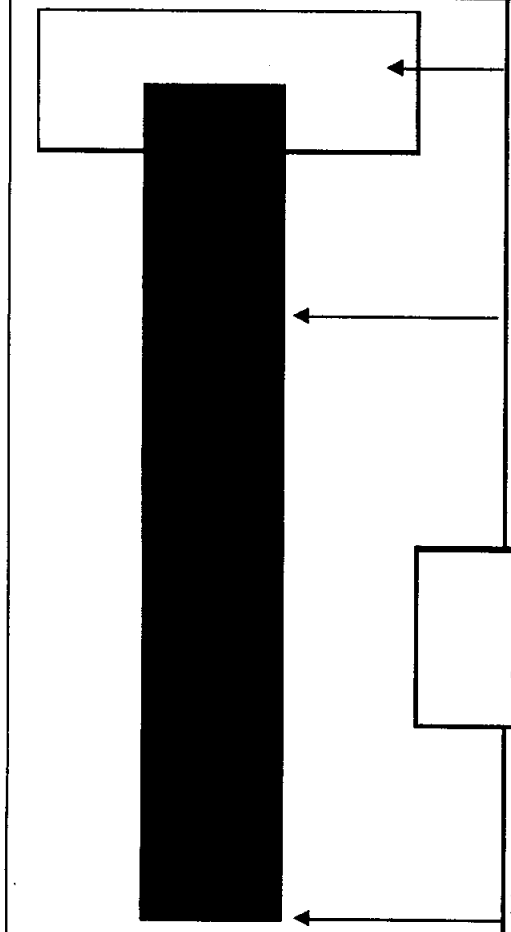
Driller/Trainee License No. 2549

Work/Decommission Start Date 7-30-15

If trainee, licensed driller's Signature and License No. _____

Work/Decommission Completed Date 7/30/2015

Construction/Design — Well Data 103-15-0858 — Formation Description



CONCRETE SURFACE SEAL — 1 FT — Formation: 0 - ____ FT

BACKFILL — 13.5 FT — Formation: 0 - ____ FT

Bent. grout

REQUIRED INFORMATION
(Must get one or both if available)

DEPT OF ECOLOGY WELL TAG #: BHS 438

CLIENT WELL ID #: MW-8

DEPTH OF BORING 14.5 FT

Scale 1" = _____

Page ____ of ____

ECY 050-12 (Rev 2/01)

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT
Notice of Intent No. AE 33106

Construction/Decommission

☐ Construction

☒ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* _____

Type of Well

☒ Resource Protection

☐ Geotechnical Soil Boring

Property Owner _____

Site Address 526 E. Moore St.

Consulting Firm GeoEngineers - Redmond

City Port Hadlock County 16-Jefferson

EWM

Unique Ecology Well ID

Tag No. _____

Location 1/4 ____ 1/4 ____ Sec ____ Twn ____ R ____ or ____ WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

Lat/Long (s,t,r still Required) Lat Deg _____ Lat Min/Sec _____ Long Deg _____ Long Min/Sec _____

☒ Driller ☐ Trainee Name (Print) Frank Scott

Tax Parcel No. _____

Driller/Trainee Signature x [signature]

Cased or Uncased Diameter 3/4" Static Level _____

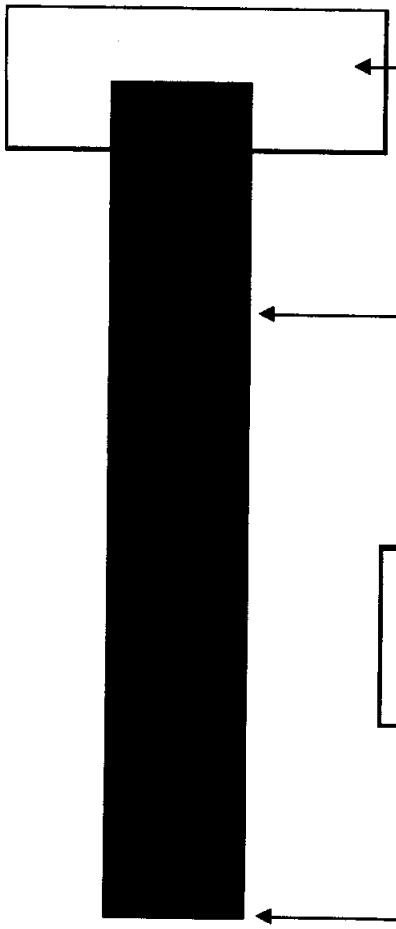
Driller/Trainee License No. 2549

Work/Decommission Start Date 7-30-15

If trainee, licensed driller's Signature and License No. _____

Work/Decommission Completed Date 7/30/2015

Construction/Design — Well Data 103-15-0858 — Formation Description



CONCRETE SURFACE SEAL 1 FT — 0 - FT

BACKFILL 17 FT — 0 - FT

Brent grout

REQUIRED INFORMATION
(Must get one or both if available)

DEPT OF ECOLOGY WELL TAG #: BHS 437

CLIENT WELL ID #: mw-4

DEPTH OF BORING 18 FT

Scale 1" = _____

Page ____ of ____

ECY 050-12 (Rev 2/01)

Legend

- Site Boundary
- Ordinary High Water (Estimated at Elevation 10.5 feet)
- Metals Area - Excavation
- Metals Area - Cap
- TPH Area - Excavation
- Slag Outcrop - Removal
- MW-1 ⊙ Decommissioned Monitoring Well Location

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Aerial photo (July 2013) from Google Earth Pro.

Monitoring Wells Decommissioned in 2012

Former Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers | **Figure C-1**

P:\0\050402\02\CAD\Completion Report\Figure C-1 Monitoring Wells Decommissioned in 2012.dwg\TAB:Fig 2 modified by TMichaud on Apr 15, 2015 - 9:54

Legend

- Site Boundary
- Ordinary High Water (Estimated at Elevation 10.5 feet)
- Metals Area - Excavation
- Metals Area - Cap
- TPH Area - Excavation
- Slag Outcrop - Removal
- MW-1 ⊙ Decommissioned Monitoring Well Location

Notes

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Aerial photo (July 2013) from Google Earth Pro.

Monitoring Wells Decommissioned in 2015

Former Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers | **Figure C-2**

APPENDIX D
Field Procedures

APPENDIX D
VERIFICATION SOIL SAMPLING PROCEDURES

General

Remedial excavation activities for the Irondale Iron and Steel Plant site (Site) were completed between August 16, 2012 and December 28, 2012 in accordance with the Engineering Design Report (EDR; GeoEngineers, 2012) to remove soil and sediment exceeding Site cleanup standards. Remedial Excavation activities were completed by Anderson Environmental Contracting, LLC of Kelso, Washington. Track-mounted excavators and off-road dump trucks were the primary equipment used to complete the remedial excavation activities at the Site.

A representative of GeoEngineers was on-site during remedial excavation activities to evaluate subsurface conditions and extent of contamination, to conduct field screening of samples, and to obtain verification soil samples from the excavation limits for chemical analyses. Sampling procedures are summarized below.

Soil and Sediment Sample Collection and Handling

Excavation verification soil samples were obtained directly from the excavation base where practical using clean disposable nitrile gloves and were placed into clean plastic bags and thoroughly mixed. A new pair of nitrile gloves was used for each sample to prevent cross-contamination. When it was not practical for a person to enter the excavation, samples were taken from the excavator bucket using clean disposable nitrile gloves and were placed into clean plastic bags and thoroughly mixed. Care was taken to sample from the center of the excavator bucket to ensure sample did not contact the bucket. A portion of the sample was then placed into clean sample jars provided by the analytical laboratory. The sample containers were filled completely to minimize headspace. The remaining portion of each sample was used for field screening.

Samples obtained from the Site were placed in a cooler with ice pending transport to the analytical laboratory. Standard chain of custody procedures were followed in transporting the samples to the laboratory.

Field Screening of Soil and Sediment Samples

A representative from our staff performed field screening of soil samples obtained from the excavation. Field screening results are used as a general guideline to delineate areas with possible petroleum hydrocarbon concentrations. In addition, screening results are used to aid in the selection of soil samples for chemical analysis. The screening methods used include: 1) visual screening, 2) water sheen screening, and 3) headspace vapor screening.

Visual screening consists of inspecting the soil for stains indicative of petroleum hydrocarbons. Visual screening is generally more effective when hydrocarbons are heavier, such as motor oil, or when hydrocarbon concentrations are high. Water sheen screening and headspace vapor screening are more sensitive methods that have been effective in detecting contamination at concentrations less than regulatory cleanup levels. However, field screening results are site-specific. The effectiveness of field screening varies with temperature, moisture content, organic content, soil type and age of contaminant. The presence or absence of a sheen or headspace vapors does not necessarily indicate the presence or absence of petroleum hydrocarbons.

Water sheen screening involves placing soil in water and observing the water surface for signs of sheen. Sheen screening may detect both volatile and nonvolatile petroleum hydrocarbons. Sheen classifications are as follows:

No Sheen (NS)	No visible sheen on water surface.
Slight Sheen (SS)	Light, colorless, dull sheen; spread is irregular, not rapid; sheen dissipates rapidly. Natural organic matter in the soil may produce a slight sheen.
Moderate Sheen (MS)	Light to heavy sheen; may have some color/iridescence; spread is irregular to flowing, may be rapid; few remaining areas of no sheen on water surface.
Heavy Sheen (HS)	Heavy sheen with color/iridescence; spread is rapid; entire water surface may be covered with sheen.

Headspace vapor screening may identify volatile petroleum hydrocarbon compounds and involves placing a soil sample in a plastic sample bag. Air is captured in the bag, and the bag is shaken to expose the soil to the air trapped in the bag. The probe of a photoionization detector (PID) is inserted into the bag, and the PID then measures the concentration of volatile organic vapors present within the sample bag headspace. The PID measures photoionizable vapor concentrations in parts per million (ppm) and is calibrated to isobutylene. The PID is designed to quantify concentrations up to 2,000 ppm. A lower threshold of significance of 1 ppm was used in this application.

APPENDIX E
Chemical Analytical Data

(provided in separate PDF files Parts 1 and 2)

APPENDIX F
Chemical Analytical Data Validation Report

GeoEngineers

Data Validation Report

Plaza 600 Building, 600 Stewart Street, Suite 1700, Seattle, WA 98101, Telephone: 206.728.2674, Fax: 206.728.2732 www.geoengineers.com

Project:	Irondale Remedial Cleanup Action – Construction Management Phase
File:	00504-042-02
Date:	February 25, 2013, Revised October 29, 2015
Lab Reports:	L120910-30, L120911-30, L120912-30, L120918-30, L120921-5 and 30, L120924-30, L120925-30, L120926-30, L120927-30, L120928-30, L121001-30, L121002-30, L121003-30, L121004-30, L121008-30, L121009-30, L121010-30, L121011-30, L121012-30, L121015-30, L121017-30, L121018-30, L121019-30, L121023-6, L121024-8, L121025-3, L121029-2, L121031-11, L121105-2, and L121127-30
	Note: The Sample Data Group (SDG) numbers listed here originated from Libby Environmental, Inc., the Primary chemical analytical laboratory for this project. Selected samples from various SDGs were sent to a secondary laboratories (Fremont Analytical and Twiss) for further analyses of metals, polycyclic aromatic hydrocarbons and soil fertility. See E-1 for a cross-reference of Sample IDs and laboratory SDGs.

This report presents the results of a United States Environmental Protection Agency (USEPA)-defined Stage 2A validation (USEPA Document 540-R-08-005; USEPA, 2009) of analytical data from the analyses soil and groundwater samples obtained from the Construction Management phase at the former Irondale Iron and Steel Plant site in Irondale, Washington. Samples obtained were submitted to Libby Environmental, Inc. (Libby) of Olympia, Washington for chemical analysis of diesel- and heavy oil-range petroleum hydrocarbons (NWTPH-Dx). Through the chain of commerce, the samples were subsequently submitted to Fremont Analytical, of Seattle, Washington for either the analysis of selected semi-volatile compounds or total metals.

References for the appropriate National Functional Guidelines (NFG) are listed at the end of this memo. It should be noted that the NFG documents have been updated since the time data validation was conducted for this sampling event in 2013. Any and all validation qualifiers mentioned in this memo would remain unchanged if held to the standards of the most recent NFG documents.

The objective of the data quality assessment was to review laboratory analytical procedures and QC results to evaluate whether the samples were analyzed using well-defined and acceptable methods that provide quantitation limits below applicable regulatory criteria, the precision and accuracy of the data are well defined and sufficient to provide defensible data, and the quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

The Libby Sample Delivery Groups (SDGs; noted above) were reviewed for the following quality control (QC) elements:

- Chain of Custody
- Holding Times
- Surrogates/Labeled Compounds
- Method and Equipment Rinsate Blanks
- Laboratory Control Samples/Ongoing Precision and Recovery Samples
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory and Field Duplicates

DATA QUALITY ASSESSMENT SUMMARY

The results for each of the QC elements are summarized below. The data assessment was performed using guidance in two USEPA documents: USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (USEPA, 2010) and USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (USEPA, 2008).

Chain-of-Custody Documentation

Chain-of-custody forms were provided with the laboratory analytical reports. No transcription errors were found, and the appropriate signatures were applied. There were no anomalies mentioned in the sample receipt forms, as the samples were transported to the laboratory at the appropriate temperatures of between 2 and 6 degrees Celsius, with minor exceptions. In cases where the cooler temperature exceeded 6 degrees Celsius, the samples were in the transportation process for less than 24 hours.

Holding Times

The extraction technical holding time is defined as the time that elapses between sample collection and sample extraction/digestion. The analysis technical holding time is defined as the time that elapses between sample extraction/digestion and instrumental analysis. Extraction and analysis maximum holding time criteria exist for each analysis according to each laboratory method and the National functional Guidelines provide instructions for qualifying analytes that were extracted outside of the holding time with a 'J' for positive compounds and a 'UJ' for compounds that were not detected. The maximum holding time criteria exist to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. All analysis technical holding times were found to be within the maximum holding time of 40 days. However, the extraction technical holding time exceedances were noted below:

SDGs 120912-30 (Libby)/1210080 (Fremont): (CPAHs) Samples SRZ-WSW01-91212, SRZ-ESW01-91212, and SRZ-EB2-91012 were extracted 14 days past the holding time. There were no positive results for any target analytes in these samples. The reporting limits for all target analytes were qualified as estimated (UJ).

SDG 121017-30 (Libby)/1211093 (Fremont): (CPAHs) Sample CON-01-101812 was extracted 16 days past the hold time. There were no positive results for any target analytes in this sample. The positive results and reporting limits for all target analytes were qualified as estimated (J/UJ). The EDD version of the data reported various compounds as positive detections that were below the MRLs. This did not match the pdf version of the data set, which listed all compounds as not-detected at the MRLs.

SDG 121018-30 (Libby)/1210176 (Fremont): (CPAHs) Sample W-Bulkhead-101812 was extracted 14 days past the hold time. There were no positive results for any target analytes in this sample. The positive results and reporting limits for all target analytes were qualified as estimated (J/UJ). The EDD version of the data reported various compounds as positive detections that were below the MRLs. This did not match the pdf version of the data set, which listed all compounds as not-detected at the MRLs.

SDG 121023-6 (Libby)/1211095 (Fremont): (CPAHs) Sample MRZ-B2-102212 was extracted 13 days past the hold time. There were no positive results for any target analytes in the sample. The positive results and reporting limits for all target analytes were qualified as estimated (J/UJ). The EDD version of the data reported

various compounds as positive detections that were below the MRLs. This did not match the pdf version of the data set, which listed all compounds as not-detected at the MRLs.

Surrogate Recoveries

A surrogate compound is a compound that is chemically similar to the analytes of interest, but unlikely to be found in any environmental sample. Surrogates are used for organic analyses and are added to all samples, standards, and blanks to serve as an accuracy and specificity check of each analysis. The surrogates are added at a known concentration and percent recoveries are calculated following analysis. All surrogate recoveries for field samples were within the laboratory control limits.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. Method blanks were analyzed with each batch of samples, at a frequency of one per twenty samples. For all sample batches, method blanks for all applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the contract required quantitation limits, with the exceptions below:

SDG L120921-30/1209144: The method blank digested on 9/26/12 reported positive results for the elements copper and zinc. There was no action taken for these outliers because the associated lab sample concentrations for these elements were greater than 10 times the preparation blank concentrations.

SDG L121002-30 (Libby)/1210029 (Fremont) and
SDG L121003-30 (Libby)/1210029 (Fremont): The method blank digested on 10/3/12 reported positive results for the element arsenic. There was no action taken for this outlier because the associated lab sample concentrations for arsenic were greater than 10 times the preparation blank concentration.

Matrix Spikes/Matrix Spike Duplicates

Because the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis. One aliquot of sample is analyzed in the normal manner, and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent (%R) value is calculated as a measurement of accuracy. Matrix spike duplicates (MSD) analyses are generated in exactly the same manner as a matrix spike, however the general reason for the duplication of the matrix spike is to measure precision through the relative percent difference (RPD) measurement. For some organic analytical methods, such as NWTPH-Dx, a laboratory control sample/laboratory control sample duplicate (LCS/LCSD) sample set is performed in lieu of a MS/MSD analysis.

For inorganics methods, the matrix spike (referred to as a “spiked sample”) is typically followed by a post spike sample if any element recoveries were outside the control limits in the “spike sample”.

Matrix spike analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The %R values for matrix spikes and laboratory control samples are specified in the laboratory documents as are the RPD values. The frequency requirements were met for all analyses that were involved in this project.

Due to the inherently high concentrations of iron in soil at the Irondale Iron and Steel Plant site, the internal parent samples used for most MS/MSD sample sets needed to be spiked with iron an order of magnitude greater than normal in an effort for the chemist to properly distinguish between the parent concentration of iron and the spiked concentration of iron. Even though this step was taken, several parent concentrations of iron were still greater than four times the amount spiked into the sample. Professional judgement was used in some of these cases for determining that the MS/MSD outliers mentioned below should not result in validation qualifiers because the extremely high iron concentrations can saturate the instrumentation detector. This saturation can affect the ability to appropriately determine accuracy and precision in some cases.

SDG L120921-5 (Libby)/1209144 (Fremont): (Metals) The laboratory performed an MS/MSD on Sample Topsoil 091112. The %R values for iron exceeded the upper control limit of 125 percent in both the MS and the MSD. There was no action taken for iron because the parent sample concentration for iron was greater than four times the amount spiked into the sample. The %R values for zinc also exceeded the upper control limit of 125 percent in the MSD, though no action was taken because the zinc %R values was within the control limits in the corresponding MS.

SDG L121002-30 (Libby)/1210029 (Fremont): (Metals) The laboratory performed an MS/MSD on Sample NRZ-NWSW1-10312. The %R values for arsenic, copper, lead, nickel, and zinc were outside of the control limits of 75 percent to 125 percent in either the MS or the MSD. There was no further action taken because the parent sample concentrations of both iron and copper were not only greater than four times the amount spiked into the sample, but both exceeded the linear calibration range of the instrument.

SDG L121018-30 (Libby)/1210176 (Fremont): (Metals) The laboratory performed an MS/MSD on Sample W-Bulkhead-101812. The %R values for iron and copper where outside of the control limits in both the MS and the MSD. No further action was required for these outliers above because the parent concentrations of both iron and copper were greater than four times the amount spiked into the MS/MSD samples.

SDG L121024-8 (Libby)/1210223 (Fremont): (Metals) The laboratory performed an MS/MSD on Sample MRZ-B3-102312. The %R values for iron, lead, and zinc where outside of the control limits in both the MS and the MSD. After inspection of the MS/MSD results, the laboratory analyzed a Post Digestion Spike (PSD) on the same parent sample. In this sample, the %R values for iron and zinc were again outside of the control limits.

The positive results for zinc were qualified as estimated (J) in Samples MRZ-B3-102312, MRZ-ESWZ-102312, MRZ-B2-102412, MRZ-B3-102412, and MRZ-B1-102412. No further action was required for iron because the parent concentration of iron was greater than four times the amount spiked into the MS/MSD samples; no further action was required for zinc because the PSD %R value was within the control limits.

SDG 1211031 (Fremont only): (Metals) The laboratory performed an MS/MSD on a parent sample that was collected from a different SDG that was un-related to this project. The %R values for iron where outside of the control limits in both the MS and the MSD. No action was taken because the matrix was from a different project site.

SDG 1210248 (Fremont only): (Metals) The laboratory performed an MS/MSD on a parent sample that was collected from a different SDG that was un-related to this project. The %R values for iron where outside of the control limits in both the MS and the MSD. No action was taken because the matrix was from a different project site.

SDG L121025-3 (Libby)/1210233 (Fremont): (Metals) The laboratory performed an MS/MSD on Sample MRZ-B1-102512. The %R values for copper and iron where outside of the control limits in both the MS and the MSD. No further action was required for these outliers above because the parent concentrations of both iron and copper were greater than four times the amount spiked into the MS/MSD samples, even after the ten-fold increase in the iron spiking solution by the chemist.

SDG L121031-11 (Libby)/1210265 (Fremont): (Metals) The laboratory performed an MS/MSD on Sample ROAD-2-103012. The %R values for arsenic, copper, iron, lead, and nickel where outside of the control limits in either the MS or the MSD. No further action was required for these outliers above because the parent concentration of iron was not only greater than four times the amount spiked into the MS/MSD samples, but it also exceeded the linear calibration range of the instrument.

Laboratory Control Samples

A laboratory control sample is essentially a blank sample that is spiked with a known amount of analyte concentration and analyzed. It is to be treated much like a matrix spike, without the possibility for matrix interference. As there is no actual sample matrix in the analysis, the analytical expectations for accuracy and precision are usually more rigorous and qualification would apply to all samples in the batch, instead of the parent sample only.

Laboratory control sample analyses should be performed once per analytical batch or every twenty field samples, whichever is more frequent. The recovery criteria for laboratory control samples are specified in the laboratory documents as are the RPD values. The frequency requirements were met for all analyses, and the %R/RPD values were within the proper control limits.

Laboratory Duplicates (Metals and Fuels only)

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory, and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration greater than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. According to the National Functional Guidelines, the action required for qualification is applied to every sample in the associated SDG (listed as the header in each paragraph below).

Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met, with the exceptions below. Careful consideration was used by GeoEngineers in assessing the usability of these data points qualified for a lack of precision. As no data points were rejected, the qualified data were acceptable for their intended use.

SDG L121002-30 (Libby)/1210029 (Fremont) and SDG L121003-30 (Libby)/1210029 (Fremont): (Metals) The laboratory performed an internal laboratory duplicate on Sample NRZ-NWSW1-10312. The RPD values for arsenic and lead exceeded the control limit of 30 percent. The positive results for both arsenic and lead were qualified as estimated (J) in all associated samples: NRZ-NWB1-10312, NRZ-NWSW1-10312, NRZ-SSW1-10312, NRZ-NSW1-10312, NRZ-NSW2-10312, NRZ-SSW2-10312, and NRZ-NWB2-10312.

SDG L121018-30 (Libby)/1210176 (Fremont): (Metals) The laboratory performed an internal laboratory duplicate on Sample W-Bulkhead-101812. The RPD value for copper exceeded the control limit of 30 percent. The positive result for copper was qualified as estimated (J) in the parent sample.

SDG L121024-8 (Libby)/1210223 (Fremont): (Metals) The laboratory performed an internal laboratory duplicate on Sample MRZ-B3-102312. The RPD values for lead and zinc exceeded the control limit of 30 percent. The positive results for lead and zinc were qualified as estimated (J) in the associated Samples: MRZ-B3-102312, MRZ-ESWZ-102312, MRZ-B2-102412, MRZ-B3-102412, MRZ-B1-102412.

Field Replicates/Duplicates

Field duplicate samples were collected and analyzed along with the reviewed sample batches. The duplicate samples were analyzed for the same parameters as the associated parent samples. As mentioned above for the laboratory duplicates the RPD is used as the criteria for assessing precision, unless one or more of the samples used has a concentration greater than five times the reporting limit for that sample. In this case, the absolute difference is used instead of the RPD.

The following field duplicate sample sets were collected for this sampling event:

- IRZ-ESW1-92612/IRZ-Dupe1-92612 from SDG **L120926-30 (Libby)/1209172 (Fremont)**
- IRZ-B4-92712/IRZ-Dupe1-92712 from SDG **L120928-30 (Libby)/1210030 (Fremont)**

The RPD/absolute difference value for the field duplicate sample sets were within their respective control limits.

OVERALL ASSESSMENT

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the surrogates, LCS/LCSD, and MS/MSD %R values, with the exceptions noted above. Precision was acceptable, as demonstrated by the laboratory duplicate, LCS/LCSD and MS/MSD RPD and absolute difference values, with the exceptions noted above.

Data points were qualified because of holding time outliers, matrix spike %R outliers, and laboratory duplicate outliers. Table F-1 includes a summary of data qualifiers and rationale.

Based on the data quality review, it is our opinion that the analytical data, including data qualified as noted above, are of acceptable quality for their intended use.

REFERENCES

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review," OSWER 9240.1-51, EPA 540-R-10-011. January 2010.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review," EPA-540-R-08-01. June 2008.

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

Table F-1

Data Validation Qualifiers and Rationale

Irondale Iron and Steel Plant

Irondale, Washington

Sample_ID	Analyte	Result	Qualifier	Data Validation Qualifier Rationale
CON-01-101812	Benzo(a)anthracene	15.6	J	Holding Time
CON-01-101812	Benzo(a)pyrene	45.3	UJ	Holding Time
CON-01-101812	Benzo(b)fluoranthene	25.9	J	Holding Time
CON-01-101812	Benzo(k)fluoranthene	45.3	UJ	Holding Time
CON-01-101812	Chrysene	30.9	J	Holding Time
CON-01-101812	Dibenzo(a,h)anthracene	45.3	UJ	Holding Time
CON-01-101812	Indeno(1,2,3-cd)pyrene	45.3	UJ	Holding Time
MRZ-B1-102412	Zinc	48	J	Matrix Spike %R, Lab Duplicate Precision
MRZ-B2-102212	Benzo(a)anthracene	19.3	J	Holding Time
MRZ-B2-102212	Benzo(a)pyrene	23.3	J	Holding Time
MRZ-B2-102212	Benzo(b)fluoranthene	33.1	J	Holding Time
MRZ-B2-102212	Benzo(k)fluoranthene	11.7	J	Holding Time
MRZ-B2-102212	Chrysene	20.5	J	Holding Time
MRZ-B2-102212	Dibenzo(a,h)anthracene	48.2	UJ	Holding Time
MRZ-B2-102212	Indeno(1,2,3-cd)pyrene	24.3	J	Holding Time
MRZ-B2-102412	Zinc	54.6	J	Matrix Spike %R, Lab Duplicate Precision
MRZ-B3-102312	Zinc	51.1	J	Matrix Spike %R, Lab Duplicate Precision
MRZ-B3-102412	Zinc	25.5	J	Matrix Spike %R, Lab Duplicate Precision
MRZ-ESWZ-102312	Zinc	38.6	J	Matrix Spike %R, Lab Duplicate Precision
NRZ-NSW1-10312	Arsenic	26.9	J	Lab Duplicate Precision
NRZ-NSW1-10312	Lead	6.81	J	Lab Duplicate Precision
NRZ-NSW2-10312	Arsenic	15.2	J	Lab Duplicate Precision
NRZ-NSW2-10312	Lead	2.26	J	Lab Duplicate Precision
NRZ-NWB1-10312	Arsenic	6.71	J	Lab Duplicate Precision
NRZ-NWB1-10312	Lead	3.2	J	Lab Duplicate Precision
NRZ-NWB2-10312	Arsenic	36.3	J	Lab Duplicate Precision
NRZ-NWB2-10312	Lead	13.8	J	Lab Duplicate Precision
NRZ-NWSW1-10312	Arsenic	12.9	J	Lab Duplicate Precision
NRZ-NWSW1-10312	Lead	3.03	J	Lab Duplicate Precision
NRZ-SSW1-10312	Arsenic	3.31	J	Lab Duplicate Precision
NRZ-SSW1-10312	Lead	1.98	J	Lab Duplicate Precision
NRZ-SSW2-10312	Arsenic	2.66	J	Lab Duplicate Precision
NRZ-SSW2-10312	Lead	1.48	J	Lab Duplicate Precision
SRZ-EB2-91012	2,4-Dimethylphenol	26.9	UJ	Holding Time
SRZ-EB2-91012	Benzo(a)pyrene	46.4	UJ	Holding Time
SRZ-EB2-91012	Chrysene	5.79	J	Holding Time
SRZ-ESW01-91212	2,4-Dimethylphenol	26.8	UJ	Holding Time
SRZ-ESW01-91212	Benzo(a)pyrene	46.2	UJ	Holding Time
SRZ-ESW01-91212	Chrysene	46.2	UJ	Holding Time
SRZ-WSW01-91212	2,4-Dimethylphenol	27.4	UJ	Holding Time
SRZ-WSW01-91212	Benzo(a)pyrene	47.3	UJ	Holding Time
SRZ-WSW01-91212	Chrysene	47.3	UJ	Holding Time
W-BULKHEAD-101812	Benzo(a)anthracene	15.3	J	Holding Time
W-BULKHEAD-101812	Benzo(a)pyrene	17.5	J	Holding Time
W-BULKHEAD-101812	Benzo(b)fluoranthene	48.1	UJ	Holding Time
W-BULKHEAD-101812	Benzo(k)fluoranthene	48.1	UJ	Holding Time
W-BULKHEAD-101812	Chrysene	35.7	J	Holding Time
W-BULKHEAD-101812	Dibenzo(a,h)anthracene	48.1	UJ	Holding Time
W-BULKHEAD-101812	Indeno(1,2,3-cd)pyrene	48.1	UJ	Holding Time
W-BULKHEAD-101812	Copper	193	J	Lab Duplicate Precision

APPENDIX G
Landfill Certificate of Disposal

Weyerhaeuser
The future is growing™

PO Box 188
Longview, WA, 98632
360-578-4435
360-578-4501
larry.fulcher@weyerhaeuser.com

November 21, 2013

Neil Morton
Senior Environmental Scientist
GeoEngineers, Inc.

Subject: Certificate of Disposal for Irondale Iron & Steel Remediation Project

This letter is to certify that the Weyerhaeuser Regional Landfill accepted for disposal soils generated during the remediation of the Irondale Iron & Steel project located at 526 Moore Street, Irondale, Washington. The Weyerhaeuser Regional Landfill is located at 3434 South Silverlake Road, Castle Rock WA 98611. The wastes were profiled and approved for disposal under the Cowlitz County issued solid waste permit, 08-SW078, which deems contaminated soils, dredging, and debris an acceptable waste. These wastes were managed in compliance with all applicable permits and regulations related to the operation of this landfill.

The contractor on the project was Anderson Environmental Contracting, LLC located at 705 Colorado, Kelso WA 98626. First loads from the Irondale project were received on September 11, 2012. The last load was received on November 21, 2012. A total of 320 truck loads and 10,563.99 tons were accepted for landfill disposal. Load summaries are attached.

I can be reached at 360-578-4435 or 360-430-1806 (cell) if you have any questions.

Sincerely,

Larry Fulcher
Materials Recovery Facility & Landfill Manager

LOAD SUMMARY

Anderson Environmental Co., LLC - Irondale Project

9/11/2012 thru 9/28/2012

DATE	TIME	CUSTOMER	HAULER, DRIVER, TRUCK#	GROSS WGT (LBS)	TARE WGT (LBS)	NET WGT (LBS)	TICKET #
LOADS DELIVERED TO LANDFILL							
9/11/2012	11:00A	AEC Irondale	Adventure - Brad	107,500	41,460	66,040	95225422
9/11/2012	11:25A	AEC Irondale	Adventure - Ron	106,420	40,680	65,740	95225423
9/11/2012	12:00P	AEC Irondale	Sines - Doug	100,700	35,380	65,320	95225425
9/12/2012	6:00A	AEC Irondale	Adventure - Brad	107,240	41,460	65,780	95225442
9/12/2012	6:00A	AEC Irondale	Adventure - Ron	104,060	40,680	63,380	95225443
9/12/2012	8:25A	AEC Irondale	Sines - Doug	103,140	35,380	67,760	95225455
9/12/2012	8:30A	AEC Irondale	Sines - Jerry	96,100	35,800	60,300	95225456
9/12/2012	1:45P	AEC Irondale	Adventure - Brad	106,760	41,460	65,300	95225468
9/12/2012	1:45P	AEC Irondale	Celorie - Ken	104,620	40,200	64,420	95225469
9/12/2012	2:05P	AEC Irondale	Adventure - Ron	106,120	40,680	65,440	95225470
9/13/2012	6:20A	AEC Irondale	Perfection Enterp - #93	91,920	39,640	52,280	95225487
9/13/2012	7:15A	AEC Irondale	Sines - Doug	99,220	35,820	63,400	95225474
9/13/2012	7:15A	AEC Irondale	Sines - Jerry	96,540	35,800	60,740	95225473
9/13/2012	10:45A	AEC Irondale	Adventure - Brad - #3	104,040	41,460	62,580	95225495
9/13/2012	10:46A	AEC Irondale	Don Hines - #53	99,960	39,860	60,100	95225494
9/13/2012	10:47A	AEC Irondale	Adventure - Ron - #2	106,920	40,680	66,240	95225496
9/13/2012	11:25A	AEC Irondale	Celorie Bros. - Ken - #22	106,500	40,200	66,300	95225497
9/13/2012	1:45P	AEC Irondale	Perfection Enterp - #93	102,980	40,600	62,380	95225502
9/14/2012	6:00A	AEC Irondale	Sines - Doug - #5	96,920	35,820	61,100	95225508
9/14/2012	6:00A	AEC Irondale	Adventure - Ron - #2	102,860	40,680	62,180	95225515
9/14/2012	6:00A	AEC Irondale	Adventure - Brad - #3	103,840	41,460	62,380	95225514
9/14/2012	6:00A	AEC Irondale	Don Hines - Roger - #53	104,780	39,860	64,920	95225516
9/14/2012	6:15A	AEC Irondale	Sines - Jerry - #04	102,180	35,800	66,380	95225509
9/14/2012	1:10P	AEC Irondale	Adventure - Brock - #3	108,880	41,460	67,420	95225535
9/14/2012	1:10P	AEC Irondale	Adventure - Ron - #2	109,840	40,680	69,160	95225536
9/14/2012	1:25P	AEC Irondale	Don Hines - Roger - #53	104,880	39,860	65,020	95225539
9/17/2012	6:45A	AEC Irondale	Celorie Bros. - Ken - #22	106,320	40,200	66,120	95225517
9/24/2012	11:03A	AEC Irondale	Don Hines - Roger - #53	104,960	39,800	65,160	95225734
9/24/2012	11:20A	AEC Irondale	Sines - Doug - #5	98,860	35,280	63,580	95225736
9/24/2012	11:20A	AEC Irondale	Sines - Kevin - #6	105,560	37,920	67,640	95225735
9/24/2012	11:35A	AEC Irondale	Lucore - Eric - #19	104,880	39,000	65,880	95225738
9/24/2012	11:40A	AEC Irondale	Adams - #101	99,180	38,140	61,040	95225739
9/24/2012	11:40A	AEC Irondale	Adams - Larry - #201	106,940	38,200	68,740	95225740
9/24/2012	12:00P	AEC Irondale	Adventure - #3	105,380	41,460	63,920	95225741
9/25/2012	5:50A	AEC Irondale	Sines Construction	109,340	35,280	74,060	95225758
9/25/2012	5:50A	AEC Irondale	Sines - Kevin - #6	114,500	37,920	76,580	95225759
9/25/2012	5:50A	AEC Irondale	Adventure - Ron - #2	112,640	40,680	71,960	95225765
9/25/2012	5:50A	AEC Irondale	Adventure - John - #3	110,040	41,460	68,580	95225762
9/25/2012	5:50A	AEC Irondale	Lucore - Eric - #19	109,740	39,000	70,740	95225760
9/25/2012	5:55A	AEC Irondale	Don Hines - Roger - #53	106,160	39,800	66,360	95225771
9/25/2012	6:05A	AEC Irondale	Adams - Larry - #201	111,220	38,200	73,020	95225763
9/25/2012	6:05A	AEC Irondale	Adams - Ross - #101	119,220	38,140	81,080	95225764
9/25/2012	1:20P	AEC Irondale	Adventure - Ron - #2	103,140	40,680	62,460	95225788
9/25/2012	1:25P	AEC Irondale	Lucore - Eric - #19	101,040	39,000	62,040	95225789
9/25/2012	1:45P	AEC Irondale	Adventure - #3	103,440	41,460	61,980	95225792
9/25/2012	2:15P	AEC Irondale	Don Hines - Roger - #53	107,320	39,800	67,520	95225793

DATE	TIME	CUSTOMER	HAULER, DRIVER, TRUCK#	GROSS WGT (LBS)	TARE WGT (LBS)	NET WGT (LBS)	TICKET #
9/25/2012	2:20P	AEC Irondale	Adams - Larry - #201	104,640	38,200	66,440	95225794
9/25/2012	2:20P	AEC Irondale	Adams - Ross - #101	101,280	38,140	63,140	95225795
9/26/2012	7:20A	AEC Irondale	Lucore - Eric - #19	108,580	39,000	69,580	95225807
9/26/2012	7:35A	AEC Irondale	Adams - Larry - #201	105,880	38,200	67,680	95225808
9/26/2012	7:35A	AEC Irondale	Adams - Ross - #101	110,520	38,140	72,380	95225809
9/26/2012	7:47A	AEC Irondale	Adventure - Ron - #2	110,480	40,680	69,800	95225810
9/26/2012	7:50A	AEC Irondale	Adventure - John - #3	103,700	41,460	62,240	95225811
9/26/2012	10:55A	AEC Irondale	Don Hines - Roger - #53	108,980	39,800	69,180	95225815
9/26/2012	10:55A	AEC Irondale	Don Hines - Frank - #21	103,800	40,320	63,480	95225814
9/26/2012	2:29P	AEC Irondale	Lucore - Eric - #19	103,380	39,000	64,380	95225831
9/26/2012	2:55P	AEC Irondale	Adventure - John - #3	105,140	41,460	63,680	95225834
9/26/2012	2:55P	AEC Irondale	Adventure - Ron - #2	112,680	40,680	72,000	95225833
9/26/2012	2:55P	AEC Irondale	Adams - Ross - #101	105,580	38,140	67,440	95225837
9/26/2012	2:55P	AEC Irondale	Adams - Larry - #201	108,160	38,200	69,960	95225836
9/27/2012	5:55A	AEC Irondale	Don Hines - Roger - #53	103,760	39,800	63,960	95225846
9/27/2012	5:55A	AEC Irondale	Kissler - #4	104,440	38,000	66,440	95225840
9/27/2012	5:56A	AEC Irondale	Hines - #21	106,480	40,320	66,160	95225847
9/27/2012	6:00A	AEC Irondale	Lucore - Eric - #19	108,960	39,000	69,960	95225851
9/27/2012	7:33A	AEC Irondale	Adventure - John - #3	103,660	41,460	62,200	95225855
9/27/2012	7:34A	AEC Irondale	Celorie - Troy - #20	106,580	38,800	67,780	95225854
9/27/2012	7:35A	AEC Irondale	Adams - Larry - #201	108,860	38,200	70,660	95225856
9/27/2012	7:35A	AEC Irondale	Adams - Ross - #101	109,120	38,140	70,980	95225857
9/27/2012	7:44A	AEC Irondale	Adventure - Ron - #2	114,420	40,680	73,740	95225853
9/27/2012	12:00P	AEC Irondale	R Trans - Brad - #51	105,800	40,200	65,600	95225864
9/27/2012	12:00P	AEC Irondale	R Trans - James - #53	107,800	39,620	68,180	95225863
9/27/2012	1:08P	AEC Irondale	Don Hines - Roger - #53	113,140	39,800	73,340	95225867
9/27/2012	1:15P	AEC Irondale	Hines - #21	105,060	40,320	64,740	95225868
9/27/2012	1:19P	AEC Irondale	Lucore - Eric - #19	106,620	39,000	67,620	95225869
9/27/2012	1:25P	AEC Irondale	Kissler - #4	106,100	38,500	67,600	95225870
9/27/2012	3:00P	AEC Irondale	Adams - Ross - #101	109,040	38,140	70,900	95225876
9/27/2012	3:00P	AEC Irondale	Adams - Larry - #201	103,860	38,200	65,660	95225875
9/27/2012	3:02P	AEC Irondale	Celorie - Troy - #20	105,760	38,800	66,960	95225877
9/27/2012	3:12P	AEC Irondale	Adventure - Ron - #2	111,960	40,680	71,280	95225878
9/27/2012	3:15P	AEC Irondale	Adventure - John - #3	105,260	41,460	63,800	95225880
9/28/2012	5:50A	AEC Irondale	Kissler - Klay T - #4	108,680	38,500	70,180	95225886
9/28/2012	5:55A	AEC Irondale	Lucore - Eric - #19	107,820	39,000	68,820	95225889
9/28/2012	7:36A	AEC Irondale	R Trans - James - #53	99,200	39,420	59,780	95225891
9/28/2012	7:36A	AEC Irondale	Hines - #21	109,600	40,320	69,280	95225893
9/28/2012	8:30A	AEC Irondale	Don Hines - Roger - #53	108,400	39,800	68,600	95225894
9/28/2012	9:15A	AEC Irondale	R Trans - Brad - #51	104,980	40,200	64,780	95225895
9/28/2012	10:20A	AEC Irondale	Celorie - Troy - #20	110,580	38,680	71,900	95225897
9/28/2012	10:20A	AEC Irondale	Adventure - John - #3	103,940	41,460	62,480	95225898
9/28/2012	11:45A	AEC Irondale	Sines - Doug - #5	105,640	35,820	69,820	95225900
9/28/2012	12:20P	AEC Irondale	Celorie - #23	108,380	39,580	68,800	95225901
9/28/2012	12:20P	AEC Irondale	Sines - Kevin - #6	109,140	37,920	71,220	95225902
9/28/2012	12:30P	AEC Irondale	Adams - Larry - #201	106,740	38,200	68,540	95225903
9/28/2012	12:30P	AEC Irondale	Adams - Ross - #101	110,680	38,140	72,540	95225904
9/28/2012	1:25P	AEC Irondale	Lucore - Eric - #19	113,080	39,000	74,080	95225905
9/28/2012	3:10P	AEC Irondale	Adventure - Ron - #2	105,380	40,680	64,700	95225907

Total Load Count:	**95**	**Total Net Weight (LBS):**	**6,344,980**
		Total Net Weight (TONS):	**3,172.5**

LOAD SUMMARY

Anderson Environmental Co., LLC - Irondale Project

10/1/2012 thru 10/31/2012

DATE	TIME	CUSTOMER	HAULER, DRIVER, TRUCK#	GROSS WGT (LBS)	TARE WGT (LBS)	NET WGT (LBS)	TICKET #
LOADS DELIVERED TO LANDFILL							
10/1/2012	10:39A	AEC Irondale	Don Hines - #53	103,400	39,800	63,600	95225931
10/1/2012	10:40A	AEC Irondale	Don Hines - #21	102,860	40,320	62,540	95225932
10/1/2012	10:50A	AEC Irondale	Celorie - #23	106,080	39,580	66,500	95225934
10/1/2012	11:13A	AEC Irondale	Lucore Eric - #19	106,820	39,000	67,820	95225937
10/1/2012	11:20A	AEC Irondale	Adams, Ross - #101	105,840	38,140	67,700	95225939
10/1/2012	11:20A	AEC Irondale	Adams, Larry - #201	109,320	38,200	71,120	95225940
10/1/2012	11:35A	AEC Irondale	Kissler - Brian - #9	106,220	41,560	64,660	95225942
10/1/2012	11:35A	AEC Irondale	Kissler - Tye - #10	103,120	38,660	64,460	95225943
10/1/2012	11:40A	AEC Irondale	Kissler - Dave - #11	106,540	41,300	65,240	95225944
10/1/2012	12:52P	AEC Irondale	Adventure - John - #3	104,660	41,460	63,200	95225950
10/1/2012	12:52P	AEC Irondale	Adventure - Ron - #2	104,440	40,680	63,760	95225948
10/2/2012	5:35A	AEC Irondale	Don Hines - Roger - #53	103,420	39,800	63,620	95225964
10/2/2012	5:54A	AEC Irondale	Lucore Eric - #19	112,100	39,000	73,100	95225967
10/2/2012	6:05A	AEC Irondale	Adams, Larry - #201	108,820	38,200	70,620	95225968
10/2/2012	6:06A	AEC Irondale	Celorie - #23	109,360	39,340	70,020	95225966
10/2/2012	6:05A	AEC Irondale	Adams, Ross - #101	107,000	38,140	68,860	95225969
10/2/2012	6:16A	AEC Irondale	Hines - #21	106,720	40,320	66,400	95225965
10/2/2012	6:30A	AEC Irondale	Kissler - Tye - #10	106,760	38,660	68,100	95225971
10/2/2012	6:30A	AEC Irondale	Kissler - Brian - #9	106,820	41,560	65,260	95225970
10/2/2012	6:30A	AEC Irondale	Kissler - Dave - #11	107,680	41,300	66,380	95225972
10/2/2012	7:15A	AEC Irondale	Adventure - John - #3	104,140	41,460	62,680	95225979
10/2/2012	7:15A	AEC Irondale	Adventure - Ron - #2	104,700	40,680	64,020	95225978
10/2/2012	3:25P	AEC Irondale	Lucore Eric - #19	104,860	39,000	65,860	95225988
10/3/2012	5:50A	AEC Irondale	Celorie - Troy - #20	108,540	38,680	69,860	95225997
10/3/2012	5:51A	AEC Irondale	Don Hines - Roger - #53	103,380	39,800	63,580	95225990
10/3/2012	5:55A	AEC Irondale	Celorie - John S. - #23	108,700	39,340	69,360	95225991
10/3/2012	5:55A	AEC Irondale	Adams, Larry - #201	108,500	38,200	70,300	95225992
10/3/2012	5:55A	AEC Irondale	Adams, Ross - #101	109,300	38,140	71,160	95225993
10/3/2012	6:05A	AEC Irondale	Hines - #21	103,820	40,320	63,500	95225994
10/3/2012	6:14A	AEC Irondale	Kissler - Brian - #9	106,980	41,560	65,420	95225996
10/3/2012	6:14A	AEC Irondale	Kissler - Tye - #10	100,320	38,660	61,660	95225995
10/3/2012	6:15A	AEC Irondale	Kissler - Dave - #11	100,920	41,300	59,620	95225998
10/3/2012	7:20A	AEC Irondale	Adventure - Ron - #2	103,080	40,680	62,400	95309907
10/3/2012	7:25A	AEC Irondale	Adventure - John - #3	111,880	41,460	70,420	95309908
10/3/2012	10:42A	AEC Irondale	Lucore Eric - #19	103,820	39,000	64,820	95309914
10/3/2012	1:25P	AEC Irondale	Don Hines - Roger - #53	104,600	39,800	64,800	95309921
10/3/2012	1:38P	AEC Irondale	Celorie - Troy - #20	110,220	38,680	71,540	95309923
10/3/2012	1:45P	AEC Irondale	Celorie - John S. - #23	105,840	39,340	66,500	95309924
10/3/2012	2:00P	AEC Irondale	Adams, Larry - #201	107,760	38,200	69,560	95309925
10/3/2012	2:00P	AEC Irondale	Adams, Ross - #101	111,240	38,140	73,100	95309927
10/3/2012	2:05P	AEC Irondale	Kissler - Tye - #10	109,140	38,660	70,480	95309926
10/3/2012	2:05P	AEC Irondale	Kissler - Brian - #9	108,560	41,560	67,000	95309928
10/3/2012	2:06P	AEC Irondale	Hines - Frank - #21	107,540	40,340	67,200	95309929
10/3/2012	2:20P	AEC Irondale	Kissler - Dave - #11	106,640	41,300	65,340	95309930
10/3/2012	2:50P	AEC Irondale	Adventure - John - #3	109,320	41,460	67,860	95309933
10/3/2012	2:50P	AEC Irondale	Adventure - Ron - #2	110,380	40,680	69,700	95309934

DATE	TIME	CUSTOMER	HAULER, DRIVER, TRUCK#	GROSS WGT (LBS)	TARE WGT (LBS)	NET WGT (LBS)	TICKET #
10/4/2012	10:30A	AEC Irondale	BWT - #2	106,300	39,740	66,560	95309953
10/4/2012	10:30A	AEC Irondale	K & S - #23	109,980	37,020	72,960	95309952
10/4/2012	11:00A	AEC Irondale	Celorie - Troy - #20	105,740	38,680	67,060	95309956
10/4/2012	11:00A	AEC Irondale	Kissler - Dave - #11	103,860	41,300	62,560	95309957
10/5/2012	5:30A	AEC Irondale	BWT - Bud - #2	83,640	39,740	43,900	95309989
10/5/2012	5:30A	AEC Irondale	K & S - #23	109,300	37,020	72,280	95309990
10/5/2012	5:30A	AEC Irondale	Kissler - Dave - #11	101,060	41,300	59,760	95309981
10/5/2012	6:00A	AEC Irondale	Celorie - Troy - #20	100,280	38,680	61,600	95309980
10/5/2012	1:00P	AEC Irondale	BWT - Bud - #2	98,040	39,740	58,300	NO TICKET
10/5/2012	1:00P	AEC Irondale	K & S - #23	108,080	37,020	71,060	95309993
10/5/2012	1:00P	AEC Irondale	Kissler - Dave - #11	109,600	41,300	68,300	95309995
10/5/2012	1:15P	AEC Irondale	Celorie - Troy - #20	115,040	38,680	76,360	95309994
10/8/2012	10:30A	AEC Irondale	Kissler - Dave - #11	105,720	41,300	64,420	95310032
10/8/2012	11:43A	AEC Irondale	Kissler - Brian - #9	109,980	41,820	68,160	95310033
10/8/2012	2:54P	AEC Irondale	Celorie - Troy - #20	108,940	38,680	70,260	95310045
10/9/2012	6:28A	AEC Irondale	Kissler - Brian - #9	108,280	41,820	66,460	95310055
10/9/2012	6:30A	AEC Irondale	Kissler - Dave - #11	104,960	41,320	63,640	95310054
10/9/2012	11:30A	AEC Irondale	Celorie - Troy - #20	110,400	38,680	71,720	95310065
10/9/2012	1:30P	AEC Irondale	Adventure - Ron - #2	111,360	40,680	70,680	95310067
10/9/2012	2:55P	AEC Irondale	Kissler - Brian - #9	107,200	41,820	65,380	95310074
10/9/2012	3:25P	AEC Irondale	Kissler - Dave - #11	105,220	41,320	63,900	95310075
10/10/2012	7:24A	AEC Irondale	Celorie - Troy - #20	107,780	38,680	69,100	95310082
10/10/2012	11:00A	AEC Irondale	Kissler - Dave - #11	108,320	41,320	67,000	95310091
10/10/2012	11:15A	AEC Irondale	Adventure - Ron - #2	105,960	40,680	65,280	95310092
10/10/2012	11:24A	AEC Irondale	Kissler - Brian - #9	108,840	41,820	67,020	95310093
10/10/2012	3:00P	AEC Irondale	Celorie - Troy - #20	115,400	38,680	76,720	95310101
10/11/2012	6:14A	AEC Irondale	Kissler - Brian - #9	107,800	41,820	65,980	95310108
10/11/2012	6:15A	AEC Irondale	Kissler - Dave - #11	105,800	41,320	64,480	95310107
10/11/2012	6:45A	AEC Irondale	Adventure - Ron - #2	104,820	40,680	64,140	95310106
10/11/2012	11:30A	AEC Irondale	Celorie - Troy - #20	108,520	38,680	69,840	95310120
10/11/2012	1:39P	AEC Irondale	Kissler - Brian - #9	107,640	41,820	65,820	95310129
10/11/2012	1:45P	AEC Irondale	Kissler - Dave - #11	107,140	41,320	65,820	95310130
10/11/2012	2:00P	AEC Irondale	Adventure - Ron - #2	106,600	40,680	65,920	95310132
10/12/2012	6:00A	AEC Irondale	Celorie - Troy - #20	109,940	38,680	71,260	95310143
10/12/2012	11:16A	AEC Irondale	Kissler - Brian - #9	106,260	41,820	64,440	95310147
10/12/2012	11:30A	AEC Irondale	Kissler - Dave - #11	104,880	41,320	63,560	95310150
10/12/2012	11:55A	AEC Irondale	Adventure - Ron - #2	108,980	40,680	68,300	95310149
10/12/2012	1:24P	AEC Irondale	Celorie - Troy - #20	107,060	38,680	68,380	95310151
10/15/2012	7:30A	AEC Irondale	Kissler - Brian - #9	105,700	41,820	63,880	95310173
10/15/2012	11:23A	AEC Irondale	Kissler - Tye - #10	106,560	38,860	67,700	95310175
10/15/2012	12:50P	AEC Irondale	Celorie - Troy - #20	106,580	40,200	66,380	95310181
10/15/2012	3:05P	AEC Irondale	Kissler - Brian - #9	107,740	41,820	65,920	95310188
10/16/2012	6:45A	AEC Irondale	Kissler - Tye - #10	105,500	38,860	66,640	95310198
10/16/2012	7:10A	AEC Irondale	Celorie - Troy - #20	104,740	40,200	64,540	95310205
10/16/2012	10:43A	AEC Irondale	Perfection - #93	118,220	39,460	78,760	95310210
10/16/2012	11:06A	AEC Irondale	Kissler - Brian - #9	106,160	41,820	64,340	95310211
10/16/2012	1:38P	AEC Irondale	Kissler - Tye - #10	107,940	38,860	69,080	95310219
10/16/2012	2:35P	AEC Irondale	Celorie - Troy - #20	106,980	38,680	68,300	95310221
10/17/2012	6:00A	AEC Irondale	Perfection - Al - #93	113,480	39,460	74,020	95310236
10/17/2012	6:00A	AEC Irondale	Kissler - Brian - #9	106,460	41,820	64,640	95310230
10/17/2012	10:50A	AEC Irondale	Kissler - Tye - #10	104,600	38,860	65,740	95310243
10/17/2012	11:08A	AEC Irondale	Celorie - Troy - #20	105,400	40,200	65,200	95310244
10/17/2012	1:25P	AEC Irondale	Perfection - Al - #93	114,960	39,460	75,500	95310259

DATE	TIME	CUSTOMER	HAULER, DRIVER, TRUCK#	GROSS WGT (LBS)	TARE WGT (LBS)	NET WGT (LBS)	TICKET #
10/18/2012	6:04A	AEC Irondale	Celorie - Troy - #20	108,580	40,200	68,380	95310274
10/18/2012	11:00A	AEC Irondale	Perfection - Al - #93	118,220	39,460	78,760	95310284
10/18/2012	1:50P	AEC Irondale	Celorie - Troy - #20	108,080	40,200	67,880	95310296
10/19/2012	6:00A	AEC Irondale	Perfection - Al - #93	112,920	39,460	73,460	95310311
10/19/2012	7:09A	AEC Irondale	Celorie - Troy - #20	104,340	40,200	64,140	95310309
10/19/2012	11:15A	AEC Irondale	BWT - #10	99,740	41,200	58,540	NO TICKET
10/19/2012	11:15A	AEC Irondale	R-Transport	103,020	42,160	60,860	NO TICKET
10/19/2012	1:15P	AEC Irondale	Mikles Excavating - #02	82,880	43,500	39,380	95310330
10/19/2012	1:35P	AEC Irondale	Perfection - Al - #93	108,260	39,460	68,800	95310331
10/19/2012	3:10P	AEC Irondale	Celorie - Troy - #22	108,840	40,200	68,640	95310336
10/22/2012	10:55A	AEC Irondale	Perfection - Al - #93	103,900	39,460	64,440	95310361
10/22/2012	10:57A	AEC Irondale	Perfection - Bob - #16	93,260	36,640	56,620	95310362
10/22/2012	11:25A	AEC Irondale	R-Transport	111,960	40,500	71,460	95310363
10/22/2012	11:30A	AEC Irondale	R-Transport	104,020	42,000	62,020	NO TICKET
10/22/2012	11:45A	AEC Irondale	Mikles Excavating - #02	111,340	43,500	67,840	95310365
10/22/2012	12:03P	AEC Irondale	Celorie - Troy - #22	106,900	40,200	66,700	95310367
10/23/2012	6:00A	AEC Irondale	Perfection - Al - #93	114,820	39,460	75,360	95310395
10/23/2012	6:00A	AEC Irondale	Perfection - Bob - #16	102,400	36,180	66,220	95310396
10/23/2012	6:30A	AEC Irondale	R-Transport - #51	107,140	40,900	66,240	95310397
10/23/2012	6:30A	AEC Irondale	Celorie - Troy - #22	106,340	40,200	66,140	95310398
10/23/2012	11:20A	AEC Irondale	BWT - Bud - #2	104,080	39,500	64,580	95310409
10/23/2012	11:20A	AEC Irondale	Kooy - Dustin - W4	105,160	38,800	66,360	95310410
10/23/2012	11:26A	AEC Irondale	Wold - Mike - #8	103,880	41,000	62,880	95310411
10/23/2012	11:35A	AEC Irondale	Mikles Excavating - #02	96,860	43,500	53,360	95310412
10/23/2012	11:37A	AEC Irondale	Dan Eades - #5	84,380	40,320	44,060	95310413
10/23/2012	1:58P	AEC Irondale	Celorie - Troy - #22	107,580	40,200	67,380	95310426
10/23/2012	2:00P	AEC Irondale	Adventure - John - #3	109,400	41,460	67,940	95310425
10/23/2012	2:12P	AEC Irondale	Perfection - Al - #93	121,000	39,460	81,540	95310427
10/23/2012	2:30P	AEC Irondale	Perfection - Bob - #16	119,140	36,640	82,500	95310428
10/23/2012	3:20P	AEC Irondale	R-Trans - Calvin - R51	105,520	40,900	64,620	95310429
10/24/2012	5:40A	AEC Irondale	BWT - Bud - #2	101,020	39,750	61,270	95310450
10/24/2012	5:40A	AEC Irondale	Wold - Mike - #8	105,320	41,000	64,320	95310451
10/24/2012	5:40A	AEC Irondale	Dan Eades - #5	87,800	40,320	47,480	95310449
10/24/2012	6:15A	AEC Irondale	Mikles Excavating - #02	98,940	43,500	55,440	95310440
10/24/2012	8:20A	AEC Irondale	Kooy - Dustin - W4	117,400	38,800	78,600	95310454
10/24/2012	10:00A	AEC Irondale	R-Trans - Calvin - R51	109,740	40,900	68,840	95310459
10/24/2012	10:15A	AEC Irondale	Celorie - Troy - #22	107,440	40,200	67,240	95310461
10/24/2012	10:15A	AEC Irondale	Adventure - Troy - #3	112,140	41,460	70,680	95310460
10/24/2012	10:35A	AEC Irondale	Perfection - Al - #93	113,040	39,460	73,580	95310462
10/24/2012	10:46A	AEC Irondale	Perfection - Bob - #16	107,520	38,180	69,340	95310464
10/24/2012	11:25A	AEC Irondale	Don Hines - #608	97,680	36,920	60,760	95310468
10/24/2012	11:26A	AEC Irondale	Don Hines - #53	106,060	40,060	66,000	95310469
10/24/2012	1:20P	AEC Irondale	Dan Eades - #5	94,720	40,320	54,400	95310478
10/24/2012	1:50P	AEC Irondale	Mikles Excavating - #02	110,620	43,500	67,120	95310480
10/24/2012	2:10P	AEC Irondale	Wold - Mike - #8	106,780	41,700	65,080	95310481
10/25/2012	5:00A	AEC Irondale	Kooy - Dustin - W4	97,380	39,120	58,260	95310489
10/25/2012	5:00A	AEC Irondale	R-Trans - Calvin - R51	109,400	40,900	68,500	95310490
10/25/2012	6:00A	AEC Irondale	Perfection - Bob - #16	105,280	36,180	69,100	95310499
10/25/2012	6:00A	AEC Irondale	Perfection - Al - #93	114,920	39,460	75,460	95310500
10/25/2012	6:23A	AEC Irondale	Celorie - Troy - #22	106,660	40,200	66,460	95310491
10/25/2012	6:24A	AEC Irondale	Adventure - John - #3	105,220	41,460	63,760	95310493
10/25/2012	6:35A	AEC Irondale	Don Hines - Roger - #53	102,820	40,600	62,220	95310501
10/25/2012	6:37A	AEC Irondale	Don Hines - Tommy - #608	100,980	36,920	64,060	95310502
10/25/2012	9:45A	AEC Irondale	R-Trans - Calvin - R51	105,220	40,900	64,320	95310508
10/25/2012	10:50A	AEC Irondale	Dan Eades - #5	89,360	40,230	49,130	95310512

DATE	TIME	CUSTOMER	HAULER, DRIVER, TRUCK#	GROSS WGT (LBS)	TARE WGT (LBS)	NET WGT (LBS)	TICKET #
10/25/2012	10:55A	AEC Irondale	Wold - Mike - #8	94,180	41,200	52,980	95310514
10/25/2012	10:55A	AEC Irondale	BWT - Bud - #2	103,660	39,750	63,910	95310513
10/25/2012	11:52A	AEC Irondale	Mikles Excavating - #02	113,200	43,500	69,700	95310518
10/25/2012	11:58A	AEC Irondale	Kooy - Dustin - W4	117,260	38,120	79,140	95310509
10/25/2012	1:45P	AEC Irondale	Perfection - Al - #93	113,560	39,460	74,100	95310525
10/25/2012	1:45P	AEC Irondale	Perfection - Bob - #16	105,260	36,180	69,080	95310526
10/25/2012	1:45P	AEC Irondale	Adventure - John - #3	108,700	41,460	67,240	95310528
10/25/2012	1:45P	AEC Irondale	Celorie - Troy - #22	107,560	40,200	67,360	95310529
10/25/2012	1:55P	AEC Irondale	Don Hines - Tommy - #608	94,800	36,920	57,880	95310531
10/25/2012	1:57P	AEC Irondale	Don Hines - Roger - #53	105,940	40,600	65,340	95310532
10/26/2012	6:00A	AEC Irondale	Dan Eades - #5	102,640	40,230	62,410	95310548
10/26/2012	6:00A	AEC Irondale	BWT - Bud - #2	99,340	39,750	59,590	95310551
10/26/2012	6:00A	AEC Irondale	Wold - Mike - #8	104,240	41,200	63,040	95310549
10/26/2012	9:00A	AEC Irondale	R-Trans - Calvin - R51	109,120	40,900	68,220	95310553
10/26/2012	9:13A	AEC Irondale	Kooy - Dustin - W4	90,860	39,120	51,740	95310554
10/26/2012	9:45A	AEC Irondale	Celorie - Troy - #22	106,740	40,200	66,540	95310556
10/26/2012	9:55A	AEC Irondale	Don Hines - Roger - #53	103,180	40,200	62,980	95310557
10/26/2012	10:06A	AEC Irondale	Don Hines - Tommy - #608	100,960	36,920	64,040	95310558
10/26/2012	10:40A	AEC Irondale	Perfection - Bob - #16	103,080	36,180	66,900	95310563
10/26/2012	10:50A	AEC Irondale	Perfection - Al - #93	122,780	39,460	83,320	95310562
10/26/2012	11:00A	AEC Irondale	Adventure - John - #3	106,280	41,460	64,820	95310564
10/26/2012	11:04A	AEC Irondale	Mikles Excavating - #02	107,260	43,000	64,260	95310565
10/26/2012	12:55P	AEC Irondale	Dan Eades - #5	87,200	40,230	46,970	95310569
10/26/2012	5:30P	AEC Irondale	Mike Maddisen - #6	110,800	40,110	70,690	95310576
10/26/2012	5:30P	AEC Irondale	Mike Maddisen - #8	105,820	40,100	65,720	95310575
10/29/2012	9:50A	AEC Irondale	BWT - Bud - #2	104,140	39,750	64,390	95310596
10/29/2012	9:55A	AEC Irondale	Wold - Mike - #8	100,360	41,280	59,080	95310597
10/29/2012	10:04A	AEC Irondale	Madsen Timber - #8	96,940	40,100	56,840	95310598
10/29/2012	10:05A	AEC Irondale	Madsen Timber - #6	104,980	40,110	64,870	95310599
10/29/2012	10:10A	AEC Irondale	Dan Eades - #5	86,160	40,320	45,840	95310600
10/29/2012	10:12A	AEC Irondale	Kooy - Dustin - W4	97,600	39,120	58,480	95310601
10/29/2012	10:32A	AEC Irondale	Perfection - Al - #93	106,160	39,460	66,700	95310603
10/29/2012	10:35A	AEC Irondale	Perfection - Bob - #16	103,700	36,180	67,520	95310602
10/29/2012	10:44A	AEC Irondale	Celorie - Troy - #22	108,280	40,200	68,080	95310604
10/29/2012	11:20A	AEC Irondale	Don Hines - Roger - #53	106,340	40,600	65,740	95310606
10/29/2012	11:20A	AEC Irondale	Don Hines - Tommy - #608	98,260	36,920	61,340	95310605
10/29/2012	12:45P	AEC Irondale	Mikles Excavating - #02	104,000	43,000	61,000	95310613
10/29/2012	5:25P	AEC Irondale	Dan Eades - #5	90,880	40,320	50,560	95310621
10/29/2012	5:34P	AEC Irondale	Kooy - Dustin - W4	106,200	39,120	67,080	95310619
10/29/2012	5:35P	AEC Irondale	BWT - Bud - #2	98,720	39,750	58,970	95310618
10/29/2012	5:35P	AEC Irondale	Wold - Mike - #8	96,480	41,280	55,200	95310620
10/30/2012	6:00A	AEC Irondale	Madsen - #8	108,140	40,100	68,040	95310623
10/30/2012	6:05A	AEC Irondale	Maddisen - Mike - #6	105,080	40,110	64,970	95310622
10/30/2012	6:05A	AEC Irondale	Don Hines - Tommy - #608	99,540	36,920	62,620	95310633
10/30/2012	6:05A	AEC Irondale	Don Hines - Roger - #53	103,160	40,600	62,560	95310632
10/30/2012	6:07A	AEC Irondale	Perfection - Al - #93	115,960	39,460	76,500	95310631
10/30/2012	6:08A	AEC Irondale	Perfection - Bob - #16	111,000	36,180	74,820	95310634
10/30/2012	9:05A	AEC Irondale	Sines - Kevin - #6	104,860	38,540	66,320	95310641
10/30/2012	9:05A	AEC Irondale	Sines Const - #4	102,600	35,940	66,660	95310645
10/30/2012	10:22A	AEC Irondale	Dan Eades - #5	96,400	40,320	56,080	95310652
10/30/2012	10:28A	AEC Irondale	Wold - Mike - #8	96,940	41,280	55,660	95310653
10/30/2012	10:30A	AEC Irondale	BWT - Bud - #2	102,300	39,750	62,550	95310654
10/30/2012	10:50A	AEC Irondale	Mikles Excavating - #02	104,500	43,000	61,500	95310656
10/30/2012	10:58A	AEC Irondale	Celorie - Troy - #22	105,560	40,200	65,360	95310657
10/30/2012	1:05P	AEC Irondale	Madsen Timber - #8	108,220	40,100	68,120	95310661

DATE	TIME	CUSTOMER	HAULER, DRIVER, TRUCK#	GROSS WGT (LBS)	TARE WGT (LBS)	NET WGT (LBS)	TICKET #
10/30/2012	1:10P	AEC Irondale	Maddisen - Mike - #6	103,520	40,110	63,410	95310662
10/30/2012	2:00P	AEC Irondale	Perfection - Bob - #16	108,120	36,180	71,940	95310666
10/30/2012	2:15P	AEC Irondale	Perfection - Al - #93	117,260	39,460	77,800	95310665
10/31/2012	6:00A	AEC Irondale	Dan Eades - #5	97,240	40,880	56,360	95310684
10/31/2012	6:05A	AEC Irondale	Madsen Timber - #6	106,460	40,110	66,350	95310682
10/31/2012	7:05A	AEC Irondale	Madsen - #8	107,700	41,000	66,700	95310683
10/31/2012	9:30A	AEC Irondale	Mikles Excavating - #02	106,320	43,000	63,320	95310681
10/31/2012	11:40A	AEC Irondale	Sines - Kevin - #6	102,500	38,540	63,960	95310697
10/31/2012	12:08P	AEC Irondale	Sines - Terry - #4	105,200	35,940	69,260	95310698
10/31/2012	1:57P	AEC Irondale	Dan Eades - #5	94,660	40,880	53,780	95310702
10/31/2012	2:15P	AEC Irondale	Celorie - Troy - #22	109,140	40,200	68,940	95310703

Total Load Count:	**220**	**Total Net Weight (LBS):**	**14,431,480**
		Total Net Weight (TONS):	**7,215.7**

LOAD SUMMARY

Anderson Environmental Co., LLC - Irondale Project

11/1/2012 thru 11/21/2012

DATE	TIME	CUSTOMER	HAULER, DRIVER, TRUCK#	GROSS WGT (LBS)	TARE WGT (LBS)	NET WGT (LBS)	TICKET #
LOADS DELIVERED TO LANDFILL							
11/1/2012	11:00A	AEC Irondale	Perfection - Bob - #16	113,200	36,180	77,020	95310718
11/1/2012	2:30P	AEC Irondale	Don Hines - Roger - #53	110,740	40,020	70,720	95310739
11/2/2012	6:50A	AEC Irondale	Perfection - Bob - #16	111,600	36,180	75,420	95310742
11/21/2012	12:20P	AEC Irondale	Kissler - Brian - #10	105,180	39,560	65,620	95339738
11/21/2012	12:30P	AEC Irondale	Celorie - #20	102,340	39,540	62,800	95339739

Total Load Count:	**5**	**Total Net Weight (LBS):**	**351,580**
		Total Net Weight (TONS):	**175.8**

WASTE MANAGEMENT

COLUMBIA RIDGE LANDFILL & RECYCLING CENTER
18177 Cedar Springs Lane
Arlington, OR 97812
(541) 454-2030
(541) 454-3312 Fax

May 1, 2014

Anderson Environmental
705 Colorado St.
Kelso WA 98626

CERTIFICATE OF DISPOSAL

Waste Management Inc. dba. Columbia Ridge Landfill has received and disposed of NON HAZARDOUS Waste material from Anderson Environmental.

Dates Received:	Sept 25, 2012 – October 2, 2012
Generator:	Jefferson County
Location:	526 Moore St - Port Hadlock, WA 98339
Profile:	105810WA
Total Loads:	62
Total Tons:	2175
Waste Type:	Contaminated soil, slag, sediment

I certify, on behalf of the above listed facility, that the above-described non hazardous waste was managed in compliance with all applicable laws.

Julie Valdez

Julie Valdez
Special Waste Billing Dept.

Ticket	Customer	Date	Hauler	Gross	Tare	Net	Tons
20003	Anderson Env	9/25/2012	SINES-05TT	109800	35400	74400	37.2
20004	Anderson Env	9/25/2012	SINES-06TT	101140	38200	62940	31.47
20011	Anderson Env	9/25/2012	SINES-05TT	106780	35400	71380	35.69
20012	Anderson Env	9/25/2012	SINES-06TT	111001	38200	72801	36.4
20020	Anderson Env	9/25/2012	SINES-05TT	115320	35400	79920	39.96
20021	Anderson Env	9/25/2012	SINES-06TT	113200	38200	75000	37.5
7					Total tons:		218.2
20023	Anderson Env	9/26/2012	SINES-05TT	107800	35400	72400	36.2
20024	Anderson Env	9/26/2012	SINES-06TT	111200	38200	73000	36.5
20031	Anderson Env	9/26/2012	SINES-06TT	107060	38200	68860	34.43
20032	Anderson Env	9/26/2012	SINES-05TT	107100	35400	71700	35.85
20034	Anderson Env	9/26/2012	CELORIE-23TT	108580	39580	69000	34.5
20039	Anderson Env	9/26/2012	SINES-06TT	105960	38200	67760	33.88
20041	Anderson Env	9/26/2012	SINES-05TT	108520	35400	73120	36.56
20043	Anderson Env	9/26/2012	KISSLER-10TT	108960	38820	70140	35.07
20045	Anderson Env	9/26/2012	CELORIE-23TT	109160	39580	69580	34.79
20048	Anderson Env	9/26/2012	KISSLER-10TT	106480	38820	67660	33.83
20049	Anderson Env	9/26/2012	SINES-06TT	109500	38200	71300	35.65
20050	Anderson Env	9/26/2012	SINES-05TT	104340	35400	68940	34.47
20051	Anderson Env	9/26/2012	CELORIE-23TT	108040	39580	68460	34.23
20054	Anderson Env	9/26/2012	KISSLER-10TT	113060	38820	74240	37.12
20055	Anderson Env	9/26/2012	SINES-06TT	107760	38200	69560	34.78
20056	Anderson Env	9/26/2012	SINES-05TT	124440	35400	89040	44.52
16					Total tons:		572.4
20057	Anderson Env	9/27/2012	SINES-05TT	107960	35400	72560	36.28
20058	Anderson Env	9/27/2012	SINES-06TT	112840	38200	74640	37.32
20059	Anderson Env	9/27/2012	CELORIE-23TT	106920	39580	67340	33.67
20060	Anderson Env	9/27/2012	KISSLER-10TT	108720	38820	69900	34.95
20072	Anderson Env	9/27/2012	SINES-05TT	104040	35400	68640	34.32
20073	Anderson Env	9/27/2012	CELORIE-23TT	110360	39580	70780	35.39
20075	Anderson Env	9/27/2012	KISSLER-10TT	106600	38820	67780	33.89
20076	Anderson Env	9/27/2012	SINES-06TT	118440	38200	80240	40.12
20086	Anderson Env	9/27/2012	CELORIE-23TT	112080	39580	72500	36.25
20087	Anderson Env	9/27/2012	SINES-05TT	102700	35400	67300	33.65
20088	Anderson Env	9/27/2012	SINES-06TT	107920	38200	69720	34.86
20090	Anderson Env	9/27/2012	KISSLER-10TT	111020	38820	72200	36.1
20099	Anderson Env	9/27/2012	SINES-05TT	104420	35400	69020	34.51
20101	Anderson Env	9/27/2012	CELORIE-23TT	108080	39580	68500	34.25
20104	Anderson Env	9/27/2012	SINES-06TT	107560	38200	69360	34.68
20105	Anderson Env	9/27/2012	KISSLER-10TT	107840	38820	69020	34.51
20110	Anderson Env	9/27/2012	CELORIE-23TT	107080	39580	67500	33.75
20112	Anderson Env	9/27/2012	SINES-05TT	106160	35400	70760	35.38
20113	Anderson Env	9/27/2012	KISSLER-10TT	108020	38820	69200	34.6

20114 Anderson Env	9/27/2012	SINES-06TT	111420	38200	73220	36.61
20					Total tons:	**705.1**
20115 Anderson Env	9/28/2012	SINES-06TT	109680	38200	71480	35.74
20116 Anderson Env	9/28/2012	CELORIE-23TT	105160	39580	65580	32.79
20117 Anderson Env	9/28/2012	KISSLER-10TT	102720	38820	63900	31.95
20118 Anderson Env	9/28/2012	SINES-05TT	107960	35400	72560	36.28
20131 Anderson Env	9/28/2012	KISSLER-10TT	104620	38820	65800	32.9
5					Total tons:	**169.7**
20172 Anderson Env	10/1/2012	CELORIE-20TT	110920	38900	72020	36.01
20181 Anderson Env	10/1/2012	CELORIE-20TT	109460	38900	70560	35.28
20190 Anderson Env	10/1/2012	CELORIE-20TT	104580	38900	65680	32.84
3					Total tons:	**104.1**
20194 Anderson Env	10/2/2012	CELORIE-20TT	102820	38900	63920	31.96
20197 Anderson Env	10/2/2012	don hines 53	111640	39980	71660	35.83
20198 Anderson Env	10/2/2012	CELORIE-23TT	110400	39580	70820	35.41
20200 Anderson Env	10/2/2012	LAWRENCE	108040	38200	69840	34.92
20201 Anderson Env	10/2/2012	ADAMS	110340	38140	72200	36.1
20202 Anderson Env	10/2/2012	HINES	106580	40000	66580	33.29
20204 Anderson Env	10/2/2012	KISSLER-10TT	105780	38820	66960	33.48
20205 Anderson Env	10/2/2012	TRANSPORT-9	108880	41560	67320	33.66
20206 Anderson Env	10/2/2012	CELORIE-20TT	103880	38900	64980	32.49
20209 Anderson Env	10/2/2012	KISSLER-11	107620	43100	64520	32.26
20210 Anderson Env	10/2/2012	ADVENTURE-2	105740	40680	65060	32.53
20212 Anderson Env	10/2/2012	ADVENTURE-3	108000	41400	66600	33.3
12					Total tons:	**405.2**
Cust Total : 62						**2175**

APPENDIX H
As-Built Drawings

ASBUILT MAP

OF THE
IRONDALE IRON AND STEEL PLANT CLEANUP ACTION
JEFFERSON COUNTY, WASHINGON

PREPARED FOR

ANDERSON ENVIRONMENTAL CONTRACTING LLC

PROCEDURES:

THIS SURVEY IS BASED ON A GROUND SURVEY UTILIZING CONVENTIONAL TRAVERSE METHODS WITH CLOSURES THAT MEET OR EXCEED THE STANDARDS CONTAINED IN WAC 332-130-090.

EQUIPMENT:

TRIMBLE S6 2" ROBOTIC TOTAL STATION
TRIMBLE TSC2 DATA COLLECTOR

DATE OF FIELD SURVEY:

FEBRUARY, 2013

NOTES:

1) THIS MAP IS BASED ON FIELD SURVEY CONDUCTED IN FEBRUARY, 2013

2) NO UNDERGROUNG UTILITIES WERE LOCATED PER THIS SURVEY

3) BOUNDARY LINES AND STREET CENTER LINES AS SHOWN HEREON WERE PRODUCED FROM INFORMATION SHOWN ON THE PLAN OF THE IRONDALE IRON AND STEEL PLANT CLEANUP ACTION DATED 8/31/11 AND PUBLISHED BY GEOENGINEERS INC.

LEGEND: (EXCEPT AS OTHERWISE INDICATED)

- ...EDGE OF GRAVEL
- ...GROUND BREAK LINE
- ...EDGE OF PLANTING AREA
- ...EDGE OF GRAVEL
- ...BRUSH LINE
- ...EDGE OF DRAINAGE CREEK
- ...EDGE OF CONCRETE/BRICK
- ...EDGE OF RIP-RAP
- ...CULVERT LINE
- ...EDGE OF DIRT TRAIL
- ...INDEX CONTOUR (5 FOOT INTERVAL)
- ...CONTOUR (1 FOOT INTERVAL)
- ...DECIDUOUS TREE, (TRUNK DIAMETER AND SPECIES IF KNOWN)
- ...CONIFEROUS TREE, (TRUNK DIAMETER AND SPECIES IF KNOWN)
- ...MONITORING WELL
- ...WOOD LOG DEBRIS
- ...LOG ROOTBALL
- ...SIGN
- ...STORM CATCH BASIN
- ...SURVEY MONUMENT

Scale 1" = 50'

-50' 0 50' 100' 150'

CONTOUR INTERVAL = 1 FOOT

HORIZONTAL DATUM:

WASHINGTON COORDINATE SYSTEM NORTH ZONE, (NAD 83/86). PER THE PLAN OF IRONDALE IRON AND STEEL PLANT CLEANUP ACTION, DATED 8/31/11, PUBLISHED BY GEOENGINEERS INC.

VERTICAL DATUM:

PER THE PLAN OF IRONDALE IRON AND STEEL PLANT CLEANUP ACTION DATED 8/31/11, PUBLISHED BY GEOENGINEERS INC.

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT I AM A PROFESSIONAL LAND SURVEYOR LICENSED TO PRACTICE IN THE STATE OF WASHINGTON AND DECLARE THAT THIS MAP CORRECTLY REPRESENTS A TOPOGRAPHIC SURVEY PERFORMED IN FEBRUARY, 2013 UNDER MY SUPERVISION, AND MEETS OR EXCEEDS INDUSTRY STANDARDS FOR TOPOGRAPHIC SURVEYS OF ITS CLASS; PERFORMED AT THE REQUEST OF ANDERSON ENVIRONMENTAL CONTRACTING LLC. IN FEBRUARY, 2013.

BRIAN L. VAN ALLER LS 35986 DATE

BRIAN L. VAN ALLER — STATE OF WASHINGTON — 35986 — REGISTERED PROFESSIONAL LAND SURVEYOR

JOB NO. 00574 SHEET: 1 OF 1

VAN ALLER SURVEYING

P.O. BOX 757 * CARLSBORG, WA. * 98324
PHONE: (360) 683-3438 * FAX: (360) 683-3241

TITLE: ASBUILT MAP OF THE IRONDALE IRON AND STEEL PLANT CLEANUP ACTION JEFFERSON COUNTY, WASHINGON

CLIENT: ANDERSON ENVIRONMENTAL CONTRACTING LLC
705 COLORADO STREET
KELSO, WA 98626

REVISIONS:

DATE	MARK	NOTE

APPENDIX I
Shoreline Habitat Restoration As-Built Report

As-Built Report

Irondale Iron and Steel Plant
Shoreline Habitat Restoration
Jefferson County, Washington

for

Washington Department of Ecology

November 17, 2014

GeoEngineers
Earth Science + Technology

As-Built Report

Irondale Iron and Steel Plant
Shoreline Habitat Restoration
Jefferson County, Washington

for
Washington Department of Ecology

November 17, 2014

GeoEngineers

1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

As-Built Report

Irondale Iron and Steel Plant
Shoreline Habitat Restoration
Jefferson County, Washington

File No. 0504-042-02

November 17, 2014

Prepared for:

Washington State Department of Ecology
Toxics Cleanup Program
300 Desmond Drive
Lacey, Washington 98504

Attention: Steve Teel

Prepared by:

GeoEngineers, Inc.
1101 South Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Joseph O. Callaghan, PWS
Associate

Shawn M. Mahugh
Senior Biologist

SMM:JOC:leh

GeoEngineers

Table of Contents

LIST OF FIGURES

APPENDICES

1.0 INTRODUCTION

GeoEngineers, Inc. (GeoEngineers) has prepared this as-built report for the Washington State Department of Ecology (Ecology) to document the habitat restoration and enhancement associated with the Irondale Iron and Steel Plant Cleanup Project (project) located in Irondale, Jefferson County, Washington (Figure 1). From 1881 to 1919, iron and steel were produced intermittently at the site by various owners. Steel plant operations during this time resulted in metals, carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and/or petroleum contamination of soil, sediment and/or groundwater. The site is owned by Jefferson County and is currently used as an undeveloped day-use park (Irondale Beach Park). Environmental cleanup and remediation activities were conducted in 2012 as detailed in the Irondale Iron and Steel Plant Cleanup Action Plan (GeoEngineers, 2009) and Final Engineering Design Report (GeoEngineers, 2012).

In addition to environmental cleanup activities, habitat enhancement work was conducted along shoreline, backshore and upland areas. These activities were conducted in late 2012/early 2013 following completion of environmental remediation tasks. This report will serve to document the "as-built" conditions of the shoreline habitat restoration and to establish a scientific baseline for monitoring the success or failure of the restored areas over the monitoring period.

2.0 PROJECT DESCRIPTION

Habitat restoration and enhancement activities focused on creating approximately 0.92 acres of new upper intertidal habitat and 1.86 acres of backshore dune habitat. Invasive species were removed and native vegetation was planted throughout the newly graded areas. Large woody debris (LWD) was installed along the newly defined ordinary high water (OHW) line and along the banks of two drainage swales located within the restoration area. Photographs are included in Appendix A and site grading and planting plans are depicted in Sheets C3.0 through C3.10 and L1.0 through L1.2 in Appendix B of this report.

2.1 Grading

The nearshore habitat within the restoration area was impacted by historic industrial uses. Large amounts of dredged sand and decomposed bark were present along the shoreline as a result of the historic iron mill and log storage uses. The restoration project removed these materials to achieve a more gradual slope and a net increase of intertidal and backshore habitat. The OHW line of approximately 10.5-foot elevation was drawn back (extended landward) by a distance ranging from approximately 20 to 50 feet relative to the historic OHW alignment. Grading at the north end of the site was designed to match the OHW line of the Chimicum Creek shoreline restoration area previously completed by Washington Department of Fish and Wildlife (WDFW). Through removal of the dredged sand and organic materials along the shoreline suitable beach sand was exposed for the intertidal and backshore areas. Disturbed upland areas were covered in approximately 12 inches of topsoil.

2.2 LWD Installation

LWD was installed above the new OHW line and within the two surface drainages. In the northern portion of the restoration area LWD (consisting of boom sticks without attached root wads) was randomly placed and not anchored. In the southern portion of the site (the remediation area), LWD with root wads attached was keyed in place with smaller diameter logs driven vertically on the waterward side of the LWD structures. Installed LWD was a minimum in size from approximately 18 to 24 inches in diameter and at least 30 feet in length.

2.3 Invasive Species Removal and Native Vegetation Plantings

Invasive species such as Himalayan blackberry (*Rubus armeniacus*) were removed during the grading activities. Additional removal of Himalayan blackberry and English ivy (*Hedera helix*) have also been conducted by local volunteer groups. Areas disturbed by remedial excavation, soil caps, or shoreline restoration grading were replanted to restore or enhance vegetation composition and wildlife habitat. In the northern restoration area, dune grass was planted in the backshore area that extends approximately 55 feet landward of the new OHW. Along the two drainage swales and in the southern portion of the shoreline restoration area native shrubs and trees were installed. The western and northern edges of the large upland cap were also planted with shrubs and small trees. Shrubs and trees also had a perimeter of mulch applied in a 2-foot diameter ring around each plant. The remaining upland cap areas were hydroseeded to help stabilize the surface of the cap material.

3.0 RESTORATION MONITORING METHODS

3.1 Vegetation Monitoring

Five circular monitoring stations with a radius of 11.8 feet (0.01 acre) were installed on site (Figure 2). Monitoring locations were chosen to provide representation of the various conditions within restoration planting areas. Monitoring Station 1 is located in shrub-planted area at the southwest corner of the large upland cap. Monitoring Stations 2 and 3 are located in the southern portion of shoreline restoration; one at the historic kiln site and one at the transition from tree/shrub plantings to dunegrass. Monitoring Stations 4 and 5 were located in the restored drainage swales.

During the as-built monitoring event, an 11.8-foot line was secured to the t-post that marks the station and rotated 360 degrees to define the circular sampling plot. Aerial coverage was estimated for the tree, shrub and herbaceous vegetation layers. Coverage for a vegetative layer is the sum of the aerial cover of all species in that layer. Total aerial coverage values greater than 100 percent indicate multiple vegetation layers within the sample plot. A plant does not have to be rooted in the plot to be considered in the estimate of canopy cover. The percent cover of invasive species within each monitoring station was also documented during monitoring event.

The health of the plant community was noted at each sample plot. Living plants were counted at each monitoring station to serve as a baseline for survivability calculations in future monitoring events. Plants within each monitoring station were inspected for signs of new plant growth, flowering and seed production. Recruitment and other native volunteer species were also noted, if observed. Plant stress was documented based on observations of the presence of dead wood, root

suckering and signs of disease or predation. Vegetation was monitored for signs of drought stress, and corrective measures will be recommended if plants are not receiving adequate water.

3.2 Wildlife Monitoring

Wildlife observations were made at each monitoring station. Wildlife sightings and other indications of use, such as bird nests, burrows, tracks, and scat, were noted when observed. Wildlife observations will be used as an indicator of general habitat quality.

3.3 Photographic Sampling

The objective of photographic sampling is to produce a visual record of the mitigation area over time. Photographs from set positions over a long period of time will be used to document whether performance standards related to vegetation are being met. Photographs were taken at each monitoring station from the top of the monitoring station post (approximately 4-foot height) toward the directions indicated in Section 5 of this report.

3.4 Maintenance

Maintenance of enhanced areas should be conducted as necessary throughout the monitoring period. Early maintenance activities may include periodic water (irrigation) and control of undesirable species. Species to be removed primarily include exotic invasive species such as reed canary grass (*Phalaris arundinacea*), Himalayan blackberry and English ivy. Other maintenance responsibilities such as trash removal and vandalism repair should be performed on an as-needed basis.

4.0 PERFORMANCE STANDARDS

Performance standards provide benchmarks against which the success of the restoration may be evaluated. Performance standards are to be evaluated during each monitoring event through the collection of quantitative data. Failure to meet the performance standards should trigger immediate corrective action. The performance standards are designed to measure key elements of the restoration plan that have been designed to improve overall habitat functions of the area.

4.1 Performance Standards

- There shall be a minimum of 80 percent survival of all planted species throughout the monitoring period. Survival will be identified by counting and documenting the numbers of dead versus live plants within each monitoring station. Species, quantities, general conditions, and sizes of plants will be described and recorded.
- Invasive, exotic and undesirable species shall be represented by an average of less than 15 percent aerial coverage within each vegetative stratum in the monitoring stations.
- Acceptable cover for native emergent, shrub and tree species within each monitoring station will be a minimum of 20 percent during Year 1 and show distinct increases during each subsequent year.

4.2 Monitoring Schedule

The site will be monitored for plant survival, aerial coverage and invasive species presence. Evidence of wildlife use and general plant health will be noted during each monitoring event. Monitoring will be required one year following the acceptance of this report (Ecology, 2012). During this one year window all dead and/or disfigured plants are to be replaced during appropriate planting periods and according to the original planting plan.

5.0 AS-BUILT BASELINE (YEAR-ZERO) MONITORING RESULTS

GeoEngineers biologists visited the restoration site on February 18, 2013 to confirm that the restoration plan had been followed to completion. Construction on site was conducted summer through winter 2012. In December 2012, the plants were installed in general accordance to the design drawing located in Appendix B. Minor modifications were made to the locations of species based on hydrologic conditions observed at the site and cultural resources concerns in the southern portion of the site. Trees were not installed in the southernmost portion of the shoreline due to historic kilns located several feet below ground surface. A full list of plants installed can be found in Table 1 below and the purchasing invoice is included in Appendix C of this report.

TABLE 1. SPECIES AND NUMBER OF PLANTS INSTALLED

Common Name	Latin Name	Container Size	Recommended On-Center Spacing (ft.)	Number Installed
Douglas Fir	*Pseudotsuga menziesii*	1 Gallon	12	11
Western Red Cedar	*Thuja plicata*	1 Gallon	12	16
Shore Pine	*Pinus contorta*	1 Gallon	12	11
Oceanspray	*Holodus discolor*	1 Gallon	5	237
Nootka Rose	*Rosa nutkana*	1 Gallon	5	169
Vine Maple	*Acer circinatum*	1 Gallon	6	97
Red elderberry	*Sambucus racemosa*	1 Gallon	6	164
Snowberry	*Symphocarpus albus*	1 Gallon	5	137
Dunegrass	*Leymus mollis*	Plug	2	Approximately 20,000

Upland soil cap areas were hydroseeded following the completion of earthwork activities. The grass seed mix used for the upland caps is contained in Table 2 below. Areas around the larger soil cap were planted with mixed shrub species (Figure 2). Invasive species control surrounding these upland areas is community-driven, volunteer-based and ongoing. While the extent of invasive vegetation removal to date is commendable, invasive species seed sources still exist on site and the success of seeded and planted areas depends on the continued monitoring and control of target species.

TABLE 2. HYDROSEED MIX

Common Name	Latin Name	Percent by Weight (%)	Minimum Percent Pure Seed (%)	Minimum Percent Germination (%)
Red Creeping Fescue	*Festuca rubra*	40	98	90
Perrenial Rygrass	*Lollium perenne*	40	98	90
White Sweetclover	*Melilotus alba*	10	98	90
Highland Colonial Bentgrass	*Agrostis capillaris*	10	98	90

5.1 Upland Soil Cap

The main surface of each upland shrub cap was hydroseeded rather than planted with shrubs. Developing a relatively flat, grass-dominated area will increase habitat diversity and recreational and historic value within the park. The new grass was observed to be germinating with even and complete coverage during the February 18th site visit. An area approximately 20 feet wide was planted with shrubs along the northwest and southwest borders of the larger soil cap (Figure 2).

5.1.1 Monitoring Station 1

Monitoring Station 1 is located in the southern portion of the larger upland soil cap within the hydroseed and shrub planting areas (Figure 2). Photographs were taken facing the Northwest, Northeast, Southeast and Southwest to better align with local conditions (Appendix A). Plant species and quantities are presented below in Table 3 and the canopy cover values in Table 4. Overall, shrubs appeared to be in good health following planting. Signs of new buds sprouting were noted on several plants.

Overall low values for cover can be attributed to how recent this as-built event followed restoration plantings. Visible mounds of mulch are still evident surrounding each plant and the area between plantings remained bare topsoil.

No invasive, volunteer, or recruited species have yet colonized this monitoring station. Mole and canine presence were noted in the surrounding area, as were sightings of crows, seagulls and robins.

TABLE 3. HEALTH AND QUANTITY OF SPECIES OBSERVED AT MONITORING STATION 1

Species	Canopy Layer	Status[1]	Planted	Alive 2013	Apparent Health
Oceanspray (*Holodus discolor*)	Shrub	P	12	12	Healthy in appearance.
Vine maple (*Acer circinatum*)	Shrub	P	9	9	Healthy in appearance.

Note:
[1]P = Planted, V = Volunteer, R = Recruit, TNTC = Too Numerous To Count

TABLE 4. PERCENT CANOPY COVER AT MONITORING STATION 1

Event and Year	Percent Cover (%)					
	Trees/Saplings	Shrubs	Herbaceous	Invasive	Bare Ground	Open Water
Spring 2013	0	5	2	0	93	0

5.2 Shoreline Restoration

Shoreline enhancement occurred above OHW from the southern limits of the site north along the beach tying into the WDFW Chimacum Creek beach restoration area. Activities included removing fill and re-grading the shoreline, installing LWD along the newly defined OHW, and creation of a backshore habitat area. This created a more natural beach slope angle and reduced erosion of the previous fill materials into the upper intertidal area. Backshore habitat areas were graded with clean sand and re-vegetated with American dunegrass (*Leymus mollis*). Trees and shrubs were installed landward of the dunegrass, creating a natural habitat transition.

5.2.1 Monitoring Station 2

Monitoring Station 2 is located near the southern end of the site in an area planted with shrubs. No trees were planted in this area to minimize potential impacts from deep rooting plants to the historic kilns (Figure 2). Photographs were taken aligned with the shoreline, approximately North, South, East and West (Appendix A). LWD with attached root wads were placed along OHW and anchored with vertical, buried timbers to retain shoreline elevation and protect the landward row of kilns. The plant species and quantities are presented below in Table 5 and the canopy cover values in Table 6. Overall, shrubs appeared to be in good health following planting. Signs of new buds sprouting were noted on several plants.

Overall low values for cover can be attributed to how recently this as-built event followed restoration plantings. Visible mounds of mulch were still evident surrounding each plant and the area between plantings was still bare topsoil and straw.

No invasive or recruited species have yet occurred within this monitoring station. Grass was noted growing through the mulch around some plantings. Seagulls were active in this area.

TABLE 5. HEALTH AND QUANTITY OF SPECIES OBSERVED AT MONITORING STATION 2

Species	Canopy Layer	Status[1]	Planted	Alive 2013	Apparent Health
Nootka rose (*Rosa nootkana*)	Shrub	P	15	15	Healthy in appearance.
Vine maple (*Acer circinatum*)	Shrub	P	7	7	Healthy in appearance.

Note:
[1]P = Planted, V = Volunteer, R = Recruit, TNTC = Too Numerous To Count

TABLE 6. PERCENT CANOPY COVER AT MONITORING STATION 2

Event and Year	Percent Cover (%)					
	Trees/Saplings	Shrubs	Herbaceous	Invasive	Bare Ground	Open Water
Spring 2013	0	5	2	0	93	0

5.2.2 Monitoring Station 3

Monitoring Station 3 is located in the southern portion of the site, where upland tree/shrub plantings transition from to dune grass (Figure 2). Photographs were taken aligned with the shoreline, approximately North, South, East and West (Appendix A). LWD has been placed along OHW near this monitoring station. The plant species and quantities are presented below in Table 7 and the canopy cover values in Table 8. Overall, trees and shrubs appeared to be in good health following planting. Signs of new buds sprouting were noted on several plants.

Overall low values for cover can be attributed to how recently this as-built event followed restoration plantings. Visible mounds of mulch were still evident surrounding each plant and the area between plantings remained bare topsoil.

No invasive, volunteer or recruited species have yet occurred within this monitoring station. Seagulls were active in this area. Track marks from a small all-terrain vehicle were noticed traversing the beach and turning around through the dune grass near this station.

TABLE 7. HEALTH AND QUANTITY OF SPECIES OBSERVED AT MONITORING STATION 3

Species	Canopy Layer	Status[1]	Planted	Alive 2013	Apparent Health
Oceanspray (*Holodus discolor*)	Shrub	P	2	2	Healthy in appearance.
Vine maple (*Acer circinatum*)	Shrub	P	5	5	Healthy in appearance.
Western redcedar (*Thuja plicata*)	Tree	P	5	5	Healthy in appearance.
Shore pine (*Pinus contorta*)	Tree	P	2	2	Healthy in appearance.
Red elderberry (*Sambucus racemosa*)	Shrub	P	15	15	Healthy in appearance.

Note:
[1]P = Planted, V = Volunteer, R = Recruit, TNTC = Too Numerous To Count

TABLE 8. PERCENT CANOPY COVER AT MONITORING STATION 3

Event and Year	Percent Cover (%)					
	Trees/Saplings	Shrubs	Herbaceous	Invasive	Bare Ground	Open Water
Spring 2013	0	5	0	0	95	0

5.2.3 Monitoring Station 4

Monitoring Station 4 is located on the south side of a small drainage swale southeast of the parking area (Figure 2). The plot encompasses both shrub plantings and dunegrass areas. Photographs were taken aligned with the shoreline, approximately Northeast, Southeast, Southwest and Northwest (Appendix A). LWD has been placed along OHW near this monitoring station. The plant species and quantities are presented below in Table 9 and the canopy cover values in Table 10. Overall, shrubs appeared to be in good health following planting. Signs of new buds sprouting were noted on several plants.

Overall low values for aerial cover can be attributed to how recently this as-built event followed restoration plantings. Visible mounds of mulch were still evident surrounding each plant and the area between plantings remained bare topsoil.

No invasive, volunteer or recruited species have yet occurred within this monitoring station. This drainage was previously dominated by Himalayan blackberry, which was removed prior to planting. Seagulls and crows were active in this area.

TABLE 9. HEALTH AND QUANTITY OF SPECIES OBSERVED AT MONITORING STATION 4

Species	Canopy Layer	Status[1]	Planted	Alive 2013	Apparent Health
Oceanspray (*Holodus discolor*)	Shrub	P	6	6	Healthy in appearance.
Vine maple (*Acer circinatum*)	Shrub	P	2	2	Healthy in appearance.
Red Elderberry (*Sambucus racemosa*)	Shrub	P	1	1	Healthy in appearance.
Dunegrass (*Leymus mollis*)	Herbaceous	P	19	19	Healthy in appearance.

Note:
[1]P = Planted, V = Volunteer, R = Recruit, TNTC = Too Numerous To Count

TABLE 10. PERCENT CANOPY COVER AT MONITORING STATION 4

Event and Year	Percent Cover (%)					
	Trees/Saplings	Shrubs	Herbaceous	Invasive	Bare Ground	Open Water
Spring 2013	0	5	5	0	90	0

5.2.4 Monitoring Station 5

Monitoring Station 5 is located on the north side of a small drainage swale just north of the parking area (Figure 2). A small portion of the plot extends from the shrub plantings into the dune grass areas. Photographs were taken aligned with the shoreline, approximately Northeast, Southeast, Southwest and Northwest (Appendix B). LWD has been placed along OHW near this monitoring station. The plant species and quantities are presented below in Table 11 and the canopy cover values in Table 12. Overall, shrubs appeared to be in good health following planting. Signs of new buds sprouting were noted on several plants.

Overall low values for cover can be attributed to how recent this as-built event followed restoration plantings. Visible mounds of mulch were still evident surrounding each plant and the area between plantings remained bare topsoil.

No invasive, volunteer, or recruited species have yet occurred within this monitoring station. This drainage was previously dominated by Himalayan blackberry, which has been removed, preserving large patches of native rose and emergent vegetation. Seagulls, crows and bufflehead were active in this area.

TABLE 11. HEALTH AND QUANTITY OF SPECIES OBSERVED AT MONITORING STATION 5

Species	Canopy Layer	Status[1]	Planted	Alive 2013	Apparent Health
Oceanspray (*Holodus discolor*)	Shrub	P	16	16	Healthy in appearance.
Dune grass (*Leymus mollis*)	Herbaceous	P	26	26	Healthy in appearance.

Note:
[1]P = Planted, V = Volunteer, R = Recruit, TNTC = Too Numerous To Count

TABLE 12. PERCENT CANOPY COVER AT MONITORING STATION 5

Event and Year	Percent Cover (%)					
	Trees/Saplings	Shrubs	Herbaceous	Invasive	Bare Ground	Open Water
Spring 2013	0	5	5	0	90	0

5.2.5 LWD Installation

To protect the newly graded shoreline and increase the habitat value of restored areas, LWD was installed along the newly defined OHW. A total of 52 logs were counted along OHW during the February site visit. Overall the wood appeared to be firmly in place and performing as expected. It was noted that several gaps exist along the line of installed logs, probably resulting from recent king tides that occurred following installation. Shoreline LWD can be viewed in pages 2 and 3 of Appendix A and plan diagrams found in Appendix B.

To protect backshore areas near the historic kiln site, 12 logs with root wads attached were placed parallel to shore with vertical timbers buried near the root wad to maintain their alignment. This installation is visible in photograph 4 of Appendix A with plan diagrams included in Appendix B.

6.0 SUMMARY

Construction was recently completed on the Irondale Iron and Steel Mill restoration site, with a few minor modifications as documented above. Observations made during the final site visit revealed that the installed plant species appear to be healthy with no signs of disease or insect damage. LWD shoreline protection is in place and functioning properly.

GeoEngineers scientists have identified that the installation is generally consistent with the restoration plan with minor adjustments due to hydrologic conditions and agency requirements.

Overall, the condition of the plants and habitat areas are satisfactory. Continued project success will be reliant upon compliance with the monitoring and maintenance measures outlined herein.

7.0 LIMITATIONS

GeoEngineers, Inc. has prepared this as-built report in general accordance with the scope and limitations of our proposal. Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in this area at the time this report was prepared. No warranty or other conditions expressed or implied should be understood.

This report has been prepared for the exclusive use of Washington State Department of Ecology and authorized agents and regulatory agencies, following the described methods and information available at the time of the work. No other party may rely on the product of our services unless we agree in advance to such reliance in writing. The information contained herein should not be applied for any purpose or project except the one originally contemplated.

8.0 REFERENCES

GeoEngineers, Inc. 2012. Final Engineering Design Report, Irondale Iron and Steel Plant. Prepared for Washington State Department of Ecology. May 1, 2012.

GeoEngineers, Inc. 2009. Revised Draft Cleanup Action Plan, Irondale Iron and Steam Plant. Prepared for Washington State Department of Ecology. August 31, 2009.

Washington State Department of Ecology (Ecology). April 2012. Specifications for Irondale Iron and Steel Plant Cleanup Action. Irondale, Washington. IFB 1237 TCP.

FIGURES

GeoEngineers

Data Sources: ESRI Data & Maps, Street Maps 2005.
Chimacum Creek Tidelands location obtained from "Health Consultation. Evaluation of Selected Metals in Irondale Beach Park and Chimacum Creek Tidelands Shell Fish." Irondale, Jefferson County, Washington. Agency for Toxic Substances and Disease Registry. July 28, 2008.

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. It is unlawful to copy or reproduce all or any part thereof, whether for personal use or resale, without permission.

Transverse Mercator, Zone 10 N North, North American Datum 1983
North arrow oriented to grid north

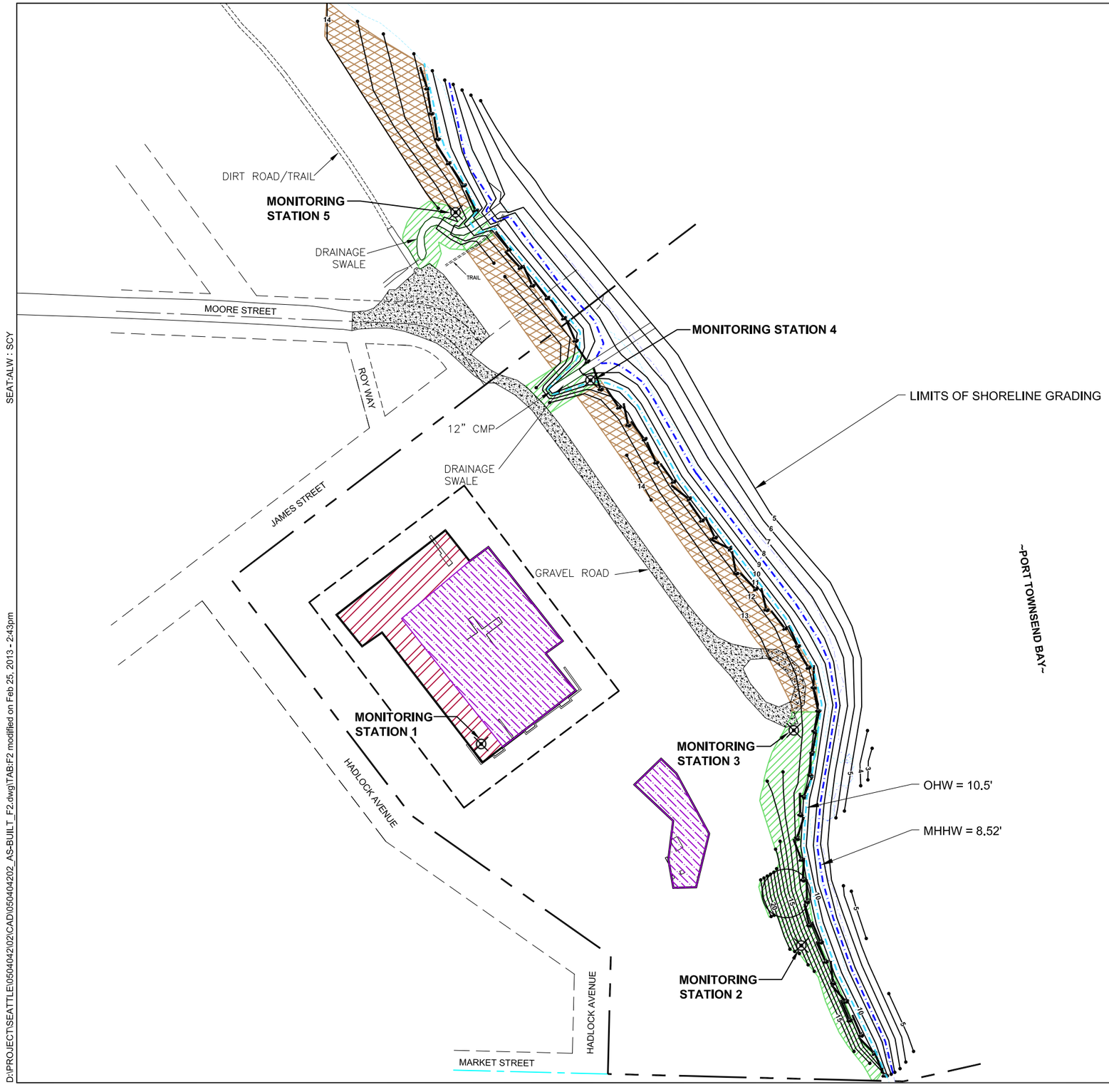
Vicinity Map

Irondale Iron and Steel Plant
Irondale, Washington

GeoEngineers

Figure 1

Office: SEA Path: W:\Seattle\Projects\0\0504042\GIS\0504042 Fig1 VM.mxd Map Revised: May 2, 2011 AMM



LEGEND

- BACKSHORE DUNEGRASS PLANTING AREA
- SHORELINE TREE AND SHRUB PLANTING AREA
- UPLAND CAP SHRUB PLANTING AREA
- UPLAND CAP HYDRO-SEED AREA
- LARGE WOODY DEBRIS
- FINAL GRADE CONTOURS
- MHHW
- OHW
- **MONITORING STATION 1** — MONITORING STATION NUMBER AND APPROXIMATE LOCATION

N, W, E, S

150 0 150
Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Drawing provided by Washington State Department of Ecology.

Landscaping As-Built Drawing

Irondale Remedial Cleanup Action
Irondale, Washington

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Figure 2

SEAT:ALW : SCY

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APPENDICES

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APPENDIX A
Site Photographs

Photograph 1
Hydroseed area of upland soil cap showing new germination.

Photograph 2
Volunteer-labor invasive species removal was conducted following environmental remediation.

Photograph 3
Invasive species removal included Himalayan blackberry and English ivy.

Photograph 4
View south of plantings and LWD root wads around historic kiln site.

Site Photographs

Irondale Iron and Steel Plant
Irondale, Washington

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Figure A-1

0504-042-02

Photograph 5
View north of transition from shoreline tree/shrub plantings to backshore dunegrass. Recent ATV tracks visible in dunegrass area.

Photograph 6
Shoreline LWD viewed south toward historic kiln area.

Photograph 7
Lower (restored) section of the southern drainage swale.

Photograph 8
Upstream of the restored portion of the southern drainage swale. Some invasive species removal evident to the left (southeast).

Site Photographs

Irondale Iron and Steel Plant
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Figure A-2

0504-042-02

Photograph 9
Restored portion of the northern drainage swale viewed from the north.

Photograph 10
View south from the northern extent of shoreline LWD installation.

Photograph 11
King tides following shoreline LWD installation resulted in several logs being relocated.

Site Photographs

Irondale Iron and Steel Plant
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Figure A-3

0504-042-02

Photograph 12
Monitoring station 1 looking northwest.

Photograph 13
Monitoring station 1 looking northeast.

Photograph 14
Monitoring station 1 looking southwest.

Photograph 15
Monitoring station 1 looking southeast.

Site Photographs Monitoring Station 1

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Irondale, Washington

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Figure A-4

0504-042-02

Photograph 16
Monitoring station 2 looking north.

Photograph 17
Monitoring station 2 looking east.

Photograph 18
Monitoring station 2 looking south.

Photograph 19
Monitoring station 2 looking west.

Site Photographs Monitoring Station 2

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Irondale, Washington

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Figure A-5

0504-042-02

Photograph 20
Monitoring station 3 looking north.

Photograph 21
Monitoring station 3 looking east.

Photograph 22
Monitoring station 3 looking south.

Photograph 23
Monitoring station 3 looking west.

Site Photographs Monitoring Station 3	
Irondale Iron and Steel Plant Irondale, Washington	
GeoEngineers	Figure A-6

0504-042-02

Photograph 24
Monitoring station 4 looking northwest.

Photograph 25
Monitoring station 4 looking northeast.

Photograph 26
Monitoring station 4 looking southwest.

Photograph 27
Monitoring station 4 looking southeast.

Site Photographs Monitoring Station 4

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Irondale, Washington

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Figure A-7

0504-042-02

Photograph 28
Monitoring station 5 looking northwest.

Photograph 29
Monitoring station 5 looking northeast.

Photograph 30
Monitoring station 5 looking southwest.

Photograph 31
Monitoring station 5 looking southeast.

Site Photographs Monitoring Station 5

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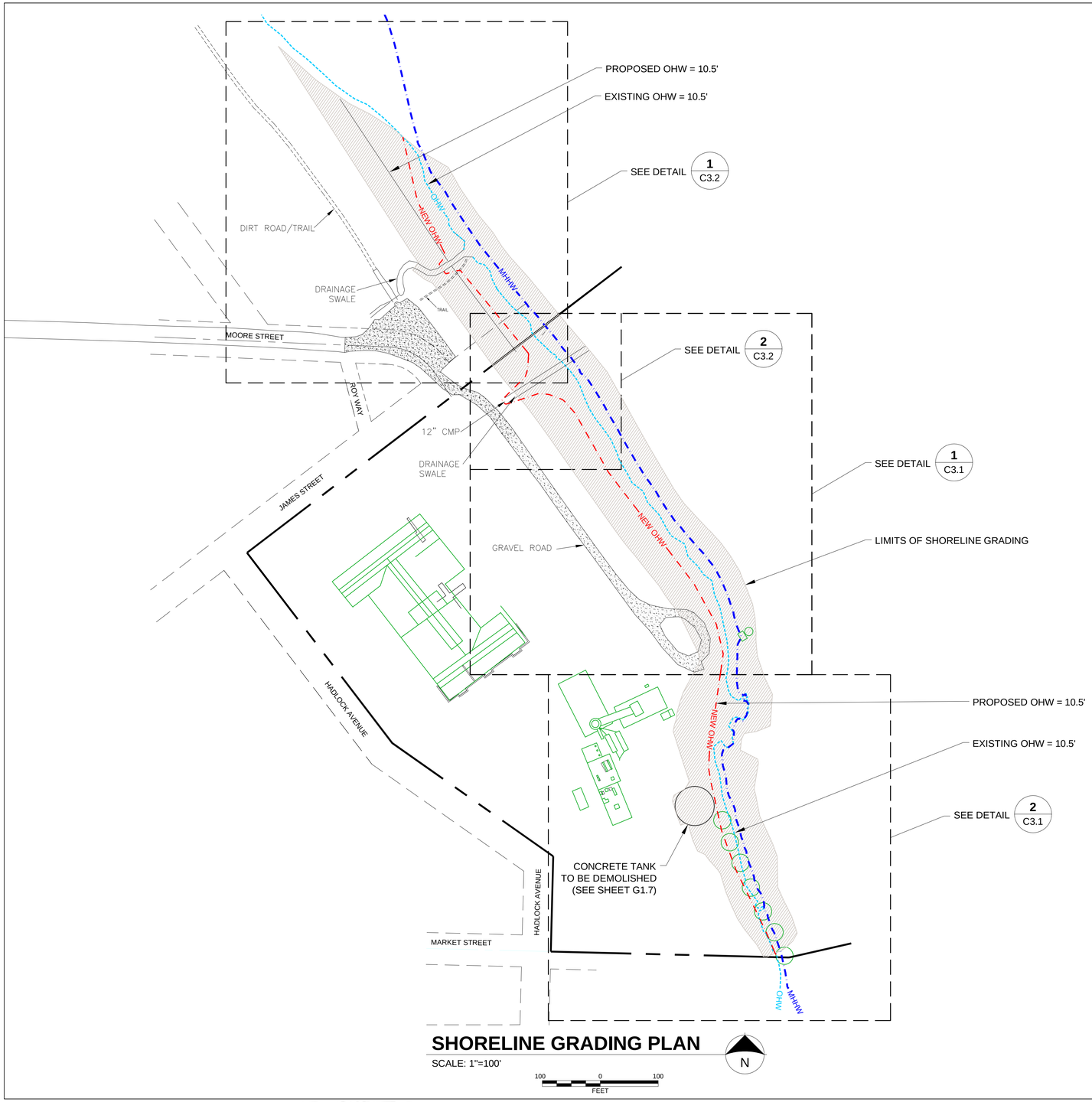
Figure A-8

0504-042-02

APPENDIX B
100 Percent Design Drawings



NOTES

1. CONTRACTOR SHALL GRADE UPLAND SURFACE SOIL AND MARINE SEDIMENT WITHIN LIMITS SHOWN TO ACHIEVE PROPOSED GRADES AS SHOWN ON SHEETS C3.2 THROUGH C3.10.
2. ALL CONSTRUCTION VEHICLE INGRESS AND EGRESS SHALL BE PERFORMED IN ACCORDANCE WITH THE CONSTRUCTION PHASING/TRAFFIC CONTROL PLANS ON DRAWING G1.3.
3. CONTRACTOR MUST ADHERE TO ALL TERMS AND CONDITIONS SPECIFIED IN THE USACE NATIONWIDE PERMIT 38 FOR THE PROJECT.
4. THE CONTRACTOR SHALL PERFORM IN-WATER WORK (BELOW OHW) ONLY DURING THE PERIODS OF JULY 16 THROUGH OCTOBER 14, 2012.
5. EXCAVATION OF CONTAMINATED MARINE SEDIMENT BELOW OHW SHALL NOT OCCUR WHEN THE IMMEDIATE WORK AREA IS INUNDATED BY TIDAL WATERS. CONTINUED WORK AS TIDE RISES IS ALLOWED IF BEHIND SHORING THAT LIMITS INFILTRATION OF TIDE WATERS AND PREVENTS RELEASE OF CONSTRUCTION WATER DIRECTLY TO TIDE WATER.
6. WATER QUALITY SHALL BE MAINTAINED TO WITHIN PROJECT PERMIT LIMITS AT ALL TIMES. CONTRACTOR SHALL UTILIZE BEST MANAGEMENT PRACTICES TO MINIMIZE TURBIDITY AND CONTAIN TURBID WATERS, SHEEN, AND DEBRIS WITHIN THE WORK AREA.
7. WORK IN THE INTERTIDAL ZONE WILL TAKE PLACE, WHENEVER POSSIBLE, AROUND THE TIDE CYCLE AND BE PERFORMED WHILE THE SITE IS EXPOSED. FOR WORK OUTSIDE AREAS OF CONTAMINATED SEDIMENT THAT REQUIRES LONGER THAN ONE LOW TIDE CYCLE, AN ANCHORED SILT CURTAIN WILL BE USED TO CONTAIN SEDIMENTS. FOR AREAS WHERE CONTAMINATED SEDIMENT IS EXCAVATED BEHIND SHORING, AS PRESENTED ON SHEET C1.1, BACKFILL OF THE CONTAMINATED SEDIMENT EXCAVATIONS SHALL BE COMPLETED PRIOR TO REMOVING SHORING.
8. VESSEL SPECIFICATIONS, NAVIGATION, AND MOORAGE SHALL BE COMPLETED IN ACCORDANCE WITH ALL U.S. COAST GUARD, STATE, AND LOCAL REGULATIONS, AND CONTRACTOR'S VESSEL MANAGEMENT PLAN.
9. AREAS WITH MATERIAL TO BE REMOVED FOR SHORELINE GRADING PURPOSES ONLY, OUTSIDE OF REMEDIAL EXCAVATION AREAS, SHALL BE GRADED TO PROPOSED FINAL GRADE SHOWN ON DRAWINGS AND MADE ACCESSIBLE TO ECOLOGY'S REPRESENTATIVE TO DETERMINE IF NATIVE MATERIAL AT GRADE IS SUITABLE AS FINAL SURFACE MATERIAL. IF NATIVE MATERIAL AT PROPOSED FINAL GRADE IS UNSUITABLE, CONTRACTOR SHALL EXCAVATE AN ADDITIONAL 1-FOOT OF MATERIAL BELOW PROPOSED FINAL GRADE.
10. ALL EXCAVATION ACTIVITIES WILL BE MONITORED BY ECOLOGY-CONTRACTED ARCHEOLOGICAL RESOURCES SPECIALIST IN ACCORDANCE WITH THE CULTURAL RESOURCES MONITORING AND DISCOVERY PLAN. DISCOVERY OF POTENTIAL ARTIFACTS MAY RESULT IN TEMPORARY WORK STOPPAGES.
11. SOIL AND SEDIMENT EXCAVATED OUTSIDE OF REMEDIAL EXCAVATION AREAS WILL BE STOCKPILED ON SITE AND USED FOR BACKFILLING REMEDIAL EXCAVATIONS AND AS UPLAND CAP MATERIAL. MATERIAL EXCAVATED OUTSIDE OF REMEDIAL EXCAVATIONS SHALL BE STOCKPILED SEPERATELY FROM POTENTIALLY CONTAMINATED SOIL AND SEDIMENT FROM REMEDIAL EXCAVATION AREAS. ALL STOCKPILED MATERIAL WILL BE SAMPLED FOR VERIFICATION OF CONTAMINANT CONCENTRATIONS BY ECOLOGY'S REPRESENTATIVE.
12. STOCKPILED MATERIAL WILL BE EVALUATED BY ECOLOGY'S REPRESENTATIVE FOR SUITABILITY FOR BACKFILL USE PRIOR TO APPROVAL FOR USE AS BACKFILL.
13. SHORELINE EXCAVATION IN AREAS NORTH OF SLAG OUTCROP SHALL BE PERFORMED PRIOR TO OR CONCURRENT WITH REMEDIAL EXCAVATION (SHEET C1.0) AND ENVIRONMENTAL CAPPING (SHEET C2.0) TO ENSURE AVAILABILITY OF BACKFILL AND CAP MATERIAL.
14. DRAINAGE SWALE LOCATED AT NORTH END OF JEFFERSON COUNTY PROPERTY (SHEET C3.2, DETAIL 2) SHALL BE REGRADED PER THE LINES PRESENTED ON THE DRAWINGS, WITHOUT ALTERING THE 12-INCH CMP CULVERT.
15. REMEDIAL EXCAVATION AREAS WATER-WARD OF PROPOSED NEW OHW SHALL BE BACKFILLED TO PROPOSED FINAL GRADE WITH VERIFIED CLEAN AND SUITABLE SAND BACKFILL MATERIAL GENERATED ON SITE. REMEDIAL EXCAVATION AREAS ABOVE PROPOSED NEW OHW SHALL BE BACKFILLED TO 1-FOOT BELOW PROPOSED FINAL GRADE WITH VERIFIED CLEAN BACKFILL MATERIAL GENERATED ON SITE.
16. THE UPPER 1-FOOT OF ALL EXCAVATION AREAS ABOVE PROPOSED NEW OHW SHALL BE BACKFILLED TO PROPOSED FINAL GRADE WITH TOPSOIL MEETING SPECIFICATIONS FOR PLANTING.
17. AREA WITHIN 6,000 BARREL OPEN TOP CONCRETE TANK SHALL BE BACKFILLED CONCURRENT WITH DEMOLITION (SEE SHEET G1.7) TO THE EXTENT POSSIBLE TO PREVENT COLLAPSE OF NATIVE SOIL AGAINST THE WALL OF THE TANK.
18. LARGE WOODY DEBRIS SHALL BE PLACED ALONG THE PROPOSED NEW OHW IN ACCORDANCE WITH THE LANDSCAPE AND RESTORATION PLAN DRAWING L1.0.
19. GRAVEL TURNAROUND AT SOUTHERN END OF EXISTING ACCESS ROAD SHALL BE REMOVED AS NEEDED TO ACHIEVE GRADING AND RESTORED IN ACCORDANCE WITH THE LANDSCAPE AND RESTORATION PLAN DRAWING L1.0.

LEGEND

- Concrete Tank to be Removed
- Approximate location of Historic Kiln
- Approximate Location of new OHW
- Limits of Shoreline Grading for Restoration

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Irondale Iron and Steel Plant Cleanup Action

Washington State Department of Ecology

SHORELINE GRADING PLAN

DRAWN:	TJM	PROJECT NO.:	50404201
DESIGN:	CLB	SCALE:	1"=80'
CHECKED:	DAC	DATE:	8/31/11

SHEET NO.
C3.0

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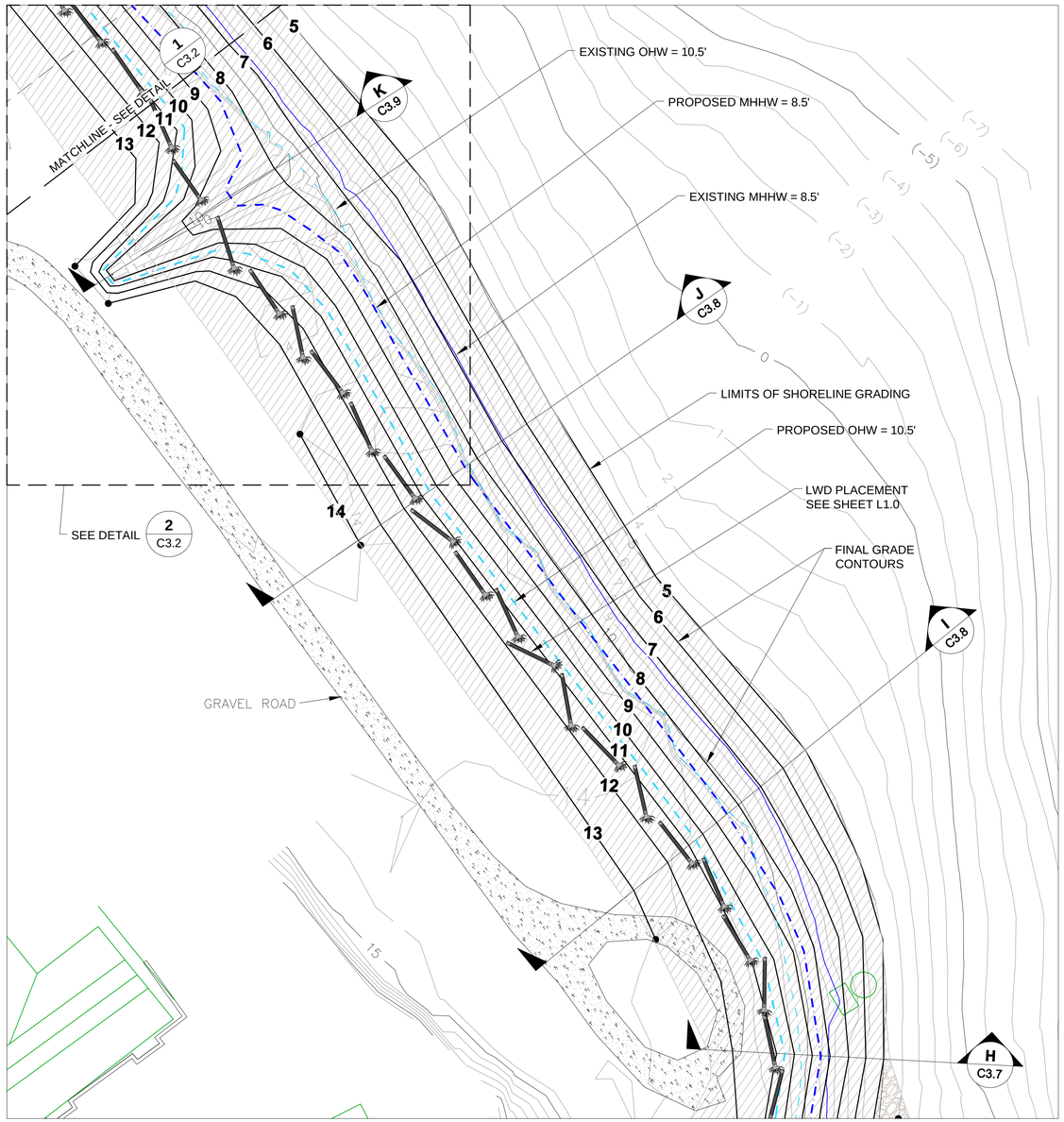

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SCALE: 1"=40'

C3.0

GRAPHIC SCALE

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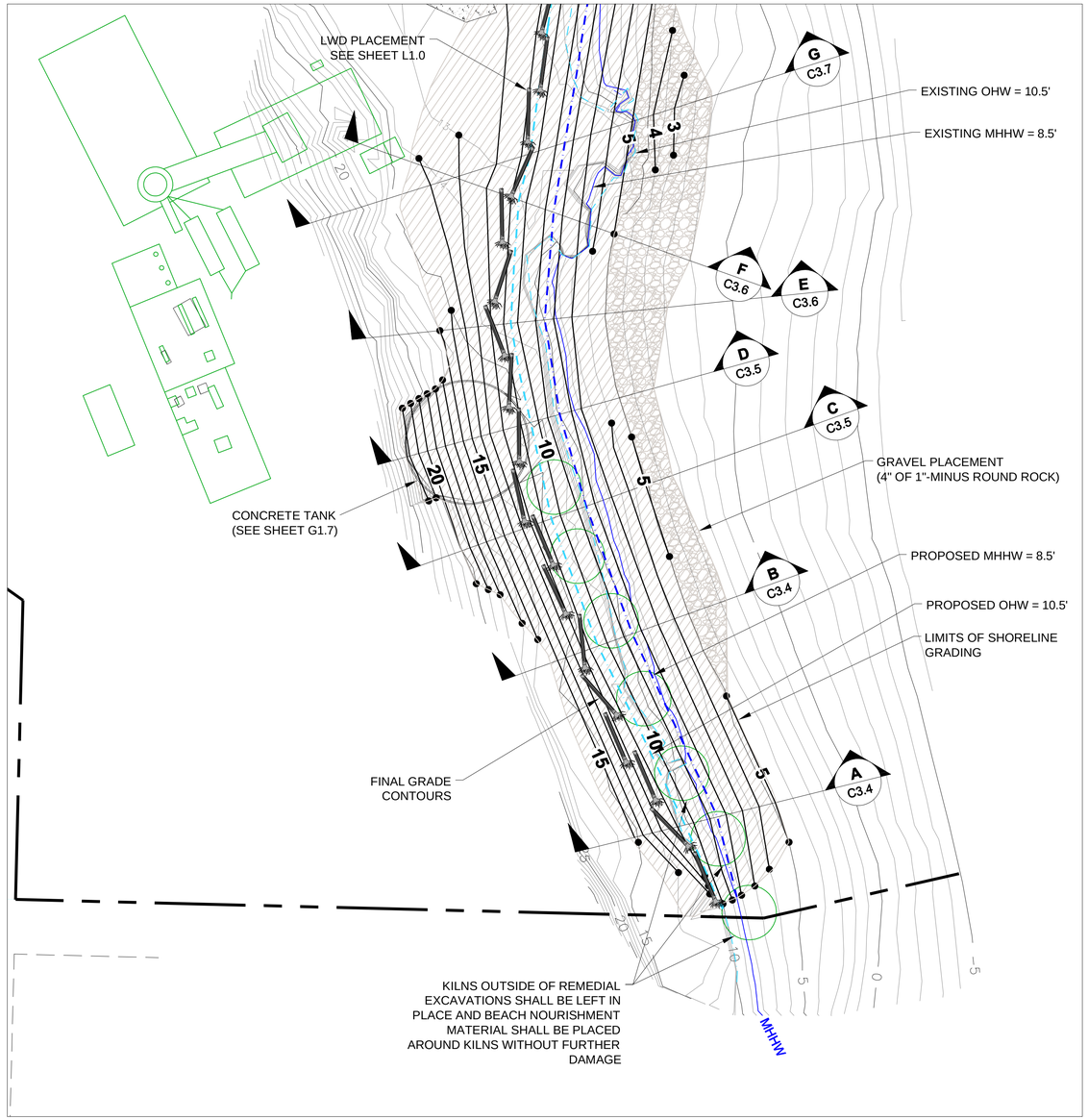
FEET



SOUTH SHORELINE GRADING DETAILS 2

SCALE: 1"=40'

C3.0

GRAPHIC SCALE

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40 0 40

FEET

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SHORELINE GRADING DETAILS

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DESIGN:	CLB	SCALE:	1"=40'
CHECKED:	DAC	DATE:	8/31/11

SHEET NO.

C3.1

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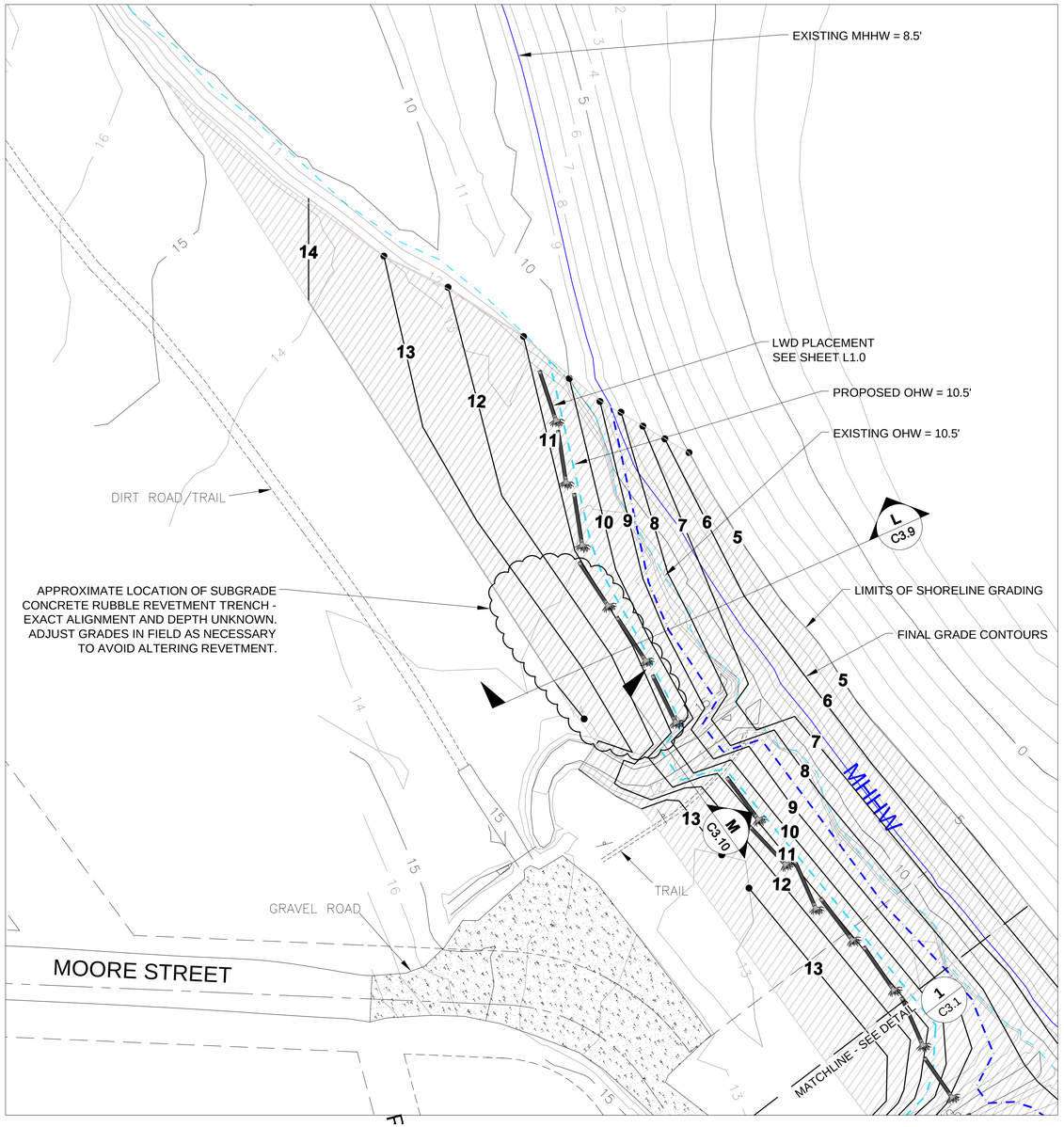

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GRAPHIC SCALE

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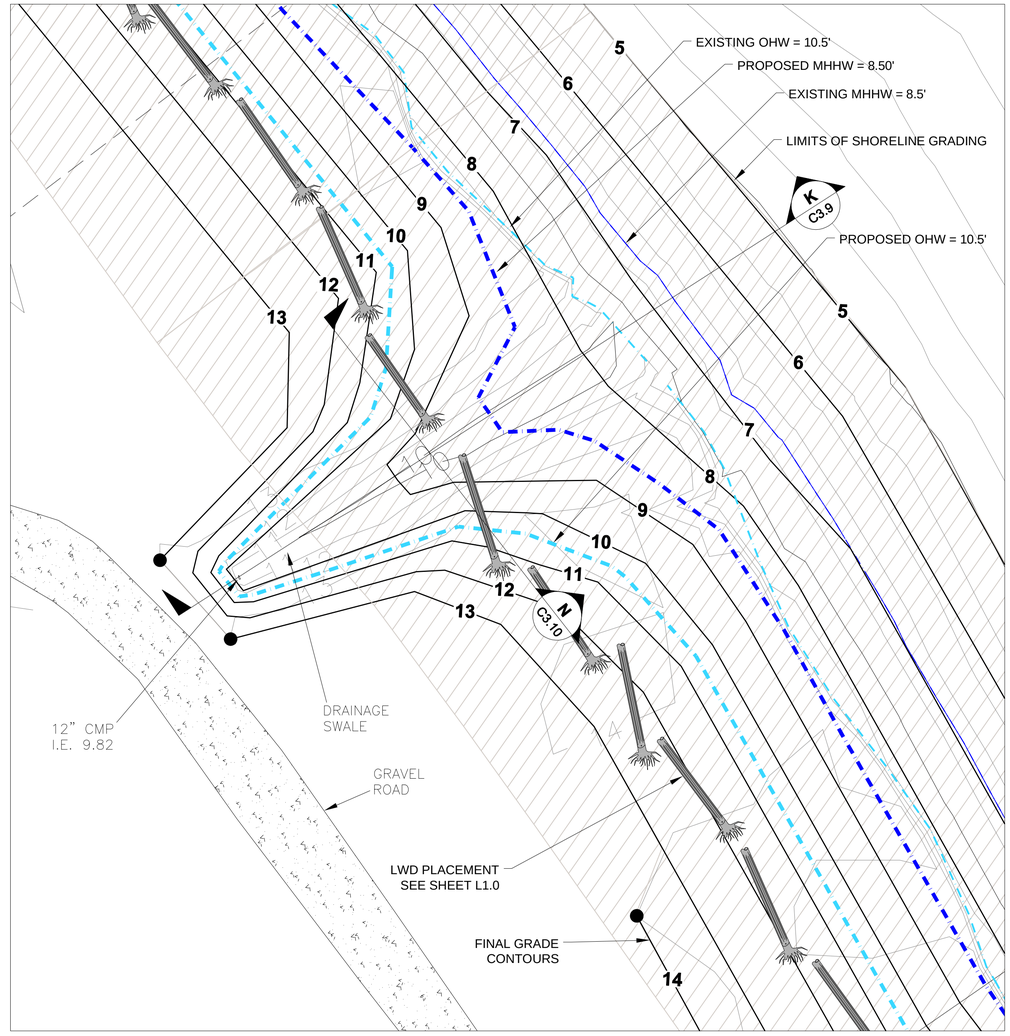
FEET



DRAINAGE SWALE GRADING DETAILS 2 C3.0

SCALE: 1"=20'

GRAPHIC SCALE

N

20 0 20

FEET

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SHORELINE GRADING DETAILS

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CHECKED:	DAC	DATE:	8/31/11

SHEET NO.

C3.2

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SHORELINE GRADING DETAILS

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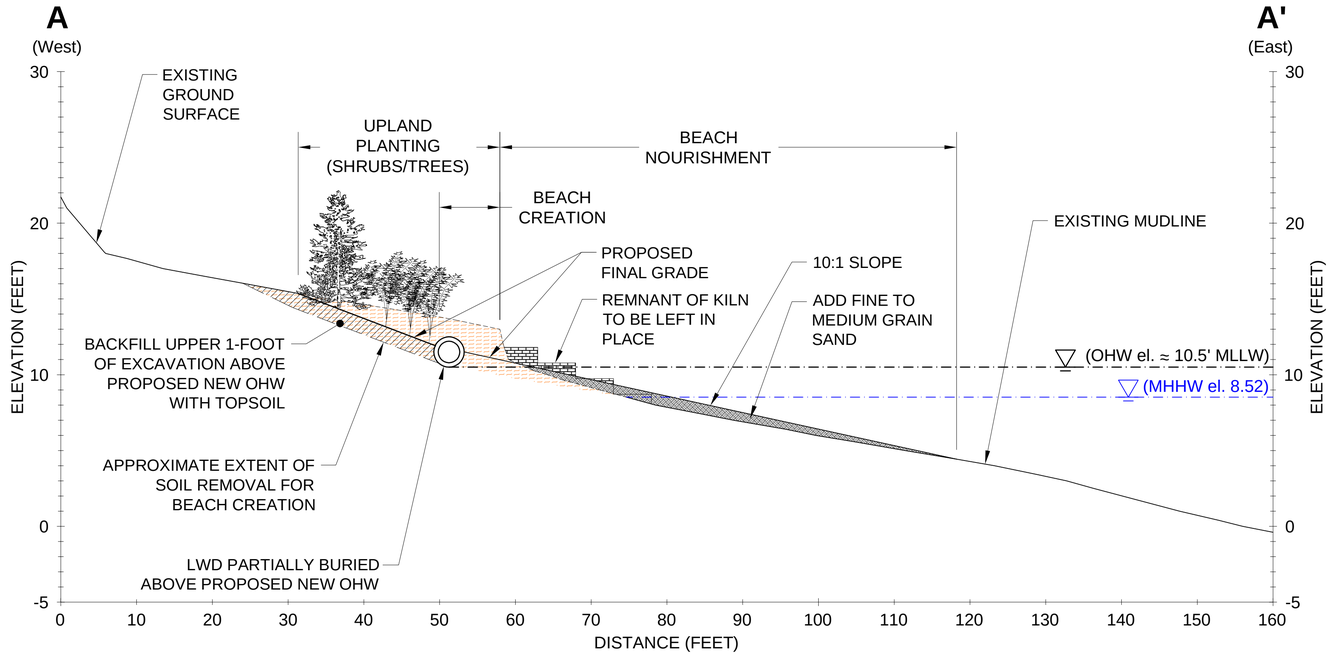

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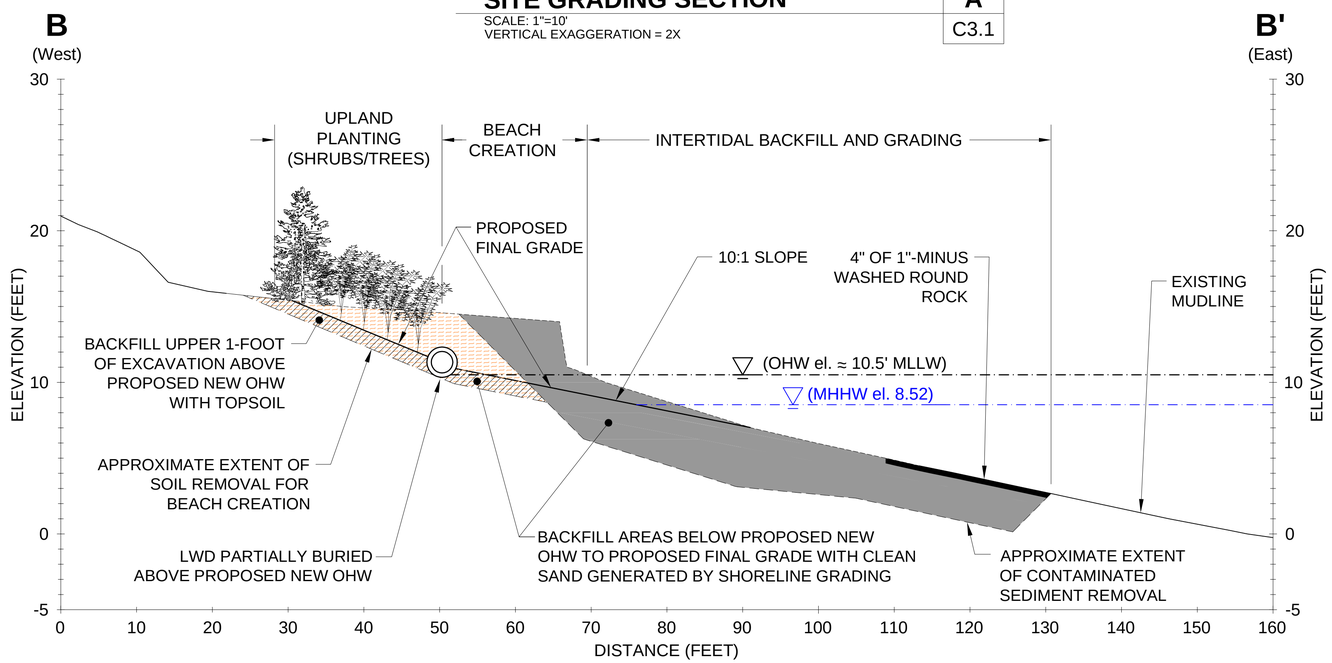

SITE GRADING SECTION

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

B
C3.1

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SITE GRADING SECTIONS

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C3.4

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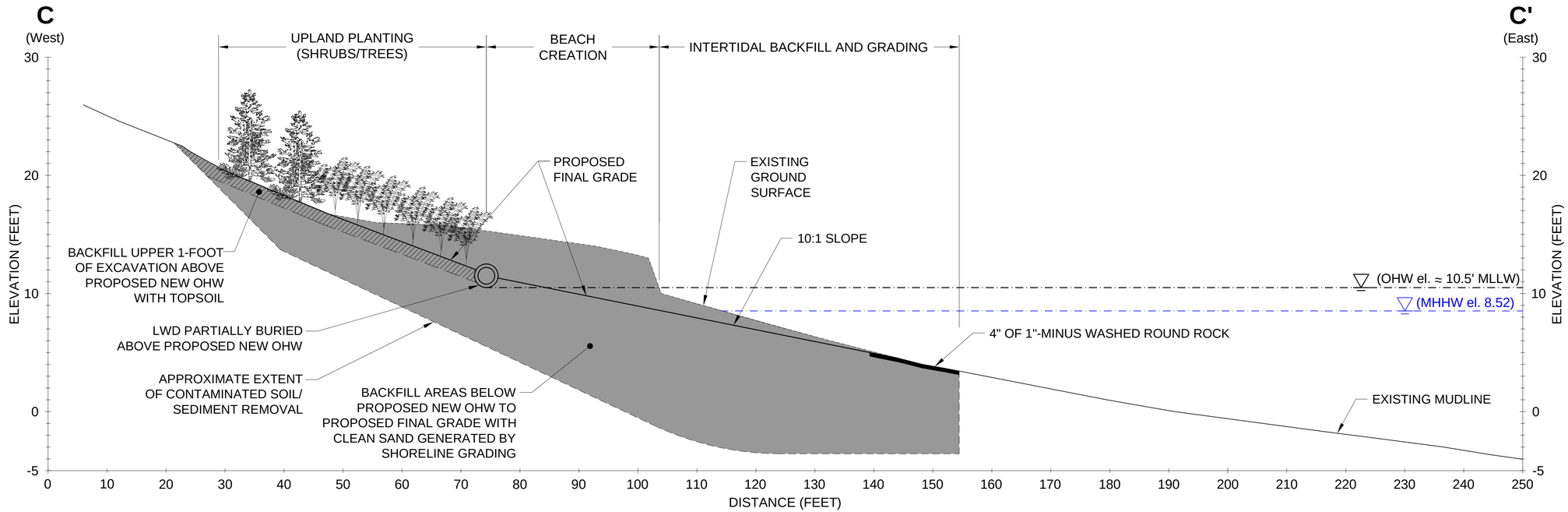

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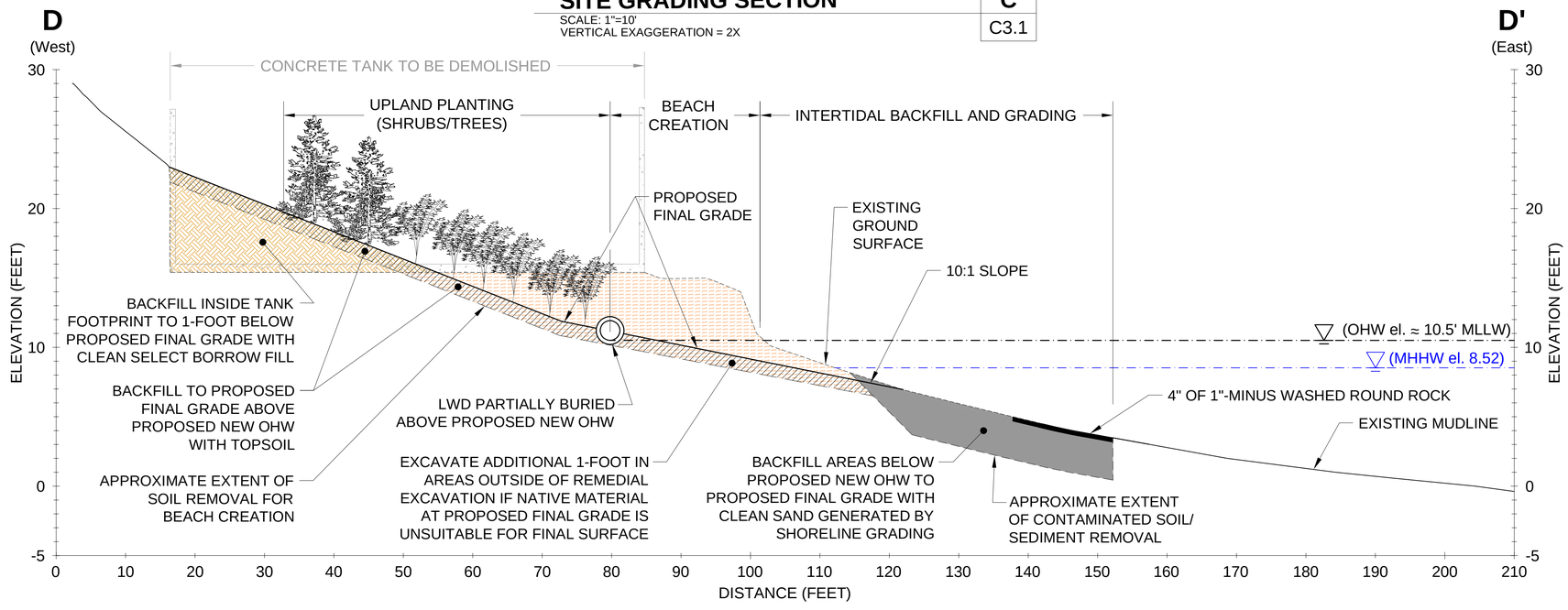

SITE GRADING SECTION

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

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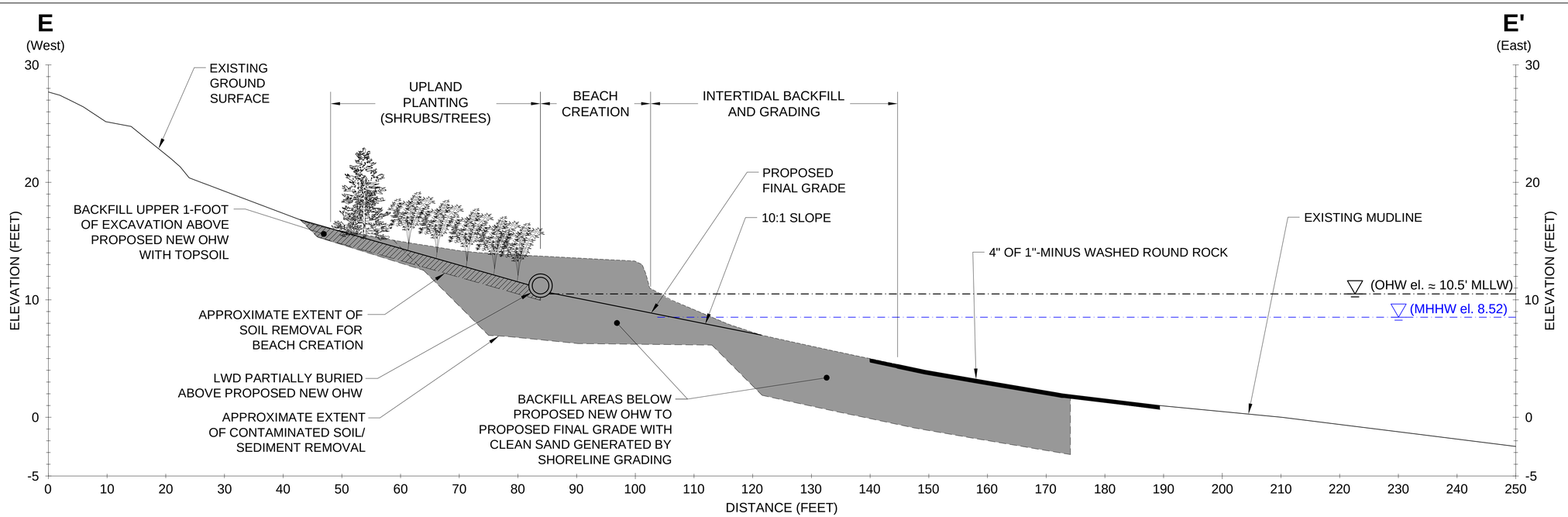

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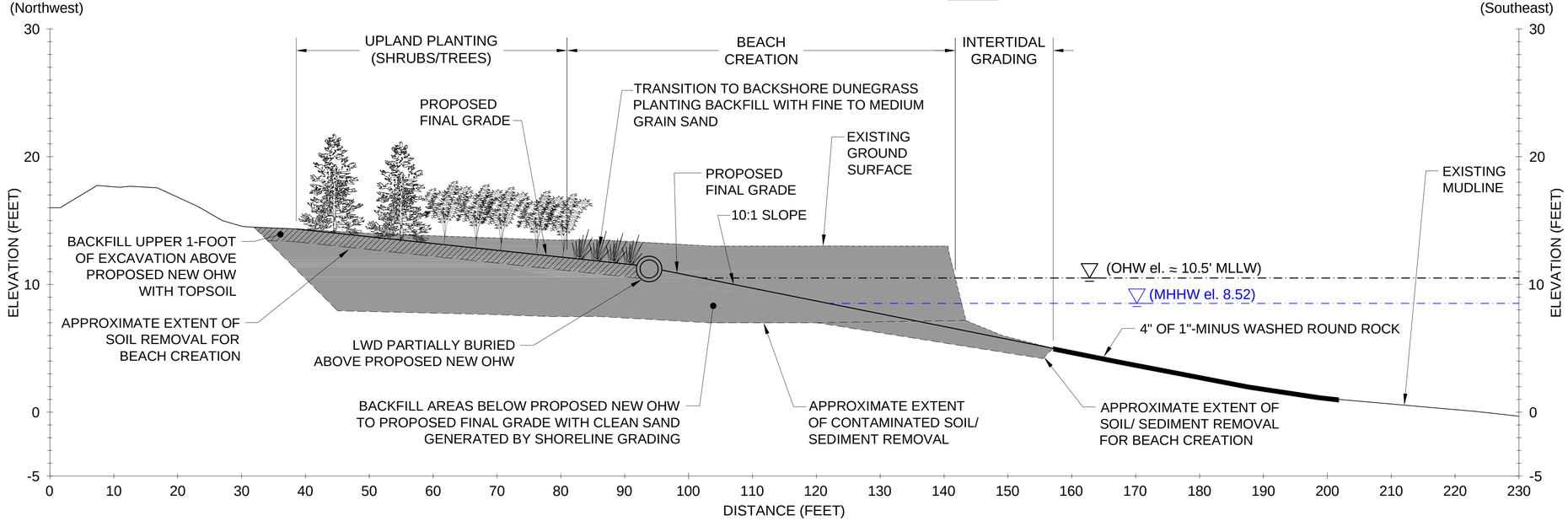

SITE GRADING SECTION

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

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C3.1

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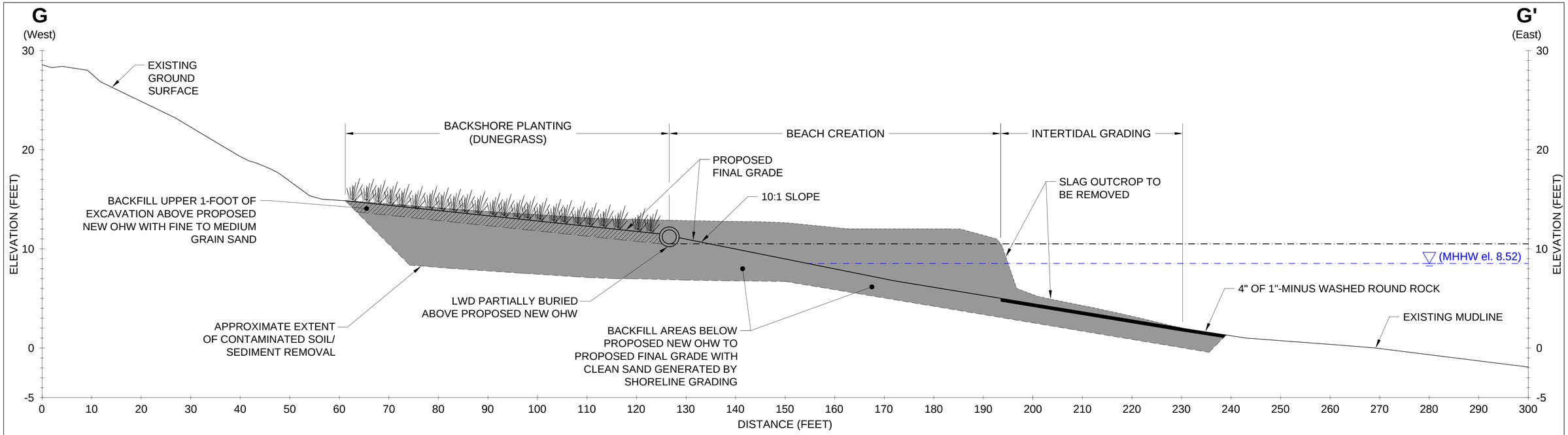

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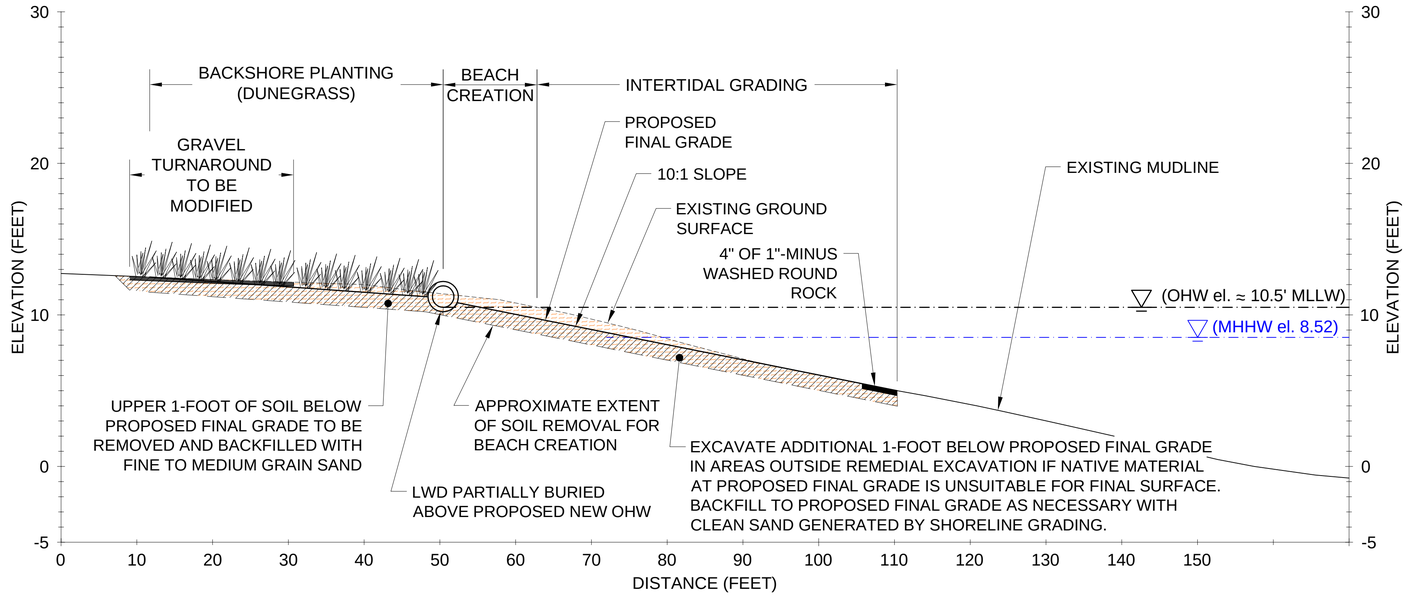

SITE GRADING SECTION

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

H
C3.1

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SHEET NO.			

C3.7

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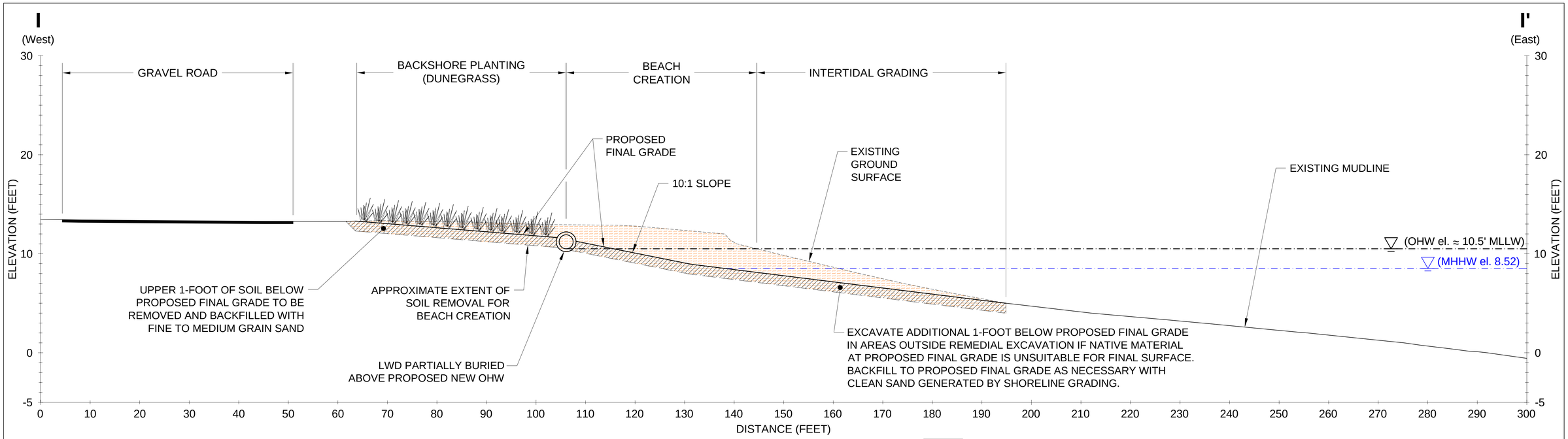

SITE GRADING SECTION

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

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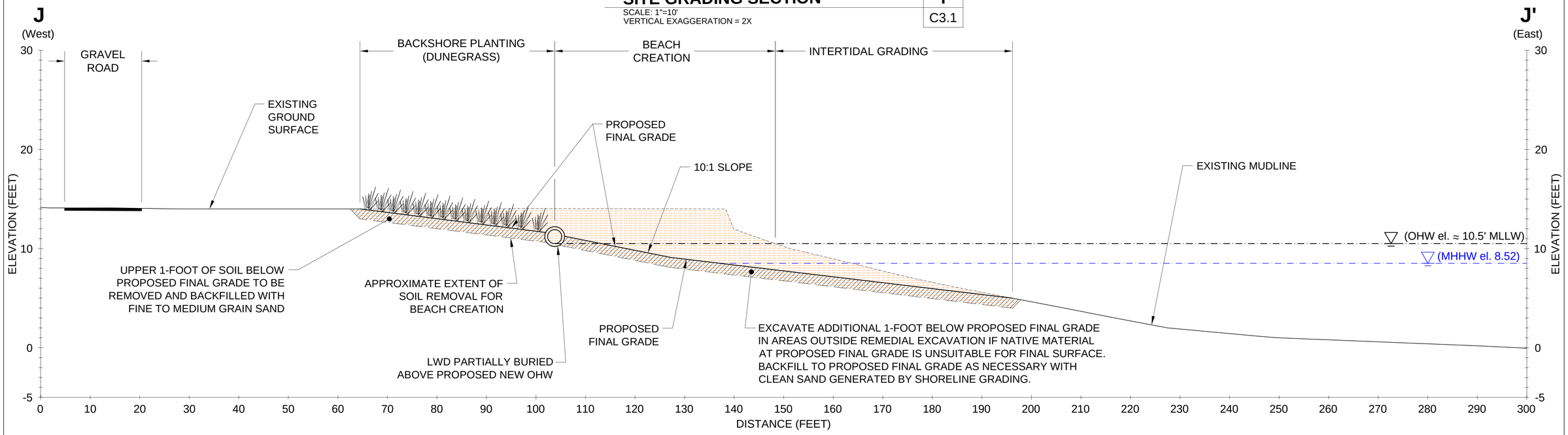

SITE GRADING SECTION

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

J
C3.1

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DRAWN:	TJM	PROJECT NO.:	50404201
DESIGN:	CLB	SCALE:	
CHECKED:	DAC	DATE:	8/31/11

SHEET NO.
C3.8

100-PERCENT DESIGN

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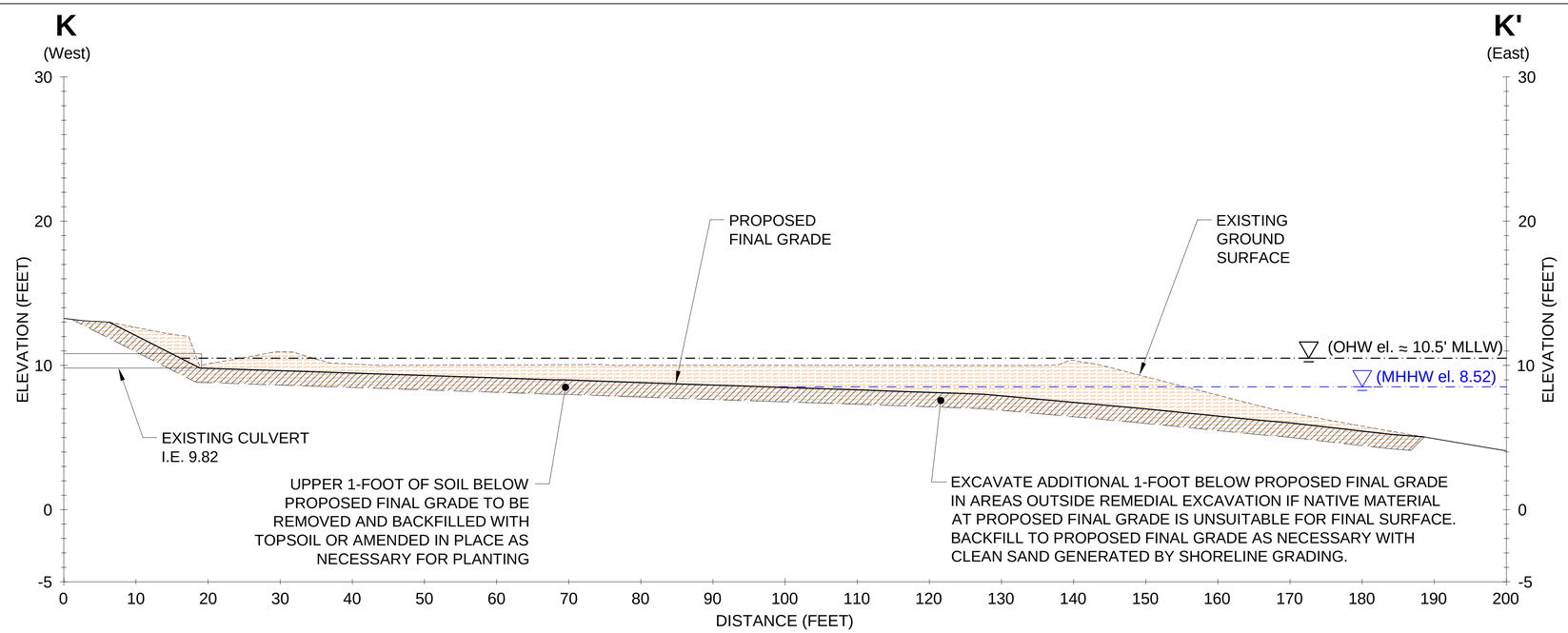
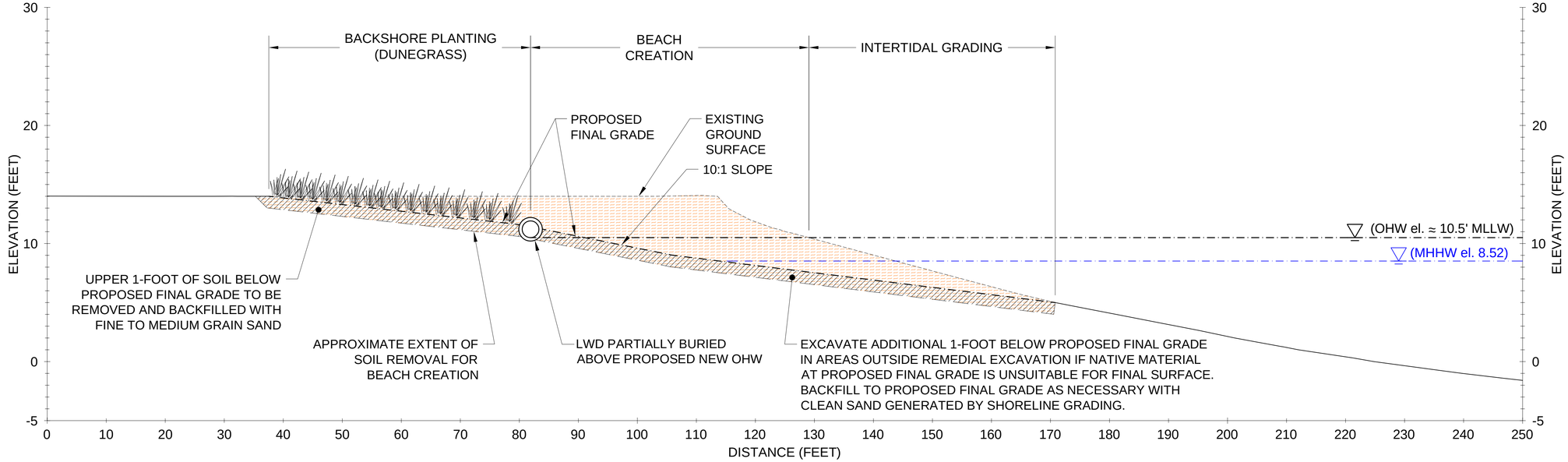


SITE GRADING SECTION

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

K
C3.2



SITE GRADING SECTION

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

L
C3.2

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F: 206-728-2731

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1	3/23/12	CLB	UPDATE DRAWINGS FOR 2012 RE-BID

Irondale Iron and Steel Plant Cleanup Action

Washington State Department of Ecology

SITE GRADING SECTIONS

DRAWN:	TJM	PROJECT NO.:	50404201
DESIGN:	CLB	SCALE:	
CHECKED:	DAC	DATE:	8/31/11

SHEET NO.
C3.9

100-PERCENT DESIGN

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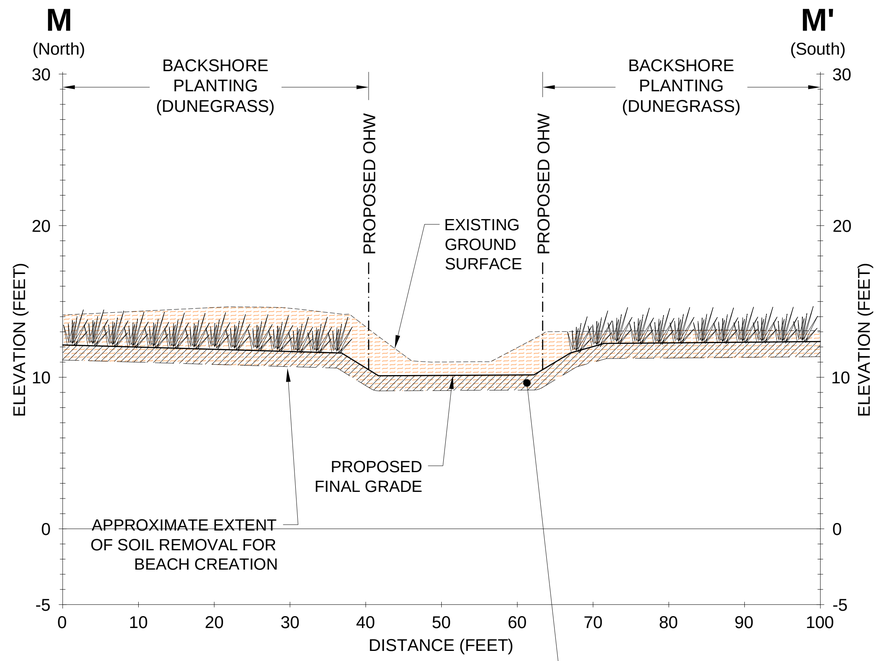
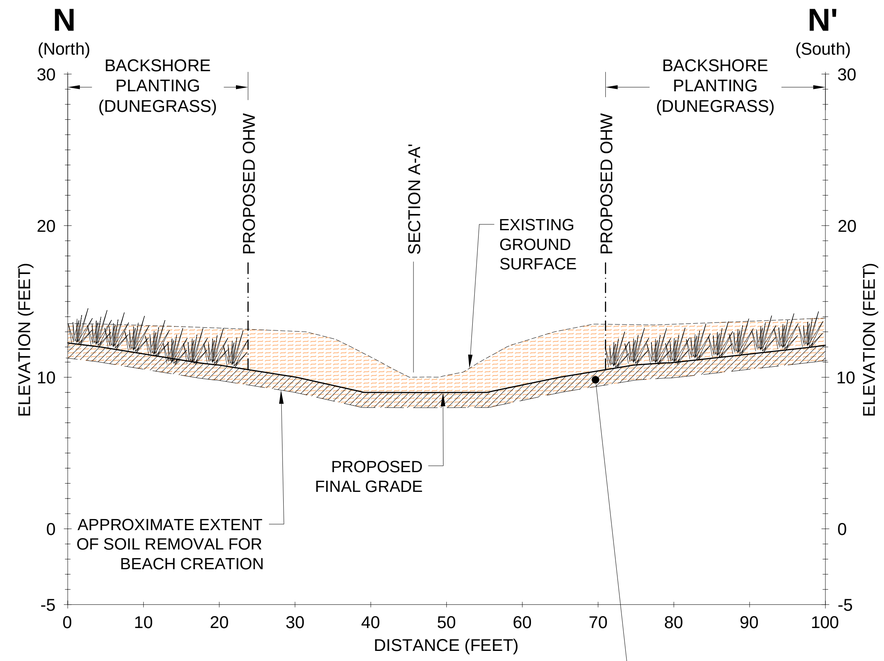


EXCAVATE ADDITIONAL 1-FOOT BELOW PROPOSED FINAL GRADE IN AREAS OUTSIDE REMEDIAL EXCAVATION IF NATIVE MATERIAL AT PROPOSED FINAL GRADE IS UNSUITABLE FOR FINAL SURFACE. BACKFILL TO PROPOSED FINAL GRADE AS NECESSARY WITH CLEAN SAND GENERATED BY SHORELINE GRADING.

SITE GRADING SECTION M

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

C3.2



EXCAVATE ADDITIONAL 1-FOOT BELOW PROPOSED FINAL GRADE IN AREAS OUTSIDE REMEDIAL EXCAVATION IF NATIVE MATERIAL AT PROPOSED FINAL GRADE IS UNSUITABLE FOR FINAL SURFACE. BACKFILL TO PROPOSED FINAL GRADE AS NECESSARY WITH CLEAN SAND GENERATED BY SHORELINE GRADING.

SITE GRADING SECTION N

SCALE: 1"=10'
VERTICAL EXAGGERATION = 2X

C3.2

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Irondale Iron and Steel Plant Cleanup Action

Washington State Department of Ecology

SITE GRADING SECTIONS

DRAWN:	TJM	PROJECT NO.:	50404201
DESIGN:	CLB	SCALE:	
CHECKED:	DAC	DATE:	8/31/11

SHEET NO.

C3.10

100-PERCENT DESIGN

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PLANTING PLAN 1 / P1.0
SCALE: 1"=100'

PLANTING NOTES

1. NO PLANTING SHALL BE PREFORMED PRIOR TO APPROVAL OF GRADING BY ECOLOGY. PLANTING LAYOUT TO BE APPROVED BY ECOLOGY.
2. FOR BACKSHORE DUNEGRASS PLANTING AREAS, SUBSTRATE SHOULD BE CLEAN, FINE TO MEDIUM GRAIN SAND OR SUITABLE NATIVE MATERIAL.
3. DUNEGRASS, TREE AND SHRUB PLANTINGS SHOULD BE SPACED ACCORDING TO ON-CENTER SPACINGS PROVIDED IN SHEET P1.1.
4. DUNEGRASS MAY BE SALVAGED FROM PROJECT AREA WITH APPROVAL OF LANDOWNER AND PROJECT BIOLOGIST.
5. A MINIMUM OF 4 INCHES OF ORGANIC MULCH IS REQUIRED AT THE BASE OF ALL TREES AND SHRUBS.
6. ADD UP TO ONE-FOOT OF TOPSOIL IN TREE AND SHRUB PLANTING AREAS. THE TOP 18" OF SUBSTRATE SHOULD BE A MIX OF SAND AND TOPSOIL (ONE THIRD SAND AND TWO THIRDS TOPSOIL.)
7. PLANT SUBSTITUTIONS SHALL BE APPROVED BY THE PROJECT BIOLOGIST.
8. PLANTS SHALL BE MAINTAINED BY CONTRACTOR AS NECESSARY, INCLUDING REGULAR WATERING DURING THE FIRST TWO YEARS.
9. IF SIGNS OF STRESS ARE OBSERVED, ADDITIONAL MEASURES SHOULD BE TAKEN TO INCREASE PLANT SURVIVAL.
10. PLANTING SUCCESS WILL BE DETERMINED BY THE PROJECT BIOLOGIST. IF SURVIVAL RATE IS LESS THAN 100% IN THE FIRST YEAR, THE CONTRACTOR WILL BE REQUIRED TO REPLANT DEAD PLANTS.

LEGEND

- BACKSHORE DUNEGRASS PLANTING AREA
- SHORELINE TREE AND SHRUB PLANTING AREA
- UPLAND CAP SHRUB PLANTING AREA
- LARGE WOODY DEBRIS (AT PROPOSED NEW OHW)
- FINAL GRADE CONTOURS
- PROPOSED MHHW

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NO.	DATE	BY	REVISION
1	3/23/12	CLB	UPDATE DRAWINGS FOR 2012 RE-BID

Irondale Iron and Steel Plant Cleanup Action

Washington State Department of Ecology

LANDSCAPING AND RESTORATION PLAN

DRAWN:	MGF	PROJECT NO.:	50404201
DESIGN:	CLB	SCALE:	NOTED
CHECKED:	DAC	DATE:	8/31/11

SHEET NO.
L1.0

100-PERCENT DESIGN

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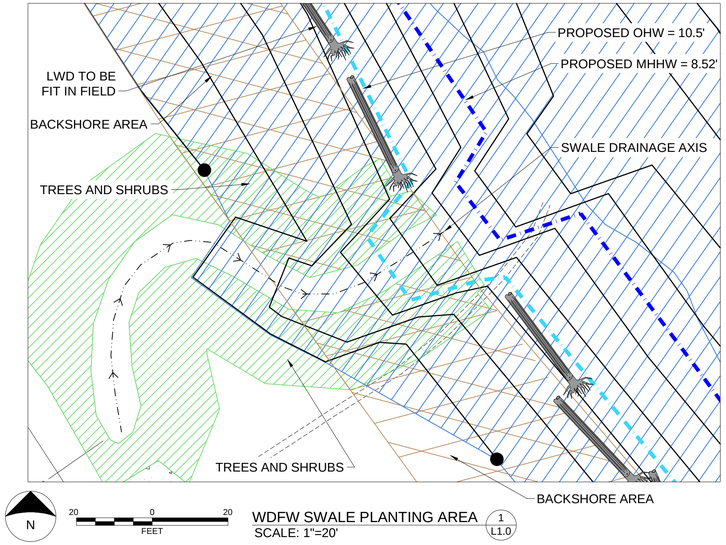
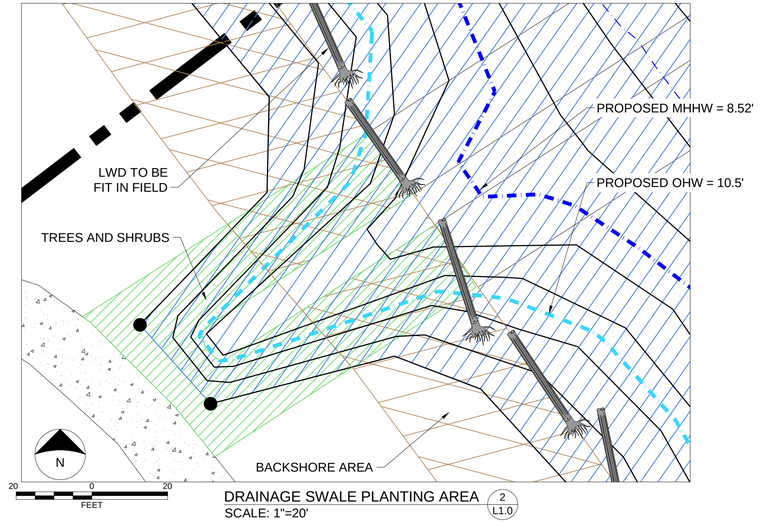
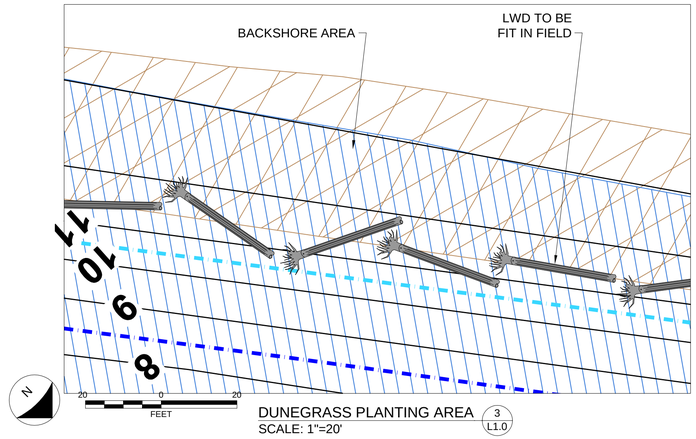


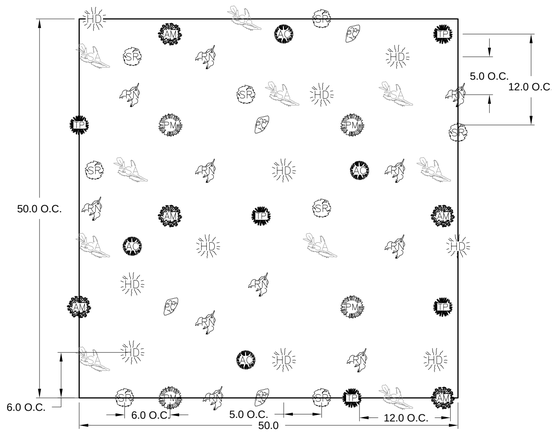
WDFW SWALE PLANTING AREA (1 / L1.0)
SCALE: 1"=20'



DRAINAGE SWALE PLANTING AREA (2 / L1.0)
SCALE: 1"=20'



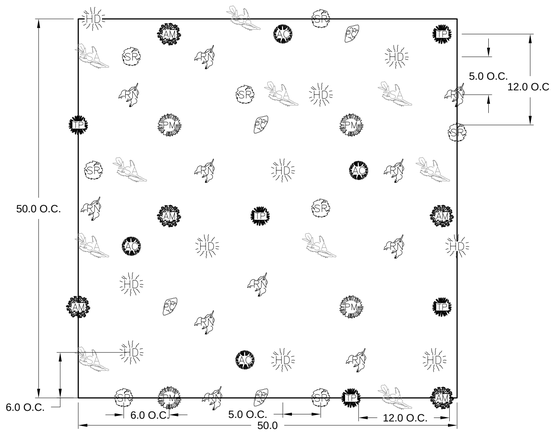
DUNEGRASS PLANTING AREA (3 / L1.0)
SCALE: 1"=20'



TREE AND SHRUB PLANTING AREA TYPICAL LAYOUT
SCALE: 1"=10'

TYPICAL TREE & SHRUB PLANTING ZONE TABLE

Symbol	Plant Species		Quantity	On Center Spacing (ft)
	Scientific Name	Common Name		
TYPICAL TREES				
PSM	*Pseudotsuga menziesii*	Douglas fir	31	12
PC	*Pinus contorta*	Shore pine	31	12
TPL	*Thuja plicata*	Western red cedar	46	12
ACM	*Acer macrophyllum*	Big-leaf maple	46	12
TYPICAL SHRUBS				
SR	*Rosa nutkana*	Nootka Rose	262	5
HD	*Holodiscus discolor*	Oceanspray	175	5
AC	*Acer circinatum*	Vine maple	61	6
SR	*Sambucus racemosa*	Red elderberry	121	6
SP	*Smyphoricarpos albus*	Snowberry	175	5



TREE AND SHRUB PLANTING AREA TYPICAL LAYOUT
SCALE: 1"=10'

TYPICAL TREE & SHRUB PLANTING ZONE TABLE

Symbol	Plant Species		Quantity	On Center Spacing (ft)
	Scientific Name	Common Name		
TYPICAL TREES				
PSM	*Pseudotsuga menziesii*	Douglas fir	31	12
PC	*Pinus contorta*	Shore pine	31	12
TPL	*Thuja plicata*	Western red cedar	46	12
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SR	*Rosa nutkana*	Nootka Rose	262	5
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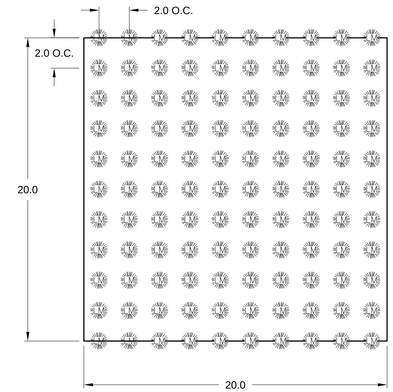
AC	*Acer circinatum*	Vine maple	61	6
SR	*Sambucus racemosa*	Red elderberry	121	6
SP	*Smyphoricarpos albus*	Snowberry	175	5



DUNEGRASS PLANTING AREA TYPICAL LAYOUT
SCALE: 1"=5'

TYPICAL DUNEGRASS PLANTING ZONE TABLE

Symbol	Plant Species		Quantity	On Center Spacing (ft)
	Scientific Name	Common Name		
LM	*Leymus Mollis*	Dunegrass	10890	2

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NO.	DATE	BY	REVISION
1	3/23/12	CLB	UPDATE DRAWINGS FOR 2012 RE-BID

Irondale Iron and Steel Plant Cleanup Action

Washington State Department of Ecology

LANDSCAPE AND RESTORATION DETAILS

DRAWN:	CMV	PROJECT NO.:	50404201
DESIGN:	CLB	SCALE:	NOTED
CHECKED:	DAC	DATE:	8/31/11

SHEET NO.
L1.1

100-PERCENT DESIGN

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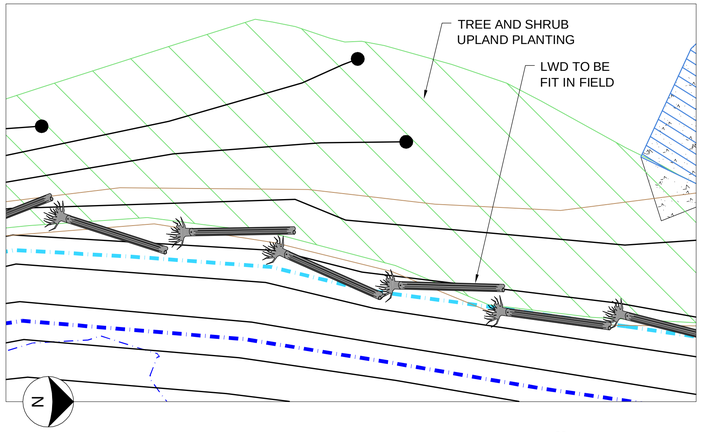
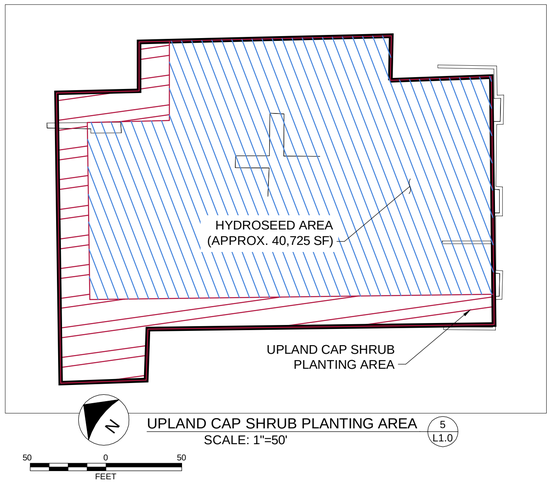
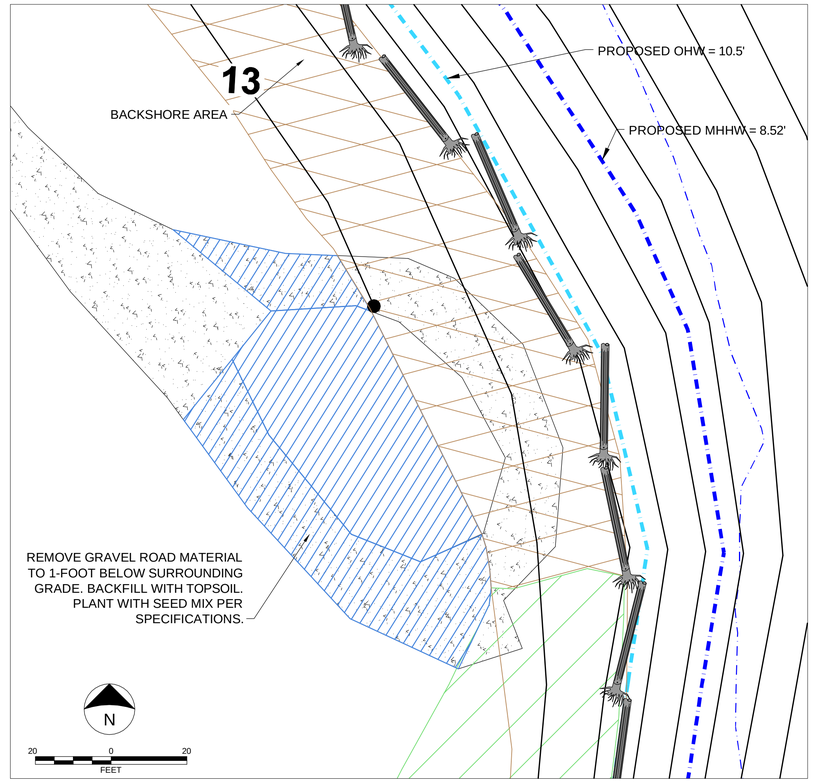


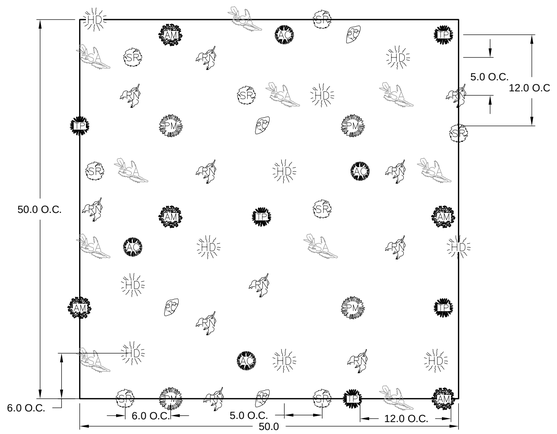
SHORELINE TREE AND SHRUB PLANTING AREA (4 L1.0)
SCALE: 1"=20'



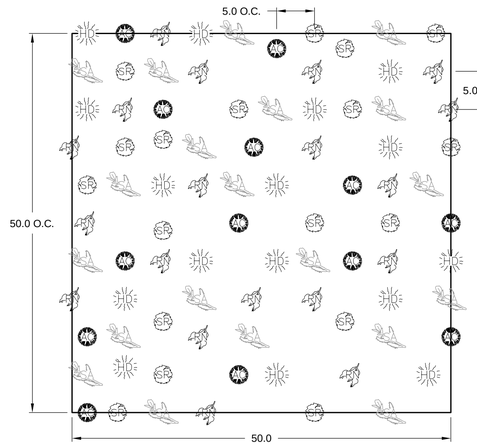
UPLAND CAP SHRUB PLANTING AREA (5 L1.0)
SCALE: 1"=50'



ACCESS ROAD RESTORATION DETAIL PLANTING AREA (6 L1.0)
SCALE: 1"=20'



SHORELINE TREE AND SHRUB PLANTING AREA TYPICAL LAYOUT
SCALE: 1"=10'



UPLAND CAP SHRUB PLANTING AREA TYPICAL LAYOUT
SCALE: 1"=10'

TYPICAL TREE & SHRUB PLANTING ZONE TABLE

Symbol	Plant Species		Quantity	On Center Spacing (ft)
	Scientific Name	Common Name		
TYPICAL TREES				
PSM	*Pseudotsuga menziesii*	Douglas fir	31	12
PCO	*Pinus contorta*	Shore pine	31	12
TP	*Thuja plicata*	Western red cedar	46	12
AM	*Acer macrophyllum*	Big-leaf maple	46	12
TYPICAL SHRUBS				
RN	*Rosa nutkana*	Nootka Rose	262	5
HD	*Holodiscus discolor*	Oceanspray	175	5
AC	*Acer circinatum*	Vine maple	61	6
SR	*Sambucus racemosa*	Red elderberry	121	6
SA	*Smyphoricarpos albus*	Snowberry	175	5

TYPICAL SHRUB PLANTING ZONE TABLE

Symbol	Plant Species		Quantity	On Center Spacing (ft)
	Scientific Name	Common Name		
TYPICAL SHRUBS				
RN	*Rosa nutkana*	Nootka Rose	75	5
HD	*Holodiscus discolor*	Oceanspray	175	5
AC	*Acer circinatum*	Vine maple	75	6
SR	*Sambucus racemosa*	Red elderberry	121	6
SA	*Smyphoricarpos albus*	Snowberry	75	5

EROSION CONTROL SEED MIX

Variety of Seed in Mixture	Percent by Weight (%)	Minimum Percent Pure Seed (%)	Minimum Percent Germination (%)
Red Creeping Fescue	40	98	90
Perennial Ryegrass	40	98	90
White Sweetclover (Melilotus Alba)	10	98	90
Highland Colonial Bentgrass	10	98	90

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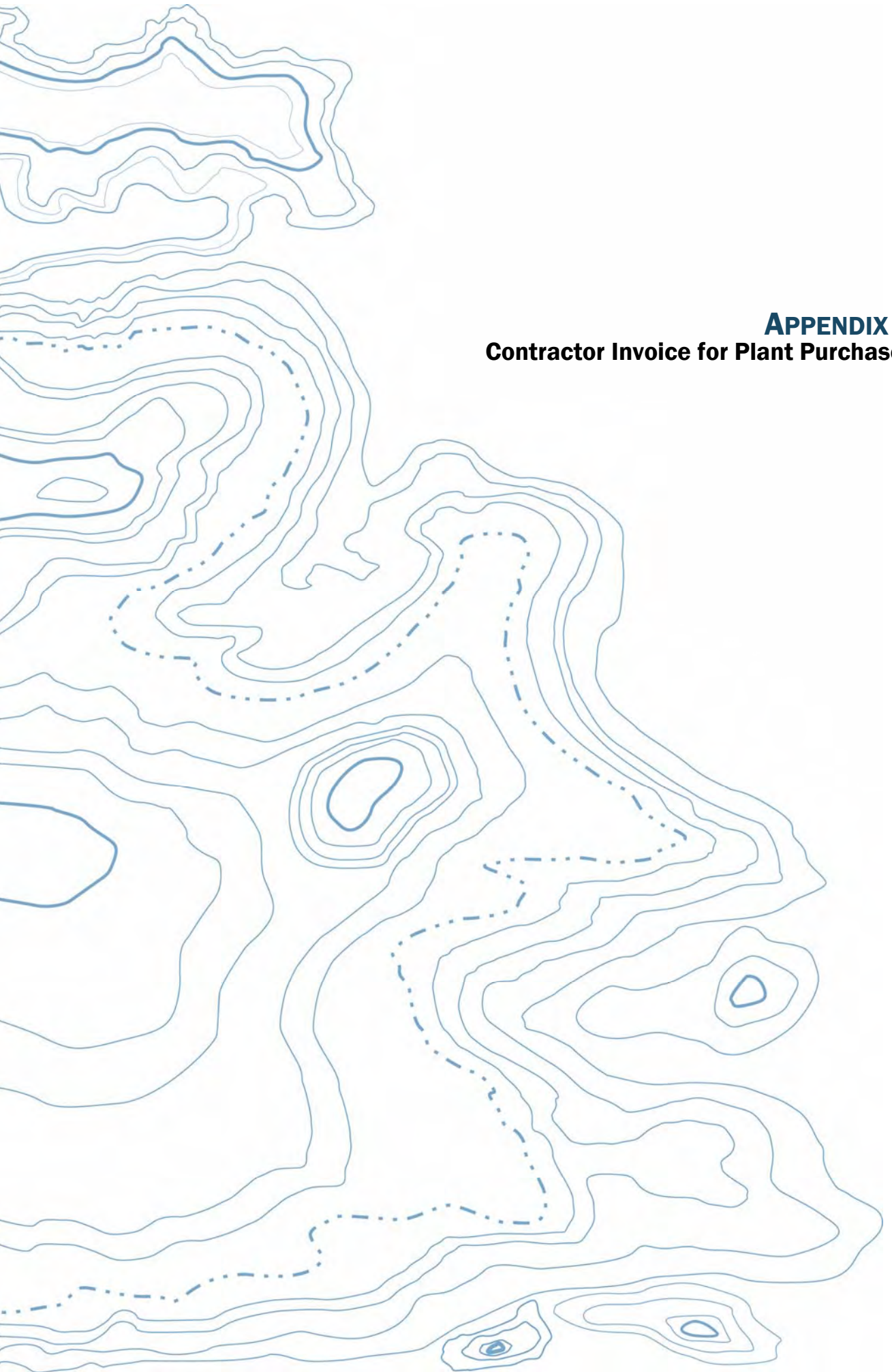
Washington State Department of Ecology

LANDSCAPE AND RESTORATION DETAILS

DRAWN:	CMV	PROJECT NO.:	50404201
DESIGN:	CLB	SCALE:	NOTED
CHECKED:	DAC	DATE:	8/31/11
SHEET NO.	L1.2		

W:\SEATTLE\PROJECTS\0\0504042\0\CAD\SHEET\CLEANUP ACTION SHEETS\0504042-01 SHEET L1.1-L1.2 PLANTING PLAN DETAILS.DWG\TAB:SHEET L1.2 MODIFIED BY CVANSLYKE ON OCT 04, 2012 - 15:33

100-PERCENT DESIGN



APPENDIX C
Contractor Invoice for Plant Purchases

Storm Lake Growers, Inc.

Invoice

18510 SR 203
Monroe, WA 98272
360-794-4842 Phone
360-794-8323 Fax

Date	Invoice #
12/11/2012	12-1002

PAID 12/13/2012

Bill To	Ship To
Killdeer Landscape	543 E. Moore St Port Hadlock/Irondale Steve 360-301-3194

P.O. Number	Terms	Rep	Ship	Via	F.O.B.	Project
	COD		12/11/2012	SL Truck		

Quantity	Item Code	Description	Price Each	Amount
11	PSEME1	Douglas Fir 1 gal	3.00	33.00
11	PINCO1	Shore Pine 1 gal	3.00	33.00
16	THUPL1	Cedar 1 gal	3.00	48.00
237	HOLDI1	Oceanspray 1 gal	3.00	711.00
97	ACECI1	Vine Maple 1 gal	3.00	291.00
164	SAMRA1	Red Elderberry 1 gal	3.00	492.00
169	ROSNU1	Nootka Rose 1 gal	3.00	507.00
137	SYMAL1	Snowberry 1 gal	3.00	411.00
1	DELIV	Delivery Charge	150.00	150.00
2	FERR	Ferry Charge	40.25	80.50
		Sales Tax	8.00%	0.00

Total $2,756.50

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APPENDIX J
Report Limitations and Guidelines for Use

APPENDIX J
REPORT LIMITATIONS AND GUIDELINES FOR USE[1]

This appendix provides information to help you manage your risks with respect to the use of this report. Please confer with GeoEngineers if you need to know more about how these "Report Limitations and Guidelines for Use" apply to your project or property.

Read These Provisions Closely

It is important to recognize that environmental engineering and geoscience practices (geotechnical engineering, geology and environmental science) are less exact than other engineering and natural science disciplines. GeoEngineers includes these explanatory "limitations" provisions in our reports to help reduce the risk of misunderstandings or unrealistic expectations that lead to disappointments, claims and disputes.

Environmental Services Are Performed for Specific Purposes, Persons and Projects

GeoEngineers has performed this Cleanup Action and Site Restoration Completion Report of the Irondale Iron and Steel Plant Site in general accordance with the scope and limitations of our proposal, dated July 15, 2011. This report has been prepared for the exclusive use of Washington State Department of Ecology. This report is not intended for use by others, and the information contained herein is not applicable to other properties.

GeoEngineers structures its services to meet the specific needs of its clients. For example, an ESA study conducted for a property owner may not fulfill the needs of a prospective purchaser of the same property. Because each environmental study is unique, each environmental report is unique, prepared solely for the specific client and property. Use of this report is not recommended for any purpose or project other than as expressly stated in this report.

This Environmental Report is Based on a Unique Set of Project-Specific Factors

This report has been prepared for the Irondale Iron and Steel Plant Site. GeoEngineers considered a number of unique, project-specific factors when establishing the scope of services for this Project. Unless GeoEngineers specifically indicates otherwise, it is important not to rely on this report if it was:

- not prepared for you,
- not prepared for your Project,
- not prepared for the specific site explored, or
- completed before Project changes were made.

1 Developed based on material provided by ASFE, Professional Firms Practicing in the Geosciences; www.asfe.org.

If changes to the Project or property occur after the date of this report, GeoEngineers cannot be responsible for any consequences of such changes in relation to this report unless we have been given the opportunity to review our interpretations and recommendations in the context of such changes. Based on that review, we can provide written modifications or confirmation, as appropriate.

Reliance Conditions for Third Parties

This report was prepared for the exclusive use of the party to whom this report is addressed. No other party may rely on the product of our services unless we agree to such reliance in advance and in writing. Within the limitations of the agreed Project scope, schedule and budget, our services have been executed in accordance with our Agreement with the Client and generally accepted environmental practices in this area at the time this report was prepared.

Understand That Geotechnical Issues Have Not Been Addressed

Unless geotechnical engineering was specifically included in our scope of service, this report does not provide any geotechnical findings, conclusions, or recommendations, including but not limited to, the suitability of subsurface materials for construction purposes.

Do Not Separate Documentation from the Report

Environmental reports often include supplemental documentation, such as maps, figures and table. Do not separate such documentation from the report. Further, do not, and do not permit any other party to redraw or modify any of the supplemental documentation for incorporation into other professionals' instruments of service.

Environmental Regulations Change and Evolve

Some substances may be present in the vicinity of the subject property in quantities or under conditions that may have led, or may lead, to contamination of the subject property, but are not included in current local, state or federal regulatory definitions of hazardous substances or do not otherwise present current potential liability. GeoEngineers cannot be responsible if the standards for appropriate inquiry, or regulatory definitions of hazardous substances, change or if more stringent environmental standards are developed in the future.

Subsurface Conditions Can Change

This environmental report is based on conditions that existed at the time the study was performed. The findings and conclusions of this report may be affected by the passage of time, by man-made events such as construction on or adjacent to the subject property, by new releases of hazardous substances, new information or technology that become available subsequent to the report date, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations. Please contact GeoEngineers before applying this report for its intended purpose so that GeoEngineers may evaluate whether changed conditions affect the continued applicability of the report.

Soil and Groundwater End Use

The cleanup levels referenced in this report are site- and situation-specific. The cleanup levels may not be applicable for other properties or for other on-site uses of the affected soil and/or groundwater. Note that hazardous substances may be present in some of the on-site soil and/or groundwater at detectable

concentrations that are less than the referenced cleanup levels. GeoEngineers should be contacted prior to the export of soil or groundwater from the subject property or reuse of the affected soil or groundwater on-site to evaluate the potential for associated environmental liabilities. GeoEngineers will not assume responsibility for potential environmental liability arising out of the transfer of soil and/or groundwater from the subject property to another location, or the reuse of such soil and/or groundwater on-site in any instances that we did not recommend, know of, or control.

Most Environmental Findings Are Professional Opinions

Our interpretations of subsurface conditions are based on field observations and chemical analytical data from widely spaced sampling locations at the subject property. Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. GeoEngineers reviewed field and laboratory data and then applied its professional judgment to render an informed opinion about subsurface conditions throughout the property. Actual subsurface conditions may differ significantly from those indicated in this report. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

Do Not Redraw the Exploration Logs

Environmental scientists prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in an environmental report should never be redrawn for inclusion in other design documents. Only photographic or electronic reproduction that preserves the entire original boring log is acceptable, but separating logs from the report can create increase the risk of potential misinterpretation.

Biological Pollutants

GeoEngineers' Scope of Work specifically excludes the investigation, detection, prevention or assessment of the presence of Biological Pollutants. Accordingly, this report does not include any interpretations, recommendations, findings or conclusions regarding the detecting, assessing, preventing or abating of Biological Pollutants, and no conclusions or inferences should be drawn regarding Biological Pollutants as they may relate to this Project. The term "Biological Pollutants" includes, but is not limited to, molds, fungi, spores, bacteria and viruses, and/or any of their byproducts.

A Client that desires these specialized services is advised to obtain them from a consultant who offers services in this specialized field.

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