Draft Cleanup Action Plan

Former Reliable Steel Site
1218 West Bay Drive NW
Olympia, Washington
Ecology Agreed Order No. DE-08TCPSR-5223

July 18, 2013

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ACRONYMS AND ABBREVIATIONS

ARARs	applicable or relevant and appropriate requirements
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSL	Cleanup Screening Level
bgs	below ground surface
BMT	BMT Properties
cm	centimeters
CWA	Clean Water Act
DCA	disproportionate cost analysis
DMMP	Dredge Material Management Program
Ecology	Washington State Department of Ecology
FS	Feasibility Study
HPA	Hydraulic Project Approval
JARPA	Joint Aquatic Resources Permit Application
HDPE	high-density polyethylene
PCBs	Polychlorinated biphenyl
AET	apparent effects threshold
LAET	Lowest Apparent Effects Threshold
2LAET	Second Lowest Apparent Effects Threshold
MHHW	mean higher high water
mg/kg	milligram per kilogram
MTCA	Model Toxics Control Act
NTUs	nephelometric turbidity units
NWP 38	Nationwide Permit 38

OHW	ordinary high water
PAHs	polycyclic aromatic hydrocarbons
RAOs	remedial action objectives
RCW	Revised Code of Washington
RI	Remedial Investigation
SEPA	State Environmental Policy Act
Site	Reliable Steel Site
SMS	Sediment Management Standards
SQS	Sediment Quality Standard
SVOCs	Semivolatile organic compounds
TCLP	toxicity characteristic leaching procedure
TOC	total organic carbon
USACE	U.S. Army Corps of Engineers
UST	underground storage tank
UTS	Universal Treatment Standards
µg/L	microgram per liter
WAC	Washington Administrative Code

1.0 INTRODUCTION

This document presents the Cleanup Action Plan (CAP) for upland and aquatic lands at the Reliable Steel Site (Site) located at 1218 West Bay Drive NW in the City of Olympia, Thurston County, Washington (Figure 1). The Site is situated on the western shoreline of Budd Inlet and is approximately 6.5 acres in size and is comprised of both upland and marine in-water (i.e., tidelands) areas. The upland area of the Site is approximately 3.2 acres in size and the marine in-water area of the Site is approximately 3.3 acres in size.

This CAP has been prepared pursuant to the requirements of the Model Toxics Control Act (MTCA) administered by the Washington State Department of Ecology (Ecology) under Chapter 173-340 of the Washington Administrative Code (WAC) and the requirements of the Sediment Management Standards (SMS) administered by Ecology under Chapter 173-204 WAC. This CAP provides a general description of the proposed remedial action for the Site and sets forth functional requirements that the cleanup must meet to achieve the remedial action objectives (RAOs) for the Site.

The purpose of this CAP is to:

- Describe the Site, including a summary of its history and extent of contamination presented in the Remedial Investigation (RI);
- Identify site-specific cleanup levels and points of compliance for each contaminant and applicable exposure medium;
- Identify applicable state and federal laws for the proposed remedial action;
- Summarize the remedial action alternatives evaluated in the Feasibility Study (FS);
- Identify and describe the selected remedial action alternative for the Site;
- Outline elements of the selected remedial action for the different media that result in protection of human health and the environment; and
- Discuss environmental covenants and Site use restrictions.

The Site is under an Agreed Order (DE-08-TVPSR-5223) between the Ecology and BOJO Investments LLC (BOJO). In 2012, BOJO dissolved the corporation and ceased to exist. Ecology's Toxic Cleanup Program is managing the completion of the RI/FS and CAP for the Site. GeoEngineers has prepared the RI/FS and CAP under contract to Ecology.

2.0 SUMMARY OF SITE CONDITIONS

Multiple investigations have been conducted at the Site since 1998. The RI/FS report prepared for the Site describes each of the investigations performed between 1998 and 2013 (GeoEngineers, 2013). The purpose of the investigations was to collect, develop, and evaluate sufficient information to allow the selection of an appropriate remedial action for the Site. Because the Site includes upland and marine aquatic areas, as shown in Figure 2, the media investigated included soil, groundwater, stormwater runoff, and sediment. This section summarizes the Site history, conceptual site models for the Site, and Site conditions and the nature and extent of contamination. More detailed descriptions of Site conditions and the nature and extent of contamination are provided in the RI/FS report (GeoEngineers, 2013).

2.1 Site History

Prior to development, the property comprising the Site was a portion of the Budd Inlet shoreline and the majority of the property likely consisted of intertidal aquatic lands. Site use has consisted of filling followed by commercial and industrial activities. Existing information indicates that the initial Site use was for lumber production. Boat building was also identified to have been performed at the Site. The most recent Site use was for steel tank and structural beam fabrication and painting that occurred from 1941 to as recent as 2009.

A 1924 Sanborn Map indicates that a "saw mill and planer" operated by Yankee Notion Mill Company was located on the northern portion of the Site. The Sanborn Map indicates that the northern portion of the Site was upland property. Therefore, the northern portion of the property was evidently filled prior to 1924. The Sanborn Map also indicates that a bulkhead was located south of the saw mill and planer and that the southern portion of the Site was tideflats. The Henry McCleary Timber Company is identified to be located north of the Site in the location of the present day Hardel Mutual Plywood Site and the Panama Lumber and Shingle Company is identified to be located south of the Site in the present day location of the Port of Olympia property.

A 1924 to 1947 Sanborn Map shows the shape of the shoreline at the Site in more or less its current configuration. Therefore the southern portion of the Site was evidently filled between 1924 and 1947.

The Site was purchased in 1941 by A.W. and Hazel Lewis to relocate their Reliable Welding business to the property (Tetra Tech, 1998). An elevated rail crane structure was the only aboveground structure present at the Site when purchased by the Lewis' in 1941. A Sanborn Map from 1945 identifies a 5-ton traveling crane with an elevation of 16 feet. The western end of the crane abuts a railroad track, and the area on either side of the crane is identified as "Lumber in Transit." Based on the configuration of the structures identified on the 1945 Sanborn Map, it appears that the crane may have previously been used to transfer lumber onto or off of railroad cars. The crane and railroad track(s) identified on the Sanborn Map are in the present location of the remaining elevated rail crane structures and railroad tracks currently present at the Site. Figures 2 and 3 show the existing and previous site conditions, respectively, including the rail crane structures and railroad tracks.

The Tank Shop (identified in one previous report as the Plate Shop) and the Maintenance Building were built by Reliable Welding in 1941 (Figure 3) (Tetra Tech, 1998). Additionally, during the 1940s, a dock was erected on Budd Inlet in the vicinity of the Tank Shop. A 1945 Sanborn Map identifies that ship welding was occurring in the building identified as the Tank Shop.

Additional expansions were performed in 1962, including construction of the Paint Shop, and in 1980, to construct the Structural Shop (Figure 3) (Tetra Tech, 1998).

During the late 1940s, the Lewis' formed a partnership of family members. In 1974, the partnership incorporated and in 1983, Bart and Jerry Olsen, members of the partnership, bought out other family member interests in the corporation (Tetra Tech, 1998). In January 1998, ownership of all of the parcels except the former railroad right-of-way was transferred from Reliable Steel Fabricators Inc., to BOJO Investments, LLC (also owned by Bart and Jerry Olson). Ownership of the former railroad right-of-way was transferred to BOJO Investments, LLC in 2004.

In August 2001, BMT Properties (BMT) acquired the operating assets of Reliable Steel and leased the property. BMT simultaneously assigned the operating assets and lease to BMT-NW. In April 2008, West Bay Reliable-0508, LLC purchased the property (Greylock, 2008). BMT-NW performed steel fabrication, sandblasting, and painting operations at the Site until 2009.

A fire in November 2010 damaged the structural integrity of the Tank Shop. The Tank Shop, Maintenance Building, and the above-ground portion of the elevated rail crane located in the upland area were demolished in 2011 after the fire (Figure 2).

2.2 Conceptual Site Models

Conceptual site models were developed to evaluate contaminant transport and exposure pathways. A conceptual site contaminant transport model was developed to describe historical release(s) of hazardous substances at the Site and the subsequent potential migration of those hazardous substances in environmental media. The conceptual site contaminant transport model is presented in Section 2.2.1. Additionally, separate conceptual site exposure models were developed to describe potential exposure pathways for human and ecological receptors. The conceptual site exposure models are presented in Section 2.2.2

2.2.1 Conceptual Site Contaminant Transport Model

The potential contaminant sources and transport mechanisms identified based on the conceptual site contaminant transport model for the Site are the following:

- Previous Site operations including lumber mill activities, boat building, and steel fabrication and painting resulted in spills and releases of petroleum hydrocarbons, metal debris, and other materials and contaminants to upland soil and marine sediment. Past releases represent potential sources of contamination to soil, groundwater, stormwater runoff and sediment.
- Contaminants in soil leach to the groundwater through dissolution into groundwater or dissolution into infiltrating/percolating stormwater and subsequent downward migration to groundwater. Groundwater flows towards Budd Inlet where it likely discharges into the intertidal area.
- Stormwater runoff from the Site and erosion of soil transports contaminants to surface water and sediment in Budd Inlet. Stormwater runs off of the Site via overland flow and through the existing stormwater conveyance features and discharges at the four outfalls at the Site.
- Waves and tidal fluctuations along the shoreline erode contaminated soil and/or intertidal sediment. Shoreline erosion transports contaminants to sediments at and adjacent to the Site.

2.2.2 Conceptual Site Exposure Models

To provide a framework for interpreting the data presented in the RI, human health and ecological conceptual site exposure models were developed. The conceptual site exposure models were developed to identify complete exposure pathways and potential receptors for the contaminants detected in various environmental media at the Site. A complete exposure pathway consists of: (1) an identified contaminant source, (2) a release/transport mechanism from the source to locations (exposure points) where potential receptors may come in contact with contaminants, and (3) an exposure route (for example, soil ingestion) where potential receptors may be exposed to contaminants. Exposure pathways that were not complete (for example groundwater ingestion) were not considered further in the RI. The human health and ecological conceptual site exposure models are summarized in the following sections.

2.2.3 Potentially Complete Exposure Pathways – Humans

A graphical presentation of the human health conceptual site exposure model is presented as Figure 4. Potential future use of the Site is for commercial and residential purposes. Human receptors that could potentially be exposed to contaminants at the Site include site workers, residents, and visitors. Because residential exposures and associated risks are typically greater than exposures/risks to site workers and visitors, a hypothetical residential scenario (i.e., unrestricted land use) was assumed for the purpose of assessing potential human health risks at the Site. The following sections present the potentially complete exposure pathways for human receptors.

SOIL

Potentially complete soil-based exposure pathways exist for humans in the upland area of the Site via incidental soil ingestion, dermal contact with soil, and inhalation of particulates. In accordance with WAC 173-340-740, human health exposure to Site soil is evaluated based on the direct contact with soil exposure pathway (for example incidental soil ingestion; unrestricted land use).

A potentially complete exposure pathway exists for humans in the upland area of the Site via vapor intrusion and inhalation of volatile contaminants where volatile contaminants are present. Specific measurements of soil vapor were not collected as part of the RI. However, potential soil vapor intrusion and inhalation of volatile contaminants is discussed as part of the nature and extent of contamination.

GROUNDWATER

Exposure of human receptors to contaminants in groundwater via direct contact and ingestion from groundwater use is not a complete exposure pathway. Groundwater at the Site is not used for potable or drinking water and based on the availability of municipal water supply and the proximity to marine surface water, groundwater at the Site is not a reasonable future source of potable or drinking water.

Groundwater from the Site is assumed to discharge in the shoreline area of the Site. Human exposure from occasional dermal contact or incidental ingestion of groundwater discharging in the shoreline area is assumed to be minimal as groundwater discharges or seeps in the shoreline area that would provide an exposure point were not identified at the Site. Therefore, these pathways are considered “potentially complete but not significant.”

A potentially complete exposure pathway exists for human exposure to contaminants in groundwater discharging to surface water in Budd Inlet via consumption of fish or shellfish.

A potentially complete exposure pathway exists for humans in the upland area of the Site via vapor intrusion and inhalation of volatile contaminants where volatile contaminants are present. Potential soil vapor intrusion and inhalation of volatile contaminants is discussed as part of the nature and extent of contamination.

STORMWATER

Stormwater falling on the Site infiltrates in unpaved areas or flows towards stormwater collection and conveyance features and Budd Inlet. Stormwater collection and conveyance features present at the Site include catch basins and pipes and four stormwater outfalls. A potentially complete pathway currently exists for human exposure from occasional dermal contact or incidental ingestion of contaminated stormwater runoff. Remediation of the upland will be required prior to future Site use. Remedial actions for Site soil will include Site capping or removal of contaminated soil and replacement of the existing stormwater collection and conveyance system. The replacement stormwater system will be constructed to not allow contaminants from Site media to enter stormwater running off of the Site. Therefore, a complete exposure pathway for human receptors to stormwater runoff contaminated by Site media will not exist in the future. As a result, exposure of human receptors to stormwater runoff contaminated by Site media is not considered further in the RI.

A potentially complete pathway exists for human exposure to contaminants in stormwater runoff discharging to surface water in Budd Inlet via consumption of fish or shellfish.

SEDIMENT

Potentially complete exposure pathways exist for human exposure to contaminants in intertidal sediments via incidental ingestion and dermal contact with sediment and ingestion of shellfish.

2.2.4 Potentially Complete Exposure Pathways – Ecological Receptors

A graphical presentation of the ecological conceptual site exposure model is presented as Figure 5. The following sections present the potentially complete exposure pathways for ecological receptors.

SOIL

The upland area of the Site is currently covered with asphalt pavement, concrete and compact gravel and generally does not provide suitable habitat for ecological receptors. Remediation of upland soil will be required prior to future Site use. Remedial actions for Site soil will include Site capping or removal of contaminated soil. Therefore, a complete exposure pathway for ecological receptors to Site soil will also not exist in the future. As a result, exposure of ecological receptors to contaminated Site soil in not a complete exposure pathway.

GROUNDWATER

Potentially complete exposure pathways exist for exposure of terrestrial ecological receptors to contaminants in groundwater via direct contact. However, because of the depth to groundwater at the Site (generally 3 to 4 feet below ground surface [bgs]), these exposure pathways are considered not significant. Ecological receptors may be exposed to contaminants in groundwater indirectly at locations where groundwater discharges to surface water in Budd Inlet. Therefore, ecological exposure to groundwater is evaluated via potential surface water exposure.

STORMWATER

A complete potential pathway exists for benthic invertebrate and fish exposure to contaminants in stormwater runoff.

SEDIMENT

Complete potential pathways exist for exposure of aquatic ecological receptors to contaminants in sediment via direct contact and consumption of benthic invertebrates and/or fish.

2.3 Summary of Environmental Conditions

The environmental conditions and nature and extent of contamination were investigated in the upland and marine areas of the Site through multiple investigations performed between 1998 and 2013. Figure 6 presents the locations of where samples were collected to characterize environmental conditions and the nature and extent of contamination at the Site. Figures 7 through 11 present the extent of contamination and Figure 12 identifies the locations and media requiring remedial action evaluation at the Site based on the investigations. The following sections summarize the environmental conditions and nature and extent of contamination in soil, groundwater, stormwater runoff, and sediment.

2.3.1 Soil

Approximately 60 soil borings have been advanced to depths of up to approximately 20 feet bgs as part of Site investigations of the upland area. Sampling locations for soil in the upland area are shown on Figure 6. In general, soil observed in borings advanced in the upland area consists of fill overlying native silt. The following describes soil material encountered beneath the upland area of the Site in general order from the ground surface to greater depths:

- Gravel fill: Gravel fill was encountered in the majority of the upland borings from the surface to depths of approximately two feet bgs. Grain size ranges from gravel with sand or silt, to silty gravel.
- Silty to sandy fill: Gray to olive to brown fill material ranging in composition from silt to sand was encountered below the gravel fill in the majority of upland borings to depths between approximately three feet and 13 feet bgs.
- Dredge fill: Gray dredge fill comprised of sand or silty sand with shells was encountered in the majority of the borings at depths ranging between approximately 4 and 15 feet bgs.
- Native deposits: Native deposits, generally comprised of gray silt but occasionally silty sand or sand with gravel, were encountered beneath the dredge fill.

Based on the information evaluated in the RI, soil in the following areas contains contaminant concentrations greater than the soil cleanup levels:

- The area within the footprint of former Maintenance Building has soil with arsenic, cadmium, and lead at concentrations greater than cleanup levels (Figure 7). The vertical extent is estimated to be from the surface to a depth of approximately 2 feet bgs. Within the footprint of former Maintenance Building, metal debris is observed to be present as a layer or in mounds on top of the soil surface.

- The area east of the Paint Shop has soil with lead and mercury at concentrations greater than cleanup levels (Figure 7). The vertical extent is estimated to be from a depth of approximately 1 foot bgs to a depth of 6 feet bgs.
- The relatively small area north of the former Maintenance Building has soil with gasoline-range petroleum hydrocarbon concentrations greater than the cleanup level (Figure 8). Additionally, analysis for BTEX compounds was not performed on the soil samples from this area. As BTEX data is not currently available for these locations, it has been assumed for the purposes of this RI, that BTEX compounds are present at concentrations greater than soil cleanup levels and concentrations that would result in soil vapor intrusion and an inhalation exposure above acceptable risk levels. The vertical extent is estimated to be to a depth of approximately 13 feet bgs.
- The relatively small area located within the eastern portion of the former Maintenance Building has soil with gasoline-range petroleum hydrocarbon concentrations greater than the cleanup level (Figure 8). Additionally, analysis for BTEX compounds was not performed on the soil samples from this area. As BTEX data is not currently available for these locations, it has been assumed for the purposes of this RI, that BTEX compounds are present at concentrations greater than soil cleanup levels and concentrations that would result in soil vapor intrusion and an inhalation exposure above acceptable risk levels. The vertical extent is estimated to be to a depth of 6 feet bgs.
- The area located southwest of the former Tank Shop has soil with diesel-range petroleum hydrocarbons at concentrations greater than the cleanup level (Figure 9). The vertical extent is estimated to be from a depth of approximately 4 feet to 10 feet bgs. A groundwater sample collected from this area (MW-4) in 2008 also contained petroleum hydrocarbons at a concentration greater than groundwater cleanup levels. A 300-gallon heating oil underground storage tank (UST) located adjacent to the southwest corner of the Tank Shop is the likely source of the diesel-range petroleum hydrocarbon contamination in this area (Figures 2 and 3). No records were identified indicating that the UST was decommissioned including removing the contents of the UST. Therefore, the tank may be a continuing source of petroleum hydrocarbon contamination to soil.
- The relatively small area located near the southeast corner of the former Maintenance Building has soil with diesel- and oil-range petroleum hydrocarbons at concentrations greater than cleanup levels (Figure 9). The vertical extent is estimated to be from the surface to 2 feet bgs. Activities in the former Crane Shed are the likely source of the diesel- and oil-range petroleum hydrocarbons in this area (Figure 3). Stained soil was observed in this area during previous Site investigations.
- The relatively small area located on the north side of the Structural Shop has soil with oil-range petroleum hydrocarbons at a concentration greater than the cleanup level (Figure 9). The vertical extent is estimated to be from the surface to 4 feet bgs. Activities in the Structural Shop associated with a former shear machine are the likely source of the oil-range petroleum hydrocarbon contamination in this area (Figure 3). Stained soil was observed in this area during previous Site investigations.

- The area located east of the Paint Shop has soil with diesel-range petroleum hydrocarbons at concentrations greater than the cleanup level (Figure 9). The vertical extent is estimated to be from approximately 1 foot bgs to approximately 9 feet bgs.
- Soil across the Site contains polycyclic aromatic hydrocarbons (PAHs) at concentrations greater than the cleanup levels. The vertical extent is estimated to be from the surface to between approximately 2 to 7 feet bgs (Figure 10).
- Metal debris on the shoreline has arsenic, cadmium, and lead at concentrations greater than the soil cleanup levels (Figure 7). The metal debris contains arsenic, cadmium, copper, and lead at concentrations greater than the sediment cleanup levels. The vertical extent is estimated to be from the surface to approximately 3 feet bgs. The analytical results for the metal debris are compared to proposed soil and sediment cleanup levels as the material is present above and below the ordinary high water (OHW) line along the shoreline (Figure 5).

Remedial action alternatives for soil were developed for all of these areas that are protective of human and ecological receptors and other Site media (i.e., groundwater, surface water runoff, and sediment).

2.3.2 Groundwater

Groundwater monitoring was performed at nine monitoring wells installed at the Site (monitoring well MW-1 through MW-9). Groundwater is typically present at the Site at a depth of three to four feet bgs. The inferred groundwater flow direction was to the east or northeast during the groundwater measurement events performed in September and October 2010. Groundwater at the Site is assumed discharge to marine surface water in Budd Inlet. The groundwater gradients during the 2010 measurement events were approximately 0.006 ft/ft.

There are no groundwater supply wells located at the Site and groundwater at or in the vicinity of the Site is not a current source of drinking water. The closest water supply well is located about 1 mile northwest of the Site and more than ½ mile inland from Budd Inlet (Ecology, 1961 and 2007). Additionally, the groundwater beneath the Site satisfies the criteria in MTCA (WAC 173-340-720) for classification as non-potable groundwater. The RI/FS provides additional detail concerning the classification of Site groundwater as non-potable (GeoEngineers, 2013).

Based on information evaluated in the RI, groundwater in the vicinity of the former maintenance building contains metals concentrations greater than groundwater cleanup levels (Figure 7). Groundwater in monitoring wells MW-6, MW-7, and MW-8 contains arsenic and copper concentrations greater than cleanup levels. These monitoring wells are located down gradient of where metal debris is present at the Site, where soil and metal debris samples contained the highest concentrations of arsenic and copper detected at the Site, and where metals were detected in soil and metal debris samples at concentrations greater than soil cleanup levels. The metals debris and metals contaminated soil are the likely source of arsenic and copper in groundwater in the vicinity of the former maintenance building.

A remedial action alternative for groundwater was developed that is protective human and ecological receptors. The remedial action alternative for groundwater will be coordinated with soil remedial actions as contaminated soil is the source to contamination in groundwater.

2.3.3 Stormwater Runoff

Stormwater falling on the Site infiltrates in unpaved areas or flows towards stormwater drainage features and Budd Inlet. Stormwater drainage features present at the Site include catch basins and associated conveyance pipes as well as two drainage ditches and four stormwater outfalls. The four stormwater outfalls are present at locations along the shoreline and on the northern portion of the Site that include the following (Figure 2):

- The 30-inch-diameter corrugated steel pipe that outfalls at the shoreline east of the former Maintenance Building;
- An 8-inch-diameter concrete pipe that outfalls at the shoreline east of the Structural Shop;
- A 12-inch-diameter corrugated high-density polyethylene (HDPE) pipe that outfalls at the shoreline south of the elevated rail crane structure; and
- An 8-inch-diameter corrugated HDPE pipe that outfalls into the drainage ditch located on the northern portion of the Site.

Off-site sources of stormwater combine with Site stormwater and discharge through the outfalls on the Site.

Based on information evaluated in this RI, stormwater runoff from the four outfalls at the Site contains PAHs and/or metals at concentrations greater than the stormwater runoff screening levels. Stormwater runoff from the four outfalls SW-1, SW-2, SW-3 and SW-4 contains lead, mercury, zinc and/or copper at concentrations greater than the screening levels (Figure 7). Stormwater runoff from outfall SW-1 also contains PAHs at concentrations greater than the screening levels (Figure 10).

Stormwater at the Site runs off of contaminated soil surfaces and entrains soil particles that are then transported to surface water and sediment in the adjacent marine area. Elevated turbidity (92.6 nephelometric turbidity units [NTUs]) was measured in the stormwater runoff sample with carcinogenic polycyclic aromatic hydrocarbon (cPAH) concentrations greater than the stormwater screening levels indicating that stormwater runoff is transporting soil particles containing cPAHs from the upland area of the Site to surface water and sediment. Remedial action alternatives for stormwater runoff will be coordinated with remedial action alternatives for soil as contaminated soil is a source to contamination in stormwater runoff.

2.3.4 Sediment

The upper shoreline is generally armored along the majority of the Site with materials including concrete (such as chunks, blocks and slabs), metal debris, and wood bulkheads. Sediment and material present in the upper shoreline portion of the Site consists of gravel and sand mixed with brick along the southern portion of the upper shoreline and gravel, sand, and silt with some metal debris along the northern portion of the upper shoreline.

Sediment in the lower marine area has been investigated at 27 locations to depths of up to approximately 8 feet below the mudline. Sediment sampling locations in the marine area are shown on Figure 6. In general, sediment observed at surface and subsurface sampling locations consists of native sediment and anthropogenic materials. Native sediment consists of marine deposits of silts to sands with shells and shell fragments. Anthropogenic material predominantly consists of wood debris including sawdust and/or processed lumber pieces. Where present, sawdust and/or processed lumber pieces are most abundant at depths ranging from 1.5 feet to 3 feet below mudline. Wood debris was not documented in any of the surface sediment (0 to 10 centimeters [cm]) samples.

Based on the information evaluated in this RI, sediment in the following areas contains contaminant concentrations greater than the sediment cleanup levels:

- The area east of the Structural Shop and former Tank Shop in the central portion of the marine area has sediment with mercury concentrations greater than the cleanup level. The vertical extent is estimated to be from near the sediment surface to between 4 and 6 feet below mudline (Figure 7).
- The area on the northern portion of the marine area has sediment with total petroleum hydrocarbons at a concentration greater than the cleanup level (Figure 9). The vertical extent is assumed to be from the surface to a depth of approximately 1 foot below the mudline.
- The northern portion of the marine area has sediment with PAH concentrations greater than cleanup levels (Figure 10). The PAH results indicate that erosion of PAH contaminated soil from the upland area at the shoreline and/or via stormwater runoff are a likely source of PAH contamination in sediment. The vertical extent is estimated to be from the surface to a depth of between approximately 1 foot and 2 feet below the mudline.
- The northern portion of the marine area has sediment with phthalate concentrations greater than cleanup levels (Figure 11). The phthalate results indicate that stormwater runoff is a likely source of phthalate concentrations greater than the cleanup level. The vertical extent is estimated to be from the surface to a depth of between approximately 1 foot and 2 feet below the mudline.

Remedial action alternatives for sediment were developed for all of these areas that are protective of human and ecological receptors. Remedial action alternatives for sediment will be coordinated with soil and stormwater remedial actions as these media are sources to contamination in sediment.

3.0 CLEANUP REQUIREMENTS

The MTCA cleanup regulations specify that a remedial action must comply with cleanup levels for contaminants present at the Site, meet the cleanup levels at the points of compliance, as well as comply with applicable or relevant and appropriate requirements (ARARs) based on federal and state laws (WAC 173-340-710). RAOs consist of goals for protecting human health and the environment based on the conceptual site models, and provide the objectives for the cleanup requirements. The Site RAOs, cleanup levels, points of compliance, and ARARs for the selected remedial action are briefly summarized in the following sections.

3.1 Remedial Action Objectives

This section presents the RAOs that are applicable to the Site. RAOs consist of chemical- and medium-specific goals for protecting human health and the environment. The RAOs specify the media and contaminants of interest, potential exposure routes and receptors, and proposed cleanup goals. Because of the substantial differences between the upland and marine area physical environments, resources/uses, and cleanup standards, as well as anticipated differences in cleanup-related construction logistics, separate remedial action alternatives were developed in the FS for the upland and marine areas. The RAOs for the upland and marine areas are summarized in the following sections.

3.1.1 Upland Area Soil, Groundwater and Stormwater Runoff

The objective of the proposed upland area remedial action is 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, groundwater, and stormwater runoff in accordance with the MTCA Cleanup Regulation (WAC 173-340) and other applicable regulatory requirements. Specifically, the objective of the upland area cleanup is to mitigate risks associated with the following potential exposure routes and receptors:

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

The cleanup goal for the upland area is to mitigate these risks by meeting the soil and groundwater cleanup levels and screening levels for stormwater runoff identified in Section 3.2.

3.1.2 Marine Area Sediment

The objective of the proposed marine area cleanup action is 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), SMS regulations (WAC 173-204) and other applicable regulatory requirements. Specifically, the objective of the sediment cleanup is to mitigate risks associated with the following potential exposure routes and receptors:

- Contact (dermal or incidental ingestion) by residents, visitors, workers (including dredging/excavation workers) and other Site users with hazardous substances in sediment;
- Ingestion by Site visitors of marine organisms contaminated by Site-related hazardous substances in sediment;
- Exposure of benthic organisms to Site-related hazardous substances in the biologically active zone of sediment (the upper 10 cm of the sediment column); and

- Ingestion by aquatic organisms of benthic organisms contaminated by Site-related hazardous substances in sediment;

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

3.2 Cleanup Standards

Cleanup standards consist of cleanup levels that are protective of human health and the environment and the points of compliance at which the cleanup levels must be met. Proposed Site-specific cleanup standards were developed in the RI and adopted during preparation of the FS for the purpose of developing the RAOs described above for the Site. The proposed media-specific cleanup levels (screening levels for stormwater runoff) along with the points of compliance are summarized below.

3.2.1 Soil

Cleanup levels for soil that are protective of human health and terrestrial ecological receptors were developed in accordance with MTCA requirements. Based on current zoning and anticipated future use, cleanup levels for Site soil are for unrestricted land use and are based on MTCA Method A and Method B soil cleanup levels. In general the most conservative criteria (i.e., lowest of MTCA Method A and Method B) were identified as the cleanup level unless background concentrations for soil were greater than the cleanup level.

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

3.2.2 Groundwater

The highest beneficial use of groundwater at the Site is based on the protection of surface water in Budd Inlet. Accordingly, surface water standards are applicable for groundwater at the Site where groundwater enters the surface water. In general, the most conservative (i.e., lowest) published numerical values selected from available state and federal surface water criteria were selected as the cleanup level for groundwater.

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 the marine water of Budd Inlet.

3.2.3 Stormwater Runoff

The cleanup levels developed for groundwater that were developed for protection of surface water are adopted as stormwater runoff screening levels for the Site to evaluate potential impacts from Site stormwater runoff. Additionally, the industrial stormwater general permit benchmark criteria for total metals, excluding mercury, are also applied as stormwater runoff screening levels. The total mercury criteria from the industrial stormwater general permit benchmark criteria is not used as the total mercury criteria developed for groundwater is more conservative (i.e., lower).

Because the stormwater screening levels are based on protection of marine surface water and industrial stormwater general permit benchmark criteria, the proposed conditional point of compliance for the stormwater screening levels is the point or points where stormwater discharges into the marine water of Budd Inlet.

3.2.4 Sediment

Sediment cleanup levels were developed according to SMS requirements and direction provided by Ecology. The lower of the SMS criteria [i.e., lower of Sediment Quality Standard (SQS) and Cleanup Screening Level (CSL)] are selected as the sediment cleanup level to compare analytical results of sediment samples with a total organic carbon (TOC) concentration within the range of 0.5 to 3.5 percent. Prior to comparing results to SMS criteria, chemical concentrations of non-ionizable Semivolatile organic compounds (SVOCs) and Polychlorinated biphenyl (PCBs) are organic carbon normalized. The lower of the apparent effects threshold (AET) criteria [i.e., lower of the Lowest Apparent Effects Threshold (LAET) and 2nd LAET (2LAET)] are selected as the sediment cleanup level to compare analytical results for samples with TOC concentrations outside of the 0.5 to 3.5 percent range.

Currently, there is no promulgated SMS criterion for total petroleum hydrocarbons (i.e., the sum of diesel- and oil-range petroleum hydrocarbons) in sediment and tributyltin ion in sediment porewater. For the Reliable Steel Site, total petroleum hydrocarbons are evaluated against the screening level of 100 milligrams per kilogram (mg/kg) as requested by Ecology and the results for tributyltin ion are evaluated against the Dredge Material Management Program (DMMP) screening level of 0.15 micrograms per liter (µg/L).

For marine sediment potentially affected by Site-related hazardous substances, the point of compliance for protection of the environment is surface sediment within the biologically active zone. The biologically active zone is represented by samples collected across the top 10 cm (i.e., 0 to 4 inches) of the sediment column.

3.3 Applicable Regulatory Requirements

In addition to the cleanup standards developed through the MTCA process and presented above, other regulatory requirements must be considered in the selection and implementation of the cleanup action. MTCA requires the cleanup standards to be “at least as stringent as all applicable state and federal laws” [WAC 173-340-700(6)(a)]. Besides establishing minimum requirements for cleanup standards, applicable state and federal laws may also impose certain technical and procedural requirements for performing cleanup actions. These requirements are described in WAC 173-340-710. Table 1 presents the ARARs identified as being applicable at this Site.

The marine area remedial action is anticipated to qualify for a U.S. Army Corps of Engineers (USACE) Nationwide Permit 38 (NWP 38). Nevertheless, federal consultation under the Endangered Species Act, Section 401 Water Quality Certification, and other substantive requirements must still be met by the remedial action. Ecology will be responsible for issuing the final approval for the remedial action, following consultation with other state and local regulators. The USACE will separately be responsible for issuing approval of the project under NWP 38, following Endangered Species Act consultation with the federal Natural Resource Trustees, and also incorporating Ecology’s 401 Water Quality Certification.

4.0 ALTERNATIVES CONSIDERED AND BASIS FOR REMEDY SELECTION

This section summarizes the results of the development and evaluation of remedial action alternatives performed in the RI/FS.

4.1 Remedial Alternatives Considered

A range of potential cleanup action alternatives were evaluated in the RI/FS report (GeoEngineers, 2013). The process of developing remedial alternatives for evaluation involved screening applicable remediation technologies for inclusion in a reasonable set of complete remedial action alternatives. Each remedial action alternative addresses the contaminated media present in the upland and marine areas of the Site. The screening and assembly of remedial technologies resulted in four complete remedial action alternatives that were evaluated in the RI/FS. The four remedial alternatives are listed below and described in more detail in Table 2.

- Alternative 1 – Upland Area and Marine Area Capping;
- Alternative 2 – Upland Area Capping and Marine Area Hot Spot Removal;
- Alternative 3 – Upland Area Capping and Marine Area Removal; and
- Alternative 4 – Upland Area and Marine Area Removal.

4.2 Evaluation Methodology

The four remedial alternatives developed in the FS were evaluated in accordance with the process outlined in MTCA.

As a first step, the alternatives were evaluated with respect to the threshold requirements. Remedial action alternatives that do not comply with the threshold requirements are not considered suitable cleanup actions under MTCA. As provided in WAC 173-340-360(2)(a), the four threshold requirements for cleanup actions are:

- Protect human health and the environment;
- Comply with cleanup standards;
- Comply with applicable state and federal laws; and
- Provide for compliance monitoring.

The MTCA disproportionate cost analysis (DCA) process was used to further evaluate which of the alternatives are permanent to the maximum extent practicable. As outlined in WAC 173-340-360(3)(e), MTCA provides a methodology that uses the criteria listed below to determine whether the costs associated with each cleanup alternative are disproportionate relative to the incremental benefit of the alternative above the next lowest-cost alternative. The comparison of benefits relative to costs may be quantitative, but will often be qualitative. Costs are disproportionate to benefits if the incremental costs of the more permanent alternative exceed the incremental degree of benefits achieved by the other lower-cost alternative [WAC 173-340-360(e)(i)]. Where two or more alternatives are equal in benefits, Ecology selects the less costly alternative [WAC 173-340-360(e)(ii)(c)]. Seven criteria are used in the disproportionate cost analysis as specified in WAC 173-340-360(2) and (3) that include the following:

- Protectiveness;
- Permanence;
- Cost;
- Long-Term Effectiveness;
- Management of Short-Term Risks;
- Implementability; and
- Consideration of Public Concerns.

Each of the MTCA criteria used in the DCA are described below.

PROTECTIVENESS

The overall protectiveness of a cleanup action alternative is evaluated based on several factors. First, the extent to which human health and the environment are protected and the degree to which overall risk at a Site is reduced are considered. Both on-site and off-site reduction in risk resulting from implementing the alternative are also considered.

PERMANENCE

MTCA specifies that when selecting a cleanup action alternative, preference shall be given to actions that are "permanent solutions to the maximum extent practicable." Evaluation criteria include the degree to which the alternative permanently reduces the toxicity, mobility or mass of hazardous substances, including the effectiveness of the alternative in destroying the hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment processes, and the characteristics and quantity of treatment residuals generated.

COST

The analysis of remedial action alternative costs under MTCA includes all costs associated with implementing an alternative, including design, construction, long-term monitoring, and institutional controls. Costs are intended to be comparable among different alternatives to assist in the overall analysis of relative costs and benefits of the alternatives. The costs to implement an alternative include the cost of construction, the net present value of any long-term costs, and agency oversight costs. Long-term costs include operation and maintenance costs, monitoring costs, equipment replacement costs, and the cost of maintaining institutional controls. Unit costs used to develop overall remediation costs for this FS were derived using a combination of published engineering reference manuals (i.e., R.S. Means); construction cost estimates solicited from applicable vendors and contractors; review of actual costs incurred during similar, applicable projects; and professional judgment.

LONG-TERM EFFECTIVENESS

Long-term effectiveness is a parameter that expresses the degree of certainty that the alternative will be successful in maintaining compliance with cleanup standards over the long-term performance of the cleanup action. The MTCA regulations contain a specific preference ranking for different types of technologies that is to be considered as part of the comparative analysis. The ranking places the highest preference on technologies such as reuse/recycling, treatment, immobilization/solidification, and disposal in an engineered, lined, and monitored facility. Lower preference rankings are applied for technologies such as on-site isolation/containment with attendant engineered controls, and institutional controls and monitoring.

MANAGEMENT OF SHORT-TERM RISKS

Evaluation of this criterion considers the relative magnitude and complexity of actions required to maintain protection of human health and the environment during implementation of the cleanup action. Cleanup actions carry short-term risks, such as potential mobilization of contaminants during construction, or safety risks typical of large construction projects. In-water dredging activities carry a risk of temporary water quality degradation and potential sediment recontamination. Some short-term risks can be managed through the use of best practices during project design and construction, while other risks are inherent to project alternatives and can offset the long-term benefits of an alternative.

IMPLEMENTABILITY

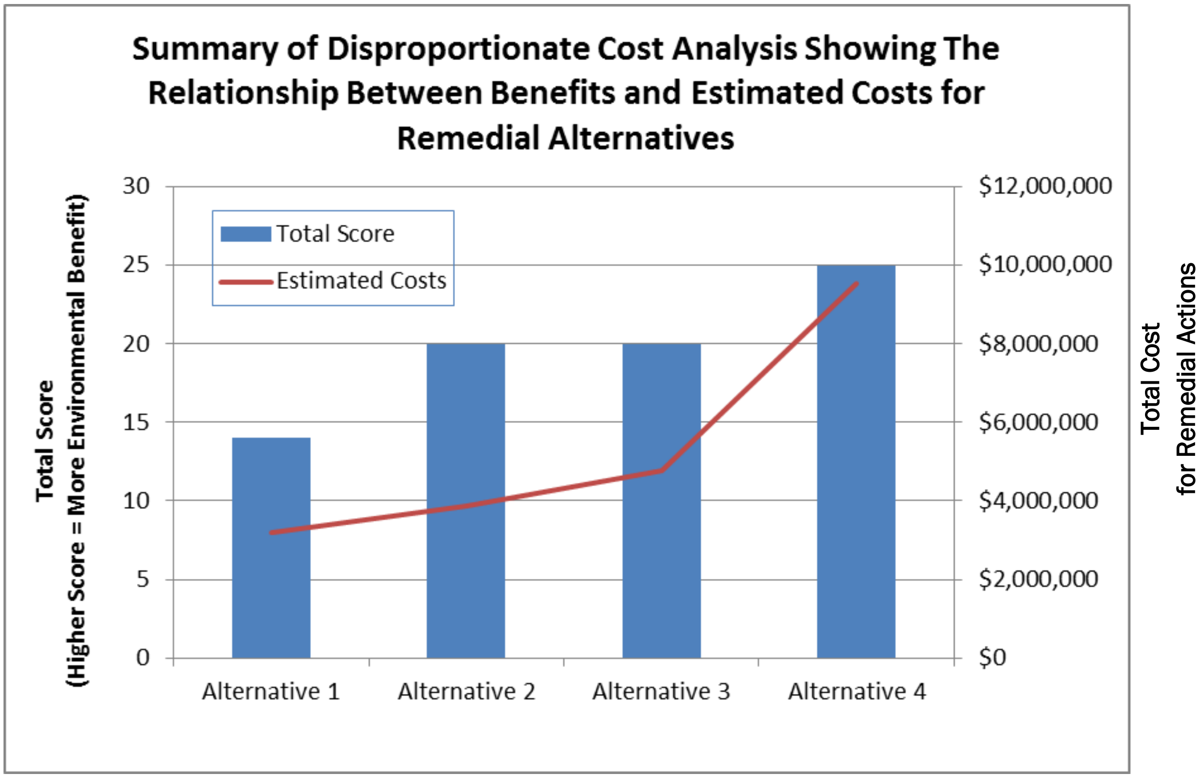
Implementability is an overall metric expressing the relative difficulty and uncertainty of implementing the remedial action. Evaluation of implementability includes consideration of technical factors such as the availability of mature technologies and experienced contractors to accomplish the cleanup work. It also includes administrative factors associated with permitting and completing the cleanup.

CONSIDERATION OF PUBLIC CONCERNS

The public involvement process under MTCA is used to identify potential public concerns regarding remedial action alternatives. The extent to which an alternative addresses those concerns is considered as part of the evaluation process. This includes concerns raised by individuals, community groups, local governments, tribes, federal and state agencies, and other organizations that may have an interest in or knowledge of the Site. In particular, the public concerns for this Site would generally be associated with environmental concerns and performance of the remedial action, which are addressed under other criteria such as protectiveness and permanence.

4.3 Evaluation And Comparison Of Alternatives

The evaluation of remedial alternatives performed in the FS showed that all four alternatives met the MTCA threshold requirements and warranted inclusion in the DCA evaluation process. The evaluation of disproportionate cost is based on a comparative analysis of costs against the six MTCA evaluation criteria identified above. Relative rankings of each alternative for these criteria using a numeric scoring scale of 1 (lowest) to 5 (highest) are summarized in Table 3. Table 4 summarizes how each alternative scores with respect to each of the DCA criterion and presents the estimated cost for each of the alternatives. Additionally, the chart below shows how each alternative scores according to the DCA criteria and how the relative benefit corresponds to the relative cost of each alternative. The conclusions of DCA evaluation are summarized in the following sections.



Notes:

Vertical bars represent scoring for environmental benefit for each alternative.
The scale for scoring of environmental benefit is on the left axis.
Horizontal line represents cost for each alternative.
The scale for the cost of the remedial actions is on the right axis.

PROTECTIVENESS

Remedial Alternative 4 achieves the highest level of protectiveness of the alternatives as a result of achieving the maximum feasible removal of soil and sediment exceeding cleanup levels. Alternatives 1 through 3 share the same proposed remedial actions for the upland area of the Site and achieve lower levels of protectiveness relative to Alternative 4. Alternatives 2 and 3 provide similar levels of protectiveness with Alternative 3 being only slightly more protective because more removal of sediment is preformed. Alternative 1 is less protective relative to the other alternatives because it leaves the most contaminants in place and relies on institutional controls to maintain protection of human health and the environment.

PERMANENCE

Remedial Alternative 4 achieves a high level of permanence through removal of the largest amount of soil and sediment with contaminant concentrations that exceed cleanup levels. The permanence of Remedial Alternatives 2 and 3 are lower than Alternative 4 as a result of maintaining upland contaminant mass on Site by relying on capping methods and institutional controls. Remedial Alternative 1 would be expected to have the lowest permanence as it utilizes capping methods for the upland and marine areas.

LONG-TERM EFFECTIVENESS

The long-term effectiveness of the remedial alternatives has relative rankings similar to those described above for the Permanence category. The long-term effectiveness relies heavily on using proven technologies to remove contaminant mass. Alternatives that rely primarily (Alternative 1) or partially (Alternatives 2 and 3) on capping and/or institutional controls to protect human health and the environment, while leaving contaminants in place have lower long-term effectiveness as a result of the need to monitor the cap and the potential for the need to revisit the cleanup action in the event of failure. Alternative 4 relies on removal of contaminant mass from the Site to the greatest extent practicable and, therefore, achieves the highest level of long-term effectiveness.

MANAGEMENT OF SHORT-TERM RISKS

Remedial Alternatives 1 through 4 involve soil and/or sediment removal, including excavation near and within the shoreline. However, the relative difference between the short-term risks associated with the four remedial alternatives is low. The short-term risk associated with Remedial Alternative 1 is lower than the other three alternatives as a result of the reduced scope of the intrusive earthwork. However, Alternative 1 involves earthwork associated with upland and marine capping and soil removal, reducing the difference between the Alternatives.

TECHNICAL AND ADMINISTRATIVE IMPLEMENTABILITY

All of the Remedial Alternatives are generally technically implementable using commonly available methods. Alternative 1 has a significantly reduced level of administrative implementability associated with the likely need for mitigation required to account for habitat loss associated with placement of a cap in the marine area of the Site. Alternative 2 rates the highest for implementability due to the relatively reduced level of earthwork required. Alternatives 3 and 4 have slightly reduced technical implementability relative to Alternative 2 because these alternatives include more extensive removal of sediments in the marine area. It is assumed that sediment removal may be conducted using land-based equipment during low tides, but there may be some implementability issues associated with removal of sediments in the intertidal area.

COST

The cost estimates for Remedial Alternatives 1 through 4 were developed as described in Table 2.

- **Remedial Alternative 1** (Upland Area and Marine Area Capping) has an estimated cost of approximately $3.20 million. This alternative includes the removal of approximately 2,060 cubic yards of contaminated soil and metal debris.
- **Remedial Alternative 2** (Upland Area Capping and Marine Area Hot Spot Removal) has an estimated cost of approximately $3.86 million. This alternative includes the removal of approximately 2,060 cubic yards of contaminated soil and metal debris and approximately 2,500 cubic yards of contaminated sediment.
- **Remedial Alternative 3** (Upland Area Capping and Marine Area Removal) has an estimated cost of approximately $4.76 million. This alternative includes the removal of approximately 2,060 cubic yards of contaminated soil and metal debris and approximately 5,200 cubic yards of contaminated sediment.

- **Remedial Alternative 4** (Upland Area and Marine Area Removal) has an estimated cost of approximately $9.55 million. This alternative includes the removal of approximately 25,200 cubic yards of contaminated soil and metal debris and approximately 5,200 cubic yards of contaminated sediment.

4.3.1 Reasonable Restoration Time Frame

The time frame for design, permitting, contracting, and construction for all of the proposed remedial alternatives is expected to be on the order of two to three years. The time frame for natural recovery of contaminated sediment is dependent of physical (i.e., deposition), biological (i.e., biodegradation, bioturbation, etc.), and chemical (i.e., transformation) processes but could be up to 10 years. Management of institutional controls in the form of restrictive covenants would be required for the contaminated upland soil left in place under Alternatives 1, 2 and 3 and would be required for the contaminated sediment left in place under all remedial alternatives. Long-term monitoring may be necessary to ensure compliance with the environmental covenants established as part of institutional controls. These requirements would extend the duration of the associated alternatives as described in Table 2.

4.3.2 Considerations of Public Concerns

The remedial alternatives proposed for the Site are generally expected to be acceptable to the public. The alternatives that achieve the greatest level of protection and certainty rely on the greatest level of soil and sediment removal and result in the most intrusive Site activities. Remedial Alternative 4, which involves significant removal of contaminated soil and sediment, scored the highest for this criterion (i.e., low to moderate public concern). Remedial Alternatives 2 and 3 rely more on capping methods as components of the upland remedial actions relative to Alternative 4 and therefore, were lower than Alternative 4 for this criterion. Remedial Alternative 1, which relies predominantly on capping, would be expected to have a lower level of acceptance by the public and therefore, was scored lower than the other alternatives.

5.0 SELECTED SITE CLEANUP ACTION

Based on the comparative analysis presented in the FS, the preferred remedial action alternative for the Site is Remedial Alternative 2. Figure 13 presents the remedial actions to be performed at the Site as part of Remedial Alternative 2. This alternative reduces immediate risk to potential human and ecological receptors through:

- Removal of metals-contaminated upland soil and metal debris that is contributing to groundwater exceedances of cleanup levels;
- Removal of gasoline-contaminated soil;
- Removal of a UST and associated diesel-contaminated soil;
- Capping the upland area of the Site along with institutional controls;
- Monitoring of the natural attenuation of metals concentrations in groundwater;
- Stormwater collection and conveyance system removal and replacement to eliminate transport of contaminated upland media in stormwater runoff;

- Hot spot removal of the most contaminated sediments in the marine area;
- Monitored natural recovery of contaminated sediments outside the hot spot removal area; and
- Implementation of institutional controls.

The following sections provide additional detail on the preferred remedial action alternative.

5.1 Demolition

Demolition is necessary to effectively conduct upland area capping and marine area hot spot removal. In addition, demolition of existing structures would support future redevelopment of the Site. Structures to be demolished as part of upland area demolition activities include the following (Figures 2 and 3):

- Structural Shop – Components of the structure including: walls; roof; concrete foundations and slabs; as well as other structural components and utilities (for example components of the stormwater collection and conveyance system, power and sewer).
- Paint Shop – Components of the structure including: walls; roof; concrete foundations, slabs, and floors; as well as other structural components and utilities (for example components of the stormwater collection and conveyance system, power and sewer).
- Tank Shop – Remaining components of the structure including concrete foundations, pads, and floors as well as other structural components and utilities (for example components of stormwater collection and conveyance system, power and sewer).
- Buttress/Foundation on Northern Boundary of Site – Large concrete structure that is on northeast corner of the upland area adjacent to the marine area.
- Rail Crane – Remaining concrete foundations and footings.
- Other Remaining Structures and Remnant Debris – Other remaining structures (such as bulkheads) and remnant debris (such as wood and concrete) present that will interfere with remedial actions in the upland marine area.

Note that the remaining structures (such as piling and foundations.) associated with the former Maintenance Building will be removed as part of removing soil and metal debris.

Structures to be demolished as part of marine area demolition activities include the following:

- Buttresses/Foundations Along Shoreline – Multiple large concrete buttresses/foundations are present on the shoreline east of the former Tank Shop, Structural Shop, and Paint Shop in the marine area.
- Rail Crane – Remaining wood components and concrete foundations and footings present in the marine area.
- Other Remaining Structures and Remnant Debris – Other remaining structures, piling, and remnant debris present in the marine area that will interfere with the remedial actions within the identified hot spot removal area.

For cost estimating purposes it was assumed that all demolition, removal, and disposal or recycling would be expected to be performed using land-based equipment during low tide. Demolition materials would be removed from the Site and recycled to the extent practicable or disposed of at an appropriate disposal facility.

5.2 Excavation and Off-site Disposal of Material Contributing to Groundwater Exceedances

Soil and/or metal debris containing metals at concentrations greater than cleanup levels is present at the surface within the footprint of the former Maintenance Building and along the upper shoreline in the central portion of the Site (Figure 7). Groundwater adjacent to and downgradient of these areas exceeds cleanup levels. Remediation of groundwater (for example natural attenuation of metals in groundwater) is not effective without removal of the source of the metals contamination. Therefore, for the remedial action to be protective of groundwater, the source of metals contamination to groundwater must be removed. Natural attenuation is anticipated to be an effective remedy for groundwater after source removal.

Figure 13 identifies the approximate areas to be excavated to remove metal debris and metals contaminated soil that is the source of metals contamination in groundwater as part of the Remedial Alternative 2. Soil in the area of the former Maintenance Building would be excavated to an approximate depth of 2 feet below the existing ground surface to remove metal debris observed at the surface and soil with metals concentrations greater than the cleanup levels. Metal debris located along the upper shoreline would be excavated to an assumed depth of 3 feet.

The excavated soil and metal debris would be characterized for disposal as required by MTCA, the Washington State Dangerous Waste Regulations and the disposal facility. The contaminated soil is anticipated to fall into two categories: non-dangerous waste suitable for disposal at a Subtitle D landfill (or similar facility approved by the local permitting agency and Ecology) or Dangerous Waste requiring disposal at a Subtitle C landfill.

For soil to be categorized as non-dangerous waste and suitable for disposal at a Subtitle D landfill (or similar facility approved by the local permitting agency and Ecology), it would be necessary to demonstrate that Site contaminants are not present at concentrations greater than 10 times the Universal Treatment Standards (UTS), as defined in 40 CFR 268.48 and/or the results of toxicity characteristic leaching procedure (TCLP) testing for metals that indicate that the excavated material does not designate as Dangerous Waste based on Toxicity Characteristic Criteria (Chapter 173-303 WAC).

It is anticipated that some of the excavated soil and/or metal debris would designate as Dangerous Waste and therefore, would be precluded from disposal at a Subtitle D (or similar) landfill. For cost estimating purposes, it is assumed that 25 percent of the soil and metal debris excavated from the former Maintenance Building and shoreline in the central portion of the Site would fail TCLP and thus would need to be disposed of at a Subtitle C landfill.

5.3 Excavation and Off-Site Disposal of Gasoline Contaminated Soil

As discussed in Section 7.0 of the RI, gasoline concentrations greater than cleanup levels are present in soil within the footprint of the former Maintenance Building and adjacent to the former Maintenance Building to the north. As BTEX data is not currently available for these locations, it has been assumed for the purposes of this RI/FS, that BTEX compounds are present at concentrations greater than soil cleanup levels and concentrations that would result in soil vapor intrusion and an inhalation exposure above acceptable risk levels. Therefore, the gasoline contaminated soil would need to be addressed as part of the remedial alternatives.

Figure 13 identifies the areas to be excavated to remove gasoline contaminated soil as part of Remedial Alternative 1 and includes:

- Soil in a relatively small area north of the former Maintenance Building would be excavated to an approximate depth of 13 feet bgs to remove soil contaminated with gasoline-range petroleum hydrocarbons.
- Soil in a small area within the eastern portion of the former Maintenance Building would be excavated to an approximate depth of 6 feet bgs to remove soil contaminated with gasoline-range petroleum hydrocarbons. This area overlaps with the area of metals-contaminated soil mentioned above, but the gasoline-contaminated soil would be expected to be located deeper.

The excavated soil and metal debris would be characterized for disposal as required by MTCA, the Washington State Dangerous Waste Regulations and the disposal facility. The gasoline contaminated soil is anticipated be non-dangerous waste suitable for disposal at a Subtitle D landfill (or similar facility approved by the local permitting agency and Ecology).

5.4 UST Decommissioning and Excavation and Off-site Disposal of Diesel Contaminated Soil

A UST, located southwest of the former Tank Shop (Figures 2 and 13) has been identified to be the likely source of diesel contaminated soil in this area. Information was not identified indicating that the UST was decommissioned or removed. Therefore, the UST remains a potential source of petroleum hydrocarbons to the surrounding soil and groundwater. As part of Remedial Action Alternative 2, the UST would be decommissioned and removed in accordance with local and state UST regulations and the associated diesel-contaminated soil would be excavated and disposed of off-site.

Soil in the vicinity of the UST would be excavated to an approximate depth of 7 feet bgs to remove soil contaminated with diesel-range petroleum hydrocarbons based on soil analytical data presented in the RI. Excavated soil would be characterized for disposal as required by MTCA, the Washington State Dangerous Waste Regulations and the disposal facility. Based on soil samples collected in the vicinity of the UST, the contaminated soil would be expected to be categorized as non-dangerous waste suitable for disposal at a Subtitle D landfill (or similar facility approved by the local permitting agency and Ecology). For cost estimating purposes, it is assumed that all of the diesel-contaminated soil removed adjacent to the UST would be disposed of at a Subtitle D (or similar) landfill.

5.5 Upland Area Capping

As part of Remedial Alternative 2, contaminated soil in the upland area would be capped to isolate the soil and limit the exposure of humans and ecological receptors to the contaminated soil that remains at the Site. The specific future development plans for the Site are unknown at this time, but it is anticipated that the Site will be used as a mixed commercial/residential property. The property is expected to be developed with a mixture of buildings, pavement, planting areas and vegetative cover.

For the purposes of the FS, it was assumed that the cap on half of the upland area would be composed of infrastructure (i.e., buildings with concrete floors, etc.) and pavement (i.e., asphalt or concrete) while the cap on the remaining half of the upland area would be composed of soil (i.e., planting areas, vegetative cover) or aggregate (for example gravel.). In the areas where a soil or aggregate material is used as cap, a geotextile will be placed between the contaminated soil and capping material to act as a visual indication of the limits of the cap. Then a 2-foot thick layer of clean soil or aggregate would be placed to create a physical barrier between the contaminated soil and Site users. Figure 13 identifies the extent of capping associated with Remedial Alternative 2. For cost estimating purposes, it was assumed that 50 percent of the upland cap area will be a soil cap, 25 percent of the area will be an asphalt pavement cap, and the remaining 25 percent of the area will be capped by structures (i.e., buildings with concrete floors, etc.).

5.6 Groundwater Monitoring

The removal and off-site disposal of metal debris and soil containing metals is anticipated to result in a reduction of metals concentrations in groundwater thereby alleviating the need for active groundwater remediation. To verify that the removal of metals-contaminated soil and metal debris is effective at reducing metals concentrations in groundwater and that natural attenuation of groundwater is occurring, new monitoring wells would be installed near the point of compliance adjacent to the shoreline following completion of the soil and metal debris removal activities.

For cost estimating purposes, it was assumed that the existing monitoring wells would be decommissioned as part of remedial actions at the Site and that four new monitoring wells would be installed adjacent to the shoreline to monitor the natural attenuation of metals concentrations in groundwater. The monitoring wells would be sampled and analyzed for contaminant concentrations as well as indicators of natural attenuation during at least eight monitoring events to demonstrate that impacts to groundwater have been addressed. Groundwater monitoring will be conducted on a quarterly basis for the first year. Ecology will then review the groundwater data to determine if quarterly monitoring should continue or if the frequency can be reduced (such as annual or semi-annual).

5.7 Stormwater Collection and Conveyance System

The stormwater collection and conveyance system is a likely transport pathway for contaminated soil and groundwater to the marine waters of Budd Inlet. This remedial alternative includes removal and replacement of the existing stormwater collection and conveyance system. The following assumptions regarding replacement of the stormwater collection and conveyance system were made for cost estimating purposes:

- The four existing outfalls and associated piping will be replaced with new material that is sealed or gasketed to not allow infiltration out of or into the stormwater conveyance system.
- Installation of 16 new catch basins at the Site.
- Lining the trenches used for installation of the new stormwater system with geotextile and backfilling the trenches with clean, imported material.
- Connecting new stormwater conveyance and collection piping to any existing upstream stormwater piping.

It is important to note that the replacement of the stormwater collection and conveyance system would need to be integrated with the specific needs of future development at the Site and the quantity assumptions identified above (such as 16 catch basins) are conceptual in nature and are only for cost estimating purposes.

5.8 Marine Area Hot Spot Removal

As part of Remedial Alternative 2, sediment in the nearshore marine area containing the highest concentrations of multiple contaminants (i.e., metals, petroleum hydrocarbons, PAHs, and phthalates) and at concentrations greater than SMS CSL levels would be removed and disposed of off-site. The SMS CSL levels correspond to chemical concentrations that result in minor adverse effects to the benthic community (Chapter 173-204 WAC). The extent of the marine area hot spot removal is identified in Figure 13. The hot spot removal would include dredging to a maximum depth of 3 feet below the mudline and backfilling with imported material. Areas in the nearshore marine area where contaminant concentrations are greater than the cleanup level after dredging to a depth of 3 feet, will be capped with 3 feet of capping material to isolate and contain the remaining sediment and limit the exposure of human and ecological receptors to the contaminants present in the sediment. Remedial Alternative 2 will remove nearshore sediment with the highest contaminant concentrations as well as allow placement of a cap in areas where contaminated sediment remains at depth without changing the elevation of the sediment surface, alleviating the need for mitigation for loss of aquatic habitat.

In the area were mercury is present in sediment (Figure 7), it is assumed that dredging will be performed to the maximum depth of 3 feet and backfill material will be placed as a cap because the sediment remaining at the base of the dredge area upon completion of dredging will contain contaminant concentrations greater than the cleanup level. In areas where PAHs, phthalates, and petroleum hydrocarbons are present and mercury is not present, it is assumed that dredging will be performed to a depth of 2 feet below the mudline and backfill material will not be considered to be a cap because sediment remaining at the base of the dredge area upon completion of dredging will have contaminant concentrations less than the cleanup level.

It is anticipated that a total of approximately 2,500 cubic yards of sediment would be removed and disposed of off-site in a Subtitle D landfill (or similar facility approved by the local permitting agency and Ecology) as part of Remedial Alternative 2. The sediment removed would be replaced with clean imported backfill material to maintain bathymetric elevations. For cost estimating purposes it is assumed that marine area hot spot removal would be conducted using land-based construction equipment and temporary sheet piling to conduct dredging/excavation without tidal inundation. To the extent practical, backfill placement would incorporate habitat enhancement features.

5.9 Natural Recovery of Contaminated Sediment

Sediment present beyond the area identified above for marine area hot spot removal (Figure 13) contains phthalates at concentrations greater than the cleanup levels. Natural recovery was identified for sediment in this area as part of Remedial Alternative 2 based on a reduction in source loading from the Site as a result of the remedial actions to be performed as part of Remedial Alternative 2 and the estimated deposition rates and phthalate concentrations identified in recent studies of Budd Inlet.

Completion of upland area capping, marine area hot spot removal, and removal and replacement of the stormwater collection and conveyance system as part of Remedial Alternative 2 is anticipated to substantially reduce the source loading of contaminants from upland media to sediment in the area identified for natural recovery. Based on a reduction in contaminant loading and anticipated deposition of sediment with concentrations of phthalates less than cleanup levels, it is anticipated that natural recovery would reduce phthalate concentrations to below cleanup levels in a reasonable time frame.

Monitoring of contaminant concentrations in sediment outside of the marine area hot spot removal would be needed to confirm that natural recovery would reduce contaminant concentrations to below cleanup levels in a reasonable time frame. Monitoring of the natural recovery of sediment would include periodic sampling and analysis of surface sediment in the natural recovery area. For cost estimating purposes it was assumed that six monitoring events will be completed to demonstrate that natural recovery of sediment is occurring.

5.10 Institutional Controls

Institutional controls will be required for capping the upland and marine areas of the Site as contaminated soil and sediment will remain beneath caps. Institutional controls such as restrictive environmental convents or deed restrictions would be necessary to ensure that the future activities and development at the Site properly maintain the caps that are installed to contain the contaminated soil and sediment that is left in place. Restrictive environmental covenants would likely require periodic monitoring and maintenance and preparation of a soil management plan. A soil management plan would specify the requirements for performing invasive work in areas where contaminated soil remains in place.

5.11 Construction Performance Monitoring

Construction performance monitoring will involve collecting soil and sediment samples from the sidewalls and/or base of the proposed removal areas to confirm that Site cleanup levels have been achieved. The concentrations of contaminants remaining on Site below cleanup levels will be documented during performance monitoring activities. Specifically, performance monitoring activities will include the following:

- Collect discrete grab samples from the final limits of the upland excavations and sediment dredged area, with the sampling density appropriately tailored to the location and size of the excavation. Detailed post-construction verification sampling plans will be developed during remedial design.
- Confirmatory soil and sediment samples will be submitted for analysis of the contaminants identified in the specific remediation areas to verify that the removal actions are complete or to document remaining contaminant concentrations at the Site.
- Samples will be analyzed on an expedited turnaround-time basis to allow the results to be compared to cleanup levels during remedial excavation/dredging to evaluate whether the final limits of the remedial excavations have been achieved.
- Topographic and bathymetric surveys will be completed to document final as-built elevations following the remedial action.

5.12 Post-Construction Confirmation Monitoring

Post-construction confirmation monitoring would be performed to confirm natural attenuation of metals concentrations in groundwater, maintenance of upland soil caps, and natural attenuation of phthalates in sediment.

The groundwater with metals concentrations greater than cleanup levels identified at the Site are associated with areas of metal debris and metals contaminated soil to be addressed by removal of these materials as part of Remedial Alternative 2. The soil removal proposed in Remedial Alternative 2 is expected to result in a reduction of metals concentrations in groundwater, thereby obviating the need for active groundwater remediation. To verify that the metal debris and soil removal is protective of groundwater, four new monitoring wells would be installed along the shoreline of the Site following completion of the removal activities. The monitoring wells would be sampled and analyzed for contaminant concentrations as well as indicators of natural attenuation during at least four quarterly events to demonstrate that groundwater concentrations are less than the groundwater cleanup levels. Long-term groundwater monitoring may be necessary if initial groundwater monitoring indicates exceedances of groundwater cleanup levels to further monitor the natural attenuation of metals concentrations over time in groundwater at the Site.

Post-construction monitoring would be required to ensure that the cap installed in the upland area of the Site remains intact. The primary purpose of the cap monitoring would be to ensure that soil above the geotextile remains at the desired thickness and is not eroding or being disturbed by Site users exposing the underlying geotextile or contaminated soil.

Post-construction monitoring would be required to ensure that the cap and backfill material installed in the marine area of the Site remains intact. The primary purpose of the cap and backfill monitoring would be to ensure that sediment is not eroding or being disturbed by Site users exposing underlying contaminated sediment.

Monitoring of phthalate concentrations in sediment in the natural recovery areas outside of the marine area hot spot removal would be performed to confirm that natural recovery is reducing phthalate concentrations to below cleanup levels in a reasonable time frame. Monitoring of the natural recovery of sediment would include periodic sampling and analysis of surface sediment in the natural recovery area. Post-construction confirmation monitoring would likely include annual sediment sampling and analysis for contaminant concentrations for the first three years after completion of remedial construction and sediment sampling and analysis at five, seven and 10 years after completion of remedial activities to demonstrate that natural recovery of sediment is occurring.

Specific monitoring procedures and mitigation measures to be performed as part of post-construction confirmation monitoring will be developed as part of remedial design or following completion of remedial action construction.

6.0 IMPLEMENTATION OF THE CLEANUP ACTION

The cleanup action described in this CAP has not been scheduled for construction to date. The cleanup action will require development of remedial design documents, permit applications, and contract documents prior to construction. This section describes the necessary steps to construct the proposed cleanup action following approval of this CAP.

6.1 Permits/Other Requirements

The remedial action is expected to be conducted under an Ecology Agreed Order, Enforcement Order, or Consent Decree. Accordingly, the remedial action meets 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 remedial action will, however, comply with the substantive requirements of applicable State and local laws. The exemption is not applicable if Ecology determines that the exemption would result in the loss of approval from a federal agency that may be necessary for the state to administer any federal law. Permits and substantive requirements applicable to the remedial action are discussed below.

6.1.1 State Environmental Policy Act

The State Environmental Policy Act (SEPA) (Revised Code of Washington [RCW] 43.21C; WAC 197-11) and the SEPA procedures (WAC 173-802) are intended to ensure that State and local government officials consider environmental values when making decisions. A SEPA checklist will be prepared as part of the permitting process for the remedial action.

6.1.2 Washington Shoreline Management Act

The Washington Shoreline Management Act (RCW 90.58) and its implementing regulations establish requirements for substantial developments occurring within water areas of the state or within 200 feet of the shoreline. According to Shoreline Management Act regulations, local shoreline management plans and requirements are adopted under the State regulations, creating an enforceable State law. The Site remedial action will comply with substantive requirements set forth by local jurisdiction, but a shoreline permit will not be required.

6.1.3 Washington Hydraulic Code

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 a Hydraulic Project Approval (HPA) permit (administered by the Washington Department of Fish and Wildlife) be obtained for any activity that could adversely affect fisheries and water resources. Although an HPA permit will not be required for the planned cleanup action, substantive timing restrictions and technical requirements under the code are applicable to planned cleanup and shoreline restoration activities below mean higher high water (MHHW).

6.1.4 Water Quality Permitting

The Clean Water Act (CWA) is the primary Federal law for protecting water quality from pollution. Section 404 of the CWA requires that permits be obtained from the USACE for discharges of dredged or fill material into waters of the United States. The development of a Joint Aquatic Resources Permit Application (JARPA) for submittal to Corp will be required to meet the Section 404 permit requirements.

In addition to the Federal CWA, water quality is regulated by Ecology under the State Water Quality Act (RCW 90.48). Section 401 of the Federal CWA requires the State to certify that Federal permits are consistent with State water quality standards. State and Federal standards for marine waters specified in the Section 404 permit will apply to discharges to surface water during sediment dredging, and to return flows (if necessary) to surface water from dewatering operations.

Construction activities that disturb one acre or more of land need to comply with the provisions of State construction stormwater regulations. Accordingly, an Ecology Construction Stormwater General Permit is required for the cleanup action, to include a stormwater pollution prevention plan or equivalent MTCA construction quality assurance project plan.

6.2 Engineering Design Report

An Engineering Design Report will be prepared that includes construction plans and specifications that document the engineering concepts and design criteria for the remedial action to be performed at the Site. The information required under WAC 173-340-400(4)(a) will be included in the Engineering Design Report. The Engineering Design Report will include an Operations, Maintenance, and Monitoring Plan describing long-term operations, maintenance, and monitoring required following completion of remedial action construction. The Engineering Design Report will also include the proposed language of environmental covenants required to be implemented as institutional controls.

6.3 Construction Plans and Specifications

Construction plans and specifications will be prepared that detail the design criteria and construction requirements to perform the remedial actions at the Site. As required by WAC 173-340-400(4)(b), the documents will include the following information, as applicable:

- A description of the work to be performed, and a summary of the engineering design criteria from the Engineering Design Report;
- A site location map and a map of existing conditions;
- A copy of applicable permit applications and/or approvals;
- Detailed plans, procedures, and specifications necessary for the remedial action;
- Specific quality control tests to be performed to document the construction, including specifications for testing or reference to specific testing methods, frequency of testing, acceptable results, and other documentation methods; and
- Provisions to ensure that the health and safety requirements of WAC 173-340-810 are met.

All aspects of construction will be performed and documented in accordance with WAC 173-340-400(6). These aspects include approval of all of the plans listed above prior to commencement of work, oversight of construction by a Professional Engineer licensed in the State of Washington, and submittal of a Construction Completion Report that documents all aspects of the cleanup and includes an opinion of the engineer as to whether the cleanup was conducted in substantial compliance with the CAP, the Engineering Design Report, and the Construction Plans and Specifications.

6.4 Anticipated Schedule for Design and Implementation

The schedule for design and implementation is not known at this time.

7.0 FIVE-YEAR REVIEW

Because the cleanup action outlined in this CAP will result in hazardous substances remaining at the Site at concentrations exceeding cleanup levels and because environmental covenants are included as part of the remedy, Ecology will review the remedial action described in this CAP every five years to ensure protection of human health and the environment. Consistent with the requirements of WAC 173-340-420, the five-year review shall include the following:

- A review of the title of the real property subject to the environmental covenant to verify that the covenant is properly recorded;
- A review of available monitoring data to verify the effectiveness of completed cleanup actions, including engineered caps and institutional controls, in limiting exposure to hazardous substances remaining at the Site;
- A review of new scientific information for individual hazardous substances or mixtures present at the Site;
- A review of new applicable state and federal laws for hazardous substances present at the Site;
- A review of current and projected future land and resource uses at the Site;
- A review of the availability and practicability of more permanent remedies; and
- A review of the availability of improved analytical techniques to evaluate compliance with cleanup levels.

Ecology will publish a notice of all periodic reviews in the Site Register and will provide an opportunity for review and comment by the potentially liable persons and the public. If Ecology determines that substantial changes in the cleanup action are necessary to protect human health and the environment at the Site, a revised CAP will be prepared and provided for public review and comment in accordance with WAC 173-340-380 and 173-340-600.

8.0 REFERENCES

GeoEngineers, Inc., Revised Remedial Investigation/Feasibility Study,(RI/FS) Former Reliable Steel Site, Olympia, Washington. GEI File No 0504-085-00. June 20 and 28, 2013.

Greylock Consulting, LLC. Revised Work Plan & Work Summary, Remedial Investigation/Feasibility Study, Reliable Steel Site, 1218 West Bay Drive NW, Olympia, Washington. April 7, 2008.

Washington State Department of Ecology (Ecology). Geology and Ground-Water Resources of Thurston County, Washington. January 1961.

Washington State Department of Ecology (Ecology). Washington State Well Log Viewer. 2007.

TABLE 1

SITE SPECIFIC APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

DRAFT CAP

RELIABLE STEEL, OLYMPIA, WASHINGTON

Authorizing Statute	Implementing Regulation	Description	Rationale
Potential Chemical-Specific ARARs			
National Toxics Rule; 33 USC 1251	Water Quality Standards; 40 CFR 131.36(b)(1)	Establishes surface water quality standards that protect aquatic life and human health. Washington adopted these standards in Chapter 173-201A WAC.	Potentially applicable to surface water and potentially relevant and appropriate to stormwater runoff, groundwater, and sediment that may impact surface water quality.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Water Quality Standards for Surface Waters; Chapter 173-201A WAC	Establishes narrative and numeric surface water quality standards for waters of the state.	Potentially applicable to surface water and potentially relevant and appropriate to stormwater runoff, groundwater, and sediment that may impact surface water quality.
Clean Water Act; 33 USC 1251-1387	Section 304a of the Clean Water Act; WAC 173-340-730(2)(b)(i)(B)	Establishes surface water quality standards that protect aquatic life and human health. Washington adopted these standards in Chapter 173-201A WAC.	Potentially applicable to surface water and potentially relevant and appropriate to stormwater runoff, groundwater, and sediment that may impact surface water quality.
Hazardous Waste Management; Chapter 70.105D RCW	Washington Model Toxics Control Act Cleanup Regulation; Chapter 173-340 WAC	Establishes groundwater, surface water, and soil cleanup levels.	Potentially applicable to contaminated soil, groundwater, surface water, and sediment at the Site.
WA Water Pollution Control Act; Chapter 90.48 RCW	Washington Sediment Management Standards; Chapter 173-204 WAC	Establishes sediment cleanup levels.	Potentially applicable to contaminated sediment at the Site.
Potential Location-Specific ARARs			
Shoreline Management Act of 1971; Chapter 90.58 RCW	Shoreline Management Act; Chapters 173-18, 173-22, and 173-27 WAC.	The substantive requirements of this statute and its implementing regulations apply to activities within 200 feet of shorelines in the state.	Proposed remedial actions must be consistent with the approved Washington State coastal zone management program.
Construction Projects in State Waters; Chapter 77.55 RCW	Hydraulic Code Rules; Chapter 220-110 WAC	Apply to work conducted in Puget Sound or within the designated shoreline that changes the natural flow or bed of the water body (and therefore has the potential to affect fish habitat).	May apply to remedial actions that take place on the shoreline.
Endangered Species Act; 16 USC 1531 et seq.	Endangered Species Act; 50 CFR Parts 17, 222, and 402	Act protects fish, wildlife, and plant species whose existence is threatened or endangered.	Applies to cleanup actions that may affect a listed threatened or endangered species or designated critical habitat.
Potential Action-Specific ARARs			
Hazardous Waste Management; Chapter 70.105D RCW	Selection of Cleanup Actions; WAC 173-340-350	Minimum requirements and procedures for conducting remedial investigation and feasibility studies.	Applicable to remedial action selection and implementation.
Hazardous Waste Management; Chapter 70.105D RCW	Institutional Controls; WAC 173-340-440	Institutional control requirements.	Potentially applicable to remedial action selection and implementation.
Hazardous Waste Management; Chapter 70.105D RCW	Compliance Monitoring Requirements; WAC 173-340-410, -720(9), -730(7), -740(7), and -745(8)	Compliance monitoring requirements for soil, groundwater, and surface water.	Potentially applicable to remedial action selection and implementation.

Potential Action-Specific ARARs			
Ecology Area of Contamination Policy	8/20/1991 Interprogram Policy	Allows movement/placement of excavated contaminated material within the regulated site without triggering dangerous waste designation.	Could be applicable for containment remedial alternatives.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Ecology Construction Stormwater General Permit	Requires obtaining a NPDES permit, development of Stormwater Pollution Prevention Plan (SWPPP) and implementation of a sediment erosion and pollution prevention controls.	Applies to construction activities that disturb one or more acres.
Water Well Construction; Chapter 18.104 RCW	Minimum Standards for Construction and Maintenance of Wells; Chapter 173-160 WAC	Applies to the construction and maintenance of monitoring wells	Potentially applicable to wells constructed for groundwater withdrawal and monitoring and decommissioning of existing or future wells.
Hazardous Waste Management; Chapter 70.105 RCW	Dangerous Waste Regulations; Chapter 173-303 WAC	Applies if dangerous wastes are generated during remedial program	These regulations must be fully complied with for any off site disposal of waste determined to be dangerous waste. This would only apply to upland remedial options as dredged sediment is exempt from waste classification.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	NPDES Permit Program; Chapter 173-220 WAC	Applicable to the discharge of pollutants and other wastes and materials to the surface waters of the state	NPDES may be required for discharges related to ongoing remedial actions or discharge of stormwater/drainage.
State Environmental Policy Act (SEPA); Chapter 43.21C.110 RCW	SEPA Rules; Chapter 197-11 WAC	Applies if future construction/remedial action occurs at the site	Applies if future construction/ remedial action occurs at the site.
Solid Waste Management; Chapter 43.21A RCW	Minimum Functional Standards for Solid Waste Handling WAC 173-304	Establishes minimum functional standards for the handling of solid waste.	Applies if non-dangerous wastes are generated during remedial action
Transportation of Hazardous Material; 49 USC 5101-5127	Hazardous Materials Regulations; 49 CFR Parts 171 through 180	Regulations that govern the transportation of hazardous materials.	Applies to any hazardous materials transported off-site as part of remediation.
Hazardous Waste-Land Disposal Restrictions; USEPA	40 CFR 268/22 CCR 66268	Establishes land disposal restrictions and treatment standards for hazardous wastes applicable to generators.	Any hazardous wastes generated as a result of on-site activities or by treatment systems must meet land disposal restriction requirements.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Federal Water Pollution Control Act Certification; Chapter 173-225 WAC	Applies to activities that may result in a discharge into navigable waters.	Applies to remedial actions that may result in a discharge into navigable waters (i.e., dredging). \\
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Mixing Zones; WAC 173-201A-400	Applies to the allowable size and location of a mixing zone.	Potentially applicable to remedial alternatives that would require substantive compliance with NPDES permit requirements.

Potential Action-Specific ARARs			
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Short Term Modifications (to State Water Quality Criteria); Chapter 173-201A-410	Criteria may be modified for a specific water body on a short-term basis when necessary to accommodate essential activities, respond to emergencies, or to otherwise protect the public interest, even though such activities may result in a temporary reduction.	Potentially applicable to remedial alternatives involving excavation/dredging of sediment.
USACE permit	Section 404 Permit Program	Applies to dredging or filling in the waters of the U.S.	A permit will be required to perform dredging of contaminated sediment and/or placing fill associated with sediment capping or backfilling of dredged areas.
Archeological and Historic Preservation	Federal Archeological and Historical Preservation Act; 16 USCA 496a-1	The Archeological and Historical Preservation Act (16 USCA 496a-1) would be applicable in areas or potential cultural resources if any subject materials are discovered during site excavation and dredging activities.	Potentially applicable for remedial alternatives that include excavation and dredging activities.
Washington State Clean Air Act; Chapter 70.94 RCW	General Requirements for Air Pollution Sources; Chapter 173-400 WAC. Controls for New Sources of Toxic Air Pollutants; Chapter 173-460 WAC	Establishes technically feasible and reasonably attainable standards and rules generally applicable to the control and/or prevention of the emission of air contaminants.	May apply to remedial alternatives that produce emissions to air.

TABLE 2

SUMMARY OF REMEDIAL ALTERNATIVES

DRAFT CAP

RELIABLE STEEL, OLYMPIA, WASHINGTON

Site Area	Matrix	Contaminants Exceeding Proposed Cleanup Levels	CLEANUP ACTION ALTERNATIVE COMPONENTS			
			REMEDIAL ALTERNATIVE 1 Upland Area and Marine Area Capping	REMEDIAL ALTERNATIVE 2 Upland Area Capping and Marine Area Hot Spot Removal	REMEDIAL ALTERNATIVE 3 Upland Area Capping and Marine Area Removal	REMEDIAL ALTERNATIVE 4 Upland Area and Marine Area Removal
Upland Area	Soil	Metals, Petroleum Hydrocarbons, and Polycyclic Aromatic Hydrocarbons (PAHs)	Site preparation including demolition of existing structures in the upland area. Excavation and off-site disposal of metals-contaminated soil and metal debris contributing to contamination in groundwater. Excavation and off-site disposal of gasoline-contaminated soil located within and adjacent to the former Maintenance Building. Decommissioning and removal of underground storage tank (UST) and associated diesel-contaminated soil located adjacent to the former Tank Shop. Capping with a 2-foot thick soil or aggregate cap or infrastructure/pavement cap over contaminated soil to limit potential exposure of human and ecological receptors to contaminants in the upland area of the Site. Implementation of institutional controls such as deed restrictions for contaminated soil left in place.	Site preparation including demolition of existing structures in the upland area. Excavation and off-site disposal of metals-contaminated soil and metal debris contributing to contamination in groundwater. Excavation and off-site disposal of gasoline-contaminated soil located within and adjacent to the former Maintenance Building. Decommissioning and removal of UST and associated diesel-contaminated soil located adjacent to the former Tank Shop. Capping with a 2-foot thick soil or aggregate cap or infrastructure/pavement cap over contaminated soil to limit potential exposure of human and ecological receptors to contaminants in the upland area of the Site. Implementation of institutional controls such as deed restrictions for contaminated soil left in place.	Site preparation including demolition of existing structures in the upland area. Excavation and off-site disposal of metals-contaminated soil and metal debris contributing to contamination in groundwater. Excavation and off-site disposal of gasoline-contaminated soil located within and adjacent to the former Maintenance Building. Decommissioning and removal of UST and associated diesel-contaminated soil located adjacent to the former Tank Shop. Capping with a 2-foot thick soil or aggregate cap or infrastructure/pavement cap over contaminated soil to limit potential exposure of human and ecological receptors to contaminants in the upland area of the Site. Implementation of institutional controls such as deed restrictions for contaminated soil left in place.	Site preparation including demolition of existing structures in the upland area. Excavation and off-site disposal of metals-contaminated soil and metal debris contributing to contamination in groundwater. Decommissioning and removal of UST and associated diesel-contaminated soil located adjacent to the former Tank Shop. Excavation and off-site disposal of contaminated soil from the upland area to remove all soil with contaminant concentrations greater than the cleanup levels.
	Groundwater	Metals	Installation of monitoring wells to monitor the natural attenuation of groundwater after completion of metal debris and metals contaminated soil removal.	Installation of monitoring wells to monitor the natural attenuation of groundwater after completion of metal debris and metals contaminated soil removal.	Installation of monitoring wells to monitor the natural attenuation of groundwater after completion of metal debris and metals contaminated soil removal.	No action because all source material is expected to be removed from the upland areas of the Site.
	Stormwater Runoff	Metals and PAHs	Removal and replacement of the existing stormwater collection and conveyance system to limit transport of contaminated upland media (i.e. soil, groundwater, and stormwater runoff) to surface water and sediment in the marine area.	Removal and replacement of the existing stormwater collection and conveyance system to limit transport of contaminated upland media (i.e. soil, groundwater, and stormwater runoff) to surface water and sediment in the marine area.	Removal and replacement of the existing stormwater collection and conveyance system to limit transport of contaminated upland media (i.e. soil, groundwater, and stormwater runoff) to surface water and sediment in the marine area.	Replacement of the existing stormwater collection and conveyance system as part of redevelopment to meet current stormwater requirements.
Marine Area	Sediment	Metals, Petroleum Hydrocarbons, PAHs, and Phthalates	Site preparation including demolition of existing structures in the marine area. Place a 3-foot thick aggregate cap over contaminated sediment to limit potential exposure of human and ecological receptors to contaminants in the marine area. Monitoring the natural recovery of contaminated sediment outside the sediment cap area. Implementation of institutional controls such as deed restrictions for contaminated sediment left in place.	Site preparation including demolition of existing structures in the marine area. Removal and off-site disposal of the most contaminated sediment (hot spot areas) located in the marine area of the Site. Monitoring the natural recovery of contaminated sediment outside the sediment hot spot removal. Implementation of institutional controls such as deed restrictions for contaminated sediment left in place.	Site preparation including demolition of existing structures in the marine area. Removal and off-site disposal of sediment with multiple contaminants at concentrations greater than Sediment Quality Standards. Monitoring the natural recovery of contaminated sediment outside the sediment removal area. Implementation of institutional controls such as deed restrictions for contaminated sediment left in place.	Site preparation including demolition of existing structures in the marine area. Removal and off-site disposal of sediment with multiple contaminants at concentrations greater than Sediment Quality Standards. Monitoring the natural recovery of contaminated sediment outside the sediment removal area. Implementation of institutional controls such as deed restrictions for contaminated sediment left in place.

TABLE 3

SUMMARY OF EVALUATION AND COMPARISON OF REMEDIAL ALTERNATIVES

DRAFT CAP

RELIABLE STEEL, OLYMPIA, WASHINGTON

Alternative Description	ALTERNATIVE 1 Marine Area and Upland Area Capping	ALTERNATIVE 2 Upland Area Capping and Marine Area Hot Spot Removal	ALTERNATIVE 3 Upland Area Capping and Marine Area Removal	ALTERNATIVE 4 Upland Area and Marine Area Removal
Alternative Ranking Under MTCA				
1. Compliance with MTCA Threshold Criteria				
Protection of Human Health and the Environment	Yes - Alternative would protect human health and the environment through a combination of capping, limited removal, natural recovery, and institutional controls.	Yes - Alternative would protect human health and the environment through a combination of capping, removal, natural attenuation/recovery, and institutional controls.	Yes - Alternative would protect human health and the environment through a combination of capping, removal, natural attenuation/recovery, and institutional controls.	Yes - Alternative would protect human health and the environment through a combination of removal and natural attenuation/recovery.
Compliance With Cleanup Standards	Yes - Alternative would require long term monitoring to ensure compliance with cleanup standards.	Yes - Alternative would require long term monitoring to ensure compliance with cleanup standards.	Yes - Alternative would require long term monitoring to ensure compliance with cleanup standards.	Yes - Alternative would require long term monitoring to ensure compliance with cleanup standards.
Compliance With Applicable State and Federal Regulations	Yes - Alternative complies with state and federal regulation.	Yes - Alternative complies with state and federal regulation.	Yes - Alternative complies with state and federal regulation.	Yes - Alternative complies with state and federal regulation.
Provision for Compliance Monitoring	Yes - Alternative includes provisions for monitoring of the upland and marine area caps to ensure containment of capped material, to assess the natural attenuation of groundwater concentrations, and to assess the natural recovery of sediment.	Yes - Alternative includes provisions for monitoring of the upland area cap to ensure containment of capped material, to assess the natural attenuation of groundwater concentrations, and to assess the natural recovery of sediment.	Yes - Alternative includes provisions for monitoring of the upland area cap to ensure containment of capped material, to assess the natural attenuation of groundwater concentrations, and to assess the natural recovery of sediment.	Yes - Alternative includes provisions for monitoring to assess the natural recovery of sediment.
2. Restoration Time Frame				
	Time frame for design, permitting, and construction of remedial actions is relatively short. The time frame for natural recovery is moderate. The time frame for long-term monitoring and maintenance is indefinite as the remedial actions will be required to be maintained into the future.	Time frame for design, permitting, and construction of remedial actions is relatively short. The time frame for natural recovery is moderate. The time frame for long-term monitoring and maintenance is indefinite as the remedial actions will be required to be maintained into the future.	Time frame for design, permitting, and construction of remedial actions is relatively short. The time frame for natural recovery is moderate. The time frame for long-term monitoring and maintenance is indefinite as the remedial actions will be required to be maintained into the future.	Time frame for design, permitting, and construction of remedial actions is relatively short. The time frame for natural recovery is moderate. The time frame for long-term monitoring and maintenance is moderate as most contaminated material would be removed from the Site.
3. Disproportionate Cost Analysis Criteria				
Protectiveness	Score = 3 Achieves a medium level of overall protectiveness as a result of capping upland and marine areas. Upland soil and the majority of contaminated sediment would effectively be isolated from human and ecological receptors. Longterm protectiveness reliant on effective implementation of institutional controls (deed restrictions).	Score = 3 Achieves a medium-high level of overall protectiveness as a result of capping the upland area and removal of the most contaminated sediment at the Site. Upland soil would be isolated from human and ecological receptors. Longterm protectiveness reliant on effective implementation of institutional controls (deed restrictions).	Score = 4 Achieves a medium-high level of overall protectiveness as a result of capping the upland area and removal of the greatest quantity of contaminated sediment. Upland soil would be isolated from human and ecological receptors. Longterm protectiveness reliant on effective implementation of institutional controls (deed restrictions).	Score = 5 Achieves a high level of overall protectiveness as a result of removal of contaminated soil and sediment at the Site.
Permanence	Score = 2 Achieves reduction of toxicity and mobility of hazardous substances at the Site by containment of contaminated soil and sediment with limited overall reduction in the mass of contaminants. The quantity of impacted soil and sediment allowed to remain on site is greater than with Alternatives 2 through 4.	Score = 4 Achieves permanent reduction of toxicity and mobility of hazardous substances at the Site by containment of contaminated soil and removal and offsite disposal of the most contaminated sediment from the marine area. The quantity of contaminated soil and sediment allowed to remain on site is less than Alternative 1 but greater than Alternatives 3 and 4.	Score = 4 Achieves permanent reduction of toxicity and mobility of hazardous substances at the Site by containment of contaminated soil and removal and offsite disposal of the largest quantity of contaminated sediment from the marine area. The quantity of contaminated soil and sediment allowed to remain on site is less than Alternatives 1 and 2 but greater than Alternative 4.	Score = 5 Achieves permanent reduction of mass, toxicity, and mobility of hazardous substances at the Site. All contaminated soil will be removed from the Site. The quantity of contaminated sediment to remain on site is less than Alternatives 1 through 3.
Long-Term Effectiveness	Score = 2 Prevents contact with contaminated soil and sediment by human and ecological receptors but removes a limited quantity of hazardous substances from the Site. Long term effectiveness reliant on monitoring and maintenance of capped areas.	Score = 3 Prevents contact with contaminated soil and sediment by human and ecological receptors and removes hazardous substances from the marine area of the Site. Long term effectiveness reliant on monitoring and maintenance of capped areas.	Score = 3 Prevents contact with contaminated soil and sediment by human and ecological receptors and removes hazardous substances from the marine area of the Site. Long term effectiveness reliant on monitoring and maintenance of capped areas.	Score = 5 Removes all contaminated soil from the upland area. Future development in the upland would not be restricted. Most contaminated sediment removed from Site.

Management of Short-Term Risks	Score = 4 Involves capping of soil and sediment in the upland and marine areas of the Site. The construction methods required under this alternative are well established and capable of reducing short-term risks.	Score = 3 Involves capping of soil and removal of sediment in the shoreline area of the Site. The construction methods required under this alternative are well established and capable of reducing short-term risks. There is some additional risk associated with sediment dredging and movement of contaminants during dredging operations.	Score = 3 Involves capping of soil and removal of sediment in the shoreline area of the Site. The construction methods required under this alternative are well established and capable of reducing short-term risks. There is some additional risk associated with sediment dredging and movement of contaminants during dredging operations.	Score = 3 Involves extensive soil and sediment removal across the Site. The construction methods required under this alternative are well established and capable of reducing short-term risks.
Technical and Administrative Implementability	Score = 1 Capping of upland and marine areas is a common approach for remediation of contaminated Sites. Placement of a cap in the nearshore marine area will cause loss of aquatic habitat that would likely necessitate mitigation in order to obtain approval of the remedial alternative. This is a significant implementability issue for capping of the marine area as proposed in this alternative.	Score = 4 Capping of the upland area and hot spot removal in the marine area are common approaches for remediation of contaminated Sites. Common construction methods and equipment are used.	Score = 3 Capping of the upland area and removal of contaminated sediment in the marine area are common approaches for remediation of contaminated Sites. Common construction methods and equipment are used.	Score = 3 Removal of contaminated soil from the upland area and removal of contaminated sediment in the marine area are common approaches for remediation of contaminated Sites. Common construction methods and equipment are used.
Consideration of Public Concerns	Score = 2 Addresses the exposure of human and ecological receptors to contaminated soil, groundwater, stormwater runoff, and sediment. Contaminated soil and sediment would remain on site require implementation of institutional controls and impose limitations on future use and development of the property.	Score = 3 Addresses the exposure of human and ecological receptors to contaminated soil, groundwater, stormwater runoff, and sediment. Includes removal and offsite disposal of the most contaminated sediment from the marine area. Contaminated soil and sediment would remain on site requiring implementation of institutional controls and would impose limitations on future use and development of the property.	Score = 3 Addresses the exposure of human and ecological receptors to contaminated soil, groundwater, stormwater runoff, and sediment. Includes removal and offsite disposal of the largest quantity of contaminated sediment from the marine area. Contaminated soil and sediment would remain on site requiring implementation of institutional controls and would impose limitations on future use and development of the property.	Score = 4 Addresses soil and sediments that poses risk to human health and the environment.

TABLE 4

SUMMARY OF MTCA EVALUATION AND RANKING OF REMEDIAL ACTION ALTERNATIVES

DRAFT CAP

RELIABLE STEEL

OLYMPIA, WASHINGTON

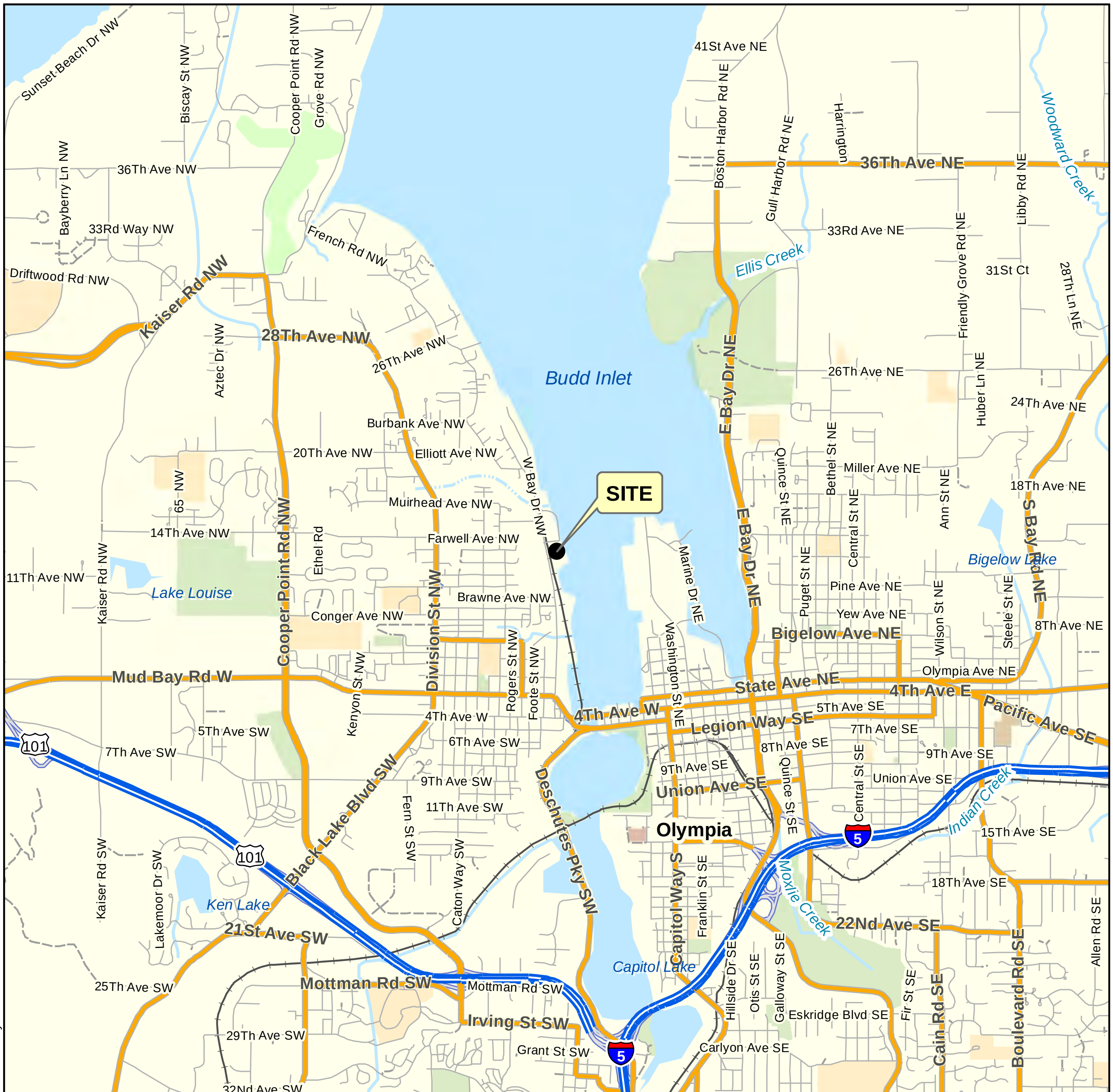
Alternative Number	ALTERNATIVE 1 Upland Area and Marine Area Capping	ALTERNATIVE 2 Upland Area Capping, Marine Area Hot Spot Removal	ALTERNATIVE 3 Upland Area Capping, Marine Area Removal	ALTERNATIVE 4 Upland Area and Marine Area Removal
Alternative Ranking Under MTCA				
1. Compliance with MTCA Threshold Criteria	YES	YES	YES	YES
2. Restoration Time Frame	Design/construction - Short Natural attenuation/recovery - Moderate	Design/construction - Short Natural attenuation/recovery - Moderate	Design/construction - Short Natural attenuation/recovery - Moderate	Design/construction - Short Natural recovery - Moderate
3. DCA Relative Benefits Ranking	4th	Tied - 2nd	Tied - 2nd	1st
Protectiveness	3	3	4	5
Permanence	2	4	4	5
Long-Term Effectiveness	2	3	3	5
Management of Short-Term Risks	4	3	3	3
Technical and Administrative Implementability	1	4	3	3
Consideration of Public Concerns	2	3	3	4
Total of Scores	**14**	**20**	**20**	**25**
4. Disproportionate Cost Analysis (DCA)				
Probable Remedy Cost (+50%/-30%, rounded)	$3,202,000	$3,856,000	$4,764,000	$9,551,000
Costs Disproportionate to Incremental Benefits	NA (1)	NO	NO	YES
Practicability of Remedy	Not Practicable (2)	Practicable	Practicable	Practicable
Remedy Permanent to Maximum Extent Practicable	Yes (3)	Yes (3)	Yes (3)	Yes
Overall Alternative Ranking	**3rd**	**1st**	**2nd**	**Costs disproportionate; not ranked**

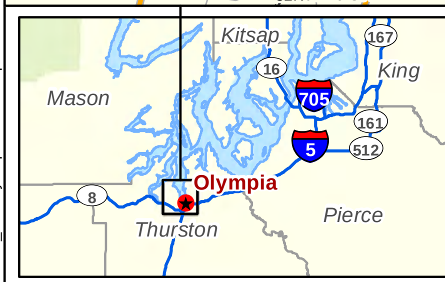
Notes:

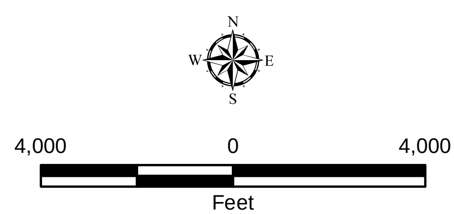
1 Not applicable since this is the lowest cost alternative.

2 Not practicable due to potential permitting and mitigation requirements associated with marine cap approach.

3 May require modification due to future land use or development.







Notes:
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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

Projection: NAD 1983 UTM Zone 10N

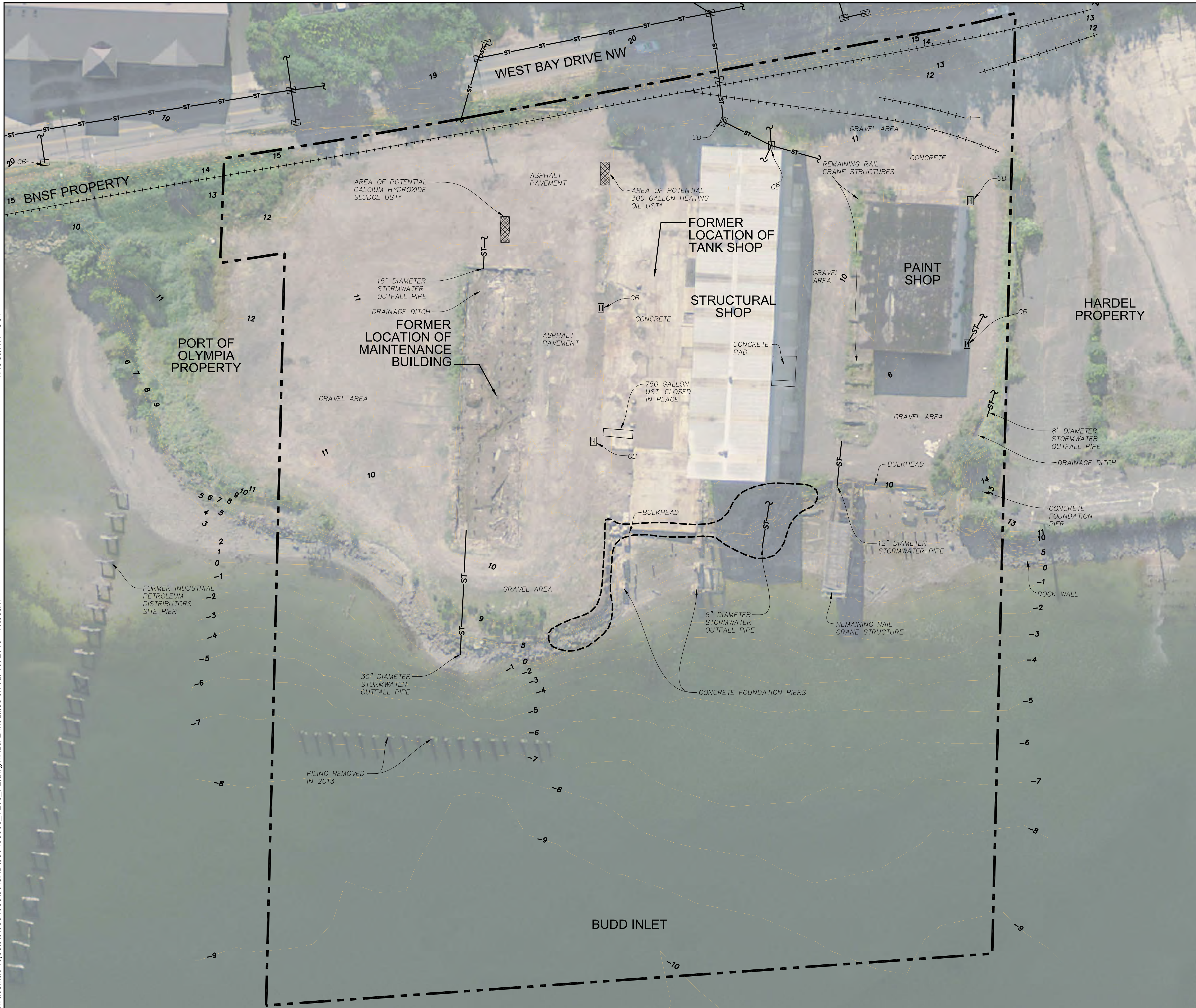
Vicinity Map

Reliable Steel Site
Olympia, Washington

GeoEngineers

Figure 1

Path: \\tac\projects\0\0504085\GIS\050408500_VicinityMap.mxd   Map Revised: 25 January 2013   amanza



Legend

Site Features

- Property Line
- Catch Basin
- Stormwater Pipe
- Railroad Track
- Approximate Area of Metal Debris Visible on Shoreline
- Topographic / Bathymetric Contour Lline and Elevation (Feet NGVD 29)

70 0 70
Feet

Notes:

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3. * Areas of potential USTs identified by geophysical survey (GPR and EM) on 3/3/2008.

Reference: Survey drawing provided by Hatton Godat Pantier Engineers and Surveyors, Inc. (11-17-08 survey) and aerial photo provided by Thurston County (2012 aerial). The aerial photo is oblique, and the features shown on the aerial do not exactly match those shown on the survey drawing.

Existing Site Conditions

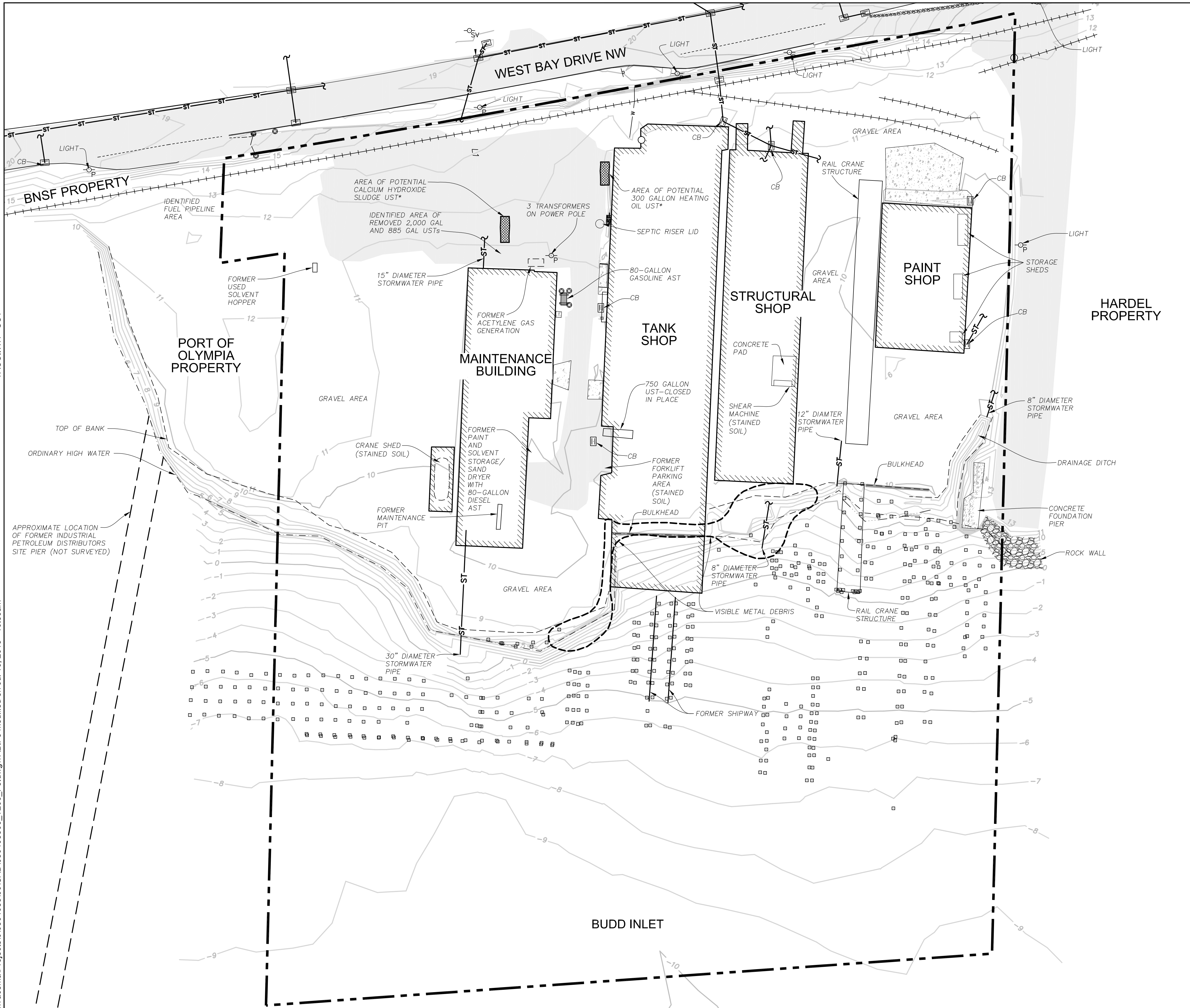
Reliable Steel Site
Olympia, Washington

GEOENGINEERS

Figure 2

W:\Tacoma\Projects\0\0504085\00\CAD\050408500_T200_F2.dwg\TAB:F2 modified on Jul 16, 2013 - 10:39am

TACO:IWH : SCY



Legend

Site Features

- Property Line
- Catch Basin
- Stormwater Pipe
- Railroad Track
- Asphalt Pavement
- Concrete
- Approximate Area of Metal Debris Visible on Shoreline
- Piling
- Bollard
- Topographic / Bathymetric Contour Line and Elevation (Feet NGVD 29)

70 0 70

Feet

Notes:

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3. * Areas of potential USTs identified by geophysical survey (GPR and EM) on 3/3/2008.

Reference: Survey drawing provided by Hatton Godat Pantier Engineers and Surveyors, Inc. (11-17-08 survey).

Previous Site Conditions

Reliable Steel Site
Olympia, Washington

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Figure 3

TACO:IWH : SCY

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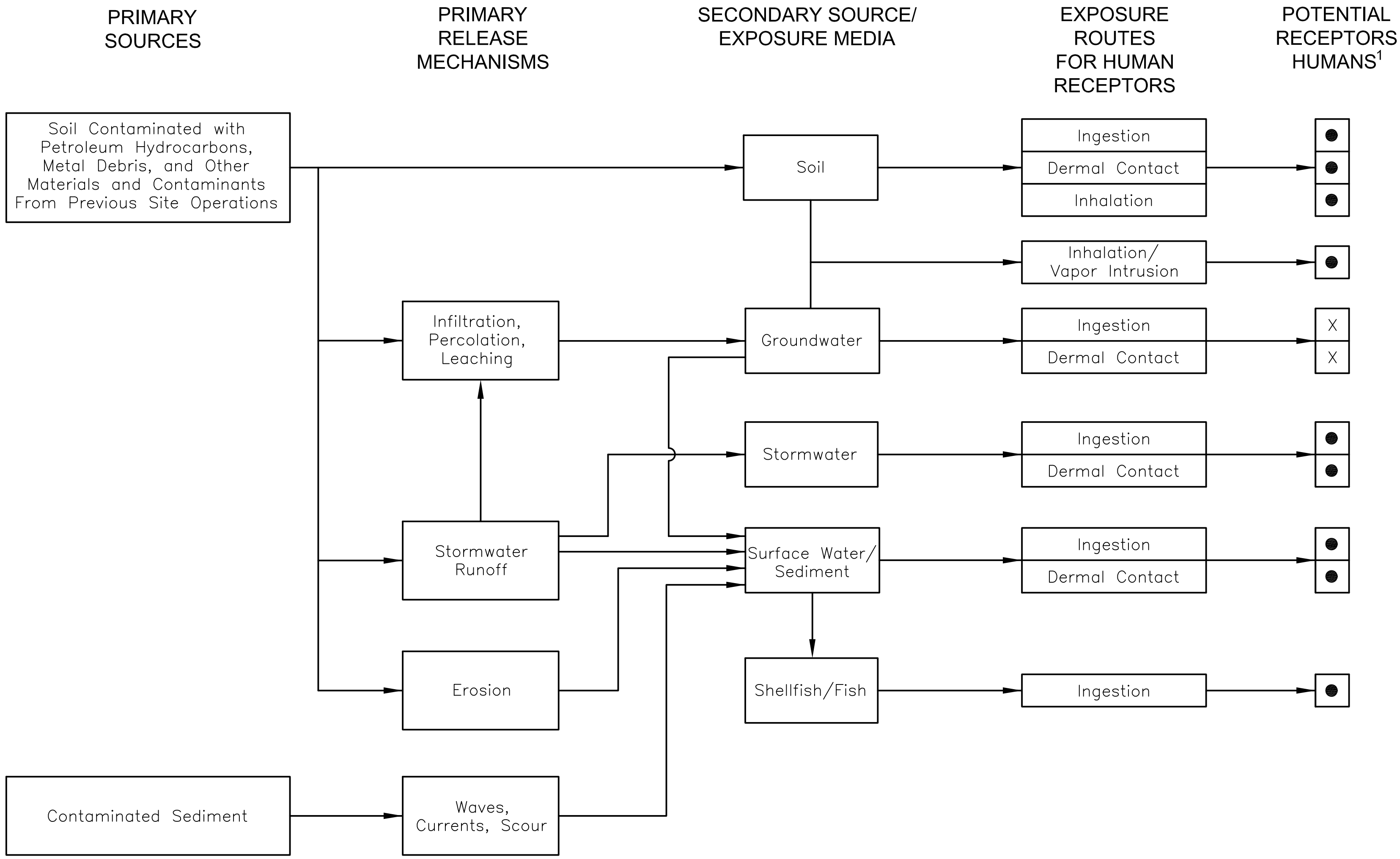

Notes:

- ● Complete Exposure Pathway
- X Potentially Complete But Insignificant Exposure Pathway
- 1 Future Commercial Workers, Residents, and Visitors

Notes:

1. 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.

Conceptual Site Exposure Model - Human Receptors

Reliable Steel Site
Olympia, Washington

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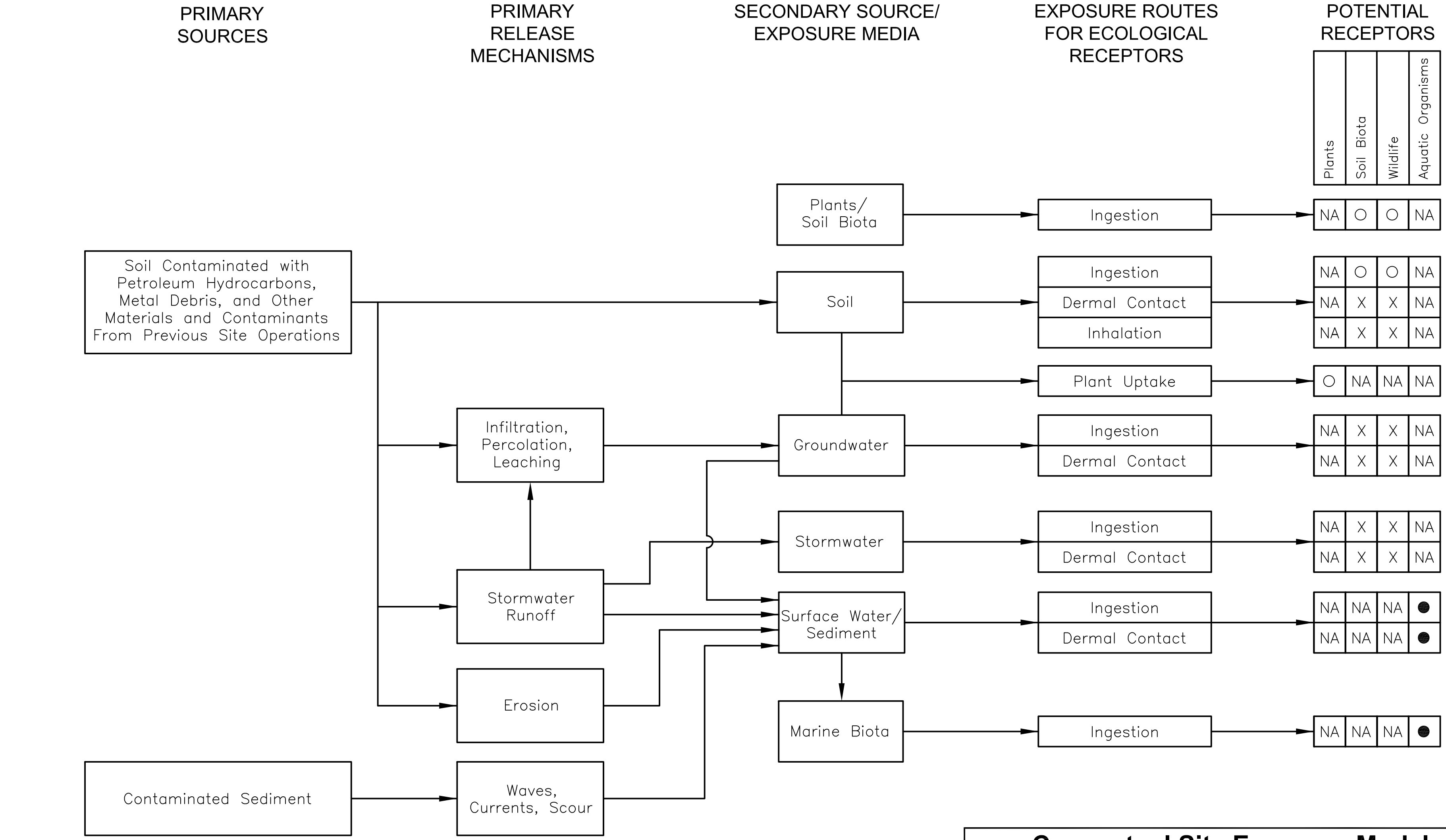
Figure 4



Secondary Source/Exposure Media	Exposure Route	Plants	Soil Biota	Wildlife	Aquatic Organisms
Plants/Soil Biota	Ingestion	NA	○	○	NA
Soil	Ingestion	NA	○	○	NA
Soil	Dermal Contact	NA	X	X	NA
Soil	Inhalation	NA	X	X	NA
Soil	Plant Uptake	○	NA	NA	NA
Groundwater	Ingestion	NA	X	X	NA
Groundwater	Dermal Contact	NA	X	X	NA
Stormwater	Ingestion	NA	X	X	NA
Stormwater	Dermal Contact	NA	X	X	NA
Surface Water/Sediment	Ingestion	NA	NA	NA	●
Surface Water/Sediment	Dermal Contact	NA	NA	NA	●
Marine Biota	Ingestion	NA	NA	NA	●

Notes:
- ● Complete Exposure Pathway
- ○ Incomplete Exposure Pathway
- X Potentially Complete But Insignificant Exposure Pathway
- NA Not Applicable

Notes:
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Conceptual Site Exposure Model - Ecological Receptors

Reliable Steel Site
Olympia, Washington

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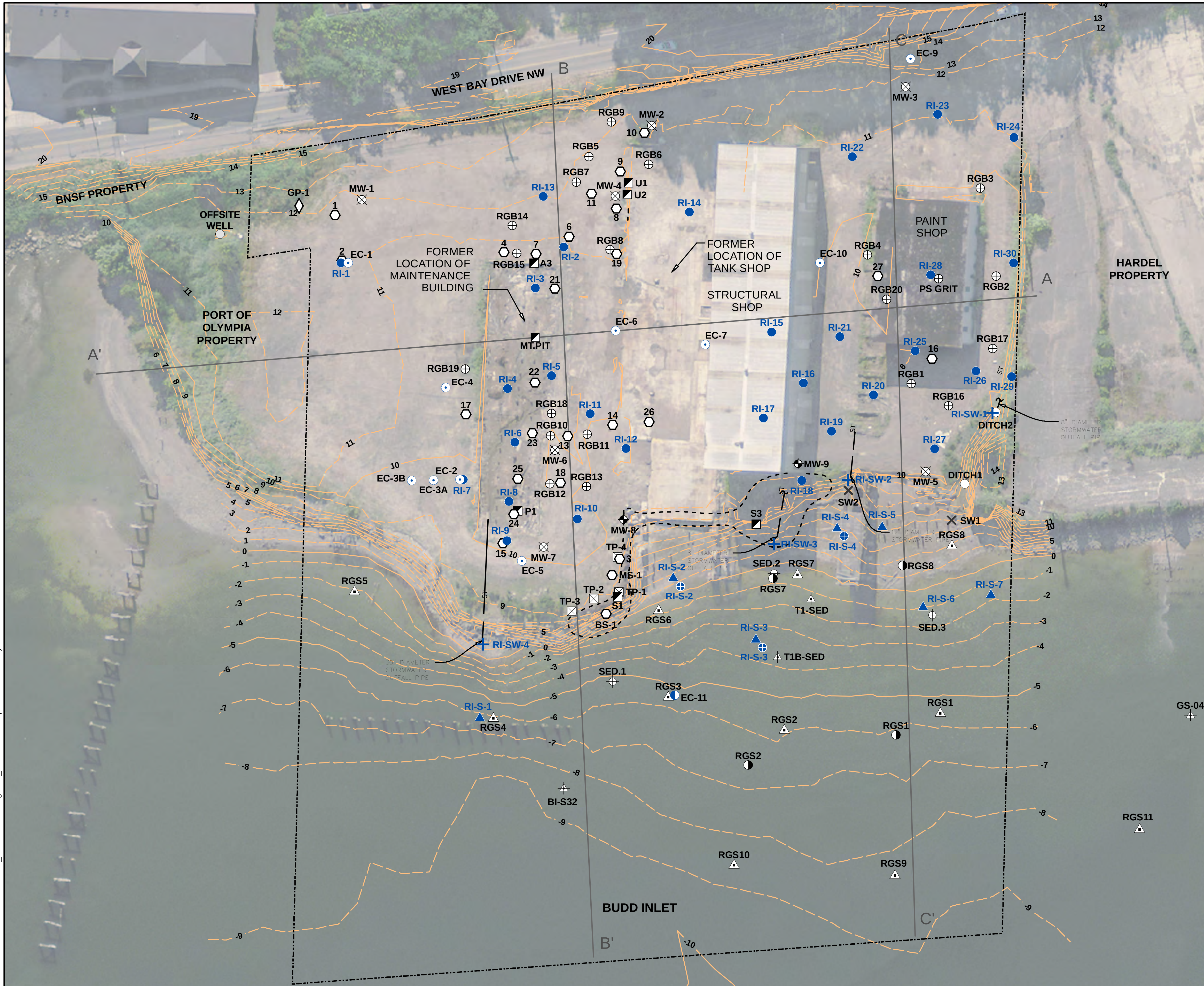
Figure 5



Legend

Remedial Investigation Locations-LEGEND

- Remedial Investigation Soil Boring Location (Greylock 2010)
- Remedial Investigation Sediment Core Sample Location (Greylock 2010)
- Remedial Investigation Stormwater Sample Location (Greylock 2010)
- Remedial Investigation Surface Sediment Sample Location (Greylock 2010)
- Supplemental Investigation Soil Boring Location (Ecology 2013)
- Supplemental Investigation Sediment Core Location (Ecology 2013)

Previous Investigation Locations-LEGEND

- DOF Soil Sample Location (2007)
- DOF Sediment Sample Location (2007)
- DOF Test Pit Sample Location (2007)
- Ecology Surface Sediment Sample Location(2008)
- Greylock Ditch Sample Location
- Greylock Monitoring Well (2008)
- Greylock Soil Sample Location (2008)
- Greylock Sediment Core Sample Location (2008)
- Greylock Surface Sediment Sample Location (2007, 2008)
- Greylock Stormwater Sample Location (2008)
- Stemen Monitoring Well (2007)
- Stemen Sample Location (2005, 2006)
- ARCADIS Sample Location (2013)
- Unknown

Site Features

- Stormwater Pipe
- Property Line
- Approximate Area of Metal Debris Visible on Shoreline
- Topographic/Bathymetric Contour Line and Elevation (feet NGVD29)
- Cross Section Locations

70 0 70

Feet

Data Source: Drawing provided by HATTON GODAT PANTIER. Aerial image from Thurston County, 2012.

Notes:
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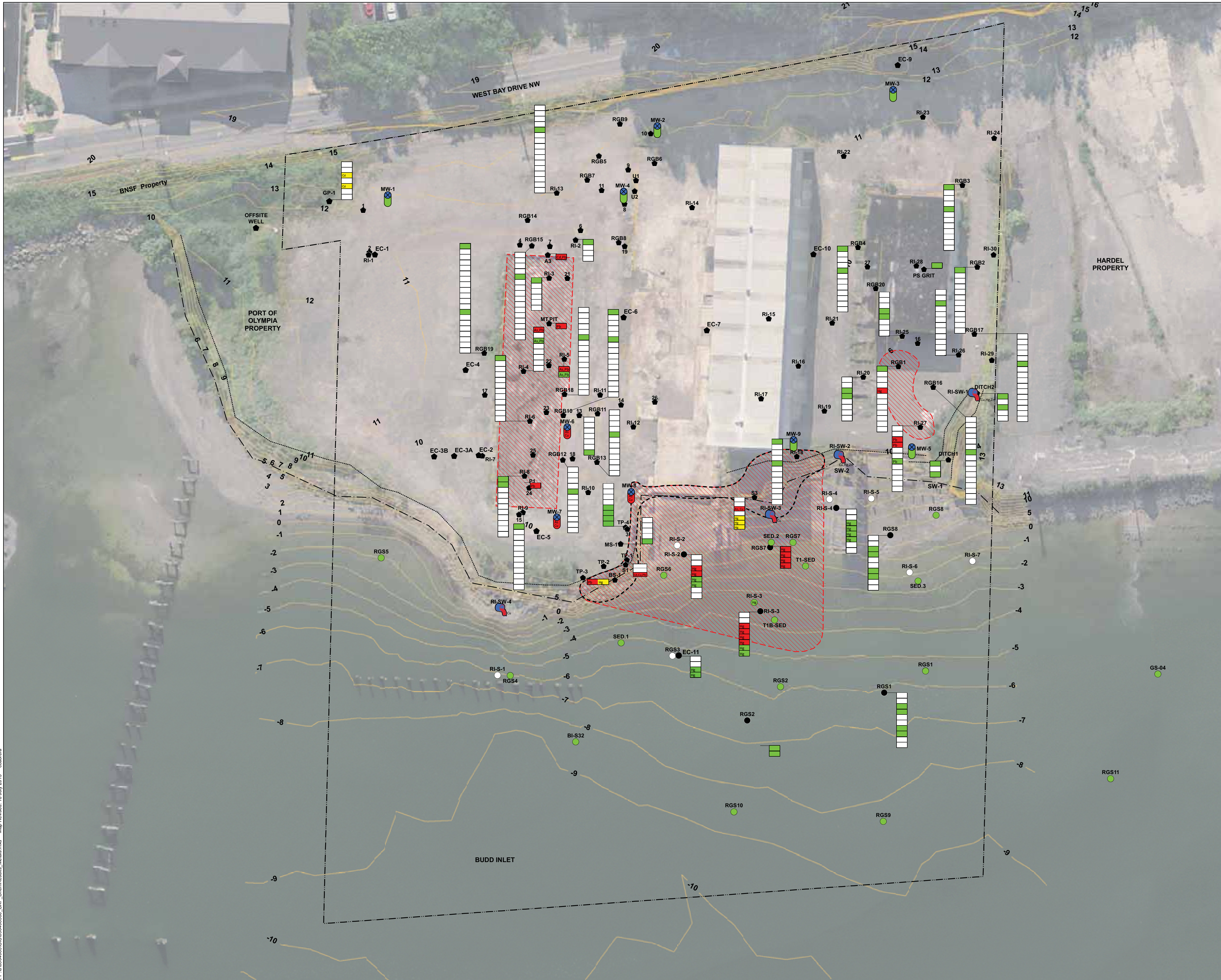
Remedial Investigation Locations

Reliable Steel Site
Olympia, Washington

GEOENGINEERS

Figure 6

Path: P:\0\0504085\GIS\0504085000_RemedialInvestigation_CAP.mxd Map Revised: 18 July 2013 ccabrera



Legend

- Property Line
- Top of Bank
- Ordinary High Water
- Approximate Area of Metal Debris Visible on Shoreline
- Topographic/Bathymetric Contour Line and Elevation (feet NGVD29)

Sampling Location Type

- Soil Sampling Location [1]
- Groundwater Monitoring Well Location
- Stormwater Sampling Location
- Surface Sediment Sampling Location [2]
- Subsurface Sediment Sampling Location [1]

Sample Depth Interval [1]

Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[3] of subsurface exploration.

Analyte

- As Arsenic
- Cd Cadmium
- Cu Copper
- Pb Lead
- Hg Mercury

Nature and Extent of Contamination

- No shading[4] of the sampling location/depth interval indicates a sample was either not obtained or not analyzed for metals.
- Red shading[4] of the sampling location/depth interval indicates that the identified analyte was detected at a concentration greater than the proposed cleanup/screening level.
- Green shading[4] of the sampling location/depth interval indicates that the identified analyte was detected at a concentration less than the proposed cleanup/screening level. If no analyte is identified within the shading, As, Cd[5], Cu[6], Pb and Hg were either not detected or detected at concentrations less than the proposed cleanup/screening levels.
- Yellow shading[4] of sampling location/interval indicates that the metals detection limit for one or more analytes was above the proposed cleanup/screening levels.
- Red hatching represents estimated area of soil/sediment exceeding proposed cleanup levels for metals.

Notes:

1 Sample depth intervals are shown for soil sampling locations and subsurface sediment sampling locations for which metals analysis was performed.

2 Surface sediment samples were generally collected from 0 to 10 cm below the mud line.

3 At locations for which the total depth of subsurface exploration is not known, the depth of the deepest sample obtained at the location represents the total depth of exploration.

4 Color shading of sampling locations/intervals presented in this figure is based on comparison of chemical analytical results of:
*Soil samples (obtained landward of OHW line) to proposed soil cleanup levels.
*Sediment samples (obtained waterward of OHW line) to proposed sediment cleanup levels.
*Samples obtained along the shoreline of metal debris to proposed soil and sediment cleanup levels.
*Groundwater samples (most recent samples analyzed at the sampling locations) to proposed groundwater cleanup levels.
*Stormwater samples (most recent samples analyzed at the sampling locations) to proposed screening levels.

5 Cadmium analysis was not performed on soil, groundwater, stormwater and sediment samples collected by Greylock Consulting in 2011.

6 Copper analysis was not performed at sampling locations S-13, BS-1, MS-1 and Sand Grit.

7 Proposed cleanup and screening levels are presented in Tables 2 through 5.The chemical analytical results for metals are presented in Tables 6, 13, 14, 19, 23, and 25.

70 35 0 70
Feet

Data Source: Aerial image from Thurston County, 2012.

General Notes:
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Extent of Metals Contamination

Reliable Steel Site
Olympia, Washington

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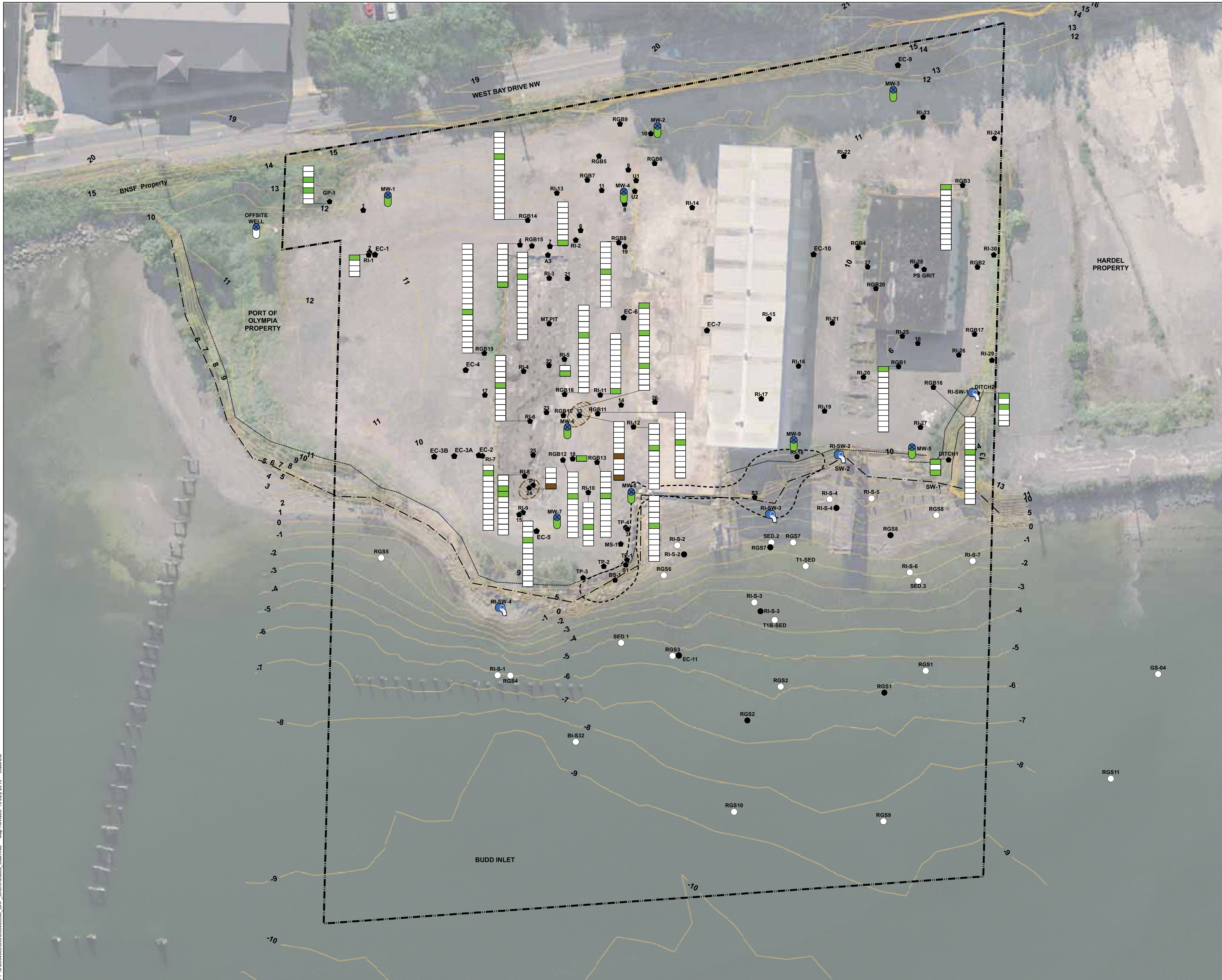
Figure 7

Path: P:\0\0504085\GIS\050408500_CAP_ChemResults_Metals.mxd Map Revised: 18 July 2013 ccabrera



Legend

- Property Line
- Top of Bank
- Ordinary High Water
- Approximate Area of Metal Debris Visible on Shoreline
- 5 Topographic/Bathymetric Contour Line and Elevation (feet NGVD29)

Sampling Location

- Soil Sampling Location [1]
- Groundwater Monitoring Well Location
- Stormwater Sampling Location
- Surface Sediment Sampling Location [2]
- Subsurface Sediment Sampling Location [1]

Sampling Interval [1]

Each box represents 1-foot sampling interval. Total number of boxes indicates the total depth[3] of subsurface exploration.

Nature and Extent of Contamination

- No shading[4] of sampling location/interval indicates sample was either not obtained or not analyzed for gasoline-range petroleum hydrocarbons.
- Brown shading[4] of sampling location/interval indicates that the gasoline-range petroleum hydrocarbons were detected at a concentration greater than the proposed cleanup/screening level.
- Green shading[4] of sampling location/interval indicates that gasoline-range petroleum hydrocarbons were detected at a concentration less than the proposed cleanup/screening level.
- Brown hatching represents estimated area of soil/sediment exceeding proposed cleanup level for gasoline-range petroleum hydrocarbons.

Notes:

1 Sampling intervals are shown for soil sampling locations and subsurface sediment sampling locations for which gasoline-range petroleum hydrocarbons analysis was performed.

2 Surface sediment samples were generally collected from 0 to 10 cm below the mud line.

3 Locations for which total depth of subsurface exploration is unknown, depth of the deepest sample obtained at such location represents total depth.

4 Color shading of sampling locations/intervals presented in this figure is based on comparison of chemical analytical results of:
*Soil samples (obtained landward of OHW line) to proposed soil cleanup levels.
*Sediment samples (obtained waterward of OHW line) to proposed sediment cleanup levels.
*Samples obtained along the shoreline of metal debris to proposed soil and sediment cleanup levels.
*Groundwater samples (most recent samples analyzed at the sampling locations) to proposed groundwater cleanup levels.
*Stormwater samples (most recent samples analyzed at the sampling locations) to proposed screening levels.

5 Proposed cleanup and screening levels are presented in Tables 2 through 5. Chemical analytical results for gasoline-range petroleum hydrocarbons are presented in Tables 8, 15, 20 and 23.

70 35 0 70
Feet

Data Source: Aerial image from Thurston County, 2012.

General Notes:
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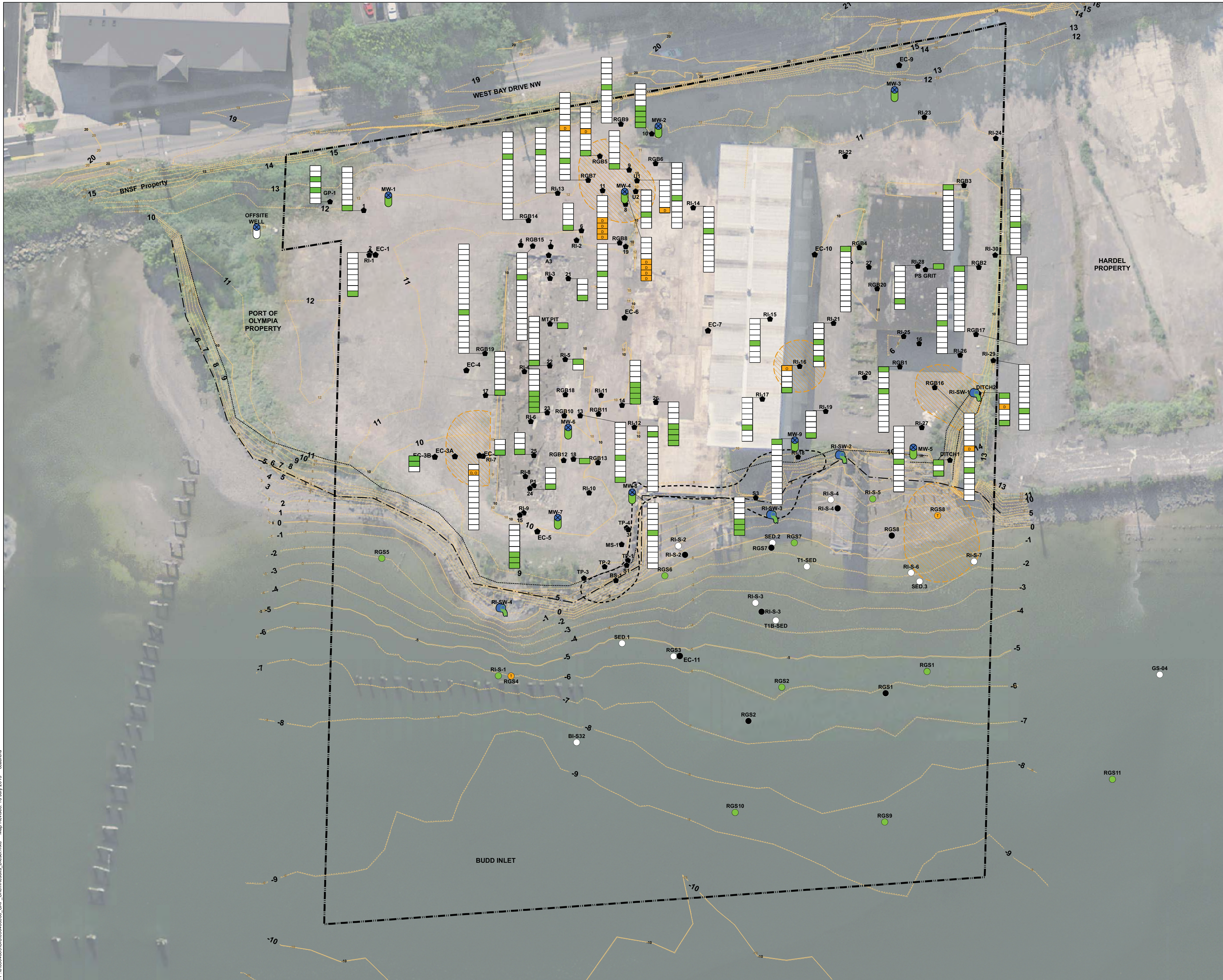
Extent of Gasoline Contamination

Reliable Steel Site
Olympia, Washington

GeoEngineers

Figure 8

Path: P:\0\0504085\GIS\0504085000_CAP_ChemResults_Gas.mxd Map Revised: 18 July 2013 ccabrera



Legend

- Property Line
- Top of Bank
- Ordinary High Water
- Approximate Area of Shoreline Metal Debris Visible on Shoreline
- Topographic/Bathymetric Contour Line and Elevation (feet NGVD29)

Sampling Location

- Soil Sampling Location [1]
- Groundwater Monitoring Well Location
- Stormwater Sampling Location
- Surface Sediment Sampling Location [2]
- Subsurface Sediment Sampling Location [1]

Sampling Interval [1]

Each box represents 1-foot sampling interval. Total number of boxes indicates the total depth[3] of subsurface exploration.

Analyte

- D Diesel-range petroleum hydrocarbons
- O Heavy oil-range petroleum hydrocarbons
- T Total petroleum hydrocarbons (sum of diesel-range and heavy oil-range petroleum hydrocarbons)

Nature and Extent of Contamination

- No shading[4] of sampling location/interval indicates sample was either not obtained or not analyzed for diesel-range and oil-range petroleum hydrocarbons.
- Orange shading[4] of sampling location/interval indicates that the identified analyte was detected at a concentration greater than the proposed cleanup/screening level.
- Green shading[4] of sampling location/interval indicates that the diesel-range and oil-range petroleum hydrocarbons were detected at concentrations less than the proposed cleanup/screening levels.
- Orange hatching represents estimated area of soil/sediment exceeding proposed cleanup levels for diesel-range and oil-range petroleum hydrocarbons.

Notes:

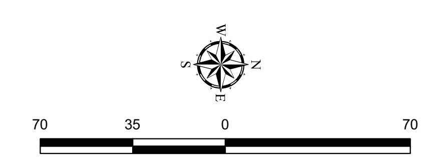
1 Sampling intervals are shown for soil sampling locations and subsurface sediment sampling locations for which diesel-range and oil-range petroleum hydrocarbon analysis was performed.

2 Surface sediment samples were generally collected from 0 to 10 cm below the mud line.

3 Locations for which total depth of subsurface exploration is unknown, depth of the deepest sample obtained at such location represents total depth.

4 Color shading of sampling locations/intervals presented in this figure is based on comparison of chemical analytical results of:
*Soil samples (obtained landward of OHW line) to proposed soil cleanup levels.
*Sediment samples (obtained waterward of OHW line) to proposed sediment cleanup levels.
*Samples obtained along the shoreline of metal debris to proposed soil and sediment cleanup levels.
*Groundwater samples (most recent samples analyzed at the sampling locations) to proposed groundwater cleanup levels.
*Stormwater samples (most recent samples analyzed at the sampling locations) to proposed screening levels.

5 Proposed cleanup and screening levels are presented in Tables 2 through 5. Chemical analytical results for diesel-range and oil-range petroleum hydrocarbons are presented in Tables 8, 13, 15, 20, 23 and 25 through 24.



Data Source: Aerial image from Thurston County, 2012.

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Extent of Diesel and Heavy Oil Contamination

Reliable Steel Site
Olympia, Washington

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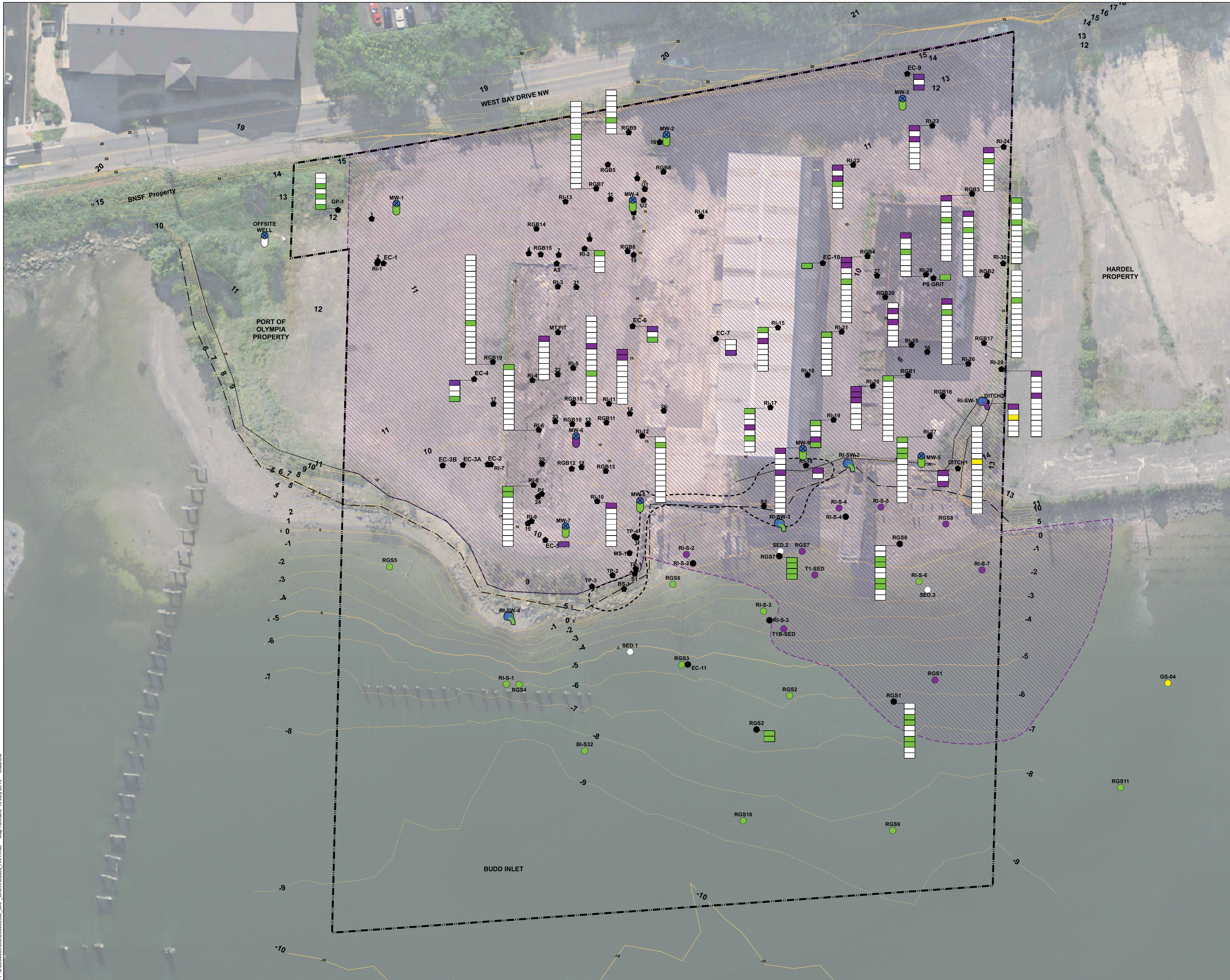
Figure 9

Path: P:\0\0504085\GIS\0504085_00_CAP_ChemResults_Diesel.mxd Map Revised: 18 July 2013 ccabrera



Legend

- Property Line
- Top of Bank
- Ordinary High Water
- Approximate Area of Metal Debris Visible on Shoreline
- Topographic/Bathymetric Contour Line and Elevation (feet NGVD29)

Sampling Location

- Soil Sampling Location [1]
- Groundwater Monitoring Well Location
- Stormwater Sampling Location
- Surface Sediment Sampling Location [2]
- Subsurface Sediment Sampling Location [1]

Sampling Interval [1]

Each box represents 1-foot sampling interval. Total number of boxes indicates the total depth[3] of subsurface exploration.

Nature and Extent of Contamination

- No shading[4] of sampling location/interval indicates sample was either not obtained or not analyzed for Polycyclic Aromatic Hydrocarbons (PAHs).
- Purple shading[4] of sampling location/interval indicates that the PAHs were detected at concentrations greater than the proposed cleanup/screening levels.
- Green shading[4] of sampling location/interval indicates that the PAHs were detected at concentrations less than the proposed cleanup/screening levels.
- Yellow shading[4] of sampling location/interval indicates that the PAH detection limit for one or more analytes was above the proposed cleanup/screening levels.
- Purple hatching represents estimated area of soil/sediment exceeding proposed cleanup level for PAHs.

Notes:

1 Sampling intervals are shown for soil sampling locations and subsurface sediment sampling locations for which PAH analysis was performed.

2 Surface sediment samples were generally collected from 0 to 10 cm below the mud line.

3 Locations for which total depth of subsurface exploration is unknown, depth of the deepest sample obtained at such location represents total depth.

4 Color shading of sampling locations/intervals presented in this figure is based on comparison of chemical analytical results of:
*Soil samples (obtained landward of OHW line) to proposed soil cleanup levels.
*Sediment samples (obtained waterward of OHW line) to proposed sediment cleanup levels.
*Samples obtained along the shoreline of metal debris to proposed soil and sediment cleanup levels.
*Groundwater samples (most recent samples analyzed at the sampling locations) to proposed groundwater cleanup levels.
*Stormwater samples (most recent samples analyzed at the sampling locations) to proposed screening levels.

5 Proposed cleanup/screening levels are presented in Tables 2 through 5. Chemical analytical results for PAHs are presented in Tables 9, 16, 21, 23 and 24.

70 35 0 70
Feet

Data Source: Aerial image from Thurston County, 2012.

General Notes:
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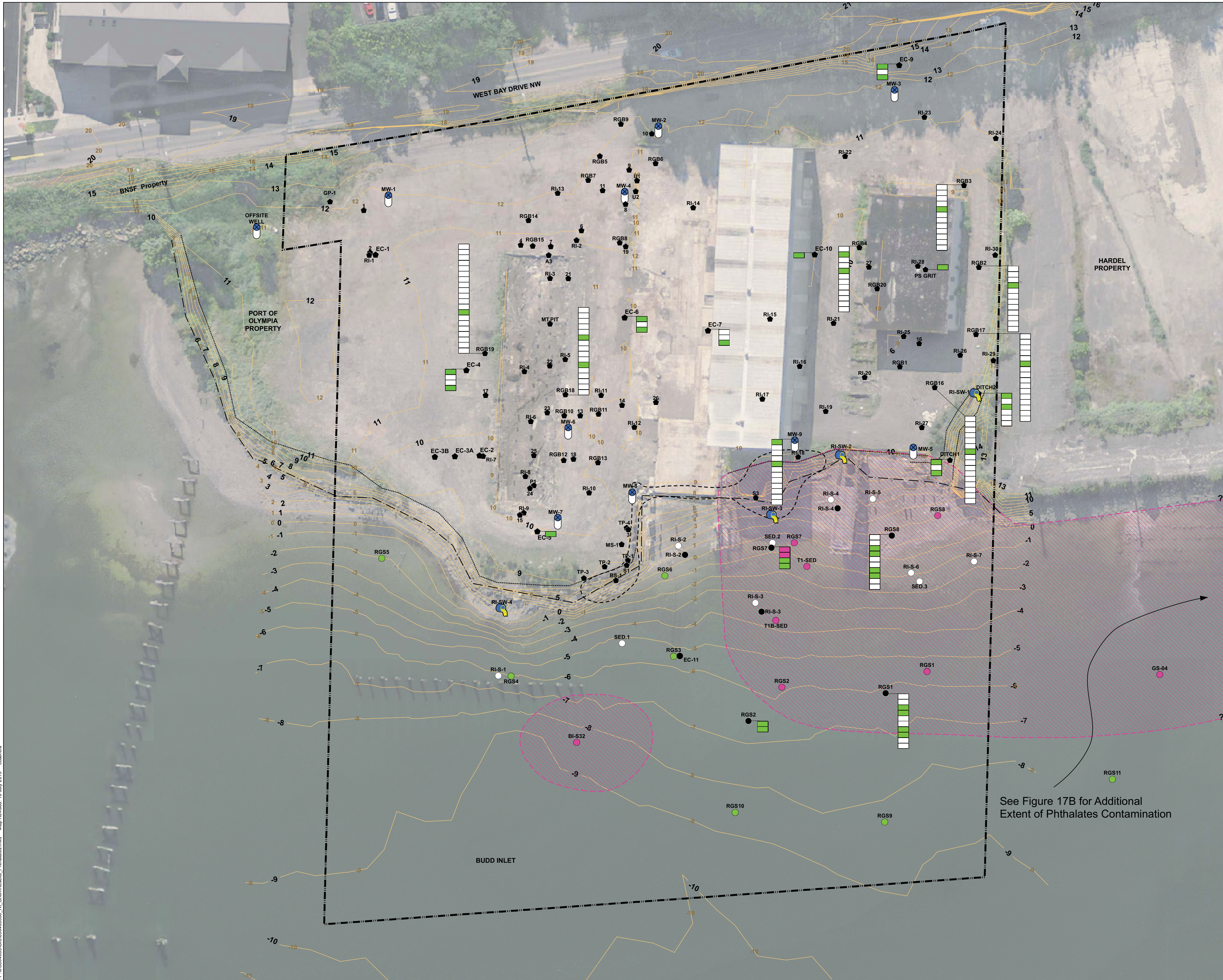
Extent of PAHs Contamination

Reliable Steel Site
Olympia, Washington

GeoEngineers | **Figure 10**

Path: P:\0\0504085\GIS\0504085\00_CAP_ChemResults_PAH.mxd Map Revised: 18 July 2013 ccabrera



Legend

- Property Line
- Top of Bank
- Ordinary High Water
- Approximate Area of Metal Debris Visible on Shoreline
- 5 Topographic/Bathymetric Contour Line and Elevation (feet NGVD29)

Sampling Location Type

- Soil Sampling Location [1]
- Groundwater Monitoring Well Location
- Stormwater Sampling Location
- Surface Sediment Sampling Location [2]
- Subsurface Sediment Sampling Location [1]

Sample Depth Interval [1]

Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[3] of subsurface exploration.

Nature and Extent of Contamination

- No shading[4] of the sampling location/depth interval indicates a sample was either not obtained or not analyzed for phthalates.
- Pink shading[4] of the sampling location/depth interval indicates that phthalates were detected at concentrations greater than the proposed cleanup/screening levels.
- Green shading[4] of sampling location/depth interval indicates that phthalates were detected at concentrations less than the proposed cleanup/screening levels.
- Yellow shading[4] of the sampling location/depth interval indicates that the laboratory method reporting limit for phthalates was above the proposed screening/cleanup levels.
- Pink hatching represents estimated area of soil/sediment exceeding proposed cleanup level for phthalates.

Notes:

1 Sample depth intervals are shown for soil sampling locations and subsurface sediment sampling locations for which phthalates analysis was performed.

2 Surface sediment samples were generally collected from 0 to 10 cm below the mud line.

3 At locations for which the total depth of subsurface exploration is not known, the depth of the deepest sample obtained at the location represents the total depth of exploration.

4 Color shading of sampling locations/intervals presented in this figure is based on comparison of chemical analytical results of:
*Soil samples (obtained landward of OHW line) to proposed soil cleanup levels.
*Sediment samples (obtained waterward of OHW line) to proposed sediment cleanup levels.
*Samples obtained along the shoreline of metal debris to proposed soil and sediment cleanup levels.
*Groundwater samples (most recent samples analyzed at the sampling locations) to proposed groundwater cleanup levels.
*Stormwater samples (most recent samples analyzed at the sampling locations) to proposed screening levels.

5 Proposed cleanup and screening levels are presented in Tables 2 through 5. The chemical analytical results for phthalates are presented in Tables 9, 15, 19, 23 and 24.

70 35 0 70
Feet

Data Source: Aerial image from Thurston County, 2012.

General Notes:
1. The locations of all features shown are approximate.
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Extent of Phthalates Contamination

Reliable Steel Site
Olympia, Washington

GEOENGINEERS

Figure 11A

Path: P:\0\0504085\GIS\050408500_RI_ChemResults_Phthalates.mxd Map Revised: 18 July 2013 ccabrera

Legend

- Property Line
- Top of Bank
- Ordinary High Water
- Approximate Area of Metal Debris Visible on Shoreline
- 5 Topographic/Bathymetric Contour Line and Elevation (feet NGVD29)

Sampling Location Type

- Surface Sediment Sampling Location [2]
- Subsurface Sediment Sampling Location [1]

Sample Depth Interval [1]

Each box represents a 1-foot sample depth interval. The total number of boxes indicates the total depth[3] of subsurface exploration.

Nature and Extent of Contamination

- No shading[4] of the sampling location/depth interval indicates a sample was either not obtained or not analyzed for phthalates.
- Pink shading[4] of the sampling location/depth interval indicates that phthalates were detected at concentrations greater than the proposed cleanup/screening levels.
- Green shading[4] of sampling location/depth interval indicates that phthalates were detected at concentrations less than the proposed cleanup/screening levels.
- Yellow shading[4] of the sampling location/depth interval indicates that the laboratory method reporting limit for phthalates was above the proposed screening/cleanup levels.
- Pink hatching represents estimated area of soil/sediment exceeding proposed cleanup level for phthalates.

Notes:

1 Sample depth intervals are shown for soil sampling locations and subsurface sediment sampling locations for which phthalates analysis was performed.

2 Surface sediment samples were generally collected from 0 to 10 cm below the mud line.

3 At locations for which the total depth of subsurface exploration is not known, the depth of the deepest sample obtained at the location represents the total depth of exploration.

4 Color shading of sampling locations/intervals presented in this figure is based on comparison of chemical analytical results of:
*Soil samples (obtained landward of OHW line) to proposed soil cleanup levels.
*Sediment samples (obtained waterward of OHW line) to proposed sediment cleanup levels.
*Samples obtained along the shoreline of metal debris to proposed soil and sediment cleanup levels.
*Groundwater samples (most recent samples analyzed at the sampling locations) to proposed groundwater cleanup levels.
*Stormwater samples (most recent samples analyzed at the sampling locations) to proposed screening levels.

5 Proposed cleanup and screening levels are presented in Tables 2 through 5. The chemical analytical results for phthalates are presented in Tables 9, 15, 19, 23 and 24.

6 The chemical analytical results for sample locations shown in Figure 17B but not in Figure 17A are in Appendix C.

60 30 0 60
Feet

Data Source: Aerial image from Thurston County, 2012.

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Extent of Phthalates Contamination

Reliable Steel Site
Olympia, Washington

GeoEngineers

Figure 11B

Path: P:\0\0504085\GIS\0504085\00_CAP_ChemResults_Phthalates_Area.mxd Map Revised: 18 July 2013 tkauhi

Legend

Site Features

- Property Line
- Catch Basin
- Stormwater Pipe
- Railroad Track
- Topographic / Bathymetric Contour Line and Elevation (Feet NGVD 29)

Nature and Extent of Contamination

- Approximate area of metal debris visible on shoreline exceeding proposed cleanup levels for metals
- Red dashed line represents estimated area of soil/sediment exceeding proposed cleanup levels for metals
- Brown dashed line represents estimated area of soil exceeding proposed cleanup levels for gasoline-range petroleum hydrocarbons
- Orange dashed line represents estimated area of soil/sediment exceeding proposed cleanup levels for diesel-range and oil-range petroleum hydrocarbons
- Purple dashed line represents estimated area of soil/sediment exceeding proposed cleanup levels for PAHs
- Pink dashed line represents estimated area of sediment exceeding proposed cleanup levels for phthalates
- Represents monitoring well location where groundwater exceeds proposed cleanup levels for metals
- Represents outfall location where stormwater exceeds proposed screening levels for PAHs and/or metals

70 0 70

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. * Areas of potential USTs identified by geophysical survey (GPR and EM) on 3/3/2008.

Reference: Survey drawing provided by Hatton Godat Pantier Engineers and Surveyors, Inc. (11-17-08 survey) and aerial photo provided by Thurston County (2012 aerial). The aerial photo is oblique, and the features shown on the aerial do not exactly match those shown on the survey drawing.

Locations and Media Requiring Cleanup Action Evaluation

Reliable Steel Site
Olympia, Washington

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Figure 12

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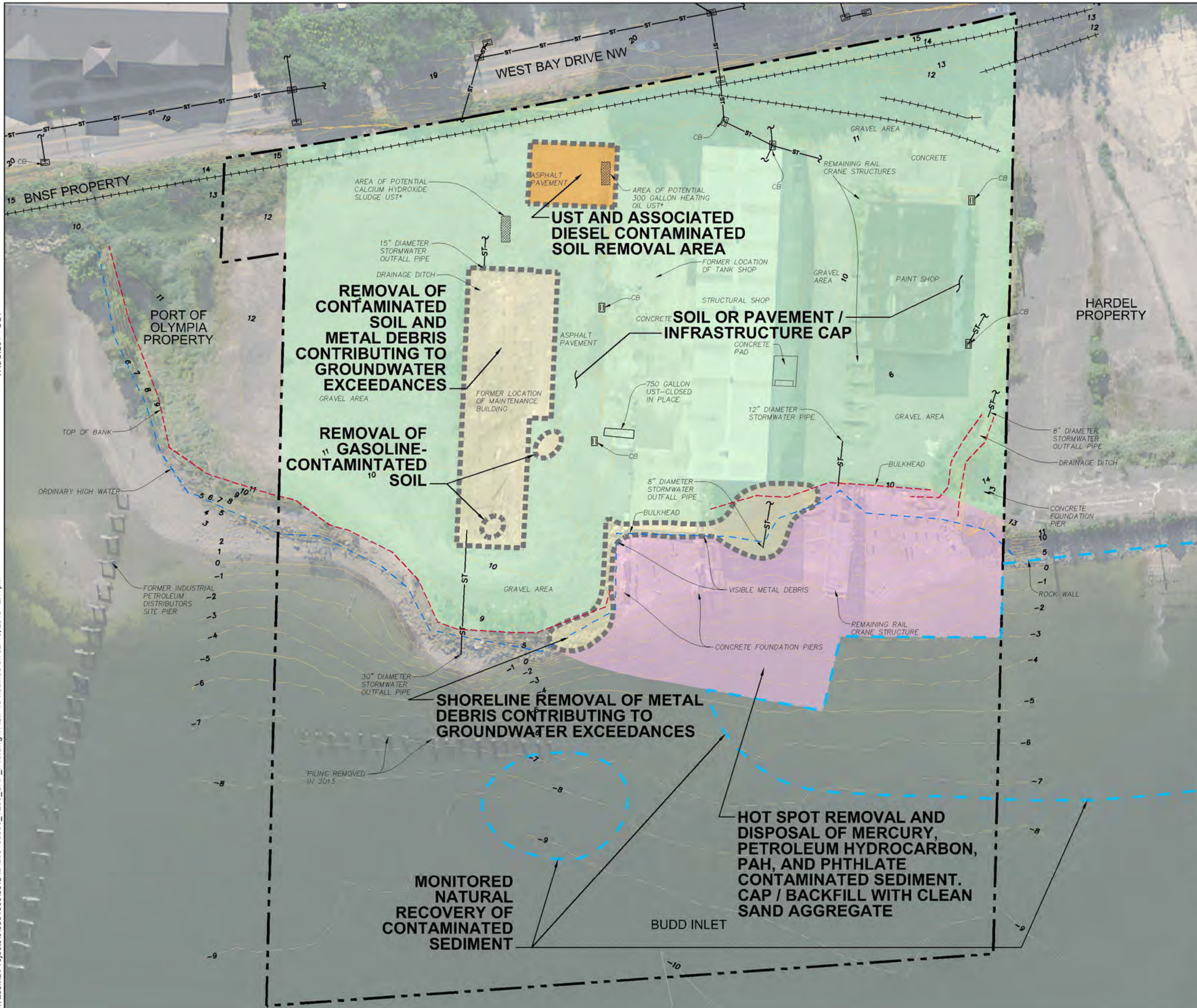

Legend

Site Features

- Property Line
- CB Catch Basin
- ST Stormwater Pipe
- Railroad Track

Remedial Alternatives

- Upland Area Soil and Metal Debris Removal
- UST and Associated Diesel-Contaminated Soil Removal
- Upland Area Capping
- Marine Area Sediment Hot Spot Removal

Upland Area Additional Actions:

1. Demolition of existing structures and infrastructure (i.e. building structures, concrete foundations and slabs, piling, etc).
2. Stormwater conveyance system removal and replacement.
3. Groundwater natural attenuation monitoring.

Marine Area Additional Actions:

1. Demolition of existing buttresses, foundations and remnant debris.
2. Shoreline stabilization and habitat enhancement incorporated into remedial actions.

70 0 70

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.
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Alternative 2: Upland Area Capping and Marine Area Hot Spot Removal

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Figure 13

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