EXHIBIT B

Draft Cleanup Action Plan

Everett Shipyard Site
Everett, Washington

Issued by:
Washington State Department of Ecology
Toxics Cleanup Program
Land and Aquatic Lands Cleanup Section
Headquarters Office, Olympia

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List of Acronyms

ARAR	Applicable Relevant and Appropriate Requirements
AST	Aboveground Storage Tank
bgs	below ground surface
CAP	Cleanup Action Plan
CLs	Cleanup Levels
cPAHs	Carcinogenic Polycyclic Aromatic Hydrocarbons
CSL	Cleanup Screening Level
CSM	Conceptual site model
CWA	Clean Water Act
CY	Cubic Yards
DCAP	Draft Cleanup Action Plan
DCA	Disproportionate Cost Analysis
Ecology	Washington Department of Ecology
ESY	ESY, Inc.
HDPE	High-Density Polyethylene
IHSs	Indicator Hazardous Substances
MLLW	Mean Lower Low Water
MTCA	Model Toxics Control Act Cleanup Regulation
NWP	Nationwide Permit
PCBs	Polychlorinated Biphenyls
PCLs	Preliminary Cleanup Levels
Port	Port of Everett
PQL	Practical quantification limit
RCW	Revised Code of Washington
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROW	Right-of-Way
SEPA	State Environmental Policy Act
SF	Square Feet
SMS	Sediment Management Standards
SQS	Sediment Quality Standards
SVOCs	Semi-Volatile Organic Compounds
TBT	Tributyltin
µg/kg	micrograms per kilogram
URS	URS Corporation
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WAC	Washington Administrative Code

EXECUTIVE SUMMARY

This document presents the Draft Cleanup Action Plan (DCAP) for the Everett Shipyard site (the Site) generally located at 1016 14th Street west of West Marine View Drive in Everett, Washington. This DCAP has been prepared pursuant to an Agreed Order meeting 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 DCAP provides a general description of the proposed upland and marine sediment cleanup actions at the Site and sets forth requirements that the cleanup must meet to achieve the cleanup action objectives for the Site.

SITE BACKGROUND

The Site is owned by the Port of Everett (Port) and includes approximately five acres of upland located west of West Marine View Drive, and adjacent in-water areas where the Port and ESY, Inc. (ESY) historically performed operations. From 1959 to 2008, ESY leased most of the upland portion of the Site from the Port ("Lease Area") and operated a boat building, maintenance, and repair facility. The in-water areas are within the Port's North Marina and include a marine railway. The Port's Travel Lift and Boat Haul-Out facility is located north of the marine railway. In addition, the Port owned and/or operated vessel and marine-related services adjacent to the Lease Area. A series of catch basins are connected to storm drain lines that discharge into the North Marina near the Port's Travel Lift, the Marine Railway, and the southwestern portion of the Site. The Lease Area is not currently occupied by a tenant and most of the unpaved portions of the Lease Area are surrounded by a chain-link fence.

Environmental studies completed at the Site between the late 1980s and 2007 identified hazardous substances in soil and sediment above preliminary cleanup levels (PCLs). To address this contamination, on April 2, 2008, Ecology, ESY and the Port entered into Agreed Order No.: DE 5271 (Agreed Order) to conduct a remedial investigation/feasibility study (RI/FS) and to develop a DCAP addressing potential upland and in-water contamination related to releases from the Site.

REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

Between 2008 and 2010, a Remedial Investigation (RI) was conducted to identify the nature and extent of contamination at the Site. The RI identified indicator hazardous substances (IHSs), i.e., substances detected at concentrations exceeding PCLs, in soil, groundwater, and marine sediments.

The IHSs for soil include: arsenic, lead, antimony, copper, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), polychlorinated biphenyls (PCBs) and petroleum hydrocarbons. The investigation results indicate that the presence of these constituents in soil cover most of the Lease Area and some areas off of the Lease Area to the south. Soils impacted by petroleum hydrocarbons were also detected adjacent to a bulkhead north of the Lease Area and southeast of the Port's Travel Lift. The depth of soil contamination is generally less than 3 feet below ground surface (bgs), except in the vicinity of the bulkhead near the Port's Travel Lift where petroleum-impacted soil was identified to a depth of about 15 feet bgs. The estimated volume of impacted soil is approximately 19,000 cubic yards (CY).

The IHSs for groundwater include: arsenic, nickel and zinc, one semi-volatile organic compound (bis[2-ethylhexyl]phthalate), and diesel-range petroleum hydrocarbons. In the central eastern portions of the Site, none of these constituents were consistently detected above the PCLs. With the exception of dissolved arsenic in the southwest portion of the Site and petroleum hydrocarbons near the Port's Travel Lift, none of the groundwater samples collected along the western side of the Site, nearest the North Marina, exhibited contaminant levels exceeding PCLs. These results indicate that contaminant transport from soil to the underlying groundwater and then to the marina appears to be limited.

The IHSs for sediment include numerous semivolatile organic compounds (SVOCs) including cPAHs, PCBs, organotin, and the metals arsenic, copper, lead, mercury, silver, and zinc. Three areas of contaminated nearshore marine sediments were identified in the North Marina. The most extensive area of contaminated sediment is the nearshore sediments north from the Port of Everett's former Tidal Grid to the Port's Travel Lift and then west to the newer sheetpile bulkhead. This area also includes impacted sediments around ESY's marine railway. The second area of sediment contamination involves the sediment and backfill material between the dual timber bulkheads near the Port's Travel Lift. A third area of isolated contamination is located at the point where a stormwater outfall designated Outfall C discharges into the marina approximately 90 feet southwest of the southwest corner of the Lease Area. The total volume of contaminated sediments at the Site is estimated to be approximately 4,800 CY.

Based on the results of the RI, the feasibility study (FS) developed and evaluated cleanup action alternatives to address the contamination at the Site. The alternatives considered for the upland and marine sediments were as follows:

Upland Alternatives

- Upland Alternative 1 – Targeted/Limited Excavation of PCB-Impacted Soil and Bulkhead Soils (1,300 CY), Off-site Disposal, Engineered-Cap, and Institutional Controls and Long-Term Monitoring
- Upland Alternative 2 – Excavation of 9,400 CY of Soil and Off-site Disposal, Engineered Cap, and Institutional Controls and Long-Term Monitoring
- Upland Alternative 3 – Building Demolition, Mass Excavation of 18,800 CY of Soil and Off-site Disposal, and Institutional Controls and Long-Term Monitoring
- Upland Alternative 4 – Bulk Excavation of 14,800 CY of Soil including all Contaminated Soil near Puget Sound and Soil Containing High Mass of Contamination, Off-site Disposal, Demolition of Two Buildings (Everett Engineering Buildings 7 and 9), Installation of Engineered Cap, and Institutional Controls and Long-Term Monitoring

Marine Sediment Alternatives

- Marine Sediment Alternative 1 – Targeted Dredging and Containment
- Marine Sediment Alternative 2 - Mass Dredging

CLEANUP ACTION PLAN OVERVIEW

Based on the findings of the RI/FS, this DCAP establishes cleanup standards for soil, groundwater and marine sediment; proposes cleanup actions to achieve these standards; presents a schedule to implement the cleanup; and identifies monitoring activities to demonstrate whether the cleanup was effective.

Cleanup Standards

Cleanup standards established for soil and groundwater were developed considering applicable exposure pathways and applicable or relevant and appropriate requirements (ARARs). These cleanup standards include the following cleanup levels (CLs) which are established for the site:

- For groundwater, CLs are based upon the protection of the marine surface water resources beneficial uses under WAC 173-340-720(4)(b)(ii).
- For soil, CLs are based upon the protection of human health via direct contact, or residual saturation levels for petroleum hydrocarbons, using MTCA Method A or B for unrestricted land use under WAC 173-740(2)(b)(i) and 173-340(3)(b)(iii)(B).
- For sediment, CLs are based upon the Marine Sediment Management Standards (SMS), set at concentrations at which sediment quality will result in no adverse effects, including no acute or chronic adverse effects on biological resources, (WAC 173-204-320). Under the SMS, the Sediment Quality Standards (SQS) will be used as a cleanup level.

The CLs need to be achieved at the point of compliance as outlined in WAC 173-340-720 through WAC 173-340-760. Institutional controls would be implemented as needed to prevent contact or exposure to media exceeding CLs following implementation of the cleanup actions.

Upland Cleanup Action

Upland Alternative 4 is the proposed upland cleanup action because it meets the threshold requirements and other MTCA requirements and is the remedy that is permanent to the maximum extent practicable as determined through a disproportionate cost analysis (DCA). The proposed upland cleanup action consists of excavation and off-site disposal of soils containing the greatest contaminant mass at concentrations exceeding the CLs. Soils planned for excavation consist of the most contaminated soils and generally are not covered by buildings or concrete pavement. These soils include all impacted soil in close proximity to Puget Sound and all of the readily accessible contaminated soil within the former Everett Shipyard operations yard, including the western area near the former Fish Processing building. Implementation of Alternative 4 requires demolition of two former Everett Engineering buildings (Buildings 7 and 9) so that contaminated soil beneath these buildings can be removed.

Key components of upland cleanup action include:

- Excavate a total of approximately 14,800 cubic yards of soil, including removal of all impacted soil in close proximity of Puget Sound and areas with the highest contaminant concentrations.
- Demolish two buildings (Everett Engineering Buildings 7 and 9) where high levels of PCBs and petroleum impacted soil were found beneath these buildings.
- Dispose of all impacted soil excavated at the Site at permitted disposal facilities.

- Install an engineered cap/barrier over the remaining soils containing concentrations of hazardous substances above CLs beneath buildings, pavement, or other structures.
- Clean out the stormwater system and modify the system as needed in areas with new paved surfaces.
- Implement an environmental covenant and five-year reviews by Ecology.

Under this alternative, site restoration will include backfill and compaction of clean imported fill materials. No pavement or cover over the excavated soils will be required, except for the limited excavation area between the marina and the Lease Area and the bulkhead excavation area. This upland cleanup action is estimated to remove approximately 98% of indicator hazardous substance mass from the site. Following implementation of the cleanup action, concentrations of IHSs in groundwater are expected to decline to less than the CLs at the point of compliance within two years of completion of soil removal and site restoration. Contact with, and migration of IHSs remaining on the Site will be managed through an engineered cap, environmental covenant, and Soil/Groundwater Management Plan.

The Soil/Groundwater Management Plan will document procedures to be implemented in the event that the integrity of the engineered cap is compromised and contaminated soil becomes exposed (e.g., contaminated soil under buildings or other capping features becomes exposed during future Site activities). Implementation of the Soil/Groundwater Management Plan will be considered part of the cleanup action if the remaining structures are demolished prior to the beginning of major upland remedial construction. Upon demolition of the remaining structures, exposed soils containing concentrations of hazardous substances above CLs will be characterized to delineate the nature and extent of contamination. Soils above CLs will be excavated and disposed of at an off-site permitted disposal facility.

Marine Sediment Cleanup Action

Marine Sediment Alternative 2 is the proposed marine sediment cleanup action because it is somewhat more permanent than Alternative 1. Mass dredging is also the most protective, as it results in removal of all of the contaminated sediment exceeding the CLs, eliminates potential ecological or human contact with contaminated sediment, and eliminates the need for long-term monitoring. As part of this cleanup action, the marine railway will be demolished to facilitate removal of sediments beneath the railway. Where docks and piers can be removed to access the sediment, clamshell dredging will be used to remove much of the sediment. Shore-based equipment may be used to remove nearshore sediment, particularly if removal can be coordinated around favorable low tides expected to expose sediments accumulated against and between bulkheads. In areas that are inaccessible, hydraulic dredging (suction-based equipment) will be used as necessary. Sediments removed from between the bulkheads will be replaced with suitable clean fill to stabilize the bulkheads. A silt curtain will be used to contain sediments that are disturbed during dredging within the work area.

It is assumed that a portion of the dredged sediments will be suitable for open-water disposal[1]. For those sediments not suitable for open-water disposal, much of the dewatering will occur on a small barge in the area of sediment removal. Dewatered sediments will be transferred from the barge to a lined 20-foot container for shipment to an off-site licensed landfill. The closest rail facility is less than 3 miles away in Everett, where containers will be transferred from a truck to rail, for shipment to a landfill.

[1] This open-water disposal option will be based upon approval of DMMP program.

Dewatering and water handling are expected to be substantial activities because of the need for large upland areas to construct settling ponds and the time required for settling of the dredged sediment-water mixture. Accumulated water will likely require particle filtration and carbon treatment prior to discharge to the local sanitary sewer system with an approved permit

Because Alternative 2 will remove all of the contaminated sediment and will not include capping, long-term monitoring and environmental covenants for future dredging or development will not be needed.

Implementation Schedule

The implementation schedule for the cleanup actions will be included in the final Consent Decree for the Site. The Consent Decree and Cleanup Action Plan (CAP) are scheduled to be finalized in the winter of 2011. Work would then be initiated on the engineering design, construction plans and specifications, and substantive permitting requirements. Permitting and engineering design work would be completed in 2012 through 2013.

1.0 INTRODUCTION

This document presents the Draft Cleanup Action Plan (DCAP) for the Everett Shipyard site (the Site) generally located at 1016 14th Street west of West Marine View Drive in Everett, Washington (Figure 1-1). The DCAP has been prepared in accordance with Agreed Order DE 5271 (Agreed Order) pursuant to the requirements of the Model Toxics Control Cleanup 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 DCAP provides a general description of the proposed upland and marine sediment cleanup actions at the Site and sets forth requirements that the cleanup must meet to achieve the cleanup action objectives for the Site. The proposed cleanup actions were identified as the preferred cleanup actions for the Site in the *Remedial Investigation/Feasibility Study* (URS Corporation [URS], 2011).

The "Site" is defined in Agreed Order (Ecology, 2008) Section IV.A as:

> *The Site (or Facility) is referred to as Everett Shipyard (the Site) and is generally located at 1016 14th Street west of West Marine View Drive, Everett, Washington (the northwest ¼ of Section 18, Township 29 North, Range 5 East). The Site is owned by the Port and includes approximately five acres of upland and adjacent in water areas. Everett Shipyard has a current leasehold on the Site and operates on Parcel Number 29051800208311, identified from the Snohomish County Assessor's Office. The Site is defined by the extent of contamination caused by the release of hazardous substances at the Site and is not limited by property boundaries. The Site includes areas where hazardous substances have been deposited, stored, disposed of, placed, or otherwise come to be located.*

As described in WAC 173-340-380, the purpose of this DCAP is to:

- Describe the Site, including a summary of its history and extent of contamination
- Identify site-specific cleanup levels and points of compliance for each indicator hazardous substance and medium of concern
- Identify applicable state and federal laws for the proposed cleanup action
- Identify and describe the selected cleanup action alternative for the Site
- Summarize the other cleanup action alternatives evaluated in the *Remedial Investigation/Feasibility Study* (RI/FS) (URS, 2011)
- Describe the type, levels and amounts of hazardous substances remaining on Site and measures that will prevent migration of these substances
- Discuss institutional controls including measures and controls that will be used to prevent contact with hazardous substances remaining on Site
- Discuss compliance monitoring requirements
- Present the schedule for implementing the cleanup action plan

2.0 SUMMARY OF SITE CONDITIONS

2.1 SITE BACKGROUND

The Site is owned by the Port of Everett (Port) and includes approximately five acres of upland located west of West Marine View Drive, and adjacent in-water areas where the Port and ESY, Inc. (ESY) historically performed operations (Figure 2-1). From 1959 to 2008, ESY leased most of the upland portion of the Site from the Port ("Lease Area") and operated a boat building, maintenance and repair facility. The in-water areas are within the Port's North Marina and include a marine railway. The Port's Travel Lift and Boat Haul-Out facility is located north of the marine railway. In addition, the Port owned and/or operated vessel and marine-related services adjacent to the Lease Area. The Lease Area is not currently occupied by a tenant and most of the unpaved portions of the Lease Area are surrounded by a chain-link fence.

The Port intends to redevelop the Site and current redevelopment plans include an upgrade to the stormwater system to a "state of the art" filter system. The timing for redevelopment is uncertain. Existing zoning maps identify the zoning of the Site as Waterfront Commercial, a designation that does not fit within MTCA's characteristics of Industrial Land Use. The City of Everett has approved a development plan that states the Site will be used for commercial and public access uses which could include commercial development such as professional office space and retail shopping. However, this does not rule out the possibility that the property could be used for residential purposes based on its current zoning.

2.1.1 Site Description

The upland portion of the Site is relatively flat and is estimated to be 15 feet (within +/- 2 feet) above Mean Lower Low Water (MLLW). The in-water portion of the Site includes the intertidal (areas exposed to air at low tide) and sub-tidal (areas always covered by water) parts of the Site associated with adjacent marine waters, generally located on the western portion of the Site. It also includes an area near the marine railway and several current and historical outfalls that discharge surface water from the upland portion of the Site and surrounding areas into the North Marina.

Areas to the north and south of the Site are currently, or have been historically, used for industrial or commercial purposes. The surrounding area is used primarily for marine-based businesses, but also includes restaurants and other retail businesses. Some areas on and adjacent to the Site are used by local business employees and customers, but are also accessible to the general public along various roads and right-of-ways that surround the Site. Some docks within the North Marina are also accessible to the public. Areas to the north and adjacent to the south of the Site are currently undergoing redevelopment and many buildings have been demolished within the past few years. No residential areas are currently situated on or adjacent to the Site. Single family residences are located on the top of the bluff east of West Marine View Drive (Figure 2-1).

The paragraph below discusses the historical ESY "Lease Area" and is not to be confused with the definition of the "Site". The term Lease Area defines the area of Port property designated for use by Everett Shipyard under a formal lease agreement. The Site is not defined by property boundaries or lease areas, but by areas where hazardous substances have been deposited, stored, disposed of, placed, or otherwise come to be located (see prior definition in Section 1.0).

ESY leased approximately five acres in the North Marina Area ("Lease Area") from the Port (Figure 2-1) and sub-leased three buildings (office/machine shop, Building 7 and Building 9) to Everett Engineering. The Lease Area is not currently occupied by a tenant and most of the unpaved portions of the Lease Area are surrounded by a chain-link fence. The Lease Area is generally bounded to the east by West Marine View Drive, to the north by 14th Street, to the west by Montague Street, and to the south by a paved are. The North Marina and Port Gardner Bay are located approximately 80 feet west of the Lease Area boundary.

The surrounding area consists of commercial and industrial development. The mouth of the Snohomish River is approximately 1 1/4 miles north of the Site (Figure 1-1).

2.1.2 Site History

The history of the Site development and operations was prepared by reviewing historical records, including Sanborn Fire Insurance maps and topographic maps, and interviews with Everett Shipyard personnel (URS, 2011). Figure 2-1 shows the current and former structures located on the Site. The Site development and operational history are described below.

Site Development

The Site appears to have been part of Port Gardner Bay in the earliest topographic maps dated 1897 and 1944. By 1947, the upland portion of the Site had been filled and the bulkhead to the west appears to have been constructed.

By 1950, the Site was developed as a small shipyard (Fishermen's Boat Shop). Boat skids were located between a joiner shop and the bulkhead and were used to side-track boats that were hauled out of the water. Two ancillary buildings (paint shop and re-saw buildings) were located near the current weld shop (fabrication bay) and wood shop buildings. A machine shop was located near the northeast corner of the Site. By 1957, the marine railway extended west from the joiner shop to the bulkhead. By the late 1960s, development of the property included additional skids on the northeast portion of the property, and the presence of other small structures. The construction of the eastern portion of the Everett Engineering machine shop building also appears to have been completed by the late 1960s.

In the 1970s, development included construction of the east end of the weld shop (fabrication bay), and a boat shed north of the northeast portion of the present day weld shop (fabrication bay). The 1980s included development of the two additional Everett Engineering buildings (Buildings 7 and 9).

The North Marina adjacent to the shipyard has been operated as a marina since at least 1959. Prior to this time, at least one shingle mill operated adjacent to the marina. Periodic maintenance dredging was required to maintain navigable water depths. The most recent dredging occurred in 2001. The 2001 dredging resulted in typical water depths of -11 to -14 feet mean lower low water (MLLW) in the area north of the floating pier.

The Port's Travel Lift boat haul out facility and adjacent areas were routinely used by the Port tenants or customers for vessel washing, painting and other maintenance. The Port's haul-out facility was present when ESY began operating at the Site in 1959 and consisted of a fixed crane used to remove boats from the water in the late 1950s and early 1960s. The Port's current Travel Lift is evident in aerial photographs beginning in 1965. In 1996, the Port constructed a nearby closed loop boat wash facility.

Historically, the Port also operated a tidal grid facility in the nearshore area south of the marine railway. According to Port personnel, the grid was used by boat owners for washing ships' hulls, painting and other maintenance activities. The tidal grid is evident in aerial photographs dated 1969, 1974, 1978 and 1991. The tidal grid was removed prior to construction of the new east bulkhead in 1995.

From 1950 to at least 1957, a net dipping operation was located just south of the former fish processing building and north of the eastern end of the Net Shed building. The net dipping facility was located outside of the former Everett

Shipyard Lease Area, and the operators of the net dipping facility were likely commercial fishermen who leased the net sheds from the Port.

Facility Operations

Since the founding of Fishermen's Boat Shop in 1947, the Site was used for building wooden fishing boats and yachts, cleaning, painting, and repairing marine vessels. Fishermen's Boat Shop became a corporation in 1961. In 2002, Fishermen's Boat Shop changed its corporate name to Everett Shipyard, Inc. In 2008, Everett Shipyard Inc. changed its name to ESY, Inc. The facility conducted repair work on marine vessels up to 110 feet long. Abrasive grit blasting and welding were added as marine repair activities. The repair work involved bilge evacuations via vacuum trucks for off-site disposal, equipment disassembly, abrasive blasting, woodwork and metalwork, painting/coating, and mechanical repairs. Abrasive blasting operations reportedly began in the 1960s when the shipyard or its customers began to work on metal boats. Aerial photographs suggest that abrasive grit was historically present on the ground surface throughout most of the central and southern portions of the Site (Figure 2-1). The operations did not include engine repairs; this work was sent off site.

Chemicals used on as part of the operations at the Site included paint and polymer coatings, coating strippers, paint thinner, rust preventer, creosote, anti-biofouling agents, xylene, diesel, lubricants, hydraulic fluid, fuel oil, and other petroleum products. Bottom paint used at the Site in 1992 (Ecology, 1992) contained copper in the form of cuprous oxide.

Handling of Stormwater and Surface Runoff Water

Historically, stormwater from the Site was managed primarily via infiltration. Catch basins were eventually installed at the Site, but the date of installation is not known. Catch basins that collected stormwater from within Everett Shipyard's operational area discharged into the North Marina at Outfalls 001 and 002 located north and south of the Marine Railway, respectively. Outfalls A and C were reported to have been connected to historic storm drains and catch basins located north and south of the Lease Area, respectively (Landau Associates, 2003). Outfall B is reportedly connected to a series of catch basins located west and south of the operational yard.

In 2002, Everett Shipyard reconfigured the catch basin discharge in the operations area to discharge to the sanitary sewer. Following the reconfiguration of the catch basins, the only stormwater runoff that entered the North Marina from the Site was runoff from a small area, primarily north of the marine railway which includes discharges from Outfall A.

Operation of Subleased Facilities

In addition to the Everett Shipyard operations, Everett Engineering subleased three buildings at the Site. Buildings were constructed for Everett Engineering's operations between 1966 and 1984. The buildings included: the office/machine shop, Building 7, and Building 9. The operations in the office/machine shop building started in the late 1960s and activities in all three buildings ceased in 2007. Another tenant occupied Building 7 and the office/machine shop building between 2008 and 2009. The buildings were vacant by November 2009. Past operations in these buildings have included the use of cutting oils, lubricant oils, hydraulic fluids and solvents. Special foundations for heavy equipment, including a foundation slab below the floor grade, were observed in Building 9.

2.2 SUMMARY OF ENVIRONMENTAL CONDITIONS

The remedial investigation (RI) identified the nature and extent of contamination including indicator hazardous substances (i.e., hazardous substances exceeding preliminary cleanup levels[PCLs]), the sources of hazardous substances, and the receptors. The findings for the RI are described below for the upland and marine portions of the Site, with a focus on the indicator hazardous substances.

2.2.1 Upland

Primary upland sources of contamination associated with the Site include abrasive blasting and painting operations from ESY and machining operations from Everett Engineering, a tenant that sub-leased portions of the Site from ESY. The abrasive blasting and painting operations were historically conducted outside buildings, primarily within the central and southwestern portions of the Site. Metals and antifouling agents, such as tributyltin (TBT), and other marine paint additives such as polychlorinated bipehnyls (PCBs), could also have been released during the blasting process as coatings were removed from vessels. Other hazardous substances used and stored at the Site included gasoline, heating oil, paints, solvents, cutting oils, glues, hydraulic oil, creosote, rust preventers, and antifreeze.

While mechanical repairs were not routinely performed at the shipyard, private boat owners were historically allowed to perform their own boat maintenance on the Site, and as a result, may have released petroleum products which contained diesel- and oil-range petroleum hydrocarbons and carcinogenic polycylic aromatic hydrocarbons (cPAHs). Other potential sources of petroleum hydrocarbons and/or cPAHs include: machine shop operations; existing and former above ground and underground storage tanks (USTs), including petroleum hydrocarbons that may have been released from suspected USTs near the Harbor Marine building located north of the Lease Area (Figure 2-3); treated wood; application of used oil to suppress dust on unpaved surfaces (as recalled by Everett Shipyard personnel); net-dipping operations; and creosote used to treat wood.

Soil

The indicator hazardous substances (IHSs) for soil detected during the investigations are: arsenic, lead, antimony, copper, cPAHs, PCBs and petroleum hydrocarbons. The investigation results indicate that the presence of these constituents in soil is laterally extensive, covering most of the Lease Area and some areas off of the Lease Area to the south as shown on Figure 2-2. Soils impacted by petroleum hydrocarbons were also detected adjacent to a bulkhead southeast of the Port's Travel Lift (Figure 2-3). The depth of soil contamination is generally less than 3 feet below ground surface (bgs), except in the vicinity of the bulkhead near the Port's Travel Lift where petroleum-impacted soil was identified to a depth of about 15 feet bgs. The estimated volume of impacted soil is approximately 19,000 cubic yards (CY). Some of the impacts to soil appear to be from releases outside of the Lease Area, but all of the source(s) have not yet been confirmed.

Groundwater

Groundwater is present beneath the Site at depths between 3 and 6 feet bgs. Groundwater generally flows to the west and has the potential to transport contaminants into the adjacent marina. Groundwater beneath the Site is not used for drinking water and groundwater is not considered potable due to the proximity to marine waters and high level of salinity.

IHSs in groundwater are limited to selected metals (arsenic, nickel and zinc), one semi-volatile organic compound (bis[2-ethylehxyl]phthalate), and diesel-range petroleum hydrocarbons. Figure 2-4 shows the groundwater sampling locations and the concentrations of IHS detected in groundwater. In the central eastern portions of the Site, none of these constituents were consistently detected above the PCLs. With the exception of dissolved arsenic in the southwest portion of the Site and petroleum hydrocarbons in the northwest portion of the Site near the Port's Travel Lift, none of the groundwater samples collected along the western side of the Site, nearest the North Marina, exhibit contaminant levels exceeding PCLs.

2.2.2 Marine Sediment

Marine sediments in portions of the North Marina adjacent to the leasehold are believed to have historically been exposed to contaminants from a variety of upland sources and other activities in the marina itself including operations at the Port's former Tidal Grid, located south of the marine railway, the Port's Travel Lift, and stormwater runoff from Everett Bayside Marine's boat repair yard. Areas around the marina have been historically used for ship maintenance and repair activities by ESY and others, included cleaning, sandblasting, and painting of

vessel hulls, and miscellaneous machine shop operations. Wastes resulting from these and other industrial and commercial operations in the area had the potential to be transported to the marine environment.

Portions of the Site and other adjacent upland areas have historically been drained by several stormwater systems that discharged into the marina. Any materials entering these stormwater conveyances, e.g., by being washed into storm drain inlets through vessel cleaning or rain events, had the potential to be released into the marina and potentially contaminate the marine sediments. Direct overland runoff into the marina in areas not protected with curbs or other barriers is another potential means of upland contaminants reaching the marina sediments. One notable example is the sloping paved area where the marine railway comes ashore. Groundwater discharging into the marina also has the potential to transport upland contaminants to the marine environment, although Site groundwater data suggest this is not a major transport mechanism. Wind also has the potential to redistribute upland contaminants, although the prevailing winds would more likely have moved contaminants away from the marina.

Marine sediment sampling during two historical sampling events and three phases of RI sampling has demonstrated that portions of the nearshore sediments in the northeastern portion of the North Marina are contaminated with a variety of chemicals. The most widespread contaminants include organic and inorganic materials, including various semi-volatile organic compounds (SVOCs) including cPAHs, the antifouling metallic organotins, including TBT, other metals, PCBs, and a variety of petroleum-based materials.

Three areas of contaminated nearshore marine sediments have been identified in the North Marina (Figure 2-5). One comparatively small area of contamination is located at the point where a stormwater outfall designated Outfall C discharges into the marina approximately 90 feet southwest of the southwest corner of the Lease Area. The contamination in this area is limited to several SVOCs. It is estimated that this area of contamination involves approximately 100 CY of sediment.

The most extensive area of contaminated sediment is the nearshore sediments north from the Port of Everett's former Tidal Grid to the Port's Travel Lift and then west to the newer sheetpile bulkhead. This area also includes the locations of outfalls associated with Everett Bayside Marine's stormwater discharge into the North Marina and the area surrounding ESY's marine railway. Sediment sampling demonstrated that contamination in these nearshore sediments typically extends on average about 60 feet out from the bulkhead. The contaminants include SVOCs, TBT, and other metals. It is estimated that this area of contamination includes a total of approximately 3,300 CY of sediment. An additional estimated 1,000 CY of sediments associated with the outer portion of the marine railway is also planned for removal.

Additional pre-design investigation, consisting of a bathymetric survey and sediment core sampling, is needed to establish the limits (both vertical and lateral extents) of sediment contamination in the vicinity of the marine railway. The pre-design sediment characterization should also include adequate vertical delineation throughout the currently defined area of sediment contamination to develop a dredge prism that can be used in the final design phase.

A third area of sediment contamination consists of the sediment and backfill material between the dual timber bulkheads that run from stormwater Outfall A north to the Travel Lift and then west to the newer sheetpile bulkhead. Outfall A, which collects stormwater from the northwest portion of the Lease Area and the adjacent roadway, discharges into the material between the two bulkheads. In addition, based on observations during RI sampling, at least five other outfalls discharge into the material located between the two bulkheads in this area. The areas drained by these five other outfalls have not been identified as being part of the Site. Contaminants found in these sediments and fill materials include SVOCs, TBT, other metals, and PCBs. Petroleum contamination was also observed in a portion of the bulkhead area during bulkhead sediment sampling and subsequently confirmed by laboratory analysis. It is estimated that the volume of contaminated materials in the dual bulkhead area is approximately 400 CY.

Thus the total volume of contaminated sediments at the Site is estimated to be approximately 4,800 CY.

2.3 CONCEPTUAL SITE MODEL

This section presents a conceptual site model (CSM) that identifies potential and/or suspected sources of hazardous substances, the types of hazardous substances detected in site media, and transport mechanisms.

2.3.1 Potential Source Areas

Primary sources of contamination associated with Site activities were abrasive blasting and painting operations from the Everett Shipyard and machining operations from Everett Engineering as discussed below.

- **Everett Shipyard** – The abrasive blasting and painting operations were historically conducted outside buildings primarily within the central and southwestern portions of the Site. Aerial photographs, interviews and Site observations indicate that significant quantities of abrasive grit accumulated in this area. Metals and antifouling agents, such as TBT, and other marine paint additives such as PCBs could also have been released during the blasting process as coatings were removed from vessels. Paint and solvent use and storage at the Site may also have resulted in accidental releases. Other hazardous substances used and stored at the Site included gasoline, heating oil, paints, solvents, cutting oils, glues, hydraulic oil, creosote, rust preventers, and antifreeze. Other potential sources of petroleum hydrocarbons and/or cPAHs related to Everett Shipyard activities include the above ground storage tank (AST) associated with the steam box, existing and former USTs, treated wood, and creosote.
- **Everett Engineering** – Everett Engineering conducted machining operations in three buildings on the eastern part of the Site and used significant quantities of cutting oil and lube oil with smaller quantities of solvents. The machinery previously installed and operated in the buildings has been removed and staining on the concrete floors in the buildings is evident. Inside Building 7, a sub-slab was constructed below the top floor slab and the soil between the two slabs appears to have been impacted, likely by oils Everett Engineering used in the machining operations. Other floor penetrations inside these building provide potential conduits for releases inside the buildings to reach the subsurface. In addition, the former compressor located near the northwest corner of the Everett Engineering maintenance shop appears to have been the source of a release of oil.

The Site and surrounding area were developed and utilized by others, including some operations by the Port, which may be sources of contamination. Examples include:

- A former Port-maintained AST for used oil collection adjacent to the southwest corner of Site.
- A former net dipping operation in the southeastern portion of the Site.
- Boat maintenance performed at the Site by boat owners.
- Businesses and operations north and northwest (e.g., former Everett Bayside Marine, Inc.) of the Site where hazardous substances may have been used and released into catch basins connected to outfalls along the bulkhead in the vicinity of the Travel Lift;
- Vessels transiting and moored within the marina area;
- Operations at the Port's former Tidal Grid located south of the marine railway, including boat maintenance and painting over water;
- The Port's Travel Lift and Boat Haul-out operation located northwest of the Site, historically used for boat washing and painting operations directly over water;

- A former crane that was located near the south of end of the deck associated with the current Travel Lift and Boat Haul-out, that was used by the Port and others to lift boats in and out of the water prior to use of the current haul-out;
- Operations within and adjacent to the building directly to the north of the Site (the Mall or Harbor Marine building) and subsurface magnetic anomalies potentially representing USTs which were identified during a geophysical survey;
- Parked vehicles and other historical operations located along 14th Street north of the Site, between the Lease Area and the bulkhead and on the north side of the former Net Shed building;
- Chemically-treated wooden pilings along the bulkhead west of the Site and associated with the marine railway and marina;
- The use of oil to suppress dust when the area surrounding the Lease Area was unpaved, as reported by Everett Shipyard personnel;
- Fill material placed beneath roadways and buildings (i.e., base course or foundation fill) prior to construction which analyses have shown to contain concentrations of cPAHs exceeding PCLs; and
- Historical operations related to the Net Shed building and a small motor repair station located near the west end of the Net Shed building.

2.3.2 Transport Mechanisms

Contaminants associated with marine vessel maintenance/repair activities that were released in the upland operations areas within the Site may have migrated beyond the Lease Area boundary in stormwater runoff. Aerial deposition of wind-blown particulates may have also dispersed contaminants (primarily during abrasive blasting operations) throughout both the upland and in-water portions of the Site. Contaminants may also have leached from the soil and migrated laterally and downward into the underlying groundwater which flows into the adjacent North Marina. However, soil and groundwater data indicate that contaminant migration associated with windblown particles and groundwater movement is limited. Surface water discharges (e.g., overland flow and via stormwater outfalls) into the North Marina and contaminant releases directly into the marina would potentially accumulate in sediment which may be re-suspended and dispersed by several mechanisms.

Vessel operations and navigation dredging within the North Marina have the potential to re-suspend and redistribute shallow sediments (e.g., through prop wash, particularly at low tide). Navigation dredging would also re-suspend and redistribute sediments. The sediment sampling results show contamination in exceedance of the criteria largely confined to a nearshore band of sediments extending approximately 40 to 60 feet from shore. These results indicate that contaminated sediment is only transported over relatively short distances.

2.3.3 Potential Exposure Pathways and Receptors

The Site and adjoining areas are currently used for commercial purposes and marina operations. The Site is zoned Waterfront Commercial and the current redevelopment agreement with the City of Everett states the Site will be used for commercial and public access uses that may include residential use. The Port indicated that it may seek a modification to the agreement to allow for a different mix of uses, including commercial development such as professional office space and retail shopping. However, this would not rule out the possibility that the Site could be used for residential purposes based on its current zoning.

Construction workers, current and future commercial/industrial workers, marina users, site visitors, and future residents could be exposed to contaminants present at the Site. Potentially significant current and future exposure pathways at the Site are:

- Soil

  - Human direct contact (i.e., ingestion and dermal exposure) with soil by construction and site maintenance workers, and future tenants or residents. It's noted that the data collected from the RI indicates that contaminant transport from soil to the underlying groundwater and then to the marina appears to be limited.
- Air
  - Exposure through inhalation of soil contaminants that have migrated to air as windblown/fugitive dust. Receptors may include site trespassers, construction and site maintenance workers, and future residents. This potential pathway also includes future indoor air exposure to commercial workers/residents who may occupy on-site buildings.
- Groundwater
  - Human dermal contact with shallow groundwater by construction and site maintenance workers.

- Marine Sediment
  - Direct human contact with sediments which would likely be limited to dredging operations and construction activity during cleanup because access to sediments is limited in this area.
  - Aquatic species including benthic invertebrates and fish can come in contact with marine sediments in the North Marina. Contaminants such as mercury have the potential to bioaccumulate in tissues and can be further concentrated moving up the food chain, ultimately potentially leading to exposures by fish including Chinook salmon, steelhead and bull trout which are threatened species, marine mammals, birds, and humans.

3.0 CLEANUP REQUIREMENTS

The MTCA cleanup regulations provide that a cleanup action must comply with site-specific cleanup standards (WAC 173-340-700), which include cleanup levels (CLs) for hazardous substances, points of compliance, and applicable or relevant and appropriate requirements (ARARs) based on federal and state laws (WAC 173-340-710). The Site CLs, points of compliance, and ARARs for the selected cleanup remedy are briefly summarized in the following sections.

3.1 INDICATOR HAZARDOUS SUBSTANCES

As described in the Agreed Order, "Indicator Hazardous Substances" means chemicals exceeding PCLs. PCLs were identified in the *Remedial Investigation/Feasibility Study* (URS, 2011). The list of indicator hazardous substances at the Site is as follows:

Soil

- Metals: arsenic, lead, antimony, and copper;
- cPAHs: benzo[a] anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, indeno[1,2,3-c,d]pyrene, dibenzo[a,h]anthracene;
- PCBs: Aroclor 1254 and total PCBs; and
- Diesel- and oil-range petroleum hydrocarbons.

Groundwater

- Metals: arsenic, nickel, and zinc;
- SVOCs: bis[2-ethylehxyl]phthalate; and
- Diesel-range petroleum hydrocarbons.

Marine Sediments

- Metals: arsenic, copper, lead, mercury, silver, and zinc;
- Organotins: TBT;
- Numerous SVOCs, including the cPAHs benzo[a]anthracene, chrysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, indeno[1,2,3-c,d]pyrene, dibenzo[a,h]anthracene, and benzo[g,h,i]perylene; and
- Total PCBs.

3.2 CLEANUP LEVELS

The potential exposure pathways presented in the CSM (Section 2.3.3) form the basis for establishing the groundwater, soil, and sediment CLs at the Site. Based upon the CSM, the following CLs are established for the site:

- For groundwater, CLs are based upon the protection of the marine surface water resources beneficial uses under WAC 173-340-720(4) (b)(ii).

- For soil, CLs are based upon the protection of human health via direct contact, or residual saturation levels for petroleum hydrocarbons, using MTCA Method A or B for unrestricted land use under WAC 173-740(2)(b)(i) and 173-340(3)(b)(iii)(B).
- The marine sediment CLs were developed according to MTCA and the SMS under the two sets of SMS criteria promulgated by Ecology (WAC 173-204-320 and -520). The Sediment Quality Standards (SQS) are set at a concentration below which effects to the benthos are unlikely, and the Cleanup Screening Levels (CSL) are set at concentrations above which more than minor adverse biological effects may be expected. The sediment CLs are set at the more stringent SQS levels. For chemicals with SQS values more stringent than natural background levels or the practical quantification limit (PQL), the natural background level or PQL will serve as the basis for the CL as described in WAC 173-340-720(7)(c) and WAC 173-340-740(5)(c).

The CLs for soil, groundwater and sediments are presented in Tables 3-1, 3-2 and 3-3, respectively.

Based upon the CSM and information presented to Ecology (URS, 2008; URS, 2010), the following CLs are not established for the Site:

- Groundwater: Site groundwater is not a current or reasonably likely future source of drinking water; therefore, CLs for the protection of groundwater as a drinking water source are not established.
- Soil:
  - An empirical evaluation of groundwater and soil data collected during Phase I and II of the RI and presented in the *Preliminary Phase II RI Data Submittal* (URS, 2010), demonstrates that hazardous substances in Site soils are protective of groundwater and marine surface water resources. Therefore, a soil cleanup level based on the protection of marine surface water resources is not established.
  - The Site has met the conditions under MTCA demonstrating that the pathway for ecological receptors is not significant. The exclusion from further terrestrial ecological evaluation using the criteria in WAC 173-340-7491 was documented in the *RI/FS Report* (URS, 2011). Therefore, CLs for the protection of ecological resources were not established.
  - Because of the nature of the contamination detected at the Site (insignificant concentrations of VOCs), the vapor intrusion pathway is incomplete and does not require further evaluation (WAC 173-340-740(3)(b)(C)). Therefore, CLs for the protection of the soil to vapor intrusion pathway were not established.

3.3 POINTS OF COMPLIANCE

The point(s) of compliance under MTCA are the point or points on site where the CLs must be attained for each specific environmental media. This section describes the points of compliance for groundwater, soil, and sediment.

3.3.1 Soil

Under MTCA, the standard point of compliance for the soil CLs based upon human health via direct contact is throughout the Site from the ground surface to 15 feet bgs per WAC 173-340-740(6)(d). This depth represents a reasonable estimate of the depth of soil that could be excavated and distributed at the soil surface as a result of Site development activities. For cleanup actions that involve containment of hazardous substances, however, the soil

CLs will typically not have to be met at the points of compliance if the following criteria are demonstrated as required under WAC 173-340-740(6)(f):

- The selected remedy is permanent to the maximum extent practicable using the procedures in WAC 173-340-360;
- The cleanup action is protective of human health;
- The cleanup action is demonstrated to be protective of terrestrial ecological receptors;
- Institutional controls are put in place that prohibit or limit activities that could interfere with the long-term integrity of the containment system;
- Compliance monitoring and periodic reviews are designed to ensure the long-term integrity of the containment systems; and
- The types, levels and amount of hazardous substances remaining on site and the measures that will be used to prevent migration and contact with those substances are specified in the Cleanup Action Plan (CAP).

The proposed cleanup action, which includes containment of some impacted soils above CLs beneath buildings or pavement, meets the requirements for this alternative point of compliance.

3.3.2 Groundwater

Under MTCA, the standard point of compliance for groundwater is throughout the site from the uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially affect by the site. Because the groundwater CLs are based on protection of marine surface water and not protection of groundwater as drinking water source, the conditional point of compliance is at the groundwater/surface water interface. Existing wells or new wells located between the upland source areas and the marine surface waters will be used to demonstrate compliance at this conditional point of compliance.

3.3.3 Sediment

The point of compliance for protection of the human health and the environment is surface sediments within the biologically active zone, 10cm below the mudline.

Dredging depth may include sediments at depths well below the current biologically active zone. This is done to ensure that planned future site use activities at or adjacent to this Site do not expose contamination and pose unacceptable risk to human health and the environment. The extent of contamination, which will set the dredging depth for the cleanup action, shall include any contaminated sediments at any depth that will be disturbed by or inhibit future Site use.

3.4 APPLICABLE REGULATORY REQUIREMENTS

Under WAC 173-340-710, MTCA requires that cleanup actions comply with all legally applicable state and federal laws and regulations and those requirements identified and determined to be relevant and appropriate (hereinafter "ARARs") for the Site.

"Applicable" requirements under MTCA are those cleanup standards, standards of control, and other human health and environmental protection requirements, criteria, or limitations adopted under state or federal law that specifically address a hazardous substance, cleanup action, location, or other circumstance at a site (WAC 173-340-200).

"Relevant and appropriate" requirements include those cleanup standards, standards of control, and other human health and environmental requirements, criteria, or limitations established under state or federal law that, while not

legally applicable to the hazardous substance, cleanup action, location, or other circumstance at a site, address problems or situations sufficiently similar to those encountered at the site that their use is well suited to the particular site (WAC 173-340-200). WAC 173-340-710(4) identifies the criteria to be used in determining whether a requirement is relevant and appropriate which include:

- Whether the purpose underlying the requirement is similar to the purpose of the cleanup action;
- Whether the media regulated or affected by the requirement is similar to the media contaminated or affected at the site;
- Whether the hazardous substance regulated by the requirement is similar to the hazardous substance found at the site;
- Whether the entities or interests affected or protected by the requirement are similar to the entities or interests affected by the site;
- Whether the actions or activities regulated by the requirement are similar to the cleanup action contemplated at the site;
- Whether any variance, waiver, or exemption to the requirements are available for the circumstances of the site;
- Whether the type of place regulated is similar to the site;
- Whether the type and size of structure or site regulated is similar to the type and size of structure or site affected by the release or contemplated by the cleanup action; and
- Whether any consideration of use or potential use of affected resources in the requirement is similar to the use or potential use of the resources affected by the site or contemplated cleanup action.

In accordance with WAC 173-340-710(9)(b), cleanup actions conducted under a consent decree or agreed order are exempt from the procedural requirements of certain state and local laws, including the Washington State Clean Air Act (Chapter 70.94 Revised Code of Washington [RCW]), Washington State Solid Waste Management Act **(**Chapter 70.95 RCW), Washington State Hazardous Waste Management Act (Chapter 70.105 RCW), Washington State Construction Projects in Water Act (Chapter 75.20 RCW, recodified at Chapter 77.55 RCW), Washington State Water Pollution Control (Chapter 90.48 RCW) and Washington State Shoreline Management Act (Chapter 90.58 RCW), as well as any laws requiring or authorizing local government permits or approvals for the action. The cleanup action must still comply with the substantive requirements of the laws in accordance with WAC 173-340-710(9)(c). It is part of Ecology's role under a consent decree or agreed order to ensure compliance with the substantive requirements, and to provide an opportunity for comment by the public, state agencies, and local governments (WAC 173-340-170[9][d]).

Because this exemption only applies to the above-referenced list of laws and regulations, the proposed cleanup action will need to comply with both substantive and procedural requirements associated with regulations identified in a few federal programs, such as U.S. Army Corps of Engineers (USACE) Nationwide Permit 38 (NWP 38), federal consultation under the Endangered Species Act, and the Clean Water Act (CWA) Section 401 Water Quality Certification. Other substantive requirements must still be met by the cleanup action. Ecology will be responsible for issuing the final approval for the cleanup 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.

The list of ARARs is provided in Table 3-4. As shown in Table 3-4 the Washington State Environmental Policy Act (SEPA) is an action-specific ARAR. SEPA requires a public review and comment period similar to MTCA. To streamline this review process, a separate draft SEPA environmental checklist has been prepared for the proposed cleanup actions. The environmental checklist includes a reference to a *Cultural Resources Inventory Report*[2] (URS, 2011a). An Inadvertent Discovery Plan has also been prepared for both upland and in-water cleanup construction activities and is presented in Appendix A of this CAP.

[2] Cultural Resources Inventory Report of Everett Shipyard Site in support of the Cleanup Action Plan is available upon written request to Washington State Department of Archaeology and Historic Preservation (http://www.dahp.wa.gov/).

4.0 PROPOSED CLEANUP ACTION

The cleanup actions described in this section were selected based on the evaluation presented in the Remedial Investigation/Feasibility Study (URS, 2011). The cleanup actions also include compliance monitoring, contingency actions and institutional controls which are described below.

4.1 DESCRIPTION OF THE CLEANUP ACTION

4.1.1 Upland Cleanup Action

Alternative 4, which consists of excavation and off-site disposal of soils containing the greatest contaminant mass at concentrations above the CLs was selected as the proposed upland cleanup action. Soils planned for excavation consist of the most contaminated soils not covered by buildings or concrete pavement. These soils include all impacted soil in close proximity to Puget Sound and all of the readily accessible contaminated soil within the former Everett Shipyard operations yard. The soils beneath Building 9 where high levels of PCBs are present and beneath Building 7 where high levels of petroleum impacted soils are located would also be excavated. Implementation of Alternative 4 requires demolition of two former Everett Engineering buildings (Buildings 7 and 9) so that contaminated soil beneath these buildings can be removed.

Figures 4-1 and 4-2 illustrate the extent of soil removal for Alternative 4. Key components of Alternative 4 include:

- Conduct hazardous materials survey and abatement of Buildings 7 and 9.
- Demolish/remove/dispose of buildings and floors (Buildings 7 and 9).
- Demolish/remove/dispose of existing paved surfaces within footprint of the excavation.
- Demolish/remove/dispose of wood and concrete structures and other miscellaneous debris within the excavation footprint.
- Excavate approximately 14,800 CY of soil within the paved and unpaved areas of the Site and from beneath Buildings 7 and 9.
- Dispose of excavated soil at off-site permitted disposal facilities, except for an estimated one-third of the bulkhead soil volume (330 CY) which is assumed to be clean and suitable for use as backfill once confirmed by sampling and analysis.
- Conduct soil confirmation analytical testing of excavation sidewall and bottom samples to confirm that CLs are achieved.
- Install engineered cap on remaining soils containing concentrations of hazardous substances above CLs beneath buildings that remain on site (“remaining structures”), pavement, or other structures. The engineered cap would include improvement to approximately 4,500 square feet (SF) of existing asphalt pavement by placement of asphalt overlay and seal coat over existing asphalt paved surfaces and sealing cracks in concrete surfaces.

- Install approximately 3,000 SF of high-density polyethylene (HDPE) liner (or other type of acceptable physical barrier) in portions of existing buildings with wooden floors.
- Clean out stormwater system and modify, as needed, in new paved surfaces.
- Install one new monitoring well in the bulkhead area and three new monitoring wells between the former operation areas and the marina and conduct two years of groundwater performance monitoring.
- Implement environmental covenant and five-year periodic reviews by Ecology.

Under this alternative, site restoration will include backfill and compaction of clean imported fill materials. No pavement or cover over the excavated soils will be required, except for the limited excavation area between the marina and the Lease Area and the bulkhead excavation area. This upland cleanup action is expected to remove approximately 98% of indicator hazardous substance mass from the site.

Following implementation of the cleanup action, approximately 2% of the indicator hazardous substance mass in soil will remain on site. Concentrations of IHSs in groundwater are expected to decline to less than the CLs at the POC within two years of completion of soil removal and site restoration. Contact with, and migration of these IHSs will be managed through an engineered cap, environmental covenant, and Soil/Groundwater Management Plan.

4.1.2 Marine Sediment Cleanup Action

The proposed marine sediment cleanup alternative is Alternative 2, Mass Dredging. This alternative includes dredging all of the sediment exceeding the CLs as shown on Figure 4-3. The marine railway will be demolished to facilitate removal of the sediments beneath the railway. Additional pre-design investigation, consisting of a bathymetric survey and sediment core sampling, is needed to establish the limits (both vertical and lateral extents) of sediment contamination in the vicinity of the marine railway and throughout the currently defined area of sediment contamination to develop a dredge prism that can be used in the final design phase.

Where docks and piers can be removed to access the sediment, sediments will be dredged using clamshell, environmental bucket, or fixed-arm equipment. Shore-based equipment may be used to remove nearshore sediment, particularly if removal can be scheduled around tides sufficiently low to expose sediments accumulated against and between bulkheads. Sediments removed from between the bulkheads will be replaced with suitable clean fill to stabilize the bulkheads.It is expected that a portion of the dredged sediments will be suitable for open-water disposal. For those sediments not suitable for open-water disposal, much of the dewatering will take place on a small barge in the area of sediment removal. A silt curtain will be used to contain sediments that are disturbed during dredging within the work area. Surface water will be monitored for the duration of the dredging to confirm compliance with applicable surface water requirements and laws. Decant water from dredged sediments may also require monitoring prior to discharging to surface water. Specific monitoring requirements will be determined during remedial design and may be similar to those for surface water monitoring. Testing may be required to determine if water quality complies with applicable surface water regulations and testing

frequency would be decreased as compliance is confirmed or increased if sample results exceed applicable surface water criteria.

Dewatered sediments will be transferred from the barge to lined containers for shipment to an off-site permitted landfill. The containers would be transferred from a truck to rail, for shipment to a landfill.

In areas that are difficult to access, hydraulic dredging (suction-based equipment) could be used. However, hydraulic dredging would generate significantly more water than clamshell dredging, since the sediments would be removed in a slurry of roughly 10 to 20 percent solids rather than 50 percent solids typical of clamshell dredging. Consequently, significantly more resources would be required to dewater the sediments prior to transport off site. Furthermore, hydraulic dredging does not work well in areas of high debris, such as under marina docks. It is assumed that hydraulic dredging will not be a major component of Alternative 2. Ideally mechanical (clamshell, environmental bucket, or fixed-arm) dredging would be used to remove sediment. The means and methods for sediment removal will be more specifically selected during design of the cleanup action.

Because Alternative 2will remove all of the contaminated sediment and will not include capping, long-term monitoring and environmental covenants relating to the marine component of the site will not be needed..

As described in the Agreed Order, it is unlikely that meaningful habitat restoration opportunities exist at the site because of current and future land use. Additional marine habitat enhancement would likely be dependent on potential future reconfiguration of the marina facilities and projected future marina operations. For example, replacement of creosoted timber bulkheads would reduce the potential for contact with and release of creosote. If the future marina configuration includes nearshore areas that will not be subject to vessel traffic, it is possible that some increase in sloped intertidal areas could be incorporated in the cleanup action design.

4.2 COMPLIANCE MONITORING

Compliance monitoring will be conducted in accordance with WAC 173-340-410, Compliance Monitoring Requirements. Detailed requirements will be described in the Compliance Monitoring Plan (CMP) which will be prepared during the cleanup action design. The objective of the CMP is to confirm that cleanup standards have been achieved, and also to confirm the long-term effectiveness of cleanup actions at the Site. The CMP will contain discussions on duration and frequency of monitoring and the rationale for the termination of monitoring. The three types of compliance monitoring to be conducted include:

- Protection Monitoring to confirm that human health and the environment are adequately protected during the construction period of the cleanup action;
- Performance Monitoring to confirm that the cleanup action has attained cleanup standards or other performance standards; and
- Confirmation Monitoring to confirm the long-term effectiveness of the cleanup action once cleanup standards and performance standards have been attained.

The cleanup action incorporates monitoring to determine whether cleanup standards have been achieved during and after the cleanup action. Three broad categories of compliance monitoring will be undertaken at the Site as described below.

Water Quality (Protection and Performance Monitoring) – During the cleanup action, construction controls and protection monitoring will be implemented as practicable to ensure surface water quality protection within the Site area. Following completion of upland cleanup actions, groundwater will be sampled on a quarterly basis at newly constructed groundwater monitoring wells for a minimum of four consecutive quarters. After four consecutive quarters of confirmation groundwater sampling, the subsequent sampling frequency will be determined in consultation with Ecology. Groundwater monitoring will be terminated once compliance with cleanup standards has been demonstrated.

Physical Limits and Integrity (Performance and Confirmation Monitoring) – Topographic and bathymetric performance monitoring will be conducted during the cleanup action to guide the limits of construction activities (e.g., soil excavation and dredging). Following completion of construction, physical confirmation monitoring of upland excavation and sediment dredge prism will be performed to verify that the planned degree of removal was achieved and the known areas of contamination have been removed. In the upland area visual inspections and measurements will be conducted to confirm the integrity of the engineered cap.

Soil and Sediment Quality (Performance and Confirmation Monitoring) – Once required excavation or dredging elevations have been verified, performance monitoring will involve collecting soil or sediment samples from the base and/or sidewalls of excavations to confirm that CLs have been achieved and to document concentrations of contaminants remaining on site. If individual samples exceed CLs (e.g., in sidewalls of upland excavations or at the base of offshore dredge prisms), then additional dredging or excavation may be performed until subsequent sampling and analysis confirms that CLs have been achieved. Alternatively, a statistical analysis of the data may be performed to demonstrate compliance with CLs.

4.3 CONTINGENCY ACTIONS

The proposed cleanup action includes a provision for contingent actions to address contaminated soil that will remain onsite following implementation of the upland cleanup action. These contingent actions will be described in a Soil/Groundwater Management Plan[3]. Under the Soil/Groundwater Management Plan, upon demolition of the remaining structures, exposed soils containing concentrations of hazardous substances above CLs will be:

- Characterized to delineate the nature and extent of contamination;
- Soils above CLs will be excavated and disposed of at an off-site permitted disposal facility; and
- Compliance monitoring will be performed to ensure that cleanup standards (e.g., CLs) have been achieved.

Details regarding the approximate extent of the residual soil impacts that will be managed under the Soil/Groundwater Management Plan, the concentrations of hazardous substances detected in these areas,

[3] The Soil/Groundwater Management Plan will be prepared as a deliverable for review and approval by Ecology following entry of Consent Decree for the cleanup action.

and the type of analyses that will be performed to characterize the extent of contamination are included in Appendix B. Implementation of the Soil/Groundwater Management Plan will be considered part of the cleanup action if the remaining structures are demolished prior to the beginning of major upland remedial construction.

If the remaining structures are demolished prior to the beginning of major upland remedial construction, the Soil/Groundwater Management Plan would be implemented concurrent with other upland remedial construction activities.

4.4 INSTITUTIONAL CONTROLS

The proposed cleanup action will leave soil exceeding CLs (Table 3-1) in place beneath remaining structures, asphalt pavement, and the concrete sidewalk on the eastside of the Site as shown on Figure 4-4. Isolated areas where groundwater exceeds CLs (Table 3-2) may also remain following the proposed soil excavation. Environmental covenants will be required for the portions of the Site where complete removal of soil exceeding applicable CLs will not be achieved and in areas where groundwater concentrations exceed CLs. The covenants will identify specific locations and depths where soil and groundwater will require special management if disturbed. The Soil/Groundwater Management Plan described above will instruct property owners on Ecology's requirements for performing invasive work in areas of remaining contaminated soil and groundwater. The environmental covenants will be recorded following completion of excavation activities described in this DCAP.

5.0 ALTERNATIVES CONSIDERED AND BASIS FOR CLEANUP ACTION SELECTION

A range of cleanup action alternatives were considered in the *Remedial Investigation/Feasibility Study* (URS, 2011). This section describes the screening of general response actions and the evaluation of cleanup action alternatives considered during the RI/FS.

5.1 GENERAL RESPONSE ACTIONS

The *Remedial Investigation/Feasibility Study* (URS, 2011) presents a screening evaluation of potentially applicable general response actions and cleanup action technologies. The screening evaluation was carried out for each of the environmental media (soil, groundwater, and sediment) requiring cleanup action evaluation.

5.1.1 Soil

General response actions for upland soils that were retained for further evaluation include: (1) institutional controls and long-term compliance monitoring; (2) engineered cap; and (3) removal and off-site disposal. These general response actions are broad actions that, singly or in combination, may be expected to meet the minimum threshold requirements for a MTCA-compliant cleanup action.

5.1.2 Groundwater

Only isolated groundwater impacts were detected during the RI and it is anticipated that concentrations of arsenic at well MW-4 and diesel-range petroleum hydrocarbons southeast of the Port's Travel Lift will achieve compliance with the groundwater CLs following implementation of the upland cleanup action alternatives described below in Section 5.2.1 via natural attenuation in response to the removal of source material (i.e., arsenic- and petroleum hydrocarbon-impacted soil) or elimination of infiltration which leaches low concentrations of arsenic from the overlying soil, or a combination of both. Therefore, treatment of groundwater was not included in any of the cleanup action alternatives. However, long-term groundwater monitoring was retained as general response action that would be conducted to demonstrate that groundwater CLs are achieved following implementation of the cleanup action.

5.1.3 Sediment

General response actions for marine sediments that were retained include: (1) institutional controls and long-term monitoring, (2) monitored natural recovery, (3) containment - in situ capping, (4) in situ treatment (porewater), (5) sediment removal by dredging, and (6) habitat enhancement.

5.2 CLEANUP ACTION ALTERNATIVES

Cleanup action alternatives were developed by assembling technologies that were carried forward from the initial screening evaluation into complete cleanup alternatives for the upland area and marine sediments. The *Remedial Investigation/Feasibility Study* (URS, 2011) presents a detailed evaluation of the cleanup alternatives, including cost estimates and the contaminant mass removal estimates for the upland area. This evaluation is summarized below.

5.2.1 Upland Area

The four upland cleanup alternatives for soil media considered in the RI/FS include combinations of containment (engineered caps and existing building slab) and excavation of various upland areas of the Site and off-site disposal of impacted soils, concrete, asphalt and building demolition debris. Institutional controls and long-term compliance monitoring were included as requirements for all of the alternatives.

The extent of residual contamination varies between alternatives; however, a Soil/Groundwater Management Plan is an element of each upland cleanup action alternative and a key component of the proposed cleanup action. As described in Section 4.3 under the Soil/Groundwater Management Plan, upon demolition of the structures, exposed soils containing concentrations of hazardous substances above CLs would be:

- Characterized to delineate the nature and extent of contamination;
- Soils above CLs will be excavated and disposed of at an approved off-site disposal facility; and
- Compliance monitoring will be performed to ensure that cleanup standards (e.g., CLs) have been achieved.

If the remaining structures are demolished prior to the beginning of major upland remedial construction, the Soil/Groundwater Management Plan would be implemented concurrent with other upland remedial construction activities.

Each of the upland alternatives is summarized below.

Upland Alternative 1 – Targeted/Limited Excavation of PCB-Impacted Soil and Bulkhead Soils (1,300 CY), Off-Site Disposal, Engineered-Cap, and Institutional Controls and Long-Term Monitoring

Alternative 1 relies primarily on engineered capping with targeted/limited excavation and off-site disposal of impacted soil, institutional controls, and long-term monitoring to achieve cleanup standards. Uplands Alternative 1 involves excavation of PCB-impacted soil with concentrations above 10,000 micrograms per kilogram (µg/kg) and petroleum-impacted soil located east of the bulkhead near the Port's Travel lift, and placement of an engineered cap over all other areas of the Site where concentrations of indicator hazardous substances in soil exceed the CLs.

The engineered cap would consist of a combination of new asphalt pavement where pavement currently does not exist and improvements to existing pavement, including asphalt overlay and seal coat. Existing buildings and underlying impervious flooring would remain in place to serve as a cap. Two buildings on the Site do not have concrete or asphalt floors: the office and wood shop. A HDPE liner or other acceptable type of physical barrier would be installed over the affected building floor area to prevent direct contact to hazardous substance above unrestricted CLs.

Key components of this alternative include:

- Excavate approximately 240 CY of soils with PCB concentrations equal to or greater 50,000 µg/kg to an approximate depth of 4 feet bgs to meet the remediation level of 10,000 µg/kg PCBs. This area would be backfilled, compacted, and covered with an engineered cap.
- Excavate approximately 400 CY of soils with PCB concentrations greater than or 10,000 µg/kg and less than 50,000 µg/kg to an approximate depth of 3 feet bgs. This area would be backfilled, compacted, and covered with engineered cap.
- Excavate approximately 1,000 CY of petroleum-impacted soil above CLs to a depth of approximately 14 feet bgs in the bulkhead excavation area, located southeast of the Port's Travel Lift. This area would be backfilled, compacted, and covered with asphalt pavement.
- Dispose of off-site excavated soil at permitted disposal facilities, except for one-third of the volume of bulkhead soil (330 CY) which is assumed to be clean and would be used as backfill once confirmed by sampling and analysis.

- Conduct soil sampling and chemical analysis to confirm that sidewall soil samples are below 10,000 µg/kg for PCBs and excavation bottom soil samples are below CLs for all indicator hazardous substances.
- Install approximately 58,000 SF of new asphalt pavement in areas that currently are not paved, including the removal of existing structures (except buildings) that would impede installation of the engineered cap.
- Improve approximately 55,000 SF of existing asphalt pavement by placement of asphalt overlay and seal coat over existing asphalt paved surfaces and sealing cracks in concrete surfaces.
- Install 3,000 SF of HDPE liner (or other type of acceptable physical barrier) in portions of existing building with wooden floors
- Remove above ground wooden skids to facilitate placement of the asphalt cap.
- Clean out and modify, as needed, the stormwater system in areas of existing and new paved surfaces.
- Install one new monitoring well in the bulkhead area.
- Conduct at least two years of groundwater performance monitoring using new and existing groundwater monitoring wells.
- Conduct long-term maintenance consisting of biannual inspections (every two years) and periodic sealcoat of pavement (assumed every five years).
- Implement environmental covenant and five-year periodic reviews by Ecology.

Under Alternative 1, 15% of indicator hazardous substance mass would be removed from the site. The estimated cleanup cost for Alternative 1 is $1.8 million (present worth).

Upland Alternative 2 –Excavation of 9,400 CY of Soil and Off-site Disposal, Engineered Cap, and Institutional Controls and Long-Term Monitoring

This alternative relies on excavation of approximately half of the impacted soils, installation of engineered cap and institutional controls to achieve cleanup standards. This alternative includes all of the soil excavation from Alternative 1, plus excavation of soil in unpaved areas outside of structures. Key components of Alternative 2 include:

- Perform soil excavation (1,600 CY), soil confirmation sampling, and barrier installation in wooden buildings equivalent to Alternative 1 above and excavate approximately 8,100 CY of additional soil within existing unpaved areas of the Site for a total excavation of approximately 9,700 CY.
- Dispose of off-site excavated soil at permitted disposal facilities, except for about one-third of the volume of bulkhead soil (330 CY) which is assumed to be clean and would be used for use as backfill once confirmed by sampling and analysis.
- Implement soil confirmation sampling in unpaved areas to verify that sidewall and bottom samples from the excavation are below CLs for all indicator hazardous substances.
- Remove above ground wooden and concrete portions of skids in unpaved areas to facilitate excavation and install engineered cap. The engineered cap would include improvement to approximately 56,000 SF of existing asphalt pavement and sealing cracks in existing concrete paved surfaces.

- Install approximately 3,000 SF of HDPE liner (or other type of acceptable physical barrier) in portions of existing buildings with wooden floors.
- Clean out the stormwater system and modify, as needed, in existing paved areas.
- Install one new monitoring well in the bulkhead area.
- Conduct at least two years of groundwater performance monitoring using new and existing groundwater monitoring wells.
- Conduct long-term maintenance consisting of biannual inspections and periodic sealcoat of pavement (assumed every five years).
- Implement environmental covenant and five-year periodic reviews by Ecology.

Under Alternative 2, 56% of indicator hazardous substance mass would be removed from the site. The estimated cleanup cost for Alternative 2 is $2.7 million (present worth).

Upland Alternative 3 – Building Demolition, Mass Excavation of 18,800 CY of Soil and Off-site Disposal and Institutional Controls and Long-Term Monitoring

Alternative 3 is the most permanent remedy developed for the upland cleanup alternatives and relies primarily on building demolition, massive excavation and off-site disposal of all soil containing hazardous substances above the CLs. The exception is the impacted soil beneath the sidewalk and West Marine View Drive right-of-way (ROW). Key components of Alternative 3 include

- Conduct hazardous materials survey and abatement of existing building structures, including all buildings within the Site and the former Fish Processing Building (entire building).
- Demolish/remove/dispose of buildings and floors (8 structures including Fish Processing Building and two covered areas and two sheds/out-buildings)
- Demolish/remove/dispose of existing paved surfaces within footprint of the excavation.
- Demolish/remove/dispose of wood and concrete structures and other miscellaneous debris within the excavation footprint.
- Properly decommission groundwater monitoring wells within the footprint of the excavation.
- Perform soil excavation (approximately 9,700 cubic yards), and soil confirmation sampling, equivalent to Alternative 2 above and excavate approximately 9,400 CY of additional soil within existing paved areas of the Site for a total excavation of approximately 19,100 CY.
- Dispose of off-site excavated soil at permitted disposal facilities, except for one-third of the volume of bulkhead soil (330 CY) which is assumed to be clean for use as backfill once confirmed by sampling and analysis.
- Clean out remaining stormwater system.
- Conduct soil confirmation analytical testing of excavation sidewall and bottom samples to confirm that CLs are achieved.
- Install one new monitoring well in the bulkhead area and three new monitoring wells between the former operation areas and the marina and conduct two years of groundwater performance monitoring using the new groundwater monitoring well network.
- Implement environmental covenant and five-year periodic reviews by Ecology for the area under the sidewalk and public ROW where hazardous substances remain in soil above CLs.

Under Alternative 3, 99% of indicator hazardous substance mass would be removed from the site. The estimated cleanup cost for Alternative 3 is $5.4 million (present worth).

Upland Alternative 4 – Limited Building Demolition (Everett Engineering Buildings 7 and 9), Bulk Excavation of 14,800 CY of Soil including All Contaminated Soil near Puget Sound and Soil Containing High Mass of Contamination, Off-site Disposal, Installation of Engineered Cap, and Institutional Controls and Long-Term Monitoring

Alternative 4 consists of excavation and off-site disposal of soils containing the greatest contaminant mass at concentrations above the CLs. Soils planned for excavation consist of the most contaminated soils and generally are not covered by buildings or concrete pavement. These soils include all impacted soil in close proximity to Puget Sound and all of the readily accessible contaminated soil within the former Everett Shipyard operations yard including the western area near the former Fish Processing building. The soils beneath Building 9 where high levels of PCBs are present and beneath Building 7 where high levels of petroleum impacted soils are located would also be excavated. Implementation of Alternative 4 requires demolition of two former Everett Engineering buildings (Buildings 7 and 9) so that contaminated soil beneath these buildings can be removed.

Figures 4-1 and 4-2 illustrate a conceptual cleanup action plan for Alternative 4. Key components of Alternative 4 include:

- Perform soil excavation, soil confirmation sampling, and barrier installation in wooden buildings equivalent to Alternative 2 above (approximately 9,700 cubic yards) and excavate approximately 5,400 CY of additional soil within existing paved areas and buildings of the Site for a total excavation of approximately 15,100 CY.
- Dispose of off-site excavated soil at permitted disposal facilities, except for an estimated one-third of the bulkhead soil volume (330 CY) which is assumed to be clean and suitable for use as backfill once confirmed by sampling and analysis.
- Conduct additional soil confirmation analytical testing of excavation sidewall and bottom samples to confirm that CLs are achieved.
- Install engineered cap on remaining soils containing concentrations of hazardous substances above CLs beneath buildings (excluding Buildings 7 and 9), pavement, or other structures. The engineered cap would include improvement to approximately 4,500 SF of existing asphalt pavement by placement of asphalt overlay and seal coat over existing asphalt paved surfaces and sealing cracks in concrete surfaces.
- Install approximately 3,000 SF of HDPE liner (or other type of acceptable physical barrier) in portions of existing buildings with wooden floors.
- Clean out stormwater system and modify, as needed, in new paved surfaces.
- Install one new monitoring well in the bulkhead area and three new monitoring wells between the former operation areas and the marina and conduct two years of groundwater performance monitoring.
- Implement environmental covenant and five-year periodic reviews by Ecology.

Under Alternative 4, 98% of indicator hazardous substance mass would be removed from the site. The estimated cleanup cost for Alternative 4 is $3.8 million (present worth).

5.2.2 Marine Area

Two cleanup alternatives were developed for the marine sediments. The first alternative combines removal of a portion of the contaminated sediments and containing the remaining contaminated sediments in place. The second alternative consists of complete removal of sediments exceeding the SMS criteria.

Each of the alternatives will require temporary relocation of vessels and floating structures to provide access for cleanup action activities.

Marine Sediment Alternative 1 – Targeted Dredging and Containment

This alternative includes dredging of selected areas based on accessibility. The marine railway would be demolished and sediments beneath the railway would be removed. Areas that are difficult to access, e.g., under docks or piers, would be capped rather than dredged. In the area of the dual wooden bulkhead near the Port's Travel Lift this could include partial removal, followed by capping. Containment would not be utilized in areas where navigation depth is critical to current and future marina usage.

The primary components of this alternative are as follows:

- Demolish and remove the marine railway.
- Dredge sediment from accessible areas using a clamshell dredge, environmental bucket, or fixed-arm dredge. Shore-based equipment may be used to remove nearshore sediment.
- Place dredged sediments on a small barge and transfer to lined containers for truck and/or rail transportation for off-site disposal.
- Use a silt curtain to contain sediments disturbed during dredging.
- Conduct surface water monitoring during the dredging to confirm compliance with applicable surface water requirements and laws.
- Conduct sediment confirmation sampling to document successful cleanup of the dredged areas.
- Install an engineered composite cap cover over contaminated sediments left in place. The composite material would be covered with a 4- to 6-inch layer of rock for protection and further consolidation of the treatment layer. The conceptual design involves a total cap thickness of approximately 12 inches.
- Conduct long-term monitoring.
- Implement environmental covenant and five-year periodic reviews by Ecology.

The estimated cleanup cost for Alternative 1 is $2.0 million (present worth).

Marine Sediment Alternative 2 - Mass Dredging

Alternative 2 involves removal of all of the sediment exceeding the CLs. The primary components of this alternative are:

- Demolish and remove the marine railway.

- As in Alternative 1, dredge sediment from accessible areas using a clamshell dredge, environmental bucket, or fixed-arm dredge. Shore-based equipment may be used to remove nearshore sediment. In areas that are inaccessible, hydraulic dredging (suction-based equipment) could be used.
- Use a silt curtain to contain sediments disturbed during dredging.
- Conduct surface water monitoring during the dredging to confirm compliance with applicable surface water requirements and laws.
- Conduct sediment confirmation sampling to document successful cleanup of the dredged areas.

Because Alternative 2 includes removal of all sediments exceeding the CLs, no ongoing monitoring or environmental covenants involving the marine component of the site would be required. The estimated cleanup cost for Alternative 2 is $2.0 million.

5.3 MTCA DISPROPORTIONATE COST ANALYSIS

The MTCA disproportionate cost analysis (DCA) is used to evaluate which of the alternatives that meet the threshold requirements are permanent to the maximum extent practicable. This analysis involves comparing the costs and benefits of alternatives and selecting the alternative whose incremental costs are not disproportionate to the incremental benefits. The evaluation criteria for the disproportionate cost analysis are specified in WAC 173-340-360(3)(f), and include:

- Overall protectiveness;
- Permanence;
- Long-term effectiveness;
- Management of short-term risks;
- Technical and administrative implementability;
- Public concerns; and
- Cost.

As outlined in WAC 173-340-360(3)(e), MTCA provides a methodology that uses the criteria listed above and described below in subsections 5.3.1 through 5.3.6 to assess whether the costs associated with each cleanup alternative are disproportionate relative to the incremental benefit of each alternative as compared to the next lowest-cost alternative. The comparison of benefits relative to costs may be quantitative, but will often be qualitative and require the use of best professional judgment.

In order to favor the benefits represented by particular criteria, this evaluation uses a weighting system accepted by Ecology. The first three criteria associated with environmentally-based benefits are more highly weighted than the other three criteria that are associated with non-environmental factors. Each of the MTCA criteria used in the DCA is described below.

5.3.1 Protectiveness: weighting factor of 30%

The overall protectiveness of a cleanup action alternative is evaluated based on several factors, including the degree to which existing risks are reduced, time required to reduce risk at the facility and attain cleanup standards, on site and off site risks resulting from implementing the alternative, and improvement of the overall environmental quality. A weighting factor of 30 percent was assigned to the numeric values associated with this evaluation criterion. This high weighting is warranted because of the overall importance of protection of human health and the environment as a primary goal of cleanup at the Site.

5.3.2 Permanence: weighting factor of 20%

The overall permanence of the cleanup action must be considered in the disproportionate cost analysis. 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. A weighing factor of 20 percent was assigned to the numeric values associated with this evaluation criterion. This criterion has the second highest weighting factor.

5.3.3 Effectiveness over the Long Term: weighting factor of 20%

Long-term effectiveness includes the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain on site at concentrations that exceed CLs, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes. The MTCA regulations specify a guide for ranking cleanup action components in descending order: reuse/recycling, destruction or detoxification, immobilization or solidification, on site or off-site disposal in an engineered, lined and monitored facility, on site isolation or containment with attending engineering controls, and institutional controls and monitoring. The MTCA preference ranking must be considered along with other site-specific factors in the evaluation of long-term effectiveness. A weighting factor of 20 percent was assigned to the long-term effectiveness criterion.

5.3.4 Management of Short-Term Risks: weighting factor of 10%

The short-term risks criteria evaluates the risk to human health and the environment associated with the alternative during construction and implementation, and the effectiveness of the measures that will be taken to manage such risks. Examples of risks include potential exposure to hazardous substances during implementation of the selected remedy or general construction hazards. A weighting factor of 10 percent was assigned to this criterion. This lower rating is based on the limited time-frame associated with the risks and the general ability to correct short-term risks during construction without significant effect on human health and the environment.

5.3.5 Technical and Administrative Implementability: weighting factor of 10%

Implementability is an overall metric expressing the relative difficulty and uncertainty of implementing the cleanup 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. The weighting factor that was assigned to the implementability criterion was 10 percent. Implementability is less associated with the primary goal of the cleanup action, protection of human health and the environment, and therefore has a lower weighting factor than criteria with greater environmental benefit. In addition, the issues associated with the implementability of a remedy are often related to the level of effort to perform the cleanup action.

5.3.6 Consideration of Public Concerns: weighting factor of 10%

Public concerns were evaluated following receipt of comments from the public on the draft RI/FS Report. The weighting factor that was assigned to the public concern criterion was 10 percent.

5.3.7 Cost

No weighting factor is applied to this quantitative category, as costs are compared against the numeric analysis. The analysis of cleanup 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 worth 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. Costs are compared against benefits to assess cost-effectiveness and practicability of the cleanup action alternatives.

5.4 EVALUATION AND COMPARISON OF UPLAND ALTERNATIVES

This section evaluates each of the cleanup action alternatives for the upland portion of the Site against the minimum threshold requirements and other MTCA requirements. Table 5-1 presents a summary of MTCA cleanup action alternatives evaluation and the results of DCA ranking for upland portion of the Site. The percent of contaminant mass removal for each key indicator hazardous substance (arsenic, lead, petroleum hydrocarbons, cPAHs, PCBs) is also summarized in Table 5-1.

5.4.1 Threshold Requirements

This section provides an evaluation of each alternative against each threshold requirement.

Protection of Human Health and the Environment

Each cleanup action alternative for upland soils is protective of human health and the environment because potential exposure pathways from direct exposure to human and ecological receptors are eliminated. Alternatives 1 and 2 include capping plus limited excavation and institutional controls to ensure protectiveness. Alternative 3 relies primarily on excavation to ensure protection of human health and the environment, but also includes containment and institutional controls for the small amount of contaminated soil that would be capped adjacent to West Marine View Drive. Alternative 4 also relies primarily on excavation, but a larger amount (21%) of contaminated soil (and approximately 2% of indicator hazardous substance mass) would remain on the Site when compared to Alternative 3.

Planned future land use would require, at a minimum, replacement of the portions of the planned cap for Alternatives 1 and 2, and would likely require removal and offsite disposal of a significant amount of additional contaminated Site soil to accommodate utilities, building foundations, and finish grades. As a result, the engineered caps for Alternatives 1 and 2 would most likely need to be significantly reconfigured or entirely replaced during redevelopment to maintain protectiveness of human health and the environment. Alternative 3 and 4 would require more limited, if any, reconfiguration during redevelopment.

Compliance with Cleanup Standards

Each cleanup action alternative for upland soils would comply with cleanup standards as discussed in Section 3.0. As described in Section 3.3, each alternative may be determined to comply with cleanup standards provided that six requirements listed in WAC 173-340-740(6)(f) are met for the containment of soils beneath an engineered cap. Alternative 3 meets all six requirements under all future land use scenarios. Alternatives 1 and 2, however, would only comply with cleanup standards in the long-term if the capping systems identified for these two alternatives can be replaced by buildings and other capping surfaces constructed as part of Site redevelopment and only if redevelopment can accommodate containment of the contaminated soil within the context of planned future roadways, utilities, building foundations and site grades. Otherwise, the cleanup action would have to be redefined as part of Site redevelopment to include partial or complete removal and off-site disposal of contaminated soil to maintain compliance with cleanup standards.

Alternative 4 removes the vast majority of contaminant mass and significantly reduces the footprint of impacted soil on the uplands Site. For the contaminated soils left on-site, Alternative 4 meets all six requirements for containment of soils and thus, complies with cleanup standards. Redevelopment of the Site following implementation of Alternative 4 would require excavation of primarily shallow soil (typically less than 1 foot deep) with relatively low concentrations of indicator hazardous substances. The integration of the redevelopment for Alternative 4 would be significantly less complex, when compared to Alternatives 1 and 2, and therefore, the limited excavation which may be required during redevelopment could be managed more easily with institutional controls.

Compliance with Applicable State and Federal Laws

All cleanup action alternatives for upland soils would comply with ARARs as defined in Section 3.0. Compliance with permit requirements would be required to meet this threshold requirement.

Provision for Compliance Monitoring

All of the cleanup action alternatives for upland soils would provide for compliance monitoring in accordance with WAC 173-340-410. Monitoring would be conducted during construction under all alternatives to confirm that human health and the environment are adequately protected. Institutional controls and long-term monitoring would be implemented as part of all of the alternatives since all of the alternatives would leave residual soil contamination to various degrees. All of the alternatives would be subject to periodic reviews by Ecology per WAC 173-340-420 to ensure that the remedy remains protective of human health and the environment. For all four alternatives, groundwater quality monitoring would be conducted to confirm that groundwater cleanup standards are achieved.

5.4.2 Other MTCA Requirements

This section provides an evaluation of each alternative against the other MTCA requirements.

Use of Permanent Solutions to the Maximum Extent Practicable

MTCA requires that cleanup actions be permanent to the maximum extent practicable, and identifies a number of criteria to evaluate whether this requirement is achieved. Evaluation of the practicability of a given alternative is based on the comparative evaluation of alternatives. If the incremental cost is determined to be substantial and disproportionate to the incremental increase in environmental benefit, the cleanup alternative is considered impracticable and eliminated from further consideration. A DCA for upland cleanup action alternatives was performed to compare Alternatives 1, 2 and 4 to Alternative 3 (baseline) to evaluate whether the incremental costs of Alternative 3 over Alternatives 1, 2 or 4 exceed the incremental degree of benefits. This analysis is described below in Section 5.4.3.

Provision for Reasonable Restoration Time Frame

Alternative 3 would be protective of human health and the environment when the excavation is completed because the remaining minor portions of the Site containing soils with indicator hazardous substance concentrations above CLs would be contained and could be managed effectively through the use of institutional controls during localized construction activities or redevelopment. As such, Alternative 3 would provide for a reasonable restoration time when considering the factors specified in WAC 173-340-360(4)(b).

Alternative 4 would be protective of human health and the environment when the excavation is completed because the remaining portions of the Site containing soils with indicator hazardous substance concentrations above CLs would be contained and could be managed reasonably through the use of institutional controls during localized construction activities or redevelopment.

Because of the magnitude of the potential modifications to these alternatives during redevelopment and the uncertainty regarding the timing for redevelopment, the restoration time under Alternatives 1 and 2 would be either undetermined or subsequent to Site redevelopment. The restoration timeframe would depend upon re-establishment of containment or off-site disposal of contaminated soil disturbed during redevelopment implementation.

5.4.3 Disproportionate Cost Analysis

The MTCA DCA is used to evaluate which of the cleanup action alternatives that meet the threshold requirements are permanent to the maximum extent practicable. This analysis involves comparing the costs and benefits of the alternatives and selecting the most permanent alternative whose incremental costs are not disproportionate to the

incremental benefits. Costs are disproportionate to benefits if the incremental cost of the more permanent alternative exceeds the incremental benefits achieved by the lower cost alternative. Alternatives that exhibit disproportionate costs are considered "impracticable." In the DCA, the alternatives are first compared to the most permanent cleanup alternative and the benefits of each alternative are ranked under the DCA criteria described in Section 5.3. The costs are then compared to these benefits and cost-benefit ratios are calculated to identify which alternative is permanent to the maximum extent practicable.

A relative numerical score for each alternative was determined by assigning a value (i.e., raw score) on a scale from 1 to 10, where 10 is the highest benefit/value, for each criterion, multiplying each value by a criterion-specific weighting factor specified in Section 5.3, and summing the weighted scores to determine an overall weighted benefit score for each alternative. Assignment of scores was based on quantitative and qualitative information using best professional judgment. Table 5-1 summarizes the result of the DCA along with evaluation of MTCA threshold and restoration timeframe requirements.

The raw scores assigned to the alternatives for each criterion in the DCA are discussed below.

Protectiveness

The overall protectiveness of Alternative 3 is high because Site risks are primarily eliminated by the mass-removal and off-site disposal of almost all contaminated soil from the Site, and containment of a small amount of contaminated soil within the West Marine View Drive ROW.

The overall protectiveness of Alternatives 1 and 2 is lower than Alternatives 3 and 4 because contaminated soil would be contained on-site in close proximity to Puget Sound, and potential future Site use may conflict with maintenance of the engineered caps. Moreover, the demolition of existing buildings, new construction of foundations and infrastructure, and establishment of future site grades associated with redevelopment would be less compatible with containing a large amount of contaminated soil at the Site.

The overall protectiveness of Alternative 4 is fairly high because Alternative 4 removes approximately 79 percent of the contaminated soil above CLs, including all of the soil in close proximity of Puget Sound and the soil with the highest contamination levels located within the Everett Shipyard operational yard. The soil that would remain on the Site would be primarily contained beneath buildings, with some soil containing relatively low concentrations of cPAHs remaining beneath engineered covers consisting of asphalt-capped areas. The volume of residual contaminated soils above CLs and the contaminant mass within the soil that would potentially be disturbed during redevelopment would be significantly less than under Alternatives 1 and 2. These risks could effectively be managed with institutional controls.

Alternative 1 is ranked with the lowest raw score for protectiveness, with an assigned raw score value of 1. Alternative 2 is ranked with a raw score value of 2, because it relies on institutional controls and long-term compliance monitoring, but to a lesser degree than Alternative 1. Alternative 4 is assigned a raw score value of 8 because it removes significantly more contaminant mass than both Alternatives 1 and 2, but not as much as Alternative 3. Alternative 3 was assigned a raw score value of 10 because it is the most protective alternative considered.

Permanence

The evaluation of permanence considers the degree to which alternatives permanently reduce the toxicity, mobility or mass of hazardous substances. Each alternative relies on excavation, offsite disposal and engineered caps to reduce the contaminant mobility and mass at the Site. None of the alternatives reduce toxicity. To assess the degree of permanence, the total contaminant mass at the Site and the contaminant mass of key indicator hazardous substances (i.e., arsenic, lead, petroleum hydrocarbons, cPAHs and PCBs) removed for each alternative was estimated during the RI/FS (URS, 2011). The percent of contaminant mass removal for each key indicator hazardous substances is summarized in Table 5-1.

Alternative 3 is the most permanent cleanup action alternative for upland soils and is assigned a raw score of 10. Alternative 1 is assigned a raw score of 1 because it does not remove a significant amount of contaminant mass. Alternative 2 is assigned a ranking score of 5 since it excavates about 50 percent of the area impacted with soils above CLs at the Site and removes at least 50 percent of the contaminant mass. Alternative 4 was assigned a raw score of 9 based on excavation area and contaminant mass removal estimates.

Effectiveness over the Long Term

The long-term effectiveness of Alternatives 1 and 2 is lower than that for Alternatives 3 and 4 due to similar reasons described under the "Permanence" criterion. The planned redevelopment of the Site may include new infrastructure, buildings, and potentially significant changes to existing grades. As a result, the engineered caps proposed for these alternatives including Alternative 4 may require reconfiguration to be maintained in the long term, and a significant amount of soils above CLs may have to be excavated and disposed of off-site during redevelopment to accommodate new roads, utilities, building foundations, and Site grades.

As such, similar raw scores described in "Permanence" are assigned to Alternative 1 and 2 based on the volume of excavated soil and the contaminant mass removed from the Site. Alternative 3 is assigned a raw score of 10 because it is the most effective alternative considered. Alternative 4 is assigned as raw score of 8 because it removes significantly more contaminant mass than both Alternatives 1 and 2, but not as much as Alternative 3.

Management of Short-Term Risks

Both capping and excavation are well established technologies and the short-term risks associated with Alternatives 1 through 4 are primarily related to general earthwork and typical/ordinary construction activities. Alternatives that minimize construction effort, handling of contaminated soil by site workers, and minimize import and export of materials to and from the site have lower short-term risks. Therefore, Alternative 1 has the lowest short-term risks and is assigned a raw score of 10. Alternative 2 is assigned a raw score of 9. Alternative 3, which involves increased risk to construction workers associated with building demolitions and hazardous material abatement, is assigned a raw score of 7, and Alternative 4 is assigned an intermediate score of 8.

Technical and Administrative Implementability

Both capping and excavation would be implemented for all four alternatives. These are well established technologies and would be easily implemented using common construction techniques and equipment. These technologies by themselves do not present any significant permitting or other administrative implementability issues. Alternative 3, is more technically complex compared to the other alternatives because of the building demolition work. Alternative 3, however, presents the least amount of administrative effort due to fewer changes which may be required during Site redevelopment.

Alternative 3 is assigned the highest raw score of 10 for this category because it involves the least amount of administrative effort to manage the institutional controls. Alternative 4 is assigned the second highest score of 9 because it would require a minimal amount of potential rework if the site were to be redeveloped. Alternatives 1 and 2 are assigned the lowest scores for this category, raw scores of 7 and 8, respectively, because these alternatives would require the greatest amount of administrative effort during potential site redevelopment (e.g., implementation of Soil Management Plan, modifications to remedy, etc.).

Considerations of Public Concerns

Given the Public's preference for a more permanent and protective cleanup alternative (source removal from the site) over capping (Ecology, 2011), a higher raw score is assigned to Alternative 3 than Alternatives 1, 2 and 4. Alternative 3 is assigned the highest raw score for this category of 10, followed by Alternative 4 with a raw score of 8 followed by Alternative 2 with a raw score of 4 and Alternative 1 with a raw score of 4.

Cost

The cost estimates developed during the RI/FS (URS, 2011) are considered order of magnitude (i.e., the estimated costs are expected to be within -30 to +50 percent of actual costs of the completed project). The primary use of these estimates is to allow comparison between alternatives during the selection process, not for establishing project budgets. Given the similarity of the components of the upland alternatives, the actual costs are likely to be proportionally higher or lower for all of the alternatives and relative costs are not anticipated to change significantly.

For fair cost comparison, capital costs are assumed to be entirely expended in year zero (or 2010 year), even though some alternatives may take longer to implement than others. Because expenditures occur over different periods of time in some of the alternatives, operation and maintenance and periodic costs are discounted to a common base year (i.e., year "zero") and added to the capital costs to obtain the total present worth of each alternative. With present worth analysis, alternatives can be compared on the basis of a single value. Following United States Environmental Protection Agency (USEPA) guidelines (USEPA, 2000), the appropriate real discount rate based on 30+ years of periodic monitoring expenditures is set at 2.7 percent per Office of Management and Budget[4]. Present worth costs are used to compare alternatives.

As shown in Table 5-1, the approximate cleanup costs for Alternatives 1 through 4 are $1.8 million, $2.7 million, $5.4 million, and $3.8 million (present worth), respectively. Costs were not assigned a weighting factor like the other criteria. The DCA presented in Table 5-1 calculates a cost to benefit ratio by dividing the estimated costs by the overall weighted benefit score.

Because Alternatives 1, 2, and 4 would leave significant to minor amounts of impacted soil in place, proper soil management plans and cleanup would be required during redevelopment to accommodate utilities and building foundations while maintaining protection of human health and the environment. As a result of this necessity, future capital cleanup costs would be incurred in the event that subsurface construction activities (or redevelopment) occur at the site. Future contingency cleanup costs were estimated under the assumption that there would be a comprehensive site redevelopment/construction in 2020. The approximate future contingency capital cleanup costs for Alternatives 1, 2 and 4 are $3.3 million, $1.8 million, and $0.76 million (present worth) due to an extensive site redevelopment, respectively (URS, 2011).

5.4.4 Conclusions of Disproportionate Cost Analysis

The ratio of the estimated cleanup cost to the overall weighted benefit score is used to assist in evaluating which of the upland alternatives is permanent to the maximum extent practicable. The most cost-effective alternative is the alternative with the lowest calculated cost/benefit ratio. As shown in Table 5-1, Alternative 4 (the second most permanent alternative) has the lowest cost/benefit ratio of "458." As such, Alternative 4 is found to be more cost effective than Alternatives 1, 2, and 3. When compared to Alternative 4, Alternative 3 would cost 42% more ($1.6 million) and would remove about 1 percent more mass of the most toxic constituents at the Site (combined mass of arsenic, lead, cPAHs and PCBs, petroleum hydrocarbons). The incremental cost for Alternative 3 is considered disproportionate to the incremental degree of benefit achieved over that of Alternative 4. The disproportionate costs are mostly attributed to the increased costs associated with demolition of the buildings at the Site, which would be

[4] http://www.whitehouse.gov/omb/circulars_a094_a94_appx-c/

required to excavate the contaminated soil beneath these buildings. As a result, Alternatives 1, 2 and 3 were determined to be "impracticable" and were discarded from further consideration. Alternative 4 is the MTCA preferred remedy for the upland portion of the Site based on the DCA.

5.5 EVALUATION OF MARINE SEDIMENT ALTERNATIVES

This section evaluates the cleanup action alternatives for marine sediment against the threshold requirements and other MTCA requirements.

5.5.1 Threshold Requirements

The two marine sediment cleanup action alternatives both meet the minimum threshold requirements for cleanup actions under MTCA. This section provides an evaluation of each alternative against each threshold requirements.

Protection of Human Health and the Environment

Both of the marine sediment cleanup action alternatives would be highly protective of human health and the environment, as they include dredging and/or capping. For Alternative 1, capping relies on adequate cap placement and maintenance for protection. The capped portion would provide moderate to high protection, depending upon placement extent, cap design, and long-term maintenance. For both alternatives, dredging would remove sediment exceeding CLs and would provide a high level of protection.

Both alternatives are expected to lead to improvement in marine habitat, through removal or containment of contaminated sediments as well as removal of the marine railway, including the associated creosote pilings.

Compliance with Cleanup Standards

Each of the marine sediment alternatives is expected to comply with the cleanup standards discussed above. Alternative 1 would use a combination of dredging in accessible areas and capping in less accessible areas to either remove or contain sediments with chemical concentrations that exceed the CLs. Alternative 2 would remove all sediments with chemical concentrations that exceed the CLs.

Compliance with Applicable State and Federal Laws

Both marine sediment alternatives would comply with ARARs identified in Section 3.

Provision of Compliance Monitoring

Both alternatives provide for confirmation sampling of the dredged area to document removal of sediment areas where chemical concentrations exceed the CLs. Alternative 1 includes long-term monitoring for the capped areas including visual inspection and periodic porewater sampling following implementation of the remedial action.

5.5.2 Other MTCA Requirements

This section provides an evaluation of each alternative against the other MTCA requirements.

Use of Permanent Solutions to the Maximum Extent Practicable

Alternative 2 provides the most permanent remedy because all sediments containing hazardous substances at concentrations above CLs would be removed and no institutional controls or long-term monitoring would be required. Alternative 1 would require institutional controls and long-term monitoring since some of the sediment that exceeds CLs would remain in the North Marina beneath a sediment cap.

Provide for Reasonable Restoration Time Frame

Both alternatives would be protective of human health and the environment at the completion of the dredging and/or capping. Monitoring and institutional controls would be required as part of Alternative 1 to ensure the integrity of the sediment cap and continued protection of human health and the environment. For costing purposes, a period of 20 years was assumed for periodic long-term monitoring.

5.5.3 Disproportionate Cost Analysis

No disproportionate cost analysis was conducted for the marine sediment alternatives because the costs for the two alternatives are of the same order of magnitude and the costs for the more permanent alternative do not appear to be disproportionate to the incremental benefit achieved.

Although no disproportionate cost analysis was performed, the marine sediment alternatives were evaluated against each of the cost analysis criteria as described in the subsections below for completeness.

Protectiveness

Both of the marine sediment alternatives would be protective of human health and the environment because each prevents human and ecological exposure to contaminated sediment by removing or isolating the contamination. Alternative 2 is considered most protective because it removes all of the sediments with hazardous substance concentrations above CLs and does not rely on institutional controls and long-term monitoring to ensure the integrity and protectiveness of the remedy.

Permanence

Neither of the sediment alternatives would permanently reduce the toxicity through destruction or treatment of the indicator hazardous substances. These alternatives rely instead on reduction in mobility and mass through containment at the Site and/or off-site disposal. Alternative 2 is more permanent because it removes all sediment with indicator hazardous substance concentrations that exceed CLs from the Site.

Effectiveness over the Long Term

Alternative 2 is superior to Alternative 1 in the long term as it does not require long-term monitoring and removes all sediment with contaminant levels exceeding the CLs. However, evidence of contamination in the dual bulkhead sediments in the Outfall A/Travel Lift area raises questions about the degree of source control in the adjacent uplands areas North and West of the Site. Several outfalls potentially serving these uplands areas discharge into the bulkhead sediments. Future releases in the dual bulkhead area could compromise the long-term effectiveness of any remedial approach implemented in this area.

Management of Short-Term Risks

The two alternatives are generally comparable in terms of short-term risks.

Technical and Administrative Implementability

Alternative 1 is slightly inferior to Alternative 2 because it leaves contaminants above CLs on-site, requiring institutional controls and long-term monitoring.

Cost

Detailed order-of-magnitude cost estimates (i.e., the estimated costs are expected to be within -30 to +50 percent of actual costs of the completed project) were presented in the RI/FS (URS, 2011). The estimated total project present worth cost for Alternative 1 including targeted dredging, capping, and long-term monitoring is approximately $2.0 million. The capital cost (equivalent to present worth for this alternative) for Alternative 2 for mass dredging is $2.0 million.

5.5.4 Conclusion of Marine Sediment Alternative Evaluation

Based on the evaluation above, the preferred marine sediment cleanup action is Alternative 2, Mass Dredging. The two alternatives evaluated are generally comparable in terms of cost. Alternative 2, however, is somewhat more permanent than Alternative 1. Dredging the entire area where sediment concentrations exceed the CLs would also be the most protective, as it would remove the contaminated sediment, eliminate potential ecological or human contact with contaminated sediment and the need for long-term monitoring.

6.0 IMPLEMENTATION OF THE CLEANUP ACTION

The Consent Decree "Exhibit E" contains an outline of the schedule to complete the remedial design and construction activities associated with the proposed cleanup actions described in this DCAP. The Consent Decree will be entered in Snohomish County Superior Court, and will become effective once entered.

7.0 REFERENCES

Ecology, 1992. Everett Harbor Action Team Inspection Report. Fishermen's Boat Shop, 1016 14th Street, Everett 98201. Site visits dates: April 23 and May 5, 1992.

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USEPA, 2000. A Guide to Developing and Documenting Cost Estimates during the Feasibility study, EPA 540-R-00-002. July.

Figures

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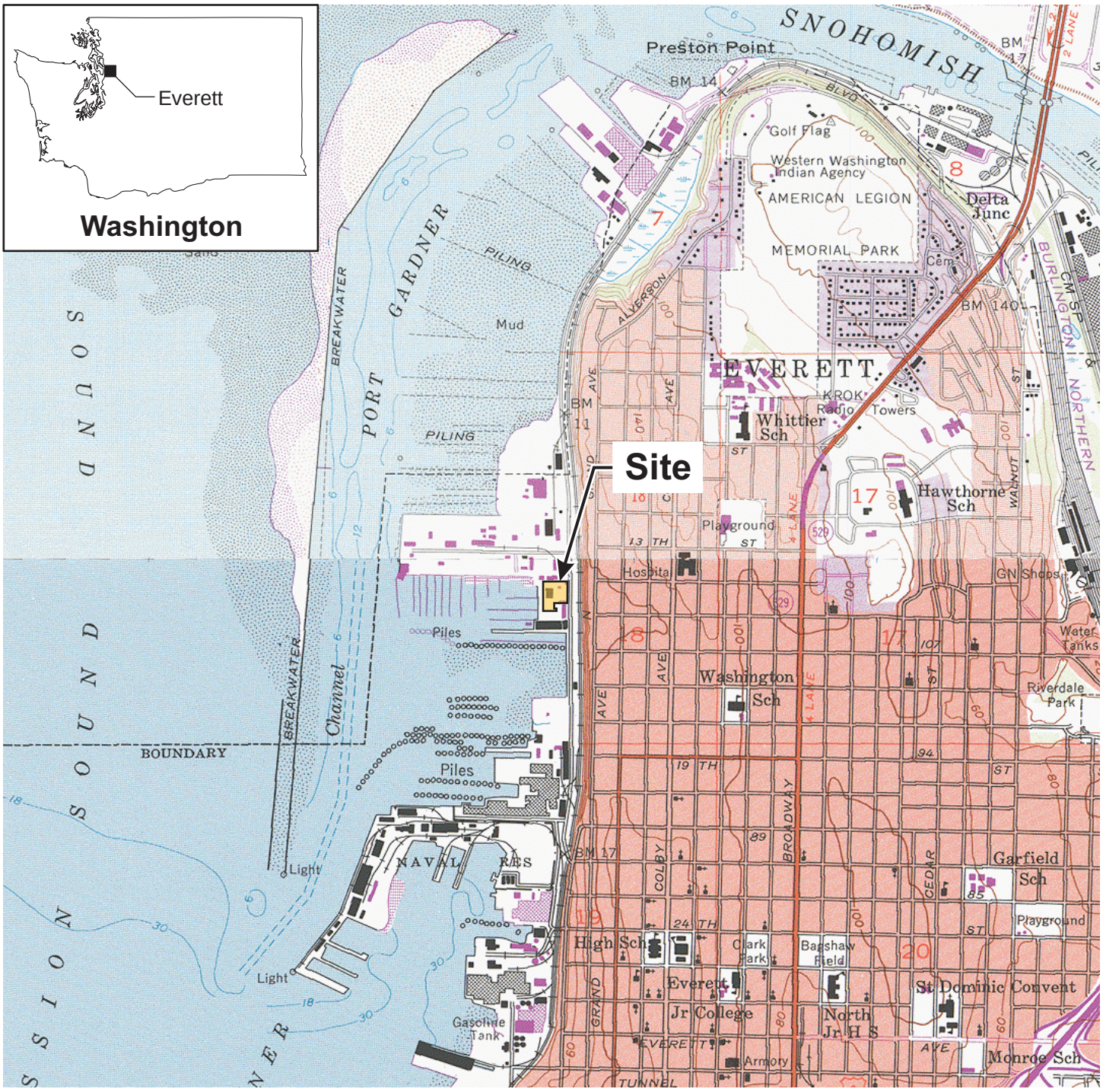

SOURCE: 7.5-minute USGS topographic quadrangles, Marysville and Everett, Washington

Figure 1-1

Site Location Map

Job No. 33761354

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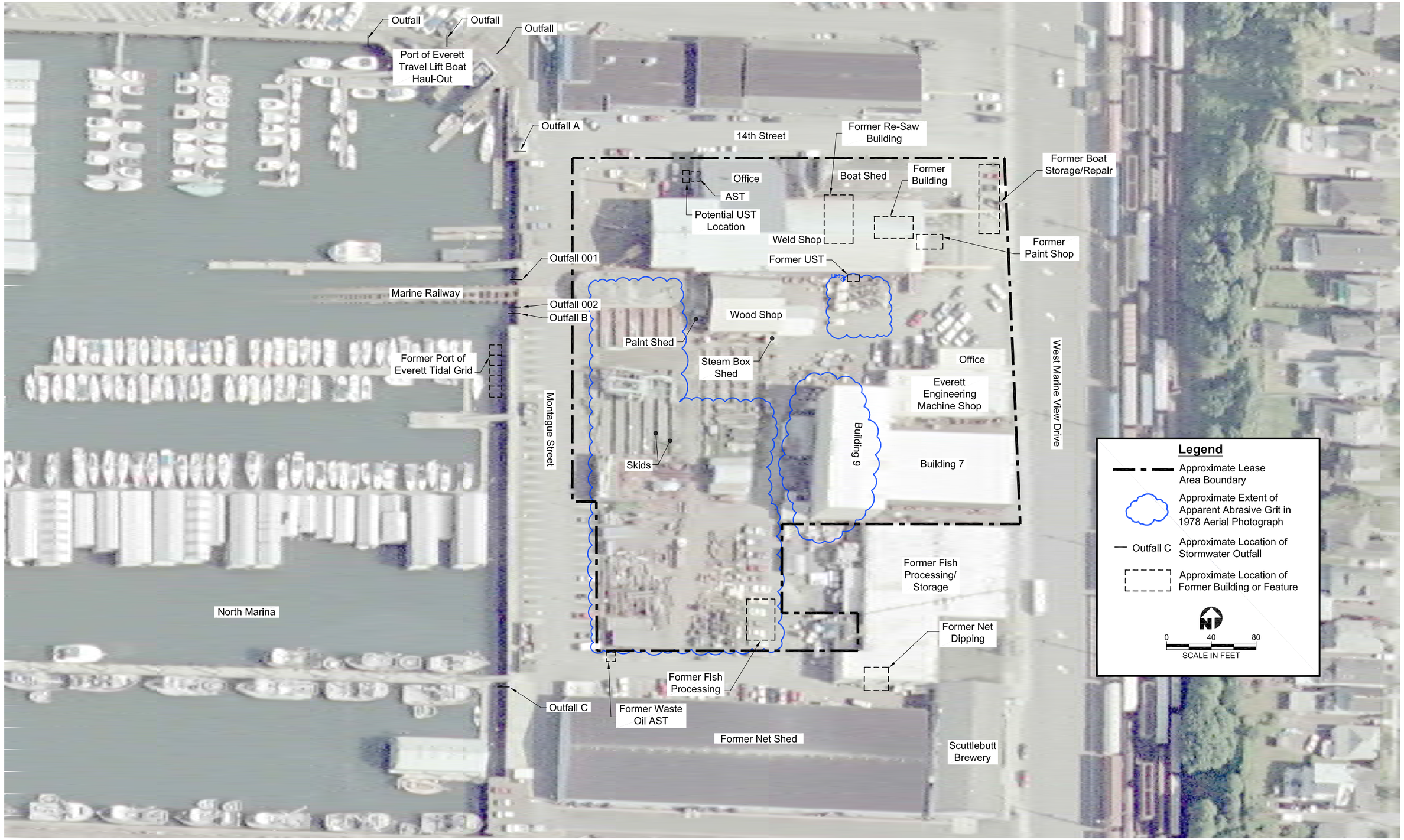
Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN



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URS

Figure 2-1
Site Plan
Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

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See Figure 2-3

American Boiler Works

American Boiler Works Office

Port of Everett Travel Lift Boat Haul-Out

Marine Mall Building

14th Street

Asphalt

Wood Deck

Boat Shed

Office

Weld Shop

Wood Shop

Paint Shed

Covered Storage

Everett Engineering Machine Shop

Everett Engineering Building 7

Building 9

Former Fish Processing/ Storage Marine View Cold Storage

Former Net Shed

Scuttlebutt Brewery

Outfall A

Outfall 001

Outfall 002

Outfall C

Marine Railway

Dock

Montague Street

North Marina

West Marine View Drive

Restroom

Shed

BSS-1 NE NE / NA NA

BSS-2 NE NE / NA NA

BSS-3 NE NE / NA NA

BSS-4 NE NE / NA NA

SB-1 NE NE / NE NE

SB-2 0.75 NE X / NE NE

SB-3 0.75 NE NE / X NA

SB-4 0.75 NE X / X NA

SB-5 0.75 NE X / X X

SB-6 3.5 X NE / NE NE

SB-7 3.5 X NE / NE NE

SB-8 0.5 NE NE / X NA

SB-9 NE NE / NE NA

SB-10 0.75 NE X / X NA

SB-11 0.75 NE X / NE NA

SB-12 0.75 NE X / X NA

SB-13 NE NE / NE NA

SB-14 NE NE / NE NA

SB-15 NE NE / NE NA

SB-16 NE NE / NE NA

SB-17 0.75 NE NE / X NA

SB-18 NE NE / NE NA

SB-19 0.5 NE X / NE NA

SB-20 NE NE / NE NA

SB-21 NE NE / NE NA

SB-22 NE NE / NE NA

SB-23 NA NA / NE NE

SB-24 3.5+ X X / NA NA

SB-25 2 NE NA / NE X

SB-26 0.75 X X / X X

SB-27 NE NE / NE NA

SB-28 NE NE / NE NA

SB-29 0.75 NE X / X NE

SB-30 0.75 NE X / X X

SB-31 0.75 NE X / X NA

SB-32 0.75 NE NE / X NE

SB-33 NE NE / NE NA

SB-34 NE NE / NE NA

SB-35 NE NE / NE NE

SB-36 2 NE NE / X NE

SB-37 NE NE / NE NA

SB-38 NE NE / NE NA

SB-39 NE NE / NE NA

SB-40 NE NE / NE NA

SB-41 NE NE / NE NA

SB-42 2 NE NE / X NE

SB-43 3+ NA X / NE NA

SB-44 NA NE / NE NA

SB-45 NA NE / NE NA

SB-46 NA NE / NE NA

SB-47 NA NE / NE NA

SB-48 1.25 NA X / X NA

SB-49 1.25 NA X / NE NE

SB-50 NA NE / NE NA

SB-51 NA NE / NE NA

SB-52 NA NE / NE NE

SB-53 NE NE / NE NA

SB-54 1.25 NE NE / X NE

SB-55 1.25 NA X / NE X

SB-56 NA NE / NE NA

SB-57 NA NE / NE NE

SB-58 NA NE / NE NA

SB-59 NA NE / NE NA

SB-60 NE NE / NE NA

SB-61 1.25 NE NE / X NE

SB-62 0.5 NE NE / X NA

SB-63 0.5 NE NE / X NA

SB-64 NA NA / NA NA

SB-65 1.25 NE NE / X NA

SB-66 NE NE / NE NA

SB-67 NE NE / NE NA

SB-68 0.5 NE NE / X NE

SB-69 1.25 NE NE / X NA

SB-70 NE NE / NE NA

SB-71 NE NE / NE NA

SB-72 1.25 NE X / X NE

SB-73 3.5 X NE / NE NE

SB-74 3+ X NE / NE NE

SB-75 1.25 NE X / X X

SB-76 1.25 NE X / X X

SB-77 1.25 NE X / NE X

SB-78 1.25 NE X / X X

SB-79 1.25 NE X / X X

SB-80 1.25 NA X / X X

SB-81 2 NE NE / X NE

SB-82 NA NE / NE NE

SB-83 NA NE / NE NE

SB-84 1.25 NE NE / X NA

SB-85 1.25 NE NE / X NA

SB-86 NE NE / NA NA

SB-87 NA NE / NE NA

SB-88 NA NE / NE NE

SB-89 0.5+ NA NE / X NA

SB-90 2 NE NE / X NE

SB-91 NE NE / NE NE

SB-92 NA NE / NE NA

SB-93 A NE NE / NE NE

SB-94 NE NE / NE NA

SB-95 NE NE / NE NA

SB-96 NE NE / NE NA

SB-97 NE NE / NE NA

SB-98 NE NE / NE NA

SB-100 NE NE / NE NA

SB-101 NE NE / NE NA

SB-102 NE NE / NE NA

SB-103 NE NE / NE NA

SB-104 NE NE / NE NA

SB-105 NE NE / NE NA

SB-106 NE NE / NE NA

SB-107 NE NE / NE NA

SS-1 2.25 NE X / NA NA

SS-2 2.25 X X / NA NA

SS-3 0.75 NE NE / X NE

SS-4 <1 NE NE / NA NA

SS-5 3.5+ X X / NA NA

SS-6 <1 NE NE / NA NA

SS-7 <1 NE NE / NA NA

SS-8 2.25 NE X / NA NA

SS-9 <1 NE NE / NA NA

SS-10 2.25 NE X / NA NA

SS-11 2.25 NE X / NA NA

SS-12 2.25 NE X / NA NA

SS-13 2.25 NE X / NA NA

SS-14 2.25 NE X / NA NA

SS-15 <1 NE NE / NA NA

SS-16 <1 NE NE / NA NA

SS-17 <1 NE NE / NA NA

SS-18 <1 NE NE / NA NA

SS-19 <1 NE NE / NA NA

SS-20 <1 NE NE / NA NA

SS-21 <1 NE NE / NA NA

SS-22 2.25 X NE / NA NA

SS-23 <1 NE NE / NA NA

SS-24 <1 NE NE / NA NA

SS-25 3.5+ NE X / NA NA

SS-26 <1 NE NE / NA NA

SS-27 2.25 NE X / NA NA

SS-28 2.25 NE X / NA NA

SS-29 <1 NE NE / NA NA

SS-30 0.5+ NE X / X NA

SS-31 0.5+ NE X / X NA

SS-32 0.5+ NE X / X NA

SS-33 0.5+ NE X / X NE

SS-34 0.5+ NE X / X NA

SS-35 0.5+ NE X / X NA

SS-36 0.5+ NE X / X NA

SS-37 0.5+ NE X / X NE

SS-38 0.5+ NE X / X NA

SS-39 0.5 NE X / X NA

MW-1 NE NE / NA NA

MW-2 NE NE / NA NA

MW-4 0.75 NE NE / X NA

MW-5 NE NE / NE NA

MW-6 NE NE / NE NA

MW-7 0.75 NE X / X X

MW-8 3+ NE NE / X NA

MW-9 3.5 NE X / X NE

MW-10 NE NE / NE NA

SS1 NE NE / NA NA

Note

2003 composite soil sample locations not shown.

Legend

- Elevation Contour (1 ft Interval)
- Storm Drain
- Catch Basin
- Monitoring Well
- Soil Boring Sample
- Surface Soil Sample
- Hand Auger
- Approximate Lease Area Boundary
- 2008/2009 Soil Samples
- Historical Soil Samples

NE Does Not Exceed Cleanup Level
X Exceeds Cleanup Level
NA Not Analyzed
TPH Total Petroleum Hydrocarbons – Diesel Range
CPAH Carcinogenic Polycyclic Aromatic Hydrocarbons
PCB Polychlorinated Biphenyl

2.0 ← Estimated Thickness of Soil Exceeding Cleanup Level (ft)

TPH | Metals
CPAH | PCB

Lateral Extent of Impacted Soil, Dashed Where Inferred or Uncertain

Lateral Extent of Suspected Impacted Soil

0 15 30
SCALE IN FEET

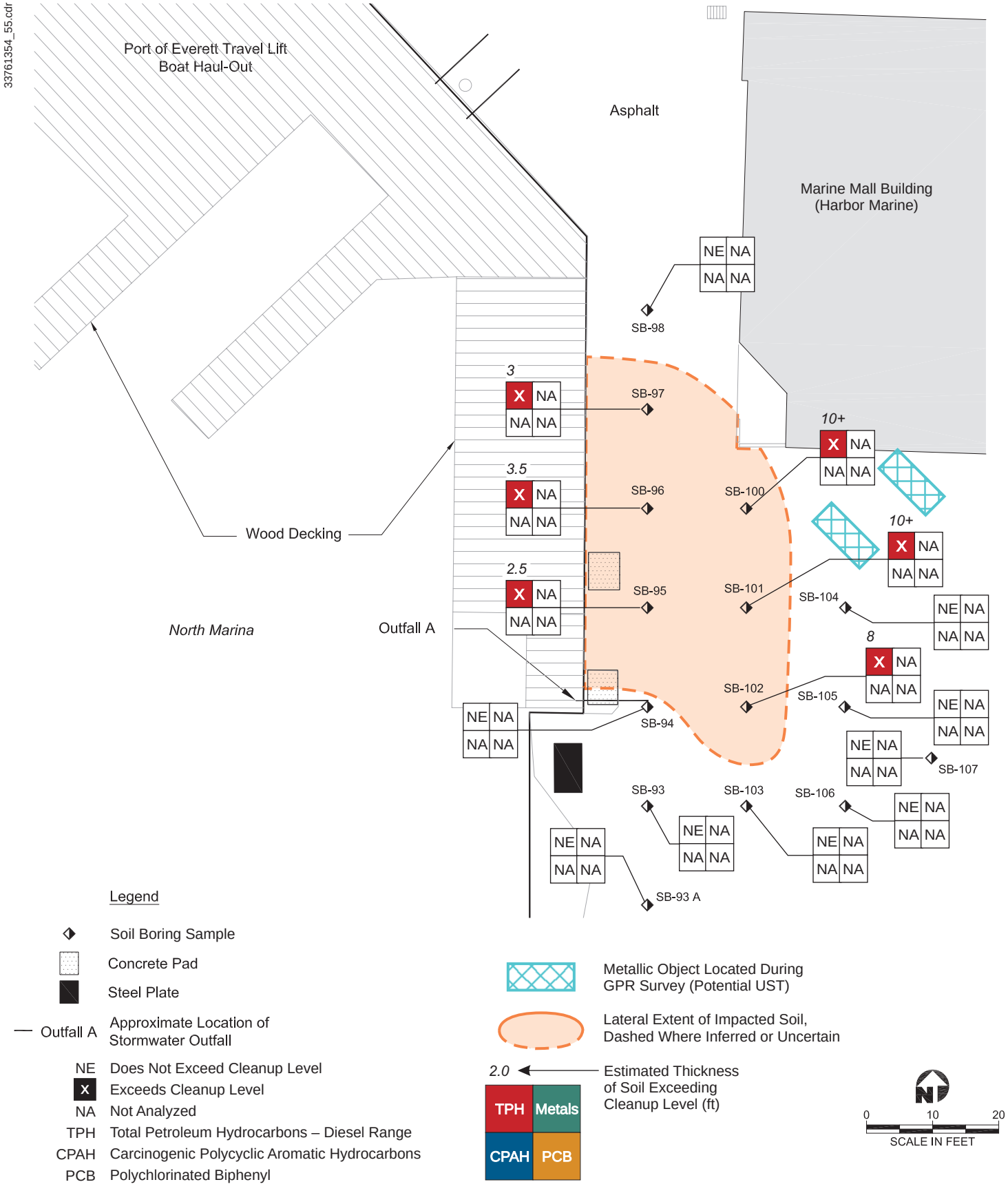
Basemap provided by Port of Everett. Field observations did not confirm catch basin and outfall connections in some cases.

Job No. 33761354

URS

Figure 2-2
Soil Samples Exceeding Cleanup Levels

Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN



Basemap provided by Port of Everett

Job No. 33761354

Figure 2-3

Soil Samples Exceeding Cleanup Levels – Bulkhead Area

URS

Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

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SB-94	6/24/2010
DRO	**6**

MW-2	1/6/2009
BEHP	**80 J**

MW-6	4/1/2009
As	**0.007**

MW-7	1/6/2009	4/1/2009
Ni	0.01 U	**0.03**
Zn	**0.42**	0.01
BEHP	**260 J**	**2.3**

MW-4	1/6/2009	4/1/2009	7/9/2009	10/13/2009
As	**0.02**	**0.009**	**0.010**	**0.006**

American Boiler Works
American Boiler Works Office
Port of Everett Travel Lift Boat Haul-Out
Marine Mall Building
14th Street
Asphalt
Outfall A
SB-94
Wood Deck
Office
Boat Shed
Weld Shop
Dock
Outfall 001
Marine Railway
Outfall 002
Outfall B
Wood Shop
Covered Storage
Paint Shed
MW-2
MW-6
MW-7
Office
Everett Engineering Machine Shop
Building 9
Everett Engineering Building 7
Montague Street
West Marine View Drive
SS
North Marina
Former Fish Processing/ Storage Marine View Cold Storage
MW-4
Shed
Restroom
Outfall C
Former Net Shed
Scuttlebutt Brewery

Legend

- Elevation Contour (1 ft Interval)
- Storm Drain
- Catch Basin
- Monitoring Well
- Groundwater Grab Sample
- Approximate Lease Area Boundary
- **BOLD** Constituent exceeds preliminary groundwater cleanup level

Hazardous Indicator Substances

	Substance	Units	Cleanup Level
	As (Arsenic)	mg/L	0.005
	Ni (Nickel)	mg/L	0.01
	Zn (Zinc)	mg/L	0.081
	BEHP (bis(2-ethylhexyl)phthalate)	µg/L	2.2
	DRO (diesel range hydrocarbons)	mg/L	0.5
NA	Not analyzed		
U	Compound was analyzed for but not detected above the reporting limit shown		
J	Estimated value		

Dissolved metals concentrations are shown.

0 15 30
SCALE IN FEET

Job No. 33761354

Figure 2-4
Groundwater Samples Exceeding Cleanup Levels

URS

Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

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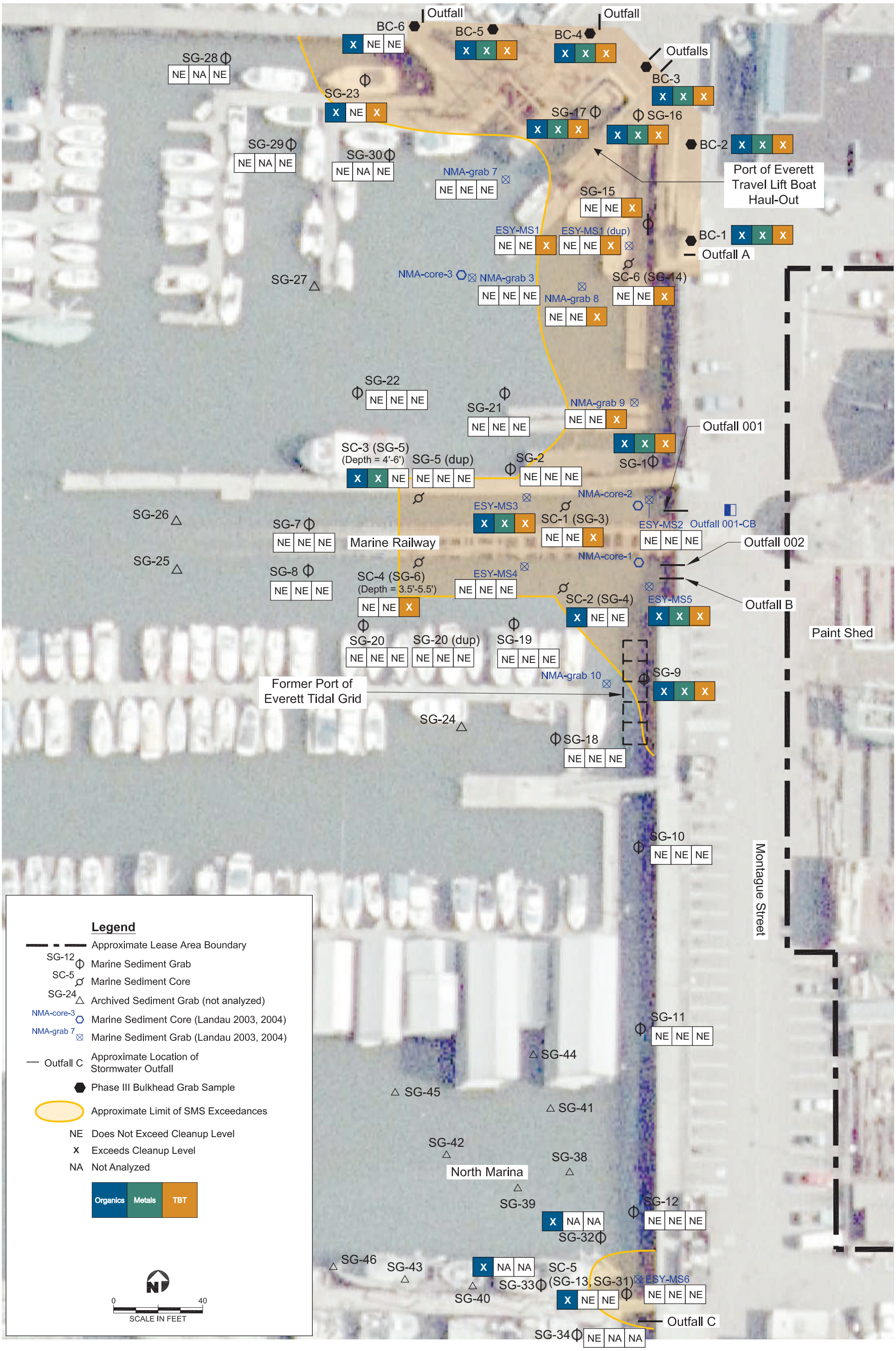

Figure 2-5

Area of SMS Exceedances

Job No. 33761354

URS

Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

Note:
See Figure 4-2 for Bulkhead Excavation Detail

14th Street
Outfall A-CB
Outfall C-CB
Montague Street
North Marina
West Marine View Drive
Office
Boat Shed
Weld Shop
Paint Shed
Wood Shop
Covered Storage
Everett Engineering Machine Shop
Building 9
Everett Engineering Building 7
Former Fish Processing/ Storage Marine View Cold Storage
Former Net Shed
Scuttlebutt Brewery

Legend

- Elevation Contour (1 ft Interval)
- Storm Drain
- Catch Basin
- Concrete
- Approximate Lease Area Boundary
- Lateral Extent of Impacted Soil
- Monitoring Well
- Soil Boring Sample
- Surface Soil Sample
- Shallow Soil Sample/Hand Auger
- Conceptual Excavation Extent to be Restored With Asphalt Pavement
- Conceptual Excavation Extent
- Buildings to be Demolished

0 25 50
SCALE IN FEET

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URS

Figure 4-1
Uplands Alternative 4
Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

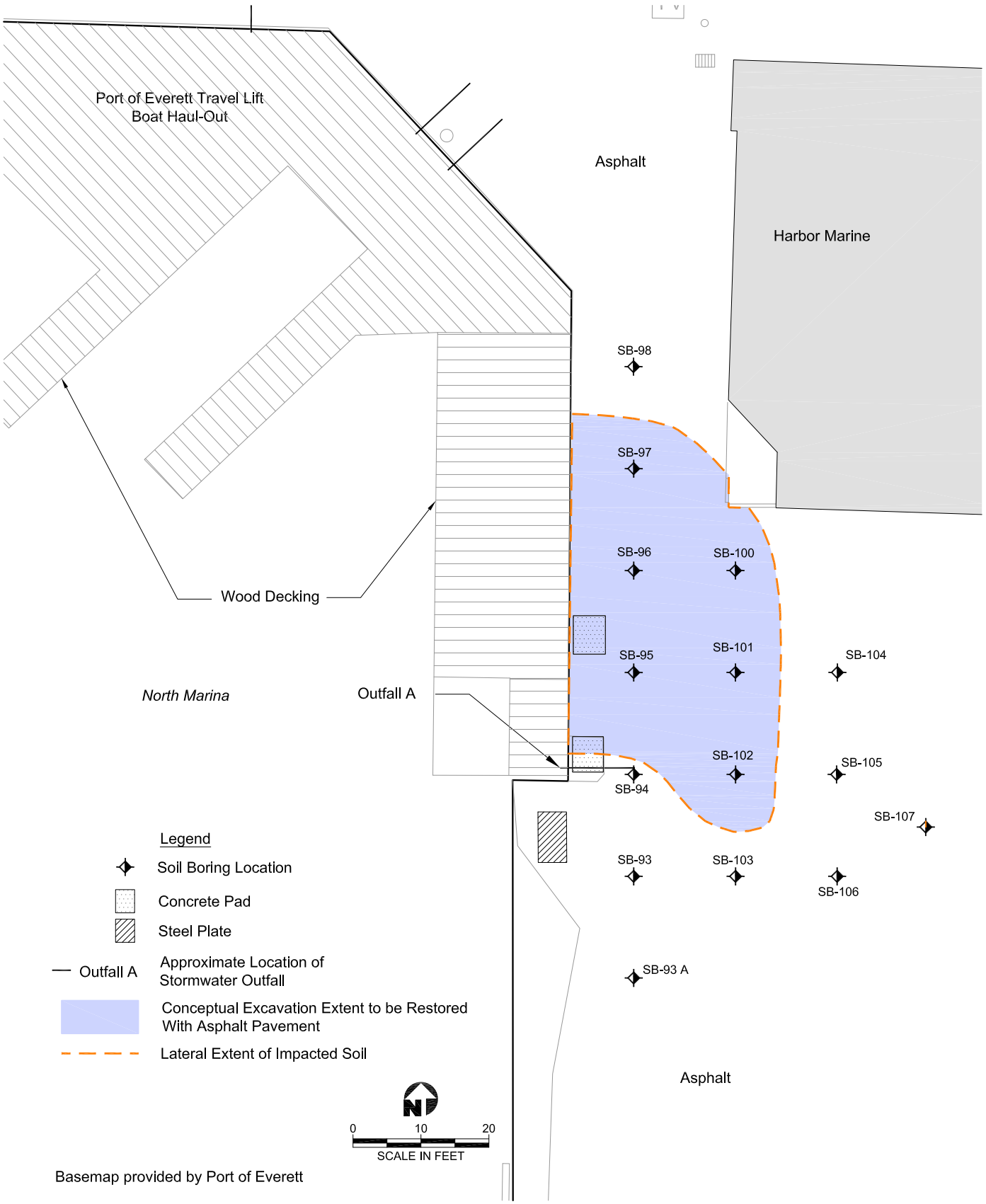

Figure 4-2
Limited Bulkhead Excavation Detail - Uplands alternative 4

Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

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URS

33761354_54.cdr

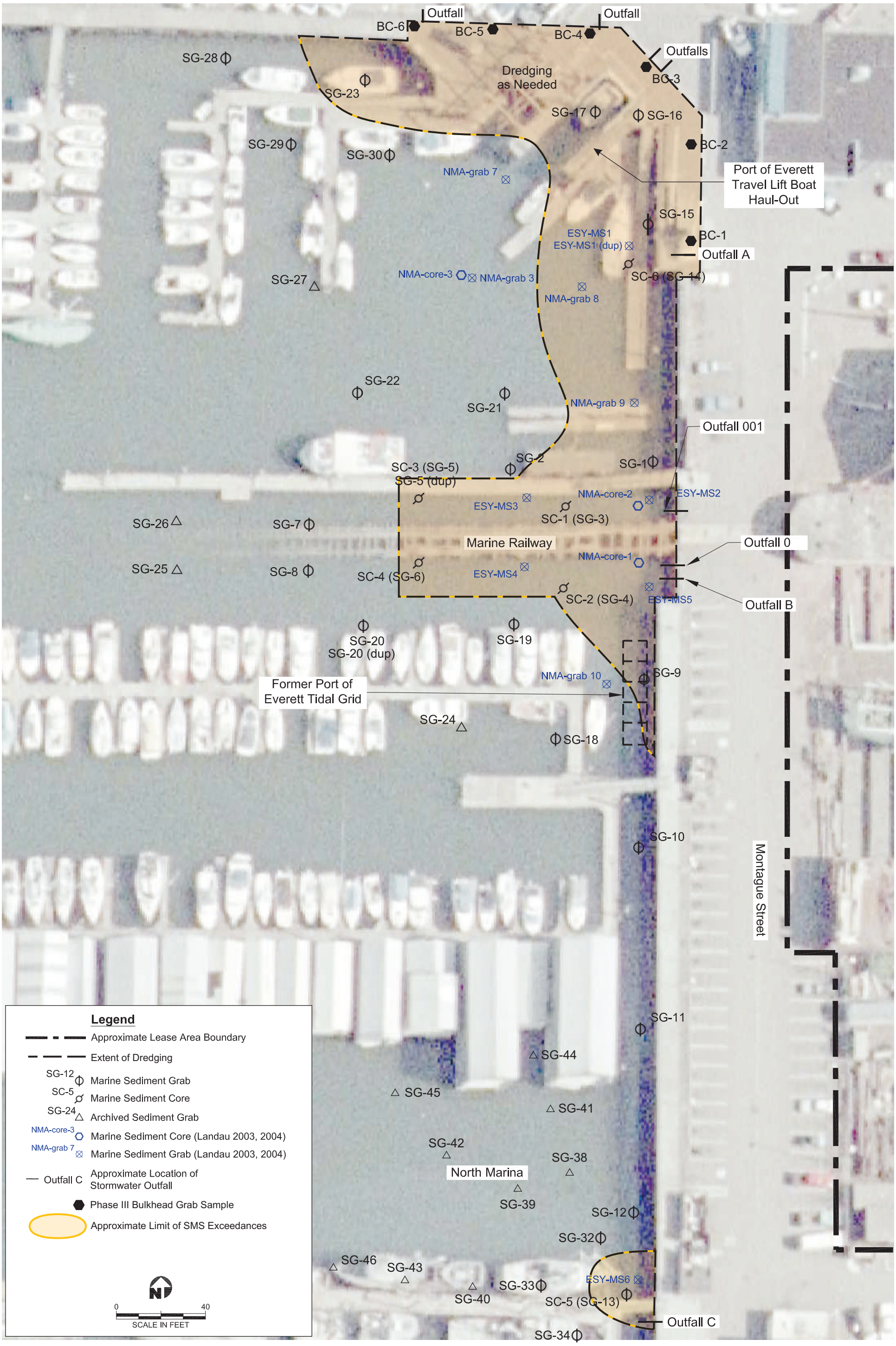

Figure 4-3

Marine Sediment Alternative 2 - Mass Dredging

Job No. 33761354

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Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

SB-54	10/30/2009	
feet bgs	*0 - 0.5*	*2 - 3*
TTEC	**194**	28

SB-61	10/30/2009	
feet bgs	*0 - 0.5*	*2 - 3*
TTEC	**756**	NA

SB-19	12/4/2008			
feet bgs	*0 - 0.5*	*1 - 2*	*3 - 4*	*4 - 5*
Pb	**373 J**	2	23 J	NA

SB-55	10/30/2009	
feet bgs	*0 - 0.5*	*2 - 3*
PCBs	**1,500 J**	NA
As	**30**	4.2
Pb	**351**	2

SB-48	11/25/2009	
feet bgs	*0 - 0.5*	*2 - 3*
TTEC	**428**	NA
As	**60**	5

MW-9	12/8/2008			
feet bgs	*0 - 0.5*	*1 - 2*	*2 - 3*	*4 - 5*
TTEC	**1,758 J**	111 J	**162 J**	16 J
As	**510**	10	NA	NA
Pb	**619**	12 J	NA	NA

SB-49	11/25/2009	
feet bgs	*0 - 0.5*	*2 - 3*
As	**30**	6

SB-62	10/30/2009		
feet bgs	*SS*	*0 - 0.5*	*2 - 3*
TTEC	**155**	6.4	35

SB-63	10/30/2009	
feet bgs	*SS*	*0 - 0.5*
TTEC	**472**	44

SB-67	10/29/2009		
feet bgs	*SS*	*0 - 0.5*	*2 - 3*
Pb	NA	**382**	NA

SB-65	10/29/2009		
feet bgs	*SS*	*0 - 0.5*	*2 - 3*
TTEC	NA	**144**	0.05

SB-89	10/29/2009	
feet bgs	*SS*	*0 - 0.5*
TTEC	**467**	**1,778**

14th Street
Outfall A-CB
Outfall C-CB
Boat Shed
Office
Weld Shop
Wood Shop
Paint Shed
Covered Storage
Building 9
Everett Engineering Machine Shop
Everett Engineering Building 7
Office
Former Fish Processing/ Storage Marine View Cold Storage
Former Net Shed
Scuttlebutt Brewery
Montague Street
North Marina
West Marine View Drive

SCALE IN FEET: 0, 15, 30

Legend

- Storm Drain (SD)
- Catch Basin
- Concrete
- Approximate Lease Area Boundary
- Lateral Extent of Impacted Soil
- Monitoring Well
- Soil Boring Sample
- Surface Soil Sample
- Shallow Soil Sample/Hand Auger
- Conceptual Excavation Extent to be Restored With Asphalt Pavement
- Conceptual Excavation Extent

bold	Exceeds Cleanup Level
TTEC	Total Toxic Equivalent Concentration (µg/kg)
PCBs	Total Polychlorinated Biphenyls (µg/kg)
As	Arsenic (mg/kg)
Pb	Lead (mg/kg)
NA	Not Analyzed or Not Available
bgs	Below Ground Surface
mg/kg	Milligrams per Kilogram
µg/kg	Micrograms per Kilogram
SS	Sub-Slab Soil Sample
J	Estimated Value

Other indicator hazardous substances (antimony) may be present.

Job No. 33761354

Figure 4-4
Exceedances of Indicator Hazardous Substances in Soil following Implementation of Alternative 4

URS

Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

Tables

Table 3-1
Groundwater Cleanup Levels for Indicator Hazardous Substances [1]
Everett Shipyard
Everett, Washington
Cleanup Action Plan

Constituent	Typical PQL	Toxic Substances Criteria (WAC 173-201A) [2] Marine Water		National Recommended Water Quality Criteria [3] Saltwater			National Toxics Rule [4] Saltwater		Cleanup Level [5]
		Acute	Chronic	CMC	CCC	Health (consumptio Organism Only	CMC	CCC	
Total Metals (mg/L)									
Arsenic*	0.001	0.069 [a,b]	0.036 [b,c]	0.069	0.036	0.00014	0.069	0.036	0.005 [d]
Dissolved Metals (mg/L)									
Copper	0.002	0.0048 [a,b]	0.0031 [b,c]	0.0048	0.0031	NE	0.0024	0.0024	0.0031 [e]
Nickel*	0.01	0.074 [a,b]	0.0082 [b,c]	0.074	0.0082	4.6	0.074	0.0082	0.01 [f]
Zinc*	0.01	0.09 [a,b]	0.081 [b,c]	0.09	0.081	26	0.09	0.081	0.081 [e]
SVOCs (µg/L)									
BEHP*	1.0	NE	NE	NE	NE	2.2	NE	NE	2.2 [g]

Notes:

[1] The selection of cleanup levels was based on the most stringent applicable surface water quality cleanup level taking into account the typical PQL and natural background levels. PQL or natural background levels (whichever is lowest) were used when they exceeded the applicable surface water quality criteria.
[2] Water Quality Standards For Surface Waters of the State of Washington, Toxic Substances Criteria, WAC 173-201A. Last update November 2006.
[3] National Recommended Water Quality Criteria, USEPA, 2006.
[4] National Toxics Rule, 40 CFR 131.36, USEPA, 2006.
[5] Cleanup levels based upon the information presented in the RI Data Submittal Phase II (URS, 2010).
[a] The metals criteria are associated with the dissolved fraction of the water column.
[b] A 1-hour average concentration not to be exceeded more than once every three years on the average.
[c] A 4-day average concentration not to be exceeded more than once every three years on the average.
[d] MTCA Method A cleanup level which is based upon natural background.
[e] Cleanup Level based upon Chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington (2006), and National Recommended Water Quality Criteria (NRWQC) 2006 which was recently approved by Ecology as a groundwater cleanup level protective of marine surface water for the Port of Everett West End Site.
[f] Cleanup Level based upon Practical Quantification Limit (PQL).
[g] Cleanup Level based upon National Toxics Rule (NTR).
[*] Hazardous Indicator Substance
BEHP - bis(2-Ethylhexyl)phthalate
CCC - Criteria continuous concentration (chronic)
CMC - Criteria maximum concentration (acute)
NA - Not applicable
NE - Not established
PQL - practical quantitation limit
SVOCs - Semivolatile organic compounds
mg/L - milligrams per liter
ug/L - micrograms per liter

Table 3-2

Soil Cleanup Levels for Indicator Hazardous Substances[1]
Everett Shipyard
Everett, Washington
Cleanup Action Plan

Constituent	Background Soil Concentrations In Puget Sound[2]	Typical PQL	MTCA Method A Cleanup Level (Unrestricted Land Use) [3]	MTCA Method B [4]		MTCA Method B Cleanup Level [5]
				Carcinogenic	Non-Carcinogenic	
Total Petroleum Hydrocarbons (mg/kg)						
Diesel-range*	NA	5.5	2,000	NE	NE	2,000
Oil-range*	NA	11	2,000	NE	NE	2,000
Carcinogenic Polycyclic Aromatic Hydrocarbons (ug/kg)						
Benzo(a)pyrene*	NA	5	100	140	NE	140
TTEC [a*]	NA	NA	100	140	NE	140
Polychlorinated Biphenyls (ug/kg)						
Aroclor 1254*	NA	30	NE	NE	1,600	1,000[b]
Total PCBs*	NA	NA	1,000	500	NE	1,000[b]
Semi-Volatile Organic Compounds (ug/kg)						
bis(2-Ethylhexyl)phthalate	NA	70	NE	71,000	1,600,000	71,000
Metals (mg/kg)						
Antimony*	5	5	NE	NE	32	32
Arsenic*	20[c]	5	20	0.67	24	20
Copper*	36	0.2	NE	NE	3,200	3,200
Lead*	24	2	250	NE	NE	250
Zinc	85	1	NE	NE	24,000	24,000

Notes:

[1] The selection of cleanup levels was based on the most stringent MTCA Method B cleanup levels for unrestriced land use taking into account the typical PQL and natural background levels. Soil cleanup levels based on the protection of marine surface water resources were not established based on an empirical demonstration indicating that concentrations in soil are protective of groundwater as marine surface water. PQL or natural l

[2] Natural Background Soil Metals Concentrations in Washington State, Table 1: Statewide & Regional 90th Percentile Values (Puget Sound), Ecology, October 1994

[3] MTCA Method A Soil Cleanup Levels for Unrestricted land Uses, Table 740-1.

[4] MTCA - Model Toxics Control Act Cleanup Regulation, WAC 173-340. 2006 and 2011 MTCA Method A and B values are from Ecology website CLARC tables downloaded April 2011 (https://fortress.wa.gov/ecy/clar when available. 2011 Method B values are from Model Toxics Control Act Cleanup Levels and Risk Calculations (CLARC) Version 3.1, Ecology Publication #94-145 Updated April 2011.

[5] Cleanup levels based upon the information presented in the RI Data Submittal Phase II (URS, 2010).

[a] Carcinogenic PAH (cPAH) cleanup levels under MTCA are based on the calculated total toxicity of the mixture using the Toxicity Equivalency Methodology in WAC 173-340-708 (8). The mixture of cPAHs shall be considered a single h and compared to the MTCA Method B cleanup level for benzo(a)pyrene.

[b] Federal (Toxic Substances Control Act, TSCA) cleanup standard for high occupancy areas is 1,000 ug/kg, consistent with MTCA Method A. Federal standard is used as cleanup level because it is adequately protective (risk is less than 1 x 10-5).

[c] MTCA Method A Cleanup Level which is based on natural background for soil.

[*] Hazardous Indicator Substance

NA - Not analyzed

NE - Not established

PQL - practical quantitation limit

mg/kg - milligram per kilogram

Table 3-3
Sediment Cleanup Levels for Indicator Hazardous Substances
Everett Shipyard
Everett, Washington
Cleanup Action Plan

Consittuent[4]	Sediment Management Standards [1]		Cleanup Level
	Sediment Quality Standard (SQS) [2]	Cleanup Screening Level (CSLs) [3]	
SVOCs (ug/kg)			
2-Methylphenol	63	63	63
4-Methylphenol	670	670	670
Benzyl Alcohol	57	73	57
SVOCs (mg/kgOC) *			
Acenaphthene	16	57	16
Benz[a]anthracene	110	270	110
Benzo[a]pyrene	99	210	99
Benzo[g,h,i]perylene	31	78	31
Bis[2-ethylhexyl]phthalate	47	78	47
Butyl Benzyl Phthalate	4.9	64	4.9
Chrysene	110	460	110
Dibenz[a,h]anthracene	12	33	12
Dibenzofuran	15	58	15
Dimethyl Phthalate	53	53	53
Fluoranthene	160	1,200	160
Fluorene	23	79	23
Indeno[1,2,3-cd]pyrene	34	88	34
Naphthalene	99	170	99
N-nitrosodiphenylamine	11	11	11
Phenanthrene	100	480	100
Pyrene	1,000	1,400	1,000
Total LPAH	370	780	370
Total HPAH	960	5,300	960
Total Benzofluoranthenes**	230	450	230
PCBs (mg/kgOC)*			
Total PCBs	12	65	12
Organotins (ug/kg)			
Tributyltin as TBT Ion	NE	73	73
Organotins-Porewater (ug/L)			
Tributyltin as TBT Ion	0.05	0.15	0.05
Metals (mg/kg)			
Arsenic	57	93	57
Copper	390	390	390
Lead	450	530	450
Mercury	0.41	0.59	0.41
Silver	6.1	6.1	6.1
Zinc	410	960	410

Notes:

[1] Sediment Sampling and Analysis Plan Appendix; Washington State Department of Ecology, Publication 03-09-043, Revised February 2008 (WAC 173-204).

[2] WAC 173-204-320, Table 1 Marine Sediment Quality Standards

[3] WAC 173-204-520, Table III Puget Sound Marine Sediment Cleanup Screening Levels and Minimum Cleanup Levels

[4] All constituents are considered to be indicator hazardous substances.

* The listed values represent a concentration in parts per million (ppm) 'normalized' on a TOC basis.

** The listed values represent the sum of the concentrations of the b, j, and k isomers of benzofluoranthene.

NE - Not established

VOCs - Volatile organic compounds

SVOCs - Semivolatile organic compounds

Total LPAH = The sum of detected naphthalene, acenaphthylene, acenaphthene, fluorene, phenanthrene, and anthracene.

Total HPAH = The sum of detected fluoranthene, pyrene, benz(a)anthracene, chrysene, total benzofluoranthenes, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene.

PCBs - Polychlorinated biphenyls

TOC - Total organic carbon

ug/kg - micrograms per kilogram

ug/L - micrograms per liter

mg/kgOC - milligrams per kilogram, 'normalized' for TOC

mg/kg - milligrams per kilogram

Table 3-4
Applicable Regulatory Requirements
Everett Shipyard
Everett, Washington
Cleanup Action Plan

Chemical-specific ARARs:

Groundwater:

Washington State Water Quality Standards for Surface Waters, WAC 173-201A-24(3) and(5), and WAC 173-201A-600
Federal Clean Water Act, 33 USC 1251-1376, National Recommended Water Quality Criteria 2006
National Toxics Rule, 33 USC 1251; 40 CFR 131.36(b)(1) and(d)(14); WAC 173-201A-240(5)

Soil:

MTCA Regulations, WAC 173-340-740(3) and 173-340-355
Toxic Substances Control Act, 15 U.S.C. §2601 et seq. 40 CFR 761.61

Marine Sediment:

WAC 173-340-710(7)(d), the Sediment Management Standards (SMS: WAC 173-204)

Location-specific ARARs:

Endangered Species Act, 16 USC 1531-1543, 50 CFR 402, 50 CFR 17
Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), 16 USC 1801 et. seq., 50 CFR Part 600
Fish and Wildlife Conservation Act, 16 USC 2901; 50 CFR 83
Federal Coastal Zone Management Act (CZMA), 16 USC 1451-1464; RCW 90.58; WAC 173-27-060, 15 CFR 923-930
Archaeological and Historic Preservation Act, 16 USC 469.
Archaeological Resources Protection Act, 16 USC 470aa; 43 CFR 7

Action-specific ARARs:

In-Water Work

Clean Water Act, Section 404 - Dredge or Fill Requirements Regulations, 33 USC 1344(a)–(d), 33 CFR Parts 320-330, 40 CFR 230
Clean Water Act, Section 401, Water Quality Certification, 33 USC 1340, WAC 173-225-010.
Temporary Modification of Water Quality Criteria and Other Requirements to Modify Water Quality Criteria, RCW 90.48; WAC 173-201A-410 through –450. Chapters 173-201A-400 through -450
Washington Hydraulics Project Approval, Chapter 75.55.061 RCW, Chapter 220-110 WAC.

Stormwater Management

Stormwater Permit Program, RCW 90.48.260; 40 CFR 122.26; Chapter 173-226 WAC

Waste Management

Washington Solid Waste Management Act and Solid Waste Management Handling Standards Regulations, Chapter 70.95 RCW, Chapter 173-350 WAC.

Resource Conservation and Recovery Act: 42 USC 6901

Dangerous Waste Act and Regulations,: RCW 70.105; Chapter 173-303 WAC

Action-specific ARARs, Continued

Toxic Substances Control Act, 15 U.S.C. §2601 et seq. 40 CFR 761.61

Regulation and Licensing of Well Contractors and Operators, Chapter 18.104 RCW; WAC 173-162-020, -030

General Regulations for Air Contaminant Source, Chapter 70.94 RCW; WAC 173-400-040(8); Puget Sound Clean Air Agency (PSCAA) Regulation 1, Section 9.15.

Local requirements

Washington State Shoreline Management Act and City of Everett Shoreline Master Program (SMP), RCW 90.58, WAC 173-27-060, City of Everett Ordinance 3053-08 and SMP.

City of Everett Stormwater and Storm Drainage, Ordinance 2196-96, amending Title 14.28, Effective February 15, 2010; City of Everett Stormwater Management Manual, dated February 2010.

City of Everett Grading Code, Title 18.28.200 EMC.

City of Everett Traffic Code, Title 46 EMC.

City of Everett Discharge to POTW Title 14.40 EMC.

State Environmental Policy Act

The State Environmental Policy Act (SEPA) (Chapter 43.21C RCW; Chapter 197-11WAC) and the SEPA procedures (Chapter 173-802 WAC)

Table 5-1
Summary of MTCA Cleanup Alternative Evaluation and DCA Results for Upland Soils
Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

Alternative		Alternative 1	Alternative 2	Alternative 3	Alternative 4
Probable Cost (Thousand $)[1]		**$1,800**	**$2,700**	**$5,400**	**$3,800**
Description		Targeted/limited excavation of PCB-impacted soil above remediation level of 10,000 µg/kg; excavation of petroleum hydrocarbon-impacted bulkhead soil; installation of engineered-cap in remaining areas above preliminary cleanup levels; institutional controls; and long-term monitoring	Excavation of contaminated soil not covered by existing pavement and buildings; excavation of petroleum hydrocarbon-impacted bulkhead soil; installation of engineered cap on remaining contaminated soil with existing structures or pavement; institutional controls; and long term monitoring	Removal of all contaminated soil, except for limited contaminated soil within the West Marine Drive right-of-way; capping of contaminated soil within the West Marine View Drive right-of-way with a concrete walkway, soil cover (landscaping strip), and asphalt pavement (if contamination extends into the roadway); institutional controls; and long-term monitoring	Bulk excavation of all contaminated soil within 150 to 250 feet of the North Marina Shoreline and all of the soil within the Everett Shipyard operations yard including western part of Former Fish Processing storage building with building demolition (Everett Engineering Bldgs 7 & 9); installation of engineered cap on remaining contaminated soil beneath existing structures and pavement; institutional controls; and long term monitoring.
Total Volume of Impacted Soil Excavation (Cubic Yards)		**1,300**	**9,400**	**18,800**	**14,800**
Contaminant Mass Removal (Percent, Estimated)	**Arsenic**	2.6%	74%	97%	96%
	Lead	7.8%	59%	98%	93%
	Diesel	48%	85%	>99%	>99%
	Oil Range	1.7%	41%	>99%	99%
	cPAHs	3.0%	61%	98%	90%
	PCBs	58%	92%	>99%	99%
	WEIGHTED TOTAL	**15%**	**56%**	**99%**	**98%**
Basis for Alternative Ranking under MTCA and Cost/Benefit					
1. Compliance with MTCA Threshold Criteria [WAC 173-340-360(2)(a)]		Yes [(2)]	Yes [(2)]	Yes [(3)]	Yes [(3)]

Table 5-1
Summary of MTCA Cleanup Alternative Evaluation and DCA Results for Upland Soils
Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

Alternative		Alternative 1		Alternative 2		Alternative 3		Alternative 4	
2. Reasonable Restoration Timeframe? [WAC 173-340-360(4)]		Either unknown or uncertain		Either unknown or uncertain		~ 2 to 3 years		Within 2 to 3 years, 98% of contaminant mass can be removed and the residual risks from residual upland soil contamination would be appropriately managed along with future site redevelopment within a resonable time period.	
3. DCA & Relative Benefits Ranking Calculation [WAC 173-340-360(3)(f)]									
Criteria	**Weighting Factor**	**Raw Score**	**Weighted Score**	**Raw Score**	**Weighted Score**	**Raw Score**	**Weighted Score**	**Raw Score**	**Weighted Score**
Overall Protectiveness	30%	1	0.3	2	0.6	10	3	8	2.4
Permanence	20%	1	0.2	5	1	10	2	9	1.8
Effectiveness over the long-term	20%	1	0.2	5	1	10	2	8	1.6
Management of short-term risks	10%	10	1	9	0.9	7	0.7	8	0.8
Technical and Administrative Implementability	10%	7	0.7	8	0.8	10	1	9	0.9
Consideration of Public Concerns	10%	4	0.4	4	0.4	10	1	8	0.8
Composite Totals			2.8		4.7		9.7		8.3
Overall Weighted Benefit Score		2.8		4.7		9.7		8.3	
Overall Alternative Benefit Ranking		4 (Least Beneficial)		3		1 (Most Beneficial)		2	
4. Ratio of Cost/Benefit		**643**		**574**		**557**		**458**	
Unit Cost per CY of Impacted Soil Removal ($/CY)		**$1,385**		**$287**		**$287**		**$257**	
5. Decision:									
Is the alternative "permanent to maximum extent practicable?"		No		No		No		Yes	
Is the alternative's cost disproportionate to its incremental benefits?		Yes		Yes		Yes		No	

Notes

Refer to Section 10.1 for the rationale for assigning these raw scores to each criteria.

1. Probable Cost = Total Project Present Worth (see Tables 10-2 through 10-5).
2. Alternatives 1 and 2 may not fully comply with MTCA threshold criteria because of the uncertainties associated with leaving relatively large percentages of contaminant mass beneath the engineered cap combined with the uncertainties associated with future site redevelopment.
3. Risks associated with the residual soil contamination after excavation are sufficiently reduced to allow for effective management via engineering and institutional controls.

Appendix A
Inadvertent Discovery Plan

Draft

Archaeological Monitoring and Inadvertent Discovery Plan

Everett Shipyard Cleanup Project

1016 14th Street

Everett, Washington

Prepared by: Sarah McDaniel, MA, RPA

URS Corporation

111 SW Columbia, Suite 1500

Portland, Oregon 97201

October 20, 2011

Table of Contents

Figures

1.0 INTRODUCTION

ESY, Inc. (ESY) and the Port of Everett (the Port) are proposing to remove contaminated soil and sediments from a site associated with the former Everett Shipyard Inc. facility (the Site) located along Everett's waterfront adjacent to Port Gardner Bay, Snohomish County, Washington (Figure 1-1). The Site includes approximately 5 acres of upland area west of West Marine View Drive and adjacent in-water areas where the Port and Everett Shipyard, Inc. historically operated. The cleanup action is more fully described in the Draft Cleanup Action Plan (DCAP) prepared by URS and dated June 9, 2011.

This Archaeological Monitoring and Inadvertent Discovery Plan discusses the measures that will be undertaken to address the potential for significant cultural resources to be present within the Site. The Inadvertent Discovery Plan presented herein is intended to specifically support Upland Alternative 4 as described in the DCAP (URS 2011a) for the site and draws from protocol outlined by the Washington State Department of Transportation (WSDOT) template for discovery plans (WSDOT 2011), and guidelines outlined by the Washington State Department of Archaeology and Historic Preservation (DAHP) for human remains discoveries on non-Federal and non-Tribal property (DAHP 2011).

Background

It is URS' understanding that the Project required joint permitting and review under the Washington State Environmental Policy Act (SEPA) and the National Historic Preservation Act (NHPA). The Washington State Department of Ecology (Ecology) functions as the lead state agency ensuring compliance with state laws providing for the protection and management of cultural resources and non-forensic human remains, including the Archaeological Sites and Resources Act (RCW 27.53), which prohibits intentional excavation or disturbance to archaeological sites on public or private lands, and the Indian Graves and Records Act (RCW 27.44), which prohibits intentional destruction of American Indian graves and provides that inadvertent disturbances require reinterment under tribal supervision. In addition, the U.S. Army Corps of Engineers (USACE) functions as the lead federal agency ensuring compliance with a variety of federal laws and regulations, such as Section 106 of the NHPA, due to issuance of a Clean Water Act Section 404 permit required for in-water cleanup activities.

Conditions of the Everett Shipyard Cleanup Project SEPA mitigated determination of non-significance issued by Ecology require an Inadvertent Discovery Plan in the event that significant historic and/or cultural resources are discovered during the construction. Cultural resource management issues will be coordinated by Ecology in cooperation with the USACE, DAHP, and the Tulalip and Suquamish Tribes. The protocols presented herein are intended to inform on-site environmental staff and construction personnel.

Project Description

<u>Upland Area Cleanup Action Activities</u>

The upland portion of the Site is relatively flat and is estimated to be 15 feet above Mean Lower Low Water sea level. The upland cleanup action includes excavation and off-site disposal of soils containing contamination (Figures 1 and 2). Soils to be excavated are generally in close proximity to Puget Sound and include all of the readily accessible contaminated soil within and

adjacent to the former Everett Shipyard operations yard. Two Everett Engineering buildings (Buildings 7 and 9) are required to be removed so that contaminated soil beneath these buildings can be removed. The depth of excavation throughout most of the Site is expected to be less than 4 feet below existing grade, and to be contained within fill. In the vicinity of the bulkhead, a small excavation area is expected to extend to a depth of approximately 14 feet below grade. The total volume of excavated soil is estimated to be about 14,800 cubic yards. Site restoration would include backfill and compaction of clean imported fill materials. In summary, proposed cleanup action activities for the upland soils that have the potential to affect cultural resources include:

- Demolish two buildings (Everett Engineering Buildings 7 and 9) where elevated levels of contaminated soils were found.
- Excavate approximately 14,800 cubic yards of soil.
- Backfill excavated areas with clean imported fill materials, compact soils and re-vegetate the affected area if necessary.
- Install asphalt paving in excavated areas between the marina and the Lease Area and near the bulkhead to restore surface conditions.

Marine Sediment Cleanup Action Activities

The in-water portion of the Site includes the intertidal (areas exposed to air at low tide) and sub-tidal (areas always covered by water) parts of the Site associated with adjacent marine waters (Figure 2). The marine sediment cleanup action includes dredging all of the sediment exceeding the cleanup levels. The marine railway would be demolished and sediments beneath the railway removed. Where docks and piers can be removed to access the sediment, clamshell dredging would be used. Sediments removed from between the bulkheads would be replaced with suitable clean fill to stabilize the bulkheads. The conceptual design assumes that clamshell, environmental bucket or fixed-arm dredging would be used for the readily accessible areas. In areas that are difficult to access, hydraulic dredging (suction-based equipment) could be used. For those sediments not suitable for open-water disposal, much of the dewatering would occur on a small barge in the area of sediment removal. Dewatered sediments would be transferred from the barge to containers for shipment to an off-site licensed landfill. In summary, proposed cleanup action activities for the marine sediments that have the potential to affect cultural resources include:

- Demolish marine railway and dispose of debris.
- Dredge all marine sediment adjacent to the property that exceeds the cleanup levels.
- Remove sediments beneath the marine railway.
- Remove docks and piers to access sediment for clamshell dredging.

- Use clamshell dredge and shore-based equipment to remove nearshore sediment against and between bulkheads, as exposed during low tide conditions.

- Use hydraulic dredging as necessary to remove sediment from inaccessible areas.

- Replace sediment removed from between the bulkheads with clean fill to stabilize the bulkheads.

Expectations for Archaeological Deposits

No known archaeological resources are found at the Everett Shipyard Cleanup site, which was subject to a cultural resources inventory in 2005 (The Johnson Partnership 2005) and 2011 (URS 2011b). However, the Site is characterized by asphalt, gravel, concrete, and fill surfaces, and identification of potential buried resources can only be addressed at this time via a review of geotechnical investigation results.

Approximately 120 soil borings were recently conducted at the Site and ranged from 0.5 foot to 16 feet in depth at the Site (URS 2011b). Soil borings completed through asphalt and concrete consistently identified shallow or surficial fill materials directly beneath the surface covering that typically range from 0.25 to 3 feet in thickness. Beneath this surficial fill, hydraulic fill material was noted. Significant variation in the hydraulic fill material was not apparent, though surficial fill material varied in composition (e.g., presence of abrasive grit and wood fragments) and thickness across the Site.

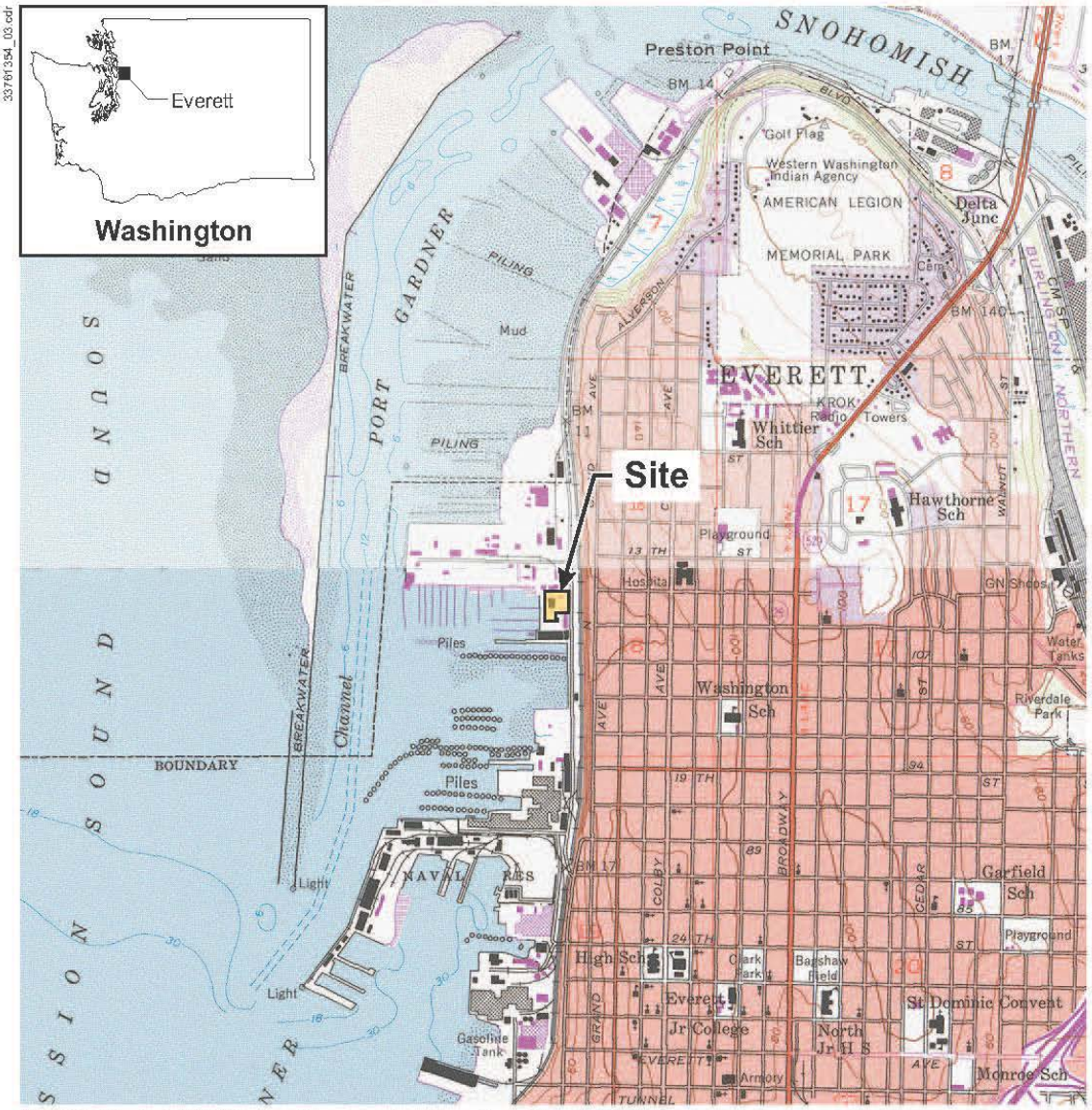
Groundwater is present beneath the Site at depths between 3 and 6 feet below the ground surface. Above the groundwater table, hydraulic fill typically consisted of brown medium grained sand with frequent rust colored mottling. None of the soil borings completed during prior site investigations appears to have been drilled through the entire thickness of the hydraulic fill material at maximum tested depths of 16 feet. Below the hydraulic fill, it is assumed that marine alluvial deposits are present and these sediments are underlain by glacial till, transitional beds, and/or advance outwash deposits (USGS 1985).

Shell fragments and wood debris, including sawdust, were noted in many of the soil cores. Wood debris was commonly observed at depths of around 3-4 feet and again at 14-16 feet. The wood debris and sawdust are not unexpected findings given that sawmill operations located along the 14th Street Pier were active beginning in the late nineteenth century and that mill wastes were intentionally deposited within the water to help create landfill, allowing for the later development of level industrial land (The Johnson Partnership 2005). Shell fragments were observed throughout the borings and are to be expected given the marine source of hydraulic fill. Dark, black, or "greasy" soil characteristics, such as are often characterized with midden soils at coastal archaeological sites, were not noted in any of the soil cores.

Depth of excavation for the cleanup activities throughout most of the Site is expected to be less than 4 feet below existing grade. It is unlikely that significant cultural resources would be buried within the upper 4 feet of fill where proposed cleanup activities would occur. Inundation of the landform prior to historic fill activities, routine accumulation of Snohomish River sediments in this area, and documented fill to depths of over 16 feet at the upland portion of the Site indicate

any potential pre-contact period resources would be deeply buried. In-water sediment cleanup activities would occur within a marina area that is routinely dredged (e.g., Port of Everett 2001) where the existing contaminated sediments are most likely modern in origin.

Although cleanup activities will not exceed the upper reaches of the fill, resources could still be present since interpretations derived from geotechnical borings may not capture the full extent of subsurface soil conditions, and since significant archaeological sites have been found beneath fill in similar industrial shoreline settings (e.g., Barrett et al. 2010).



SOURCE: 7.5-minute USGS topographic quadrangles, Marysville and Everett, Washington

Job No. 33761354

Figure 1-1
Site Location Map

URS

Everett Shipyard
Everett, Washington
DRAFT RI/FS

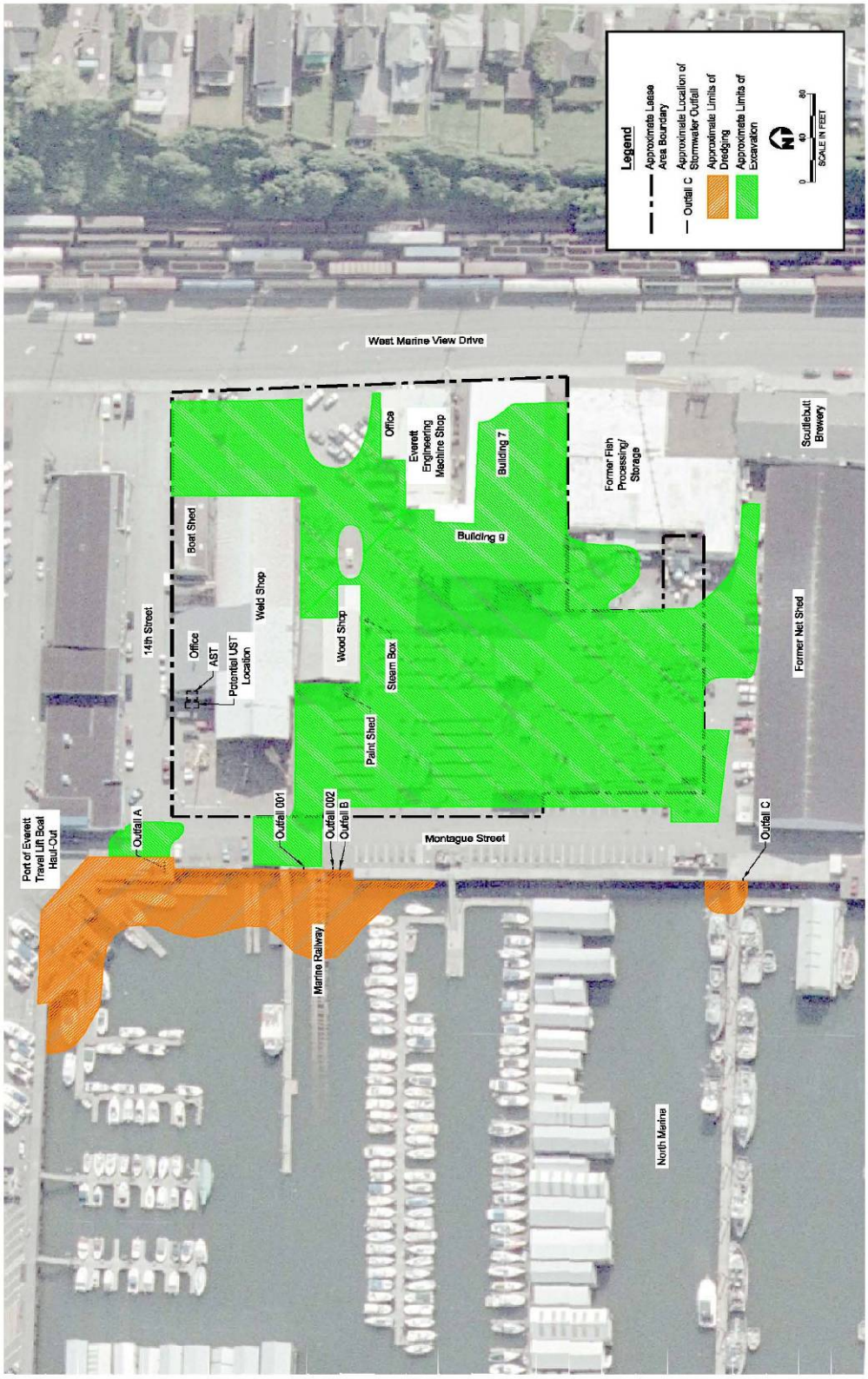


Figure 1-2
Site Plan
Everett Shipyard
Everett, Washington
CULTURAL RESOURCES IN REPORT

URS

3.0 PROCEDURES FOR THE INADVERTENT DISCOVERY OF CULTURAL RESOURCES

Potentially significant archaeological materials may be present within the Project site. Types of archaeological materials that may be encountered could include, but are not limited to: stone tools and flakes (arrowheads), charcoal-stained soils or dark and greasy soils, fire-modified rock, concentrations of shell[1] or animal bones, organic materials (basketry, wooden posts, bone and wooden artifacts), and concentrations of old (more than 50 years) bottles, ceramics, and cans.

If any archaeological resources are discovered during construction activities, work will be stopped immediately and Ecology, the Department of Archaeology and Historic Preservation (DAHP), the City of Everett Planning and Community Development Department, and the Tulalip and Suquamish Tribes Cultural Resources Departments will be notified in a timely manner (current day if possible) and no later than the next business day. An archeologist will be retained for an onsite inspection and the parties mentioned above will also be invited to participate. The archaeologist will document the discovery and provide a professionally documented site form and report to the above-listed parties. In the event of any discovery of human remains, work will be immediately halted in the discovery area, the remains will be covered and secured against further disturbance, and the Everett Police Department and Snohomish County Medical Examiner will be immediately contacted, along with the DAHP Physical Anthropologist and authorized Tribal representatives. A treatment plan by the archaeologist will be developed in consultation with the above-listed parties consistent with RCW 27.44 and RCW 27.53 and implemented according to WAC 25-48.

Information presented below identifies the key responsibilities of construction personnel in the event of a discovery of an item of potential cultural significance during the Everett Shipyard Cleanup Project. In the unanticipated event of a discovery, the following steps shall be taken:

1. **Stop Work and Protect the Discovery Site.** If any agency employee, contractor, or subcontractor believes that he or she has uncovered any cultural resources, all work within a minimum of 50 feet of the discovery ("discovery site") will be stopped to provide for its total security, protection, and integrity. The discovery site shall be secured. Vehicles, equipment, and unauthorized personnel will not be permitted to traverse the discovery site.

2. **Notify Project Coordinators.** The individual making the discovery will immediately contact the ESY's Project Coordinator. ESY's project coordinator will notify the Project Coordinator for the Port. If the ESY Project Coordinator is not immediately available, then the Port's Environmental Coordinator will be contacted.

[1] Isolated, small wood fragments or sawdust, and marine shells typical of hydraulic fill materials, are anticipated and are not to be considered significant archaeological materials at the ESY Site.

Name	Organization	Role	Phone
Jim Flynn	URS	Environmental Coordinator for ESY, Inc.	Cell: 206-619-5952 Office: 206-438-2113
Larry Beard	Landau Associates	Environmental Coordinator for the Port of Everett	Cell: 206-999-0690 Office: 425-329-0307

3. **Notify Project Archaeologist.** Immediately following the work stoppage and notification to Project Coordinator(s), the Project Archaeologist shall be contacted.

Name	Organization	Role	Phone
Sarah McDaniel	URS	Project Archaeologist	Cell: 360-624-4285 Office: 503-478-7660
Mike Kelly	URS	Project Archaeologist (Alternate)	Cell: 503-475-2426 Office: 503-948-7274

4. **Identify the Find.** The Project Archaeologist, in coordination with ESY, Inc. and the Port, is responsible for ensuring that appropriate steps have been taken to protect the discovery site. The Project Archaeologist for the Everett Shipyard Cleanup Project shall be qualified as a professional archaeologist under the Secretary of Interior's Professional Qualification Standards (as outlined in 36 CFR Part 61). As such, the Project Archaeologist shall be qualified to examine the find to determine if it is archaeological. If it is determined not to be archaeological, work may proceed at the discovery site with no further delay.
5. **Notify Additional Parties.** If the discovery is determined by the Project Archaeologist to be a cultural resource, ESY, Inc., and the Port of Everett or their designee will continue with notification to Ecology, USACE, DAHP, and the Tulalip and Suquamish Tribes within one (1) working day. If the find may relate to human remains or funerary objects, protocol outlined in the following section regarding human remains shall be enacted immediately. Confidentiality of the find will be maintained by ESY, Inc. the Port of Everett and their contractors.

Name	Organization	Role	Phone
Hun Seak Park	Ecology	Permitting Agency	Office: 360-407-7189
Erin Legge	USACE	Permitting Agency	Office: 206-764-6695
Rob Whitlam	DAHP	State Archaeologist	Office: 360-586-3080
Stephenie Kramer	DAHP	Assistant State Archaeologist	Office: 360-586-3083
Gerry Ervine	City of Everett	Planning Department	Office: 425-257-7146
Hank Gobin	Tulalip Tribes	Tribal Historical Preservation Officer	Office: 360-654-2636
Dennis Lewarch	Suquamish Tribes	Tribal Historical Preservation Officer	Office: 360-394-8529 Cell: 360-509-1321

6. **Obtain Consent to Proceed with Construction**. Construction work will not recommence at the discovery site until treatment has been completed and the Tribes, DAHP, and/or jurisdictional agencies, as appropriate, have provided written or verbal consent to proceed.

4.0 SPECIAL PROCEDURES FOR THE ENCOUNTERING OF HUMAN SKELETAL REMAINS

If likely or confirmed human remains are encountered, all further sampling or other ground-disturbing activity will cease immediately. The following procedures will be enacted:

1. **Stop Work and Protect the Remains.** In the event that an employee, contractor, or subcontractor believes that he or she has uncovered any human skeletal remains, all work within a minimum of 50 feet of the remains will be stopped to provide for their total security, protection, and integrity. Remains will immediately be covered with a tarp only, for temporary protection in place and to shield them from being photographed. The discovery location will not be left unsecured at any time, and confidentiality will be maintained by ESY and its contractors.

2. **Notify Project Coordinators.** The individual making the discovery will immediately contact the ESY Project Coordinator. ESY's Project Coordinator will notify the Project Coordinator for the Port. If the ESY Project Coordinator is not immediately available, then the Port's Environmental Coordinator will be contacted.

Name	Organization	Role	Phone
Jim Flynn	URS	Environmental Coordinator for ESY, Inc.	Cell: 206-619-5952 Office: 206-438-2113
Larry Beard	Landau Associates	Environmental Coordinator for the Port of Everett	Cell: 206-999-0690 Office: 425-329-0307

3. **Notify Law Enforcement and County Coroner's Office.** If human remains are known or suspected, the Project Coordinator or his designee will notify the local law enforcement agency and coroner's office in the most expeditious manner possible (RCW 27.44; 68.50; 68.60). The county coroner will determine if the remains are human, whether the discovery site constitutes a crime scene, and will notify DAHP if the remains are non-forensic.

Name	Organization	Role	Phone
Non-emergency Contact	Snohomish County Sheriff's Office	Local Law Enforcement	425-388-3411 800-562-4367
Non-emergency Contact	Everett Police Department	Local Law Enforcement	425-257-8400
Norman Thiersch, M.D.	Snohomish County Medical Examiner	Coroner	425-438-6200

4. **Notify Tribes and DAHP**. Concurrently, the Project Coordinator or designee will immediately notify the Tribe(s), DAHP, USACE, and the Project Archaeologist. Per RCW 27.44, 68.50, and 68.60, DAHP will have jurisdiction over non-forensic human remains from non-Federal and non-Tribal land and report them to cemeteries and affected tribes. The State Physical Anthropologist will make a determination of whether the remains are Indian or Non-Indian and report that finding to any appropriate cemeteries and affected tribes (RCW 27.44, 68.50, 68.60). DAHP will handle all consultation with affected parties as to the preservation, excavation, and disposition of the remains.

Name	**Organization**	**Role**	**Phone**
Rob Whitlam	DAHP	State Archaeologist	Office: 360-586-3080
Dr. Guy Tasa	DAHP	State Physical Anthropologist	Office: 360-586-3534 Cell: 360-790-1633
Hank Gobin	Tulalip Tribes	Tribal Historical Preservation Officer	Office: 360-654-2636
Dennis Lewarch	Suquamish Tribes	Tribal Historical Preservation Officer	Office: 360-394-8529 Cell: 360-509-1321
Hun Seak Park	Ecology	Permitting Agency	Office: 360-407-7189
Erin Legge	USACE	Permitting Agency	Office: 206-764-6695
Sarah McDaniel	URS	Project Archaeologist	Office: 503-478-7660 Cell: 360-624-4285
Mike Kelly	URS	Project Archaeologist (Alternate)	Office: 503-948-7274 Cell: 503-475-2426

5. **Obtain Consent to Proceed with Construction**. Construction work will not recommence at the location of the human remains until the tribes, DAHP, and/or jurisdictional agencies, as appropriate, have provided written consent to proceed.

5.0 REFERENCES

Barrett, Thomas Stacy Schneyder, Tait Elder and Kurt Perkins
2010 Fish Traps and Mud Flats: Archaeological Identification of a Pre-contact Weir Feature in Grays Harbor, Washington. Paper presented at the 63rd Northwest Anthropology Conference, Ellensburg, Washington.

Department of Archaeology and Historic Preservation (DAHP)
2011 Guidelines for the Discovery of Human Remains. Online document. Available, http://www.dahp.wa.gov/pages/archaeology/documents/GuidelinesfortheDiscoveryofHumanRemains.pdf. Accessed May 4, 2011.

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2011a Draft Cleanup Action Plan, Everett Shipyard, 1016 14th Street, Everett, Washington. June 9.

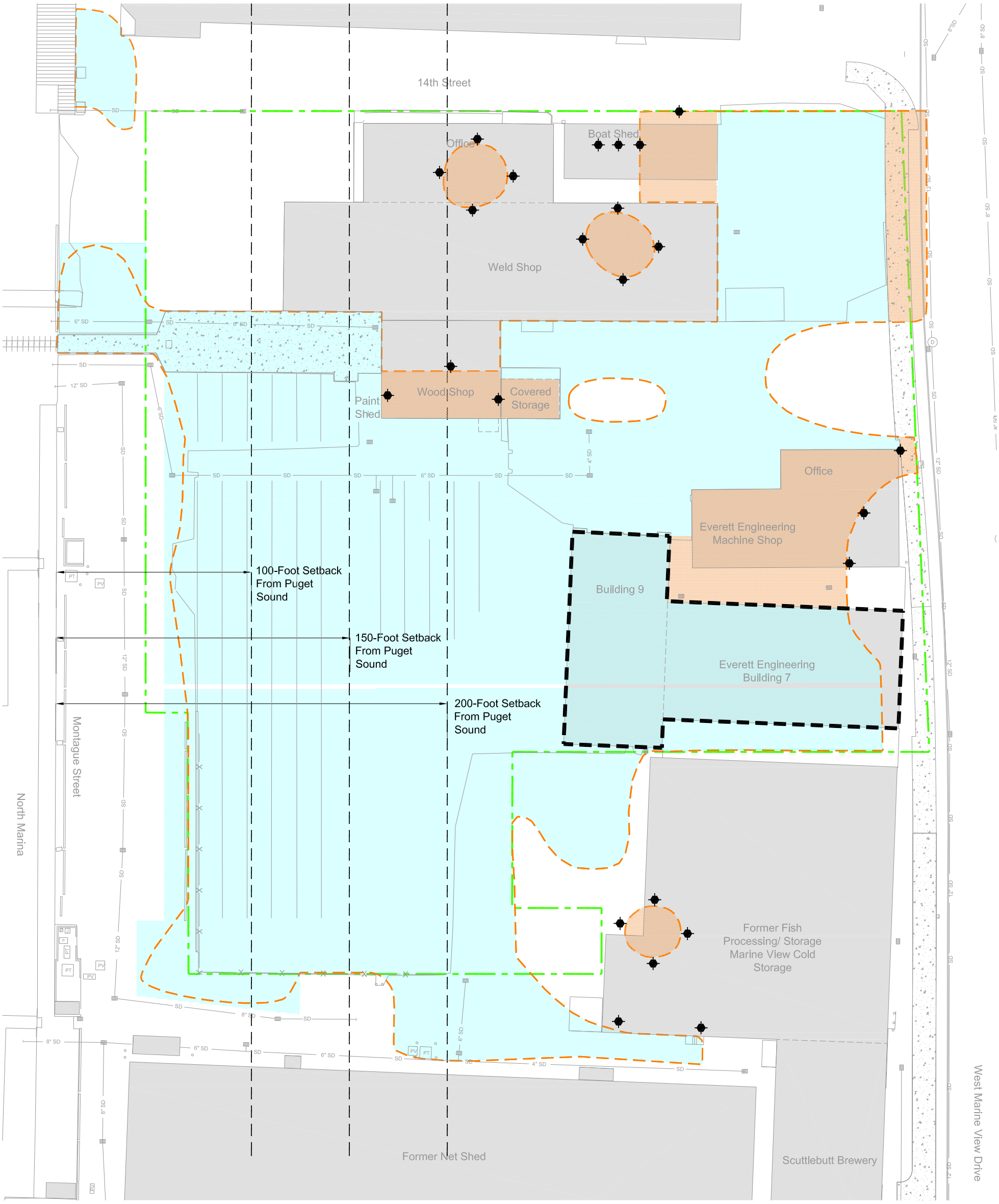
2011b Draft Cultural Resources Inventory Report. Everett Shipyard Cleanup Project, 1016 14th Street, Everett, Washington. June.

U.S. Geologic Survey (USGS)
1985 Geologic Map of the Everett 7.5 Minute Quadrangle, Snohomish County, Washington. Map MF-1748 by James P. Minard.

Washington State Department of Transportation (WSDOT)
2011 Plan and Procedures for the Unanticipated Discovery of Cultural Resources and Human Skeletal Remains Online template. Available, http://www.wsdot.wa.gov/NR/rdonlyres/4A942436-C459-4DA9-9868-5CE63A15111D/0/DiscoveryFormTemplate.doc. Accessed May 4, 2011.

Appendix B

Soil and Groundwater Management Plan – Background Information



Q:\geo\Everett Shipyard\SubTasks\Cleanup Action Plan\Fig B-1 Extent Resid.Soil.dwg
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FIgure B-1

Extent of Residual Soil Impacts to be Managed Under the Soil Management Plan

Everett Shipyard
Everett, Washington
CLEANUP ACTION PLAN

URS

Table B-1
Summary of Soil Analyses Performed in Areas to be Managed under the Soil Management Plan
Everett Shipyard
Everett, Washington
Cleanup Action Plan

Area	Location	Sample ID Depth Interval (feet)	Actual Sample Depth (feet below ground surface)	Ground Surface Material	TPH	cPAHs	Metals	SVOCs	PCBs	VOCs
Weld shop	SB-19	0-0.5	0.75-1.25	Concrete	x	x	x			
	SB-19	1-2	1.75-2.75				x			
	SB-19	2-3	2.75-3.75							
	SB-19	3-4	3.75-4.75		x	x	x			
	SB-19	4-5	4.75-5.75		x		x			x
West Marine View Drive Right-of-Way	SB-48	0-0.5	0-0.5	Bare ground		x	x			
	SB-48D	0-0.5	0-0.5			x	x			
	SB-48	2-3	2-3			x	x			
	SB-49	0-0.5	0-0.5	Bare ground		x	x		x	
	SB-49	2-3	2-3				x			
	MW-9	0-0.5	0.75-1.25	Asphalt	x	x	x	x	x	
	MW-9	1-2	1.75-2.75			x	x		x	
	MW-9	2-3	2.75-3.75			x				
	MW-9	4-5	4.75-5.75			x				
Everett Shipyard Office	SB-54	0-0.5	0-0.5	Elevated flooring	x	x	x		x	
	SB-54	2-3	2-3			x	x			
Boat Shed	SB-55	0-0.5	1.25-1.75	Concrete		x	x		x	
	SB-55D	0-0.5	1.25-1.75			x	x			
	SB-55	2-3	3.25-4.25				x			
Wood Shop	SB-61	0-0.5	0.15-0.65	Elevated flooring	x	x	x		x	
	SB-61	2-3	2.15-3.15			x	x			
Everett Engineering Office	SB-62	SS	0.75-1.25	Concrete		x				
	SB-62	0-0.5	1.25-1.75		x	x	x			
	SB-62D	0-0.5	1.25-1.75		x	x	x			
	SB-62	2-3	2.5-3.5		x	x	x			
	SB-62D2	2-3	2.5-3.5		x	x	x			
	SB-63	SS	0.75-1.25	Concrete		x				
	SB-63	0-0.5	1.5-2		x	x	x			
	SB-63	2-3	3-4							
Everett Engineering Machine Shop	SB-65	SS	0.5-1	Concrete		x				
	SB-65	0-0.5	1-1.5		x	x	x			
	SB-65	2-3	3-4			x				
	SB-67	SS	0.5-0.75	Concrete		x			x	
	SB-67D	SS	0.5-0.75							
	SB-67	0-0.5	0.75-1.25		x	x	x		x	
	SB-67D2	0-0.5	0.75-1.25							
	SB-67	2-3	3-4				x			
Fish Processing Building	SB-89	SS	0.5-1.25	Concrete		x	x			
	SB-89	0-0.5	1.25-2			x				

Notes:

TPH - Total petroleum hydrocarbons
cPAHs - Carcinogenic polycyclic aromatic hydrocarbons
SVOCs - Semi-volatile organic compounds
PCBs - Polychlorinated biphenyls
VOCs - Volatile organic compounds
D in the location indicates a field duplicate was collected and analyzed
SS sample depth indicates sample was collected immediately below a concrete slab
See Figure C-1 for areas and locations

Table B-2

Summary of Soil Analytical Results for Areas to be Managed under the Soil/Groundwater Management Plan

Everett Shipyard, Everett, Washington; Cleanup Action Plan

Sample ID:		SB-19	SB-19	SB-19	SB-19	SB-48		SB-48	SB-49	SB-49	SB-54	SB-54	SB-55		SB-55	SB-61	SB-61	SB-62	SB-62		SB-
Sample ID Depth Interval (feet bgs):	**Preliminary Cleanup Levels**	0 - 0.5	1 - 2	3 - 4	4 - 5	0 - 0.5		2 - 3	0 - 0.5	2 - 3	0 - 0.5	2 - 3	0 - 0.5		2 - 3	0 - 0.5	2 - 3	SS	0 - 0.5		2 -
Date Collected:		12/4/2008	12/4/2008	12/4/2008	12/4/2008	11/25/2009		11/25/2009	11/25/2009	11/25/2009	10/30/2009	10/30/2009	10/30/2009		10/30/2009	10/30/2009	10/30/2009	10/30/2009	10/30/2009		10/30
Field QC:							Field Duplicate							Field Duplicate						Field Duplicate	
TPH (mg/kg)																					
Diesel-range**	2,000[a]	7.0	NA	10	6.5 U	NA	NA	NA	NA	NA	6.1 U	NA	NA	NA	NA	7.9	NA	NA	5.4 U	5.4 U	43 J
Oil-range**	2,000[a]	26	NA	19	13 U	NA	NA	NA	NA	NA	22	NA	NA	NA	NA	25	NA	NA	11 U	11 U	560 J
cPAHs (ug/kg)																					
Benzo(a)pyrene**	140[b]	16	NA	4.8 U	NA	**280**	**320**	5.0 U	65	NA	140	20	41	50	NA	**570**	4.8 U	110 J	4.8 U	5.3	27 J
TTEC**	140[b]	21	NA	NA	NA	**365**	**428**	NA	88	NA	**194**	28	62	77	NA	**756**	NA	**155**	0.05	6.4	35
PCBs (ug/kg)																					
Aroclor 1254**	1,600[b]	NA	NA	NA	NA	NA	NA	NA	39 J	NA	34 J	NA	1,500 J	NA	NA	34 J	NA	NA	NA	NA	NA
Total PCBs**	1,000[a]	NA	NA	NA	NA	NA	NA	NA	39 J	NA	76 J	NA	**1,500 J**	NA	NA	34 J	NA	NA	NA	NA	NA
Metals (mg/kg)																					
Antimony**	32[b]	5 UJ	NA	7 UJ	NA	6 UJ	8 J	NA	5 UJ	NA	6 UJ	NA	5 UJ	5 UJ	NA	6 UJ	NA	NA	5 UJ	5 UJ	6 UJ
Arsenic**	20[a]	6 J	NA	7 UJ	NA	**40**	**60**	5	**30**	6	8	NA	**30**	**24**	4.2	7	NA	NA	6	6	11
Copper**	3,200[b]	424	8.5	45.0	14.5	413	489	9.5	104	8.3	62.4 J	12	426 J	459 J	8.9	53 J	11.7	NA	29.9 J	29.8 J	90.8 J
Lead**	250[a]	**373 J**	2	23 J	NA	112	145	NA	82	NA	24	NA	**350**	**351**	2	10	NA	NA	7	6	142

Notes:

NA - Not analyzed or not available

NE - Not established

cPAHs - Carcinogenic Polycyclic Aromatic Hydrocarbons

PCBs - Polychlorinated biphenyls

TPH - Total petroleum hydrocarbons

VOCs - Volatile Organic Compounds

bgs - below ground surface

mg/kg - milligrams per kilogram

ug/kg - micrograms per kilogram

J - Estimated value

U - Compound was analyzed for but not detected above the reporting limit shown

UJ - Compound was analyzed for but not detected above the reporting limit shown. The reporting limit is an estimated value.

R - Rejected. The presence or absence of this analyte cannot be verified

[a]MTCA Method A Soil Cleanup Level

[b]MTCA Method B Soil Cleanup Level - Direct contact

[c]Carcinogenic PAH (cPAH) cleanup levels under MTCA are based on the calculated total toxicity of the mixture using the Toxicity Equivalency Methodology in WAC 173-340-708 (8). The mixture of cPAHs shall be considered a single hazardous substance and compared to the applicable MTCA Method B cleanup level for benzo(a)pyrene

[d]Protection of Marine Surface Water

[e]Sample was re-analyzed . For reporting purposes higher value if detected was used, while the lower undetect was used if undetected

[f]Cleanup level is for total xylenes

Only results for indicator hazardous substances are shown. See RI/FS Report (URS, 2011) for complete results.

BOLD Exceeds preliminary cleanup level

* Chromatographic profile does not match the laboratory standard chromatogram

** Indicator Hazardous Substance

Notes:

NA - Not analyz

NE - Not establi

cPAHs - Carcinc

PCBs - Polychlo

TPH - Total petr

VOCs - Volatile

bgs - below grou

mg/kg - milligra

ug/kg - microgra

J - Estimated val

U - Compound v

UJ - Compound

shown. The r

Table B-2

Summary of Soil Analytical Results for Areas to be Manag

Everett Shipyard, Everett, Washington; Cleanup Action Pl

Sample ID:		-62	SB-63	SB-63	SB-65	SB-65	SB-65	SB-67	SB-67	SB-67	SB-89	SB-89	MW-9	MW-9	MW-9	MW-9
Sample ID Depth Interval (feet bgs):	**Preliminary Cleanup Levels**	3	SS	0 - 0.5	SS	0 - 0.5	2 - 3	SS	0 - 0.5	2 - 3	SS	0 - 0.5	0 - 0.5	1 - 2	2 - 3	4 - 5
Date Collected:		/2009	10/30/2009		10/29/2009	10/29/2009	10/29/2009	10/29/2009	10/29/2009	10/29/2009	10/29/2009	10/29/2009	12/8/2008	12/8/2008	12/8/2008	12/8/2008
Field QC:		Field Duplicate														
TPH (mg/kg)																
Diesel-range**	2,000[a]	18 J	NA	5.7 U	NA	5.4 U	NA	NA	72	NA	NA	NA	74	NA	NA	NA
Oil-range**	2,000[a]	220 J	NA	11 U	NA	12	NA	NA	72	NA	NA	NA	350	NA	NA	NA
cPAHs (ug/kg)																
Benzo(a)pyrene**	140[b]	20 J	**360 J**	34	4.8 U	110	4.8 U	20 J	44	NA	**370**	**1,400**	**1,300 J**	86 J	120 J	12 J
TTEC**	140[b]	27	**472**	44	NA	**144**	0.05	26	63	NA	**467**	**1,778**	**1,758 J**	111 J	**162 J**	16 J
PCBs (ug/kg)																
Aroclor 1254**	1,600[b]	NA	NA	NA	NA	NA	NA	61 J	67 J	NA	NA	NA	320 J	30 UJ	NA	NA
Total PCBs**	1,000[a]	NA	NA	NA	NA	NA	NA	172 J	109 J	NA	NA	NA	520 J	NA	NA	NA
Metals (mg/kg)																
Antimony**	32[b]	6 UJ	NA	5 UJ	NA	5 UJ	NA	NA	5 UJ	NA	5 UJ	NA	**80**	5 UJ	NA	NA
Arsenic**	20[a]	11	NA	7	NA	7	NA	NA	10	NA	7	NA	**510**	10	NA	NA
Copper**	3,200[b]	100 J	NA	13.8 J	NA	24	NA	NA	302	12.4	19.3	NA	1,430	25.3 J	NA	NA
Lead**	250[a]	100	NA	12	NA	20	NA	NA	**382**	NA	10	NA	**619**	12 J	NA	NA

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shed

genic Polycyclic Aromatic Hydrocarbons

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Organic Compounds

nd surface

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ms per kilogram

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vas analyzed for but not detected above the reporting limit shown

was analyzed for but not detected above the reporting limit

reporting limit is an estimated value.

R - Rejected. The presence or absence of this analyte cannot be verified

[a]MTCA Method A Soil Cleanup Level

[b]MTCA Method B Soil Cleanup Level - Direct contact

[c] Carcinogenic PAH (cPAH) cleanup levels under MTCA are based on the calculated total toxicity of the mixture using the Toxicity Equivalency Methodology in WAC 173-340-708 (8). The mixture of cPAHs shall be considered a single hazardous substance and compared to the applicable MTCA Method B cleanup level for benzo(a)pyrene

[d] Protection of Marine Surface Water

[e]Sample was re-analyzed . For reporting purposes higher value if detected was used, while the lower undetect was used if undetected

[f]Cleanup level is for total xylenes

Only results for indicator hazardous substances are shown. See RI/FS Report (URS, 2011) for complete results.

BOLD Exceeds preliminary cleanup level

* Chromatographic profile does not match the laboratory standard chromatogram

** Indicator Hazardous Substance

Table B-3
Summary of Soil Analyses Planned in Areas to be Managed under the Soil Management Plan
Everett Shipyard
Everett, Washington
Cleanup Action Plan

Area	Previous Borings with CL Exceedances	Planned Analyses			
		TPH	cPAHs	Metals	PCBs
Weld shop	SB-19			X	
West Marine View Drive Right-of-Way	SB-48, SB-49, MW-9	X	X	X	X
Everett Shipyard Office	SB-54		X		
Boat Shed[1]	SB-55	X	X	X	X
Wood Shop	SB-61		X		
Everett Engineering Office	SB-62, SB-63	X	X	X	X
Everett Engineering Machine Shop	SB-65, SB-67	X	X	X	X
Fish Processing Building	SB-89		X		

Notes:

CL - Cleanup Level

x - indicates analysis is for sample collected from this area

TPH - Total petroleum hydrocarbons

cPAHs - Carcinogenic polycyclic aromatic hydrocarbons

PCBs - Polychlorinated biphenyls

[1]Abrasive grit was observed in shallow soil in boring SB-28 in the western side of the boat shed. Soil from this interval was not previously analyzed and this area will investigated after the boat shed is demolished.