Site-Specific Cleanup Action Plan (SCAP)

Development Sites 8 and 9
Tacoma, Washington

for
Foss Waterway Development Authority

June 26, 2014

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1.0 INTRODUCTION

This Site-Specific Cleanup Action Plan (SCAP) has been prepared for Development Sites 8 and 9 (the Site) located at 1131 and 1119 Dock Street, respectively, in Tacoma, Pierce County, Washington (Figure 1). This SCAP was prepared to meet the requirements of the area-wide Consent Decree (CD) between the Washington State Department of Ecology (Ecology) and the City of Tacoma (City) and Foss Waterway Development Authority (FWDA) for remediation and redevelopment of City-owned, upland properties located adjacent to the Thea Foss Waterway (Ecology, 1994 and 2002, CD No. 94-2-10917-6) and the Thea Foss Redevelopment Cleanup Action Plan (CAP) included as Exhibit C to the CD (Ecology, 1994). This SCAP has been prepared for the FWDA to support remediation and redevelopment of the upland portion of Development Sites 8 and 9 and identifies the remedial actions that are to be performed at the Site as part of redevelopment to meet the requirements of the CD and Thea Foss Redevelopment CAP.

Remediation of sediment present at the Site was completed in 2006 under an Administrative Order of Consent (AOC) (EPA, 1994) and CD (EPA, 2003) between the Environmental Protection Agency (EPA) and the City. Therefore, this SCAP does not include the requirements for remedial actions for sediment present at the Site.

The upland portion of the Site is currently used to provide public access and parking as well as access to the Foss Harbor Marina (Figure 2). The Site is proposed to be redeveloped for mixed-use commercial and residential use. Proposed land use plans include construction of a multi-story building or buildings at grade or with below grade parking, residential or commercial development on the ground floor, and residential housing on the upper floors. Proposed land use will also continue to include public access and open space as well as access to the Foss Harbor Marina. The proposed land use will require excavation for construction of building foundations, below grade parking, installation of utilities, as well as replacement of structures that support public access at the Site. Additionally, areas around the building will include asphalt/concrete pavement, landscaping, and open space.

This SCAP presents the cleanup actions required to be performed at the Site to support redevelopment of the Site for mixed commercial and residential land use in accordance with the area-wide CD (Ecology, 1994 and 2002; CD No. 94-2-10917-6) and the Washington State Model Toxics Control Act (MTCA) cleanup regulations [Chapter 173-340 Washington Administrative Code (WAC)]. Specifically, this SCAP has been prepared to:

- Describe the Site background and current conditions including an overview of the Site history and environmental conditions.
- Identify the media of concern and site-specific cleanup levels for the Site.
- Identify the land use and a conceptual redevelopment for the Site.
- Summarize the remedial action requirements specified in the Thea Foss Redevelopment CAP.
- Describe the remedial actions based on a conceptual redevelopment for the Site.
- Identify the estimated costs and assumptions for remedial actions.

- Describe the justification for the cleanup action for a conceptual redevelopment of the Site.
- Identify applicable State and Federal laws pertaining to the remedial actions.

Additionally, this SCAP describes an emergency interim action that was performed to remedy a failing bulkhead located on the shoreline of Development Site 9. The emergency interim action was performed by the City and included excavation and off-site disposal of contaminated soil present behind the failing bulkhead, removing the bulkhead and a wooden esplanade and capping the shoreline slope.

The following sections describe Site conditions, Site history and environmental conditions and summarize the cleanup action alternative specified in the Thea Foss Redevelopment CAP. Also presented are the remedial actions for soil and groundwater containing concentrations of total carcinogenic polycyclic aromatic hydrocarbons (cPAHs), petroleum hydrocarbons, arsenic, lead, and/or nickel at concentrations greater than cleanup levels.

2.0 SUMMARY OF SITE BACKGROUND AND CONDITIONS

2.1. Regulatory Framework

Development Sites 8 and 9 and the Thea Foss Waterway lie within the larger Commencement Bay Nearshore/Tideflats (CB/NT) Superfund Site. The CB/NT Superfund site encompasses approximately 10 to 12 square miles of shallow water, shoreline, and adjacent uplands, most of which is highly developed and industrialized land.

In the 1980s the City began to acquire property along the Thea Foss Waterway in an effort to spur environmental cleanup and redevelopment in downtown Tacoma within the CB/NT Superfund Site. Then, in 1994, the City voluntarily entered into an Administrative Order of Consent (AOC) with the EPA (EPA, 1994) for pre-remedial design investigation and remedial design for a portion of the Thea Foss Waterway and a CD (CD No. 94-2-10917-6) with Ecology for cleanup of the area encompassing the adjacent, City-owned upland properties. Cleanup work administered under the AOC (EPA, 1994) with EPA and CD (CD No. 94-2-10917-6) with Ecology are closely related, sharing a common boundary at mean higher high water (MHHW).

Under the AOC (EPA, 1994) as well as a CD (EPA, 2003) with EPA, the City completed remedial design and remediation of sediment within the portion of the Thea Foss Waterway from the "Mouth" of the Waterway (i.e., where the Thea Foss Waterway enters the larger Commencement Bay) to near the 21st Street Bridge, including the Wheeler-Osgood Waterway. The portion of the Thea Foss Waterway remediated by the City encompassed sediment at and below (i.e., waterward) the MHHW line at Development Sites 8 and 9. Remediation of sediment within the Thea Foss Waterway by the City was completed in 2006. The remedial actions performed by the City at the Site are described further in Section 2.2.5 below and the Thea Foss and Wheeler-Osgood Waterways Remediation Project Remedial Action Construction Report (City of Tacoma, 2006a).

The area-wide CD (CD No. 94-2-10917-6) with Ecology for the City-owned upland properties adjacent to the Thea Foss Waterway specifically requires the following remedial actions to be performed at properties subject to the CD:

- Perform a remedial investigation (RI).
- Prepare a SCAP for soil contamination that is consistent with the Thea Foss Redevelopment CAP (i.e., Exhibit C to the CD).
- Remediate soil contamination in accordance with the SCAP.
- Provide and maintain institutional controls and compliance monitoring as required in the CD.

A copy of the original area-wide CD (Ecology 1994; CD No. 94-2-10917-6), First Comprehensive Amendment to the CD (Ecology 2002) and the Thea Foss Redevelopment CAP (Ecology, 1994) are presented in Appendix A.

Environmental investigations of the Hicks-Bull and Coast Iron Works properties that include Development Sites 8 and 9 were performed in the 1980s and 1990s and an RI was performed in 2001 to evaluate the presence of contamination in soil and groundwater resulting from past filling and industrial activities at the Site. The results of the RI are presented in the report titled Draft Site-Specific Remedial Investigation, Thea Foss Upland Properties, Hicks-Bull, Coast Iron Works, and Steam Plant Properties, Tacoma, Washington (City of Tacoma, 2002). A copy of the RI that includes Development Sites 8 and 9 is provided in Appendix B. The RI identifies contaminant releases at Development Sites 8 and 9 that require cleanup at the Site.

This SCAP has been prepared pursuant to the area-wide CD (Ecology 1994 and 2002; CD No. 94-2-10917-6) and Thea Foss Redevelopment CAP (Ecology, 1994) as well as MTCA (Chapter 70.105D RCW) and associated implementing regulations (Chapter 173-340 WAC).

2.2. Site Description and Current Conditions

Development Sites 8 and 9 are located at 1131 and 1119 Dock Street, respectively, in Tacoma, Washington (Figure 1). The Site is comprised of four Pierce County Parcels that include 8950001961, 8950001962, 8950001963 and 8950001964 (Figure 2). Development Sites 8 and 9 are bounded on the west by Dock Street and the Dock Street right-of-way (ROW), on the north by the Murray Morgan Bridge and the East 11th Street ROW, on the east by the Thea Foss Waterway, and on the south by the proposed Central Waterfront Park property (Figure 2).

Parcel 8950001961 comprises upland area on the southern portion of the Site between Dock Street and the Thea Foss Waterway and is approximately 0.92 acres in size (Figure 2). Parcel 8950001962 comprises upland area on the northern portion of the Site between Dock Street and the Thea Foss Waterway and is approximately 0.81 acres in size. Parcel 8950001963 is approximately 0.45 acres in size and is comprised of upland, shoreline, and marine areas on the northern portion of the Site as well as a 10-foot wide marine area that extends along the waterward side of Parcel 8950001964. Parcel 8950001964 is approximately 0.51 acres in size and is comprised of upland, shoreline and marine property located on the southern portion of the Site.

A survey was performed by Sitts & Hill Engineers, Inc. of Tacoma, Washington in April 2013 to document Site conditions. An emergency interim action was subsequently performed along and adjacent to the shoreline on the northern two parcels (parcels 8950001962 and 8950001963) in January through March (January-March) 2014. The drawing from the 2013 survey is provided in Appendix C. Interim action design drawings identifying modifications to the shoreline performed after

the 2013 survey are provided in Appendix D. Figure 3 as well as Figures 4A and 4B present the conditions at the time of the April 2013 survey and identify the approximate area where the interim action was performed at the Site in January-March 2014. Post-construction survey of the interim action area has not been completed to date.

The western portion of Development Sites 8 and 9 are uplands between the Dock Street ROW and the Thea Foss Waterway. The upland portion of the Site is generally flat with elevations ranging from approximately +17 feet Mean Low Low Water (MLLW) at the top of the shoreline slope adjacent to the Thea Foss Waterway to the approximate elevation of +19 feet MLLW adjacent to the Dock Street ROW on the western boundary of the Site (Figure 3). The elevation of the western boundary of the Site is approximately 2 feet lower than the elevation of the adjacent concrete sidewalk that runs along the eastern side of the Dock Street ROW. The upland portion of the Site slopes down from the top of the shoreline (i.e., approximate elevation of +17 feet MLLW) to approximate elevations between -6 and -10 feet MLLW in the marine area on the eastern boundary of the Site.

The northern portion of the upland area of the Site (i.e., Development Site 9) is paved with asphalt and is used as a lot for paid parking or reserved parking for the Foss Harbor Marina that is located in the Thea Foss Waterway east of the Site (Figures 2 and 3). Access to the parking lot on the northern portion of the upland area is via two driveways from Dock Street. One driveway is located on the northwest corner of the Site adjacent to the 11th Street ROW and the other driveway is located in the central portion of the Site. Multiple landscape features bounded by concrete curbing are located on the northern portion of the Site in the parking lot area. Additionally, walkway ramps from the upland parking area to the adjacent marina floats are located on the northern and southern portions of Development Site 9.

Multiple utilities are currently present on the northern portion of the Site within the parking lot area that include power, stormwater, sanitary sewer and communications (Figure 4A). Utilities that were present within the interim action excavation area were removed and rerouted/replaced prior to initiation of interim action construction activities. Engineering design plans identifying the utilities that were removed and rerouted/replaced as part of the interim action are presented in Appendix D. Structures associated with the power utilities include below ground lines, junction boxes/vaults, meters and pad-mounted transformers. Structures associated with stormwater utilities include catch basins, manholes and conveyance piping. Structures associated with sanitary sewer utilities include a manhole and conveyance piping. Structures associated with communication utilities include manholes and communication lines. It should be noted that a fiber optic cable has been identified to be present on the northern portion of the Site that passes under the Thea Foss Waterway (City of Tacoma, 2006a). Multiple utilities including power, stormwater, and communications cross the Site between Dock Street and the Thea Foss Waterway shoreline adjacent to the Murray Morgan Bridge and the 11th Street ROW. Utilities also traverse the eastern portion of Development Site 9.

A timber bulkhead previously formed the eastern boundary of the upland area on the northern portion of the Site (i.e., Development Site 9) and a timber esplanade supported by wood piling also extended from the bulkhead over the marine area on Development Site 9 (Figures 2 and 3) prior to implementation of the interim action. The timber bulkhead was installed by the U.S. Army Corps of Engineers (USACE) in the early 1900s (Exeltech, Inc., 2005). The timber bulkhead and esplanade were in poor condition and the potential collapse of the bulkhead was the reason for performing the

emergency interim action on the northern portion of the Site in January-March 2014. The timber bulkhead, esplanade and associated timber piling were removed as part of the interim action. The engineering design plans for the emergency interim action are provided in Appendix D.

The shoreline waterward of the timber esplanade on Development Site 9 underwent remediation as part of the City's remedial actions for the Thea Foss Waterway. Remedial actions included dredging and capping the shoreline slope waterward of the face of the timber esplanade to an approximate elevation of -20 feet MLLW in 2004 and 2005. The cap that was placed on the shoreline slope consists of an approximate 18-inch layer of sand and gravel that is armored with an approximate 18-inch layer of riprap. Additionally, the voids of the riprap armoring were filled with sand and rounded gravel habitat mix to enhance the habitat at the Site. The shoreline slope cap was constructed at an approximate 1.5 foot vertical to 1 foot horizontal (1.5V/1H) slope (City of Tacoma, 2006a). Regular monitoring of the remedial action cap is conducted by the City to ensure that the remedial actions continue to remain protective of human health and the environment (City of Tacoma, 2006b). Remedial actions performed by the City for the Thea Foss Waterway are further described in Section 2.3.4.

As part of the emergency interim action, the shoreline above the slope cap placed as part of the remedial action of the Thea Foss Waterway was excavated to create a 2H/1V slope and then capped. The capping that was completed as part of the emergency interim action was similar to capping completed as part of the remedial action of the Thea Foss Waterway. The cap that was placed on the shoreline slope excavated as part of the interim action also consists of an approximate 18-inch layer of sand and gravel armored with an approximate 18-inch layer of riprap and habitat mix was placed to fill the voids of the riprap armoring. Interim action activities performed by the City in response to the failing bulkhead are further described in Section 4.0.

Two buildings are present on the southern portion of the Site (i.e., Development Site 8) that are approximately 13,600 and 500 square feet in size (Figures 2, 3 and 4B). The larger building previously housed the Coast Iron and Machine Works until the 1980s and then was vacant until the Boy Scouts of America began using the building in the early 1990s to support a Sea Scouts program. The larger building has more recently been identified as the Sea Scouts Building. The Sea Scouts program used the building as a meeting and equipment storage facility until 2012. The larger building is currently vacant. The smaller building appears to have been used for wood working as wood debris (i.e., sawdust, wood chips, etc.) was observed to be present on workbench and floor of the building.

The larger building (i.e., Sea Scouts Building) is constructed of wood and has concrete floors. The interior of the building is generally comprised of two large open spaces with several smaller interior rooms. A survey of potential regulated building materials was conducted on the larger building in April 2013 by Pacific Rim Environmental, Inc. of Seattle, Washington. The purpose of the survey was to provide a preliminary evaluation of the presence and quantity of regulated materials (i.e., asbestos-containing materials, lead-based paint, and universal wastes) present in the building that require mitigation and management prior to and during building demolition. The results of the survey indicated that lead based paint, asbestos-containing material, and universal waste materials (i.e., fluorescent fixtures, ballasts and tubes) are present on/in the larger building. The report presenting the results of the survey is provided in Appendix E.

The second, smaller building located on the southeast corner of larger building (Figures 2, 3 and 4B) is constructed of wood and is currently empty. A survey of potential regulated building materials was also conducted on the smaller building in April 2013 by Pacific Rim Environmental, Inc. The results of the survey indicated that that lead based paint and universal waste materials (i.e., fluorescent fixtures, ballasts and tubes) are present in the smaller building (Appendix E).

The southern portion of the upland area of the Site (i.e., southern portion of Development Site 8) is a combination of gravel/soil and pavement (i.e., asphalt and concrete) and is used for two paid parking areas (Figures 2, 3 and 4B). Access to the parking areas on the southern portion of the upland area is via two driveways from Dock Street. One driveway is located on the southwest corner of the Site adjacent to the proposed Central Waterfront Park property and the other driveway is located in southern portion of the Site. A concrete sidewalk traverses the southern portion of the upland area between the two parking areas that provides public access from the Dock Street ROW to a concrete pile-supported, wood-surfaced esplanade structure constructed over the Thea Foss Waterway on Development Site 8.

The concrete pile-supported esplanade structure present on the southern portion of the Site (i.e., Development Site 8) was constructed in the late 1980s. The upper shoreline slope adjacent to the concrete pile-supported esplanade structure and north of the esplanade is armored with riprap placed over geotextile material. Placement of the geotextile and riprap armoring on the upper shoreline slope was performed in conjunction with construction of the concrete pile-supported esplanade structure (Hart Crowser, 2002).

The lower shoreline slope beneath and waterward of the esplanade and north of the esplanade on Development Site 8 underwent remediation as part of the City's remedial actions for the Thea Foss Waterway. Remedial actions included capping the shoreline slope beneath and waterward of the face of the esplanade on Development Site 8 as well as north and south of the esplanade to an approximate Elevation -20 feet MLLW in 2005. The cap that was placed on the shoreline slope consists of an approximate 18-inch layer of sand and gravel that is armored with approximate 18-inch layer of riprap. Additionally, the voids of the riprap armoring were filled with sand and rounded gravel habitat mix to enhance the habitat at the Site. The shoreline slope cap was constructed at between an approximate 2V/1H and 1.5V/1H slope (City of Tacoma, 2006a). Regular monitoring of the remedial action cap is conducted by the City to ensure that the remedial actions continue to remain protective of human health and the environment (City of Tacoma, 2006b). Remedial actions performed by the City for the Thea Foss Waterway are further described in Section 2.3.4.

A habitat enhancement feature consisting of a benched area planted with riparian plant species was also constructed south of concrete pile-supported esplanade on Development Site 8 by the City as part of remedial actions for the Thea Foss Waterway (Figure 2). The habitat area was constructed using logs placed horizontally on the surface of the shoreline slope cap at an approximate elevation of +11 feet MLLW. The habitat enhancement area is also monitored by the City.

The area between the west side of the buildings at the Site and the top of the shoreline slope of the Thea Foss Waterway is either soil or concrete pavement (Figures 2, 3 and 4B). Concrete pavement esplanade sidewalk is located along the top of the shoreline slope between northern end of the concrete pile supported esplanade on Development Site 8 and Development Site 9. An

approximately 160-foot-long landscaping strip is located in the concrete paved area that contains bushes and relatively mature trees. The remaining portion of the area is soil with grass and brush.

Two monitoring wells (HB-MW02 and HB-MW03) are located on the upland portion of Development Site 8 adjacent to the Thea Foss Waterway. The wells were constructed in March 2001 as a part of the remedial investigation of the Site (City of Tacoma, 2002). The wells are constructed of 2-inch-diameter schedule 40 PVC and have 10-foot well screens. Based on measurements taken in April 2013 the total depths and depths to groundwater, respectively, in the monitoring wells are the following:

- HB-MW02 – 14.59 feet bgs and 8.80 feet bgs; and
- HB-MW03 - 14.24 feet bgs and 8.54 feet bgs.

Monitoring well HB-MW01 was decommissioned prior to initiation of the emergency interim action as the well was located in the interim action excavation area (Figure 3).

2.3. Description of Adjacent Sites

2.3.1. Dock Street ROW

Remedial actions were completed in 2008 within the Dock Street ROW from East 15th Street to 470 feet north of East 11th Street. The remedial actions conducted within the Dock Street ROW were completed pursuant to a CD with Ecology (CD No. 94-10917-6) (City of Tacoma, 2005). The remedial actions included upgrades to infrastructure within and resurfacing of the Dock Street ROW.

An investigation of the Dock Street ROW was performed prior to the remedial actions and upgrades in the Dock Street ROW (City of Tacoma, 2001). Contaminants were identified to be present at concentrations greater than MTCA cleanup levels in soil and groundwater. Contaminants detected at concentrations greater than MTCA cleanup levels in soil included carcinogenic polycyclic aromatic hydrocarbons (cPAHs) and arsenic. Contaminants detected at concentrations greater than MTCA cleanup levels in groundwater include benzene and arsenic.

Upgrades to the infrastructure within the Dock Street ROW consisted of replacing utilities including stormwater, sanitary sewer and water lines. Remedial actions included placing all utilities in a combined utility trench that was lined with geotextile and backfilled with clean bedding material or overexcavating the utility corridor 1 foot and then backfilling with clean bedding material. The Dock Street ROW was also upgraded by resurfacing the street with asphalt and constructing concrete curbs and gutters, sidewalks, and driveway entry pans. The asphalt and concrete surfaces comprise a remedial action cap to physically isolate residual contaminants in soil and to limit infiltration of precipitation within the ROW. Additionally, the surface grade was raised and sloped toward the west to promote surface water flow away from the Thea Foss Waterway and into the reconstructed stormwater system. All unsuitable soil materials that were encountered during construction were transported to an off-site disposal facility (City of Tacoma, 2001).

2.3.2. 11th Street ROW

A remedial investigation within the 11th Street ROW was conducted by Hart Crowser in 1998. Three soil borings were advanced to 20 feet bgs, two test pits were excavated to depths of between 5 and

6.5 feet bgs, and one monitoring well was installed to a depth of approximately 15 feet bgs beneath the west side of the Murray Morgan Bridge between Dock Street and the Thea Foss Waterway.

Samples collected as part of the remedial investigation in 1998 were analyzed for total metals, toxicity characteristic leaching procedure (TCLP) metals, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), polychlorinated biphenyls (PCBs), pesticides, and total petroleum hydrocarbons (TPH). One sample, (11ROW-L1) collected as part of the investigation contained lead at a concentration of 4,680 milligrams per kilogram (mg/kg). A TCLP lead analysis on the sample indicated that there is a potential for the presence of characteristic Dangerous Waste at the Site the Site. Additionally, total PCBs, total cPAHs and TPH as heavy oil were detected in fill within the 11th Street ROW at concentrations above screening levels. These contaminant concentrations are likely related to cutting oils and other lubricants that may be present in machined metal observed within the ROW. A groundwater sample collected from R11-MW01 within the 11th Street ROW had detections of dissolved metals exceeding the CD cleanup levels (City of Tacoma, 2002).

Construction activities have recently been completed to restore and upgrade the Murray Morgan Bridge structure. Additionally, utility upgrades were performed in the 11th Street ROW beneath the bridge between Dock Street and the Thea Foss Waterway as part of the project including stormwater infrastructure (i.e., an oil/water separator vault) to treat and convey stormwater from the west side of the bridge deck. Stormwater from the west side of the bridge deck is conveyed to the Thea Foss Waterway through stormwater outfall 6000403 located in the northeast corner of the Site (City of Tacoma, 2013).

2.3.3. 1147 Dock Street Property

The property south of the Site is currently vacant and was recently purchased by the FWDA for the proposed Central Waterfront Park. The northern portion of the 0.7-acre property was previously the location of a steam plant from the 1920s to the 1980s and a warehouse was previously located on the southern portion of the property. The steam plant was demolished in the mid-1980s and the warehouse was demolished by the end of the 1970s. The property has remained unused except for parking since the mid-1980s.

Two 35,000 gallon underground storage tanks (USTs) used for Bunker-C fuel storage were removed in October 1992 from the central portion of the property along with approximately 120 cubic yards of associated petroleum-contaminated soil (Investco Financial Corporation, 1993). In December 1992, additional remedial excavation occurred in the area of the USTs where exceedances of petroleum hydrocarbons and PAHs remained in a sidewall and the base of the previous excavation. The additional remedial excavation removed approximately 20 cubic yards of petroleum hydrocarbon-contaminated soil. Petroleum hydrocarbons were either not detected or were detected at concentrations less than the current MTCA Method A cleanup level in confirmation soil samples collected as part of the additional remedial excavation. Five additional borings were installed in 1994 to further assess petroleum hydrocarbon contamination on the property. Petroleum hydrocarbons were either not detected or detected at concentrations less than the current MTCA Method A cleanup levels for petroleum hydrocarbons in the samples collected from the soil borings (Looney, 2007).

An Ecology-lead interim remedial excavation of approximately 1,000 tons of mercury-contaminated fill soil was completed on the northern shoreline of the property in 1998. The source of the mercury was reportedly fill materials consisting of consolidated ash and boiler waste. Other contaminants detected in the soil at concentrations greater than MTCA Method A cleanup levels or sediment at concentrations greater than sediment quality objectives (SQOs) on the northern portion of the shoreline included petroleum hydrocarbons, lead, zinc, and cPAHs. Confirmation soil samples were collected from the base and sidewalls of the remedial excavation. Mercury, cPAHs and lead were detected above the MTCA Method A cleanup levels and the SQOs in the samples. A geotextile barrier and several feet of crushed rock armoring were placed in the excavation as a cap in 1998 to prevent contaminant migration from the upland to the Waterway. As part of the remedial action in the Thea Foss Waterway in 2005, additional capping materials consisting of gravel and sand were placed over the previous cap to enhance shoreline marine habitat (Looney, 2007).

Approximately 46 cubic yards of mercury-contaminated soil was also excavated from two locations on the Site in 2005. Confirmation soil samples were collected from the base and sidewalls of each excavation for mercury analysis. Mercury was either not detected or was detected at concentrations less than the current MTCA Method A cleanup level in the confirmation soil samples collected from the two excavations (Looney, 2007).

Ecology entered into an Agreed Order (#DE 3373) in 2007 with a former property owner, Federal Asset Recovery. Ecology granted a No Further Action (NFA) in 2007 for soil and groundwater on the Site based on the results of previous investigations and remedial actions. Additionally, a restrictive covenant was established for the shoreline portion of the property that was capped in 2006 as part of remediation of the Foss Waterway (Ecology, 2007).

2.3.4. Thea Foss Waterway

As stated in Section 2.1, Development Sites 8 and 9 and the Thea Foss Waterway lie within the larger Commencement Bay Nearshore/Tideflats (CB/NT) Superfund Site. In 1994, the City voluntarily entered into an AOC with the EPA for investigation and remedial design of the portion of the Thea Foss Waterway from the "Mouth" of the Waterway to near the 21st Street Bridge (EPA, 1994). Remedial actions were subsequently performed under a CD between the City and EPA (EPA, 2003). Remedial actions performed under the AOC and CD with EPA are applicable to the portion of the waterway at and below (i.e., waterward) the MHHW line (EPA, 1994).

Remediation of sediment within the Thea Foss Waterway was completed in 2006. The remedial actions performed by the City are described in the Thea Foss and Wheeler-Osgood Remediation Project Remedial Action Construction Report (City of Tacoma, 2006a). The remedial actions performed in the Thea Foss Waterway are periodically monitored by the City to ensure that the remedial actions are continuing to be protective of the human health and the environment. Monitoring of the remedial actions is being performed under an Operations, Maintenance, and Monitoring Plan (OMMP) prepared for the Site (City of Tacoma, 2006b). The results of the periodic monitoring are documented in a report that is prepared upon completion of each monitoring event.

Under the AOC and CD, the City completed remedial design and remediation of sediment along the shoreline of Development Sites 8 and 9 and adjacent to Development Sites 8 and 9 within the Thea Foss Waterway. The portion of Development Sites 8 and 9 included in remedial actions for the Thea

Foss Waterway are within a portion of the remediation area designated Remedial Area 8 (RA 8). The portion of the Thea Foss Waterway remediated by the City encompassed sediment waterward of the MHHW line at Development Sites 8 and 9 but also extended above the MHHW line to the top of the shoreline slope south of the esplanade on Development Site 8 where a habitat enhancement area was constructed on the shoreline slope (Figure 2). The remedial actions performed at Development Sites 8 and 9 included dredging and/or capping the shoreline as well as placement of habitat mix on the shoreline surface (see Section 2.2).

The remedial actions performed as part of the Thea Foss and Wheeler-Osgood Waterway Remediation Project were/are subject to monitoring in 2006, 2008, 2010, 2013 and 2016 as part of the OMMP prepared for the Site (City of Tacoma, 2006b). Monitoring activities include evaluation of the physical integrity of the cap that includes cap inspections and hydrographic survey and evaluation of sediment quality that includes sediment sampling and analysis. The report prepared for monitoring performed in 2010, the most recent year for which a monitoring report was available, identified that the slope cap at Development Sites 8 and 9 was intact based on slope cap integrity monitoring and that chemical concentrations in the sediment samples were less than the cleanup levels (City of Tacoma, 2010).

2.4. Historical Land Use

The historical land use at the Site presented in this section is a summary of the information provided in the RI (City of Tacoma, 2002). A more detailed presentation of the historical land use is presented in the RI that is included as Appendix B. Figure 2, from the RI is reproduced in this SCAP as Figure 5 for reference in the discussion presented below.

Prior to Euroamerican settlement, the Tacoma waterfront and area encompassing the Port of Tacoma were tidelands of the Puyallup River Delta with steep bluffs on the west and east sides of the delta and the Puyallup River valley to the south. The Site is located on the west side of the Puyallup River Delta at the base of a bluff below what is now Downtown Tacoma.

Initially, railroad lines were developed along the base of the bluff west of the present day location of the Site. Beginning in the 1890s through the early 1900s, the tidelands were filled under the ownership of the Tacoma Land Company, a subsidiary of the Northern Pacific Railroad Company with material dredged from the current Thea Foss Waterway along with material removed from the adjacent bluff. The present day alignment of the Thea Foss Waterway was finished in 1905. The parcels south of 11th Street remained relatively undeveloped until 1910 when Northern Pacific Railway transferred the properties to the City of Tacoma. The City began leasing the property to various industries that primarily consisted of machine and metal working shops (Figure 5). A summary of historical land use at the Site includes the following:

- The Hicks-Bull Machine Shop resided on Lots 1 through 3 (Figure 5) comprising the northern portion of the Site between the 1910s and 1937. Dravis Engineering and Machine Works, who bought Hicks-Bull, operated in a similar area from 1937 to 1963 then transferred the facilities to Atlas Foundry who used the buildings that were present on the property at that time for storage. In 1978, the City leased the lots to Moorage Associates (Totem Boat Haven).
- Tacoma Welding Company, Coast Iron and Machine Works, multiple fish and seafood packers, and an auto repair business operated on Lots 3 through 5 from approximately 1914 to 1975.

Tacoma Welding Company operated in a building located on Lot 4 adjacent to Dock Street from approximately 1914 to the mid-1930s. An auto repair business subsequently operated in the building for approximately 10 years until 1946. Coast Iron and Machine Works operated in a building on Lot 5 starting in approximately 1914 but later relocated the operations to Lots 7 and 8. The Tacoma Fish Packing Company, Marush Fish and Oyster Company, and Johnny's Seafood operated from buildings on Lots 3 through 5 sometime between approximately 1920 and 1975.

- A steam boiler works and welding facility operated on Lot 6 and a portion of Lot 7 from approximately 1920 to 1955. The boiler works and welding company name changed multiple times during that period (i.e., Tacoma Steam Boiler Works, Tacoma Steam Boiler and Welding Works, etc.).
- Coast Iron and Machine Works occupied a building on Lots 7 and 8 from the early 1930s to the 1980s. The building was most recently used by the Boy Scouts of America for the Sea Scouts program.
- The Pacific Machine Shop occupied Lot 9 from approximately 1918 through 1986. The machine shop building was demolished in 1990.
- The Ryan Fruit Company warehouse is indicated to have operated on the southern portion of Lot 9 and Lots 10 and 11 starting in the 1920s. The William Brothers was identified to have succeeded the Ryan Fruit Company and also performed warehousing but in the late 1940s operated a maintenance garage. In approximately 1966, the Western Fish and Oyster Company operated a retail store built primarily on Lot 10 and the southern portion of Lot 9. Lot 11 was used for parking. The Western Fish and Oyster Company building was demolished in 1990.
- The City established the Tacoma Steam Plant No. 1 on Lots 11 and 12 in 1922. This electrical plant was built as a backup system and was reportedly rarely operated. The plant was demolished by the City in 1985.

3.0 SUMMARY OF SITE CHARACTERIZATION RESULTS

Characterization of Site media was performed as part of multiple investigations completed between 1980 and 2001. Various investigations were performed to evaluate specific areas of the Site and specific media between 1980 and 1998. In 2001, an RI was performed to characterize the nature and extent of impacts to soil and groundwater on the Site. The RI report prepared for the Site (City of Tacoma, 2002) (Appendix B) describes each of the investigations.

The specific objectives of the RI included the following:

- Evaluate fill and soil quality at the Site;
- Evaluate groundwater quality entering the Thea Foss Waterway;
- Identify the vertical and lateral extent of slag and other waste material; and
- Identify potential sources of contamination to soil and groundwater.

This section presents a summary of the characterization results for Site soil and groundwater based on the results presented in the RI (City of Tacoma, 2002). For a detailed description of the results, refer to the RI presented in Appendix B.

The results of characterization of sediment at the Site is not presented in this SCAP as sediment at the Site has been remediated as part of the Thea Foss and Wheeler-Osgood Waterways Remediation Project and was completed in 2006. As described above in Sections 2.1 and 2.3.4, the remedial actions for sediment at the Site were performed under an AOC and CD between EPA and the City (City of Tacoma, 2006a). Monitoring of the sediment remedial actions is being performed by the City to ensure that the remedial actions continue to be protective of human health and the environment (City of Tacoma, 2006b).

3.1. Fill and Soil Characteristics and Quality

As part of the RI, 10 test pits were excavated to depths up to 10 feet and five soil borings advanced to approximately 17 feet. Thirty-three soil samples were collected and analyzed for metals, diesel- and oil-range petroleum hydrocarbons, and PAHs. One soil sample was analyzed for benzene, ethylbenzene, toluene and xylenes (BETX). The following is a summary of the fill and soil characteristics and stratigraphy presented in the RI (Appendix B).

The results of the Site investigation identified that fill is present overlying native tideflat deposits comprised of sand containing shells. Based on the results of the RI, the fill ranges from approximately 1 to 12 feet thick and is comprised of a mix of debris and dredged sediment. Debris observed to be present in the fill includes brick, asphalt, concrete, wood, creosote treated wood, burnt wood, coal, slag, ash and cinders. Material interpreted to be dredged fill is comprised of sand with occasional shells. Additionally, creosote-treated piling that likely supported a previous structure were observed to be present at an investigation location on the southern portion of the Site. The fill containing debris was observed to be thickest along the shoreline on the eastern portion of the Site and was not observed in borings advanced in the Dock Street ROW. Figures 8 and 9 from the RI that present cross sections based on observations during the remedial investigation of the Site are reproduced in this SCAP as Figures 6A and 6B.

The results from the remedial investigation identified that metals including arsenic and lead, cPAHs, and oil-range petroleum hydrocarbons were present in fill and soil at concentrations greater than soil cleanup levels. The sample locations where contaminant concentrations were detected in fill and soil greater than cleanup levels as part of the remedial investigation of the Site are shown on Figures 7A and 7B and include the following:

- Total cPAHs were detected at concentrations exceeding soil cleanup levels in fill materials present throughout much of the Site. Total cPAHs concentrations exceeding soil cleanup levels were predominantly detected in fill material containing a mix of debris.
- Lead and arsenic were detected at concentrations exceeding soil cleanup levels predominantly in the central portion of the Site. The highest concentration of lead (i.e., 2,630 mg/kg) and the only detection of arsenic at a concentration greater than the soil cleanup level (i.e., 77.2 mg/kg) was in a sample collected from 3 to 5 feet bgs at test pit location HB-TP05 completed east of the Sea Scouts building on Development Site 8, which was previously used by Coast Iron and Machine Works and by the Tacoma Steam Boiler Works. Lead was also detected at a

concentration exceeding soil cleanup levels (i.e., 252 mg/kg) in a sample collected from 1 to 2 feet bgs at test pit location HB-TP10 in the southwest corner of the Site where the former Tacoma Steam Plant resided. The sample was collected of fill consisting of tan ash material.

- Oil-range petroleum hydrocarbons were detected at a concentration exceeding the soil cleanup level (i.e., 4,000 mg/kg) in a sample collected at test pit location HB-TP01 in the northeast corner of the Site. The sample was collected from the surface to 1-foot bgs.

3.2. Groundwater Characteristics and Quality

Groundwater characteristics and quality were evaluated using four monitoring wells present at the Site. Three of the monitoring wells (i.e., HB-MW01 through HB-MW03) were installed as part of the remedial investigation of the Site. Groundwater characteristics and quality were also evaluated using one previously existing monitoring well (i.e., RD3-UMW2A) at the Site. Eleven groundwater samples were collected from the four monitoring wells and analyzed for a combination of: dissolved metals; gasoline-, diesel-, and oil-range petroleum hydrocarbons; PAHs; and BETX. The following is a summary of the groundwater characteristics and quality presented in the RI (Appendix B).

Water level measurements were collected from the four monitoring wells present at the Site during high and low tides and a tidal monitoring study was performed using monitoring well RD3-UMW2A. Based on the water level measurements and tidal study, the minimum groundwater depth at the Site was estimated to be approximately 7 feet bgs and the average depth to groundwater was estimated to be approximately 9 feet bgs. Additionally, the net groundwater flow across the site was identified to be toward the Thea Foss Waterway, with short-term flow reversals that likely occur during high tides.

Groundwater samples collected during the remedial investigation identified that dissolved arsenic, copper, and nickel concentrations were greater than groundwater cleanup levels. Dissolved arsenic and copper detections were attributed to the high salinity of the groundwater and were in the general range of concentrations detected at other upland parcels adjacent to the Thea Foss Waterway with similarly high salinity groundwater. A reference sample of surface water collected at Owen Beach at Point Defiance Park, North Tacoma had dissolved arsenic and copper concentrations higher than the samples collected at the Site indicating that the dissolved arsenic and copper concentrations detected in Site groundwater were partly attributable to the salinity in the groundwater.

Dissolved nickel was detected at concentrations ranging from 25.8 micrograms per liter (µg/L) to 47 µg/L in groundwater collected from monitoring well HB-MW02. The reference sample collected from Owen Beach had a dissolved nickel concentration of 10.8 µg/L. The results for dissolved nickel in the reference sample collected from Owen Beach was consistent with results of other samples collected from the Site. Therefore, groundwater in the vicinity of monitoring well HB MW02 was identified to be the only location where groundwater was impacted by the Site. The highest concentrations of nickel in soil were observed in three test pits (i.e., HB-TP05, HB-TP06 and HB-TP07) nearest to monitoring well HB-MW02 (Table B-3 in Appendix B) indicating that soil in this area is most likely a source of nickel in groundwater and contributing to nickel in groundwater at concentrations greater than the cleanup level.

3.3. Summary of Site Contaminants and Conditions

Based on the remedial investigation, metals (i.e., arsenic, copper, lead and nickel), cPAHs and petroleum hydrocarbons are present at concentrations greater than cleanup levels at the Site. Contaminants present in Site soil exceeding cleanup levels include arsenic and lead, total cPAHs, and petroleum hydrocarbons. Metals including arsenic, copper, and nickel were detected in groundwater at concentrations exceeding cleanup levels. However, only nickel appears to be present in groundwater at a concentration exceeding the cleanup level as a result of sources in Site soil.

Site contaminants at concentrations greater than cleanup levels are predominantly detected in fill materials containing various debris (Figures 6A, 6B, 7A and 7B). Total cPAHs were detected at concentrations exceeding soil cleanup levels in fill materials present throughout much of the Site. Metals and petroleum hydrocarbons were also detected in fill material containing debris but were generally detected in localized areas.

Dissolved nickel was detected in groundwater at monitoring well HB-MW02 at concentrations ranging from 25.8 µg/L to 47 µg/L (Figure 7B) and greater than a reference sample collected from Owen Beach (i.e., 10.8 µg/L). The highest concentrations of nickel in soil were observed in three test pits (i.e., HB-TP05, HB-TP06 and HB-TP07) nearest to monitoring well HB-MW02 indicating that soil in this area is most likely a source of nickel in groundwater and contributing to nickel in groundwater at concentrations greater than the cleanup level.

The site-specific RI states that "… the site meets the intent of the Consent Decree Cleanup Action Plan with expected contaminant types, land use history, and analyte concentrations". The site-specific RI also states that "The CAP [i.e., Thea Foss Redevelopment CAP] identifies Alternative 3 Remediation of Soils Based on Future Land Use Development as the appropriate alternative for site cleanup all along the Thea Foss waterfront based on the an Area-Wide Feasibility Study" (City of Tacoma 2002). Therefore, based on the results of the RI, the cleanup action requirements of the Thea Foss Redevelopment CAP will be implemented as part of the redevelopment of Development Sites 8 and 9.

4.0 EMERGENCY INTERIM ACTION

This section presents a summary of the tasks performed to implement an emergency interim action at Development Site 9. For a more detailed description of components of the interim action, refer to the interim action documentation provided in Appendix D.

An emergency interim action was performed by the City in January-March 2014 to remedy a failing bulkhead on the shoreline of Development Site 9. The emergency interim action included excavation and off-site disposal of soil and sediment present adjacent to the failing bulkhead, removing the bulkhead and adjacent wooden esplanade and capping of the excavated shoreline slope. Tasks performed to complete the emergency interim action included the following:

- Engineering design and permitting;
- Removing, rerouting and replacing utilities that were in the interim action excavation area;
- Characterizing soil and sediment for off-site disposal;

- Excavation of soil from behind the bulkhead to create a 2H/1V slope;
- Excavation of sediment waterward of the bulkhead down to the existing slope cap;
- Removal of the bulkhead and wooden esplanade; and
- Capping of the shoreline slope.

Engineering design was performed to develop the project plans used to implement the interim action as well as provide the basis for permitting the interim action. Permitting included preparation and submittal of a Joint Aquatic Resources Permit Application (JARPA), State Environmental Policy Act (SEPA) checklist and Biological Evaluation. Project permits and approvals included a Corps of Engineers Nationwide Permit 3, Hydraulic Project Approval and SEPA Determination of Non-significance (DNS). Additionally, a Notification of Intent to Proceed with the Site 9 Emergency Interim Action was submitted by the City to Ecology upon receipt of project permits and approvals. The engineering design plans, permitting submittals and project permits and approvals prepared to perform the interim action are provided in Appendix D. Additionally, photographs of the failing bulkhead prior to the emergency interim action are provided in the JARPA (Appendix D).

Utilities present within the interim action area were removed prior to initiation of interim action excavation activities. Utilities were relocated and replaced west of the interim action excavation area (see engineering design plans in Appendix D). Soil excavated as part of utilities replacement was characterized and disposed of off site. Three samples of the stockpiled soil were analyzed for a combination of total metals, TCLP lead, PAHs, polychlorinated biphenyls (PCBs) and gasoline-, diesel-– and oil-range petroleum hydrocarbons. Additionally, a fish bioassay test was performed on one sample in accordance with Ecology Publication 80-12. Based on the stockpile sample results, the soil was disposed of at the LRI Subtitle D landfill under a Waste Disposal Authorization (WDA) from the Tacoma Pierce County Health Department (TPCHD) (see utility excavation WDA in Appendix D). Approximately 125 tons of soil excavated to install utilities was disposed of at the LRI landfill (Appendix D).

During utility replacement activities, a buried tank was encountered west of the interim action excavation area on the northeast portion of Development Site 9. The tank was approximately 4-feet long and 2-feet in diameter and constructed of steel. The tank was filled with sand indicating that it had previously been closed in place. The buried tank was left in-place at the Site. Ground penetrating radar (GPR) was performed within the upland portion of the interim action excavation area to evaluate the potential presence of additional buried tanks. A report was prepared that identified the location of the tank encountered on the northeastern portion of Development Site 9 as well as a location on the southeastern portion of Develop Site 9 where there was a question as to whether an additional tank was present (see buried tank information in Appendix D). The second location was determined to be a buried concrete slab with a void space present beneath it during the interim action excavation activities (Appendix D).

Also removed from the interim action area prior to initiation of excavation was monitoring well HB-MW01. Monitoring well HB-MW01 was decommissioned by a licensed driller (see well decommissioning report in Appendix D).

Soil and sediment sampling and analysis was performed to pre-characterize the soil and sediment to be excavated from the interim action area for off-site disposal. Soil borings were advanced at 11 locations. Soil samples were collected from at or near the Site surface to depths up to 10 feet bgs. Sediment samples were collected from seven locations from near the sediment surface to depths up to 30 inches. The soil and sediment samples from the interim action excavation area were analyzed for a combination of total metals, TCLP metals, PAHs and diesel- and oil-range petroleum hydrocarbons. cPAHs were detected in soil samples collected from the interim action excavation area at concentrations greater than the soil cleanup level. Additionally, lead was detected in several soil samples at concentrations greater than the soil cleanup level. One sample was also collected from a two to 6-inch thick "oil mat" that was present in the upland portion of the interim action area. The oil-range petroleum hydrocarbon concentration in the sample (7,000 mg/kg) was also greater than the cleanup level. Samples collected of sediment located within the interim action excavation area contained cPAHs and lead at concentrations similar to soil. Based on the pre-characterization sample results, the soil and sediment was approved for disposal at the LRI Subtitle D landfill under a WDA from the TPCHD (see interim action soil and sediment pre-characterization and WDA in Appendix D).

Excavation of sediment in front of the bulkhead as well as soil behind the bulkhead was performed to create an approximate 2H/1V slope from the top existing slope cap installed as part of remediation of the Thea Foss Waterway to the top of the shoreline slope in the interim action area. Excavation was performed in 25 to 50 foot wide swaths starting from the south end of the interim action area and proceeding to the north. Soil and sediment excavation was performed during low tides so that the excavation was performed in the dry (i.e., when the soil and sediment were not covered by water). A containment boom was also deployed to encompass the interim action area during construction activities. Capping of the shoreline slope with slope cap filter material (i.e., mix of sand and gravel) was performed upon completion of excavation of each swath. The portion of the bulkhead and esplanade present in each swath was also removed. All of the material (i.e., soil, sediment, bulkhead, and esplanade) that was removed was transferred to the upland and disposed of off site at the LRI landfill. Approximately 4,085 tons of contaminated soil and sediment excavated as part of the emergency interim action were disposed of at the LRI landfill (Appendix D).

The excavated slope was capped with an approximate 18-inch layer of slope cap filter material comprised of sand and gravel and armored with an approximate 18-inch layer of riprap. Habitat mix was placed to fill the voids of the riprap armoring. Approximately 3,500 tons of slope cap filter material, rip rap and habitat mix were placed to complete the cap. Additionally, 15 root wads were anchored to the slope at an approximate elevation of +10 feet MLLW to enhance the habitat at the Site. Physical and chemical testing was performed on the capping material prior to use at Development Site 9. Chemical testing included analysis for total metals, semi-volatile organic compounds, PCBs and pesticides (see capping material testing results in Appendix D).

5.0 CLEANUP ACTION REQUIREMENTS

5.1. Thea Foss Redevelopment Cleanup Action Plan

The Thea Foss Redevelopment CAP included in the CD for remediation of City-owned upland properties adjacent to the Thea Foss Waterway, consistent with MTCA, requires that remedial actions

be performed to protect human health and the environment, comply with cleanup standards and other applicable or relevant and appropriate requirements (ARARs), as well as provide for compliance monitoring. Additionally, the Thea Foss Redevelopment CAP, the CD and MTCA specify that remedial actions should recognize land use planning and the ultimate use of the Site.

The feasibility study process for the City-owned properties evaluated multiple remedial alternatives to address potential risks to human health and the environment from soil contamination present at the City-owned upland properties including Development Sites 8 and 9. Based on comparative analysis, the alternative selected by Ecology specified in the Thea Foss Redevelopment CAP is Remediation Based on Future Land Use Development (identified as Alternative 3 in the CAP) (Ecology, 1994). The Thea Foss Redevelopment CAP identified three land use scenarios and specific remedial actions that are to be performed based on the land use scenario. The land use scenarios identified in the CAP include the following:

- Scenario 1: Proposed redevelopment with ground floor residential use;
- Scenario 2: Proposed redevelopment for commercial/retail, open space, or upper story residential uses; and
- Scenario 3: Proposed industrial use for properties located on the east side of the Thea Foss Waterway.

The Thea Foss Redevelopment CAP also identified cleanup levels for soil and groundwater at the City-owned upland properties that are protective of human health and the environment and in consideration of Site use.

As specified in the CAP, the site-specific cleanup levels and required remedial actions to be performed at Development Sites 8 and 9 are based on the land use and the proposed redevelopment to occur at the Site. Redevelopment at Development Sites 8 and 9 will include Scenario 1 and/or Scenario 2 land use. The following sections identify the land use and conceptual redevelopment for Development Sites 8 and 9 and the site-specific cleanup levels and summarize the remedial actions specified in the Thea Foss Redevelopment CAP.

5.2. Land Use and Proposed Redevelopment Plan

Development Sites 8 and 9 are located within an area that is zoned S-8, Shoreline District – Thea Foss Waterway under City of Tacoma Municipal Code Chapter 13.10 (City of Tacoma, 2003). The intent of the "S-8" Shoreline District is to improve the environmental quality of Thea Foss Waterway and provide continuous public access to the waterway as well as encourage the reuse and redevelopment of the area for the following (City of Tacoma, 2003):

- Mixed-use, pedestrian oriented development;
- Residential development;
- Marinas, related facilities, and waterborne transportation;
- Water-oriented commercial uses and maritime activities; and
- Water-oriented public parks and public facilities.

Proposed redevelopment plans for Development Sites 8 and 9 are consistent with the intent of the S-8 Shoreline District zoning as well as the Master Redevelopment Strategy for the Thea Foss Waterway (FWDA, 2012). Redevelopment is anticipated to consist of mixed use including a combination of the following:

- Construction of a multi-story building or buildings with commercial development or residential use on the ground floor and residential use on the upper floors.
- Construction of the multi-story building or buildings on the existing Site surface or with below grade structures including below grade parking.
- Public access to the Thea Foss Waterway as well as access to the Foss Harbor Marina.
- Public open space and/or park area.

The actual extent of each general type of land use identified above (i.e., commercial, residential, public access and a public park) will be determined based on the market conditions at the time of redevelopment. The actual redevelopment that is constructed will be based on the design prepared by a developer of the Site.

Redevelopment will require excavation for construction that may include a building or buildings and associated infrastructure including foundations, below ground parking, installation of utilities, as well as replacement of structures that support public access at the Site. Where redevelopment consists of residential use on the ground floor, all fill and soil is required to be excavated to the mean-high groundwater level as specified in the Thea Foss Redevelopment CAP.

Areas around and beneath the building or buildings would include asphalt/concrete pavement for walkways and vehicle access and parking. Areas around the building or buildings would also include landscaping and open spaces (i.e., lawn area). A park could also be developed to provide a larger open space for the public.

- Replacement of structures that provide public access to the waterway and public open space will be part of Site redevelopment. The esplanade structure on Development Site 8 will be maintained and access to the esplanade on Development Site 8 and between the esplanades on Development Sites 8 and 9 will be integrated into redevelopment for the Site. Plans have been prepared for replacement of the esplanade structure on Development Site 9. The plans include installing a new concrete pile supported and surfaced esplanade adjacent to and over the new shoreline slope created as part of the emergency interim action.

The current plans for the replacement esplanade on Development Site 9 are provided in Appendix F.

The Site is currently used to provide access to the Foss Harbor Marina. Access to Foss Harbor Marina floats is currently provided by two walkways located at the north and south ends of Development Site 9 that connects the upland to the marina floats and facilities. Walkways will be maintained and/or reconstructed to continue to provide access to the Foss Harbor Marina as part of redevelopment and Site use.

The land use and redevelopment described above provide the basis for the site-specific cleanup levels and the remedial actions required to be performed at Development Sites 8 and 9 under the Thea Foss Redevelopment CAP.

5.3. Site Cleanup Standards

The Thea Foss Redevelopment CAP specifies site-specific cleanup standards based on the requirements of MTCA (Chapter 173-340 WAC) and the proposed Site redevelopment. Additionally, the CAP identified maximum contaminant concentrations for soil. Table 1 presents the cleanup standards for soil and groundwater for individual constituents identified in the CAP as well as the individual maximum contaminant concentrations for soil that are applicable to Development Sites 8 and 9 based on the land use and proposed redevelopment. The cleanup standards presented in this SCAP have been updated from the cleanup levels presented in Thea Foss Redevelopment CAP based on updates to the cleanup levels in MTCA as well as other applicable state and federal criteria (Table 1). The following sections further describe the cleanup levels for soil and groundwater.

5.3.1. Soil Cleanup Standards

The cleanup standards for the Site soils are based on protection of groundwater and surface water, and on estimates of reasonable maximum exposure expected for protection of human health based on Site use. The residential use scenario as defined in MTCA represents the reasonable maximum exposure scenario for direct contact at Development Sites 8 and 9 because of the proposed redevelopment for residential use. The cleanup standards for residential use are the MTCA Method B cleanup levels. For contaminants for which Method B cleanup levels are not established, the MTCA Method A cleanup levels for unrestricted land use are used.

The CAP identified maximum soil concentrations that were characterized as the upper limit for site-wide contaminant concentrations for which the remedial technologies specified in the CAP are applicable (Table 1). The CAP identified that there were upland Sites adjacent to the Thea Foss Waterway where materials including slag are present in soil that may contain contaminants greater than the maximum soil concentrations identified in the CAP but also identified that the materials could be readily removed from soil at the Sites. Therefore, the CAP identified that the presence of the material doesn't exclude a Site from applicability under the CAP (Ecology, 1994).

5.3.2. Groundwater Cleanup Standards

The cleanup standards for Site groundwater are based on protection of marine surface water including protection of aquatic life (i.e., marine chronic criteria specified in Chapter 173-201A WAC and 40 CFR 131) and the protection of human health from consumption of aquatic organisms (40 CFR 131) (Table 1). Protection of surface water is applicable for Site groundwater since groundwater at the Site was determined to be non-potable as specified in the Thea Foss Redevelopment CAP (Ecology, 1994).

Consistent with MTCA (WAC 173-140-720), shallow groundwater at Development Sites 8 and 9 is not considered a potable water source as shallow groundwater from the Site is not currently being used for potable water and is not suitable as a future potable water source due to the high potential for saline water intrusion as a result of groundwater extraction. It is also unlikely that a contaminant

in the shallow groundwater will be transported to an area where groundwater is a current or potential future source of potable water (Ecology, 1994).

5.4. Remedial Actions for the Proposed Redevelopment and Site Use

Remedial actions required under the Thea Foss Redevelopment CAP for the proposed redevelopment and Site use at Development Sites 8 and 9 include the following:

- Remediation of excavated soil;
- Isolation of contaminants below soil and pavement caps;
- Over-excavation or lining of the excavation area with geotextile and backfilling with clean soil in areas where repeated excavation may occur;
- Establishment of institutional controls where residual contamination remains on site; and
- Compliance monitoring.

The following sections further describe each of the remedial actions required for the Site.

5.4.1. Remediation of Excavated Soil

Remediation is required for all contaminated soil removed from excavations performed at the Site. Treatment of excavated contaminated soil is preferred, whenever practicable, but actual treatment process options are dependent on the contaminant characteristics and type of excavated material. Soil that is treated and reused on site must meet cleanup levels presented in Table 1.

The results of the remedial investigation indicate that fill and soil is present at the Site that contains cPAHs, metals and petroleum hydrocarbons at concentrations greater than the cleanup levels. Additionally, fill/soil is present with lead concentrations greater than the maximum soil contaminant concentration and fill/soil is present that is a source contributing to nickel in groundwater at concentrations greater than the groundwater cleanup standards that must be excavated to meet the requirements of the Thea Foss Redevelopment CAP. Fill and soil excavated from the Site containing contaminant concentrations greater than the maximum soil concentrations and/or cleanup levels and/or contributing to concentrations in groundwater greater than the groundwater cleanup levels will require treatment based on its chemical characteristics and type. Alternatively, excavated material that is not practical to treat may be disposed of off site at an appropriate disposal facility.

5.4.2. Isolation Beneath Soil or Pavement Caps

Where residential use is not proposed for the ground floor, caps consisting of soil or pavement are required to isolate contaminants left on site and to prevent exposure.

A cap comprised of soil constructed to isolate contaminated soil present at the Site must consist of 3 feet of clean soil cover. Remedial actions could include excavating and treating up to 3 feet of soil to meet MTCA Method B standards followed by reuse as backfill.

Pavement comprised of asphalt or concrete can be used for isolating contaminated soil to be left on site. A building or structure can also be used to cap contaminated Site soils. Building foundations

may rest on contaminated soil, but backfill around the foundation must be clean or soil treated to meet the site-specific cleanup levels.

5.4.3. Over-Excavation or Lining of Excavation Areas

In utility corridors or other areas where repeated excavation is anticipated to occur in the future and contaminants are present at concentration greater than the cleanup standards, over-excavation and backfilling with clean soil or lining the excavation with geotextile fabric before backfilling with clean soil is required to limit future exposure to contaminated soil by utility or other workers.

Utility trenches are required to be constructed to state and city standards. Additionally, the CAP requires that all utility trenches excavated through soil with contaminant concentrations exceeding the cleanup level be over-excavated to allow for a minimum 1-foot perimeter of clean soil outside the standard trench dimensions or the utility trench is required to be lined with geotextile fabric. The utility trenches are also required to be backfilled with clean or treated soil meeting the cleanup standards.

5.4.4. Institutional Controls

Institutional controls are required in areas of the Site where residual contamination remains following remedial actions to control future land use and disturbance of soil, provide for long-term maintenance of caps (i.e., soil and pavement caps), to prohibit use of groundwater for potable water and to provide compliance monitoring.

5.4.5. Compliance Monitoring

Compliance monitoring is required to confirm that human health and the environment are protected during the construction and operation and maintenance of the cleanup action. Compliance monitoring will also be required to confirm that cleanup actions have attained the cleanup standards prescribed in the cleanup action plan and ensure the long-term effectiveness of the remedial action including the long-term integrity of any isolation systems as well as other requirements for isolation technologies.

6.0 SITE-SPECIFIC CLEANUP ACTION PLAN

This section presents the site-specific cleanup action plan for Development Sites 8 and 9 based on the requirements of the CD and CAP for a conceptual redevelopment plan for the Site that includes mixed use including a combination of the following:

- Construction of a multi-story building on the existing Site surface that is used for commercial development on the ground floor and residential use on the upper floors.
- Construction of a multi-story building with residential use on the ground floor and residential use on the upper floors and with below ground parking.
- Public and vehicle access to the Thea Foss Waterway and Foss Harbor Marina.
- Public access along the shoreline.
- Utility corridors.
- Public open space or park area.

Figure 8 presents a Site map that depicts a conceptual redevelopment plan and Figure 9 presents a cross section through the Site that depicts a conceptual representation of the remedial actions required to be performed as part of the cleanup action.

As stated in Section 4.2, the actual extent of each type of land use identified above (i.e., commercial, residential, public access and public park) will be determined based on the market conditions at the time of redevelopment and design prepared by a developer of the Site. The specific engineering design for remedial actions to be performed at Development Sites 8 and 9, based on the actual redevelopment to be constructed at the Site, will be presented in an Engineering Design Report (EDR) and construction plans and specifications. The EDR will be prepared in accordance with MTCA requirements. The EDR and construction plans and specifications will provide specific design requirements and procedures for completing the remedial actions at the Site.

The following sections provide additional descriptions of the actions that would be required to be performed as part of redevelopment of Development Sites 8 and 9 based on the conceptual redevelopment plan.

6.1. Site Preparation and Demolition

Redevelopment and remedial actions at the Site to support the conceptual redevelopment plan will require site preparation and demolition activities that include the following:

- **Demolition of the two buildings present on the southern portion of the Site**. The existing buildings will need to be demolished to allow for Site redevelopment and implementation of remedial actions. Regulated building materials as well as other components of the existing buildings are required to be managed and disposed of in accordance with all local, state and federal regulations.
- **Demolition of pavement present at the surface over a majority of the Site.** The existing asphalt and concrete pavement, including concrete slabs within the Sea Scouts building, will need to be demolished to allow for Site redevelopment and remedial actions. The demolished pavements are required to be removed from the Site and are anticipated to be recycled or disposed of at appropriate disposal facilities.
- **Demolition of piling associated with existing and former Site structures.** Piling that are associated with existing or former Site structure(s), where present, will need to be demolished to extent necessary to support construction of buildings or other structures and completion of remedial actions. Demolished piling will need to be disposed of at an appropriate disposal facility.
- **Demolition of utilities.** In areas where excavation to support redevelopment and remedial actions requires removal of existing utilities, the utilities will be required to be demolished and/or decommissioned in accordance with applicable requirements. Utilities that are trunkaded at the limits of an excavation and have the potential to provide a transport pathway for soil or water (ex., stormwater and sanitary sewer pipes, etc.) will be required to be plugged. Grout will need to be placed in the ends of utility pipes that are trunkaded to prevent transport of Site media, including soil and groundwater, in the remaining portion of the pipes. The demolished components of existing utilities within the excavation will need to be disposed of at an appropriate disposal facility.

- **Demolition of other remnant structures.** Remnant structures including previous building support structures (i.e., concrete footings, pilings, etc.), concrete pads, utilities, as well as other structures (ex., buried tanks, piping, etc.) may be present beneath the surface of the Site and may be encountered during remedial actions and redevelopment activities. Remnant structures that are encountered will need to be demolished to the extent necessary to support completion of remedial actions and redevelopment and the demolished structures will need to be managed and recycled and/or disposed of at appropriate recycling and/or disposal facilities.
- **Decommissioning or modification of existing monitoring wells.** Existing monitoring wells at the Site may need to be decommissioned prior to remedial actions and redevelopment activities at the specific monitoring well locations. However, the existing monitoring wells could be protected and the well casings and protective casings could be modified (i.e., raised) to account for changes in the Site surface as a result of redevelopment activities. Decommissioning and/or modification to the monitoring wells are required to be performed by a licensed driller in accordance with state regulations.

6.2. Remediation of Excavated Soil

Redevelopment of the Site, as identified in the conceptual redevelopment plan, will include excavation of soil for the following;

- Removal of all fill and soil with contaminant concentrations greater than the site-specific cleanup standards down to the mean-high groundwater level where residential use will occur on the ground floor;
- Construction of building foundations and structures;
- Below grade parking;
- Installation of utilities; and
- Grading the site.

Remedial actions at the Site are also required to include remedial excavation and removal of fill and soil on the eastern portion of the Site with lead concentrations greater than the maximum soil contaminant concentration and fill and soil that is a source contributing to nickel concentrations in groundwater that are greater than the groundwater cleanup standard to comply with the Thea Foss Waterway Redevelopment CAP.

The extent of excavation to install building foundations and structures will be dependent on the design of the building to be constructed. Excavation to construct below grade parking is to be performed to the depth of the mean-high groundwater level. Installation of utilities will include excavation of utility trenches and corridors in accordance with the requirements of the CAP and Site grading will be needed to facilitate stormwater conveyance as well as transition between surface features on the Site (i.e., between building access areas and esplanade structures) and between Site surface features and surface features on adjacent Sites (i.e., between esplanade structures on the Site and on adjacent Sites). Additionally, Site grading will be required to facilitate transition between different cap types (i.e., soil cap and pavement caps) utilized to contain contaminated soil (Figure 9).

As previously stated, remediation is required for all soil with contaminant concentrations greater than site-specific cleanup standards removed from excavations performed at the Site. The CAP specifies that excavated soil with contaminant concentrations greater than the cleanup standards can't be relocated on site and capped. Contaminated soil that is treated to meet the cleanup levels presented in Table 1 or soil present at the Site that meets the cleanup levels as well as other Site redevelopment considerations (ex., geotechnical requirements) can be reused on site.

Fill and soil present at the Site has been identified to contain cPAHs, metals, and petroleum hydrocarbons at concentrations greater than the cleanup standards. Additionally, fill/soil with lead concentrations greater than the maximum soil contaminant concentration and fill/soil that is a source contributing to nickel concentrations in groundwater at concentrations greater than the groundwater cleanup standards is present on the eastern portion of the Site. Nickel concentrations in fill/soil present in the area of monitoring well location HB-MW02 were the highest detected at the Site. A conceptual redevelopment plan that includes excavation of all fill/soil down to the mean-high groundwater table is anticipated to remove lead detected at a concentration greater than the maximum contaminant concentration (i.e., 2,630 mg/kg in a sample collected from test pit location HB-TP05; Figure 7B) and fill/soil with the highest concentrations of nickel (i.e., sampling locations HB-TP04, HB-TP05, HB-TP06 and HB-TP07; Figure 7B; Table B-3 in Appendix B) contributing to nickel in groundwater at monitoring well HB-MW02 (Figure 7B).

Additional characterization will be required to evaluate fill and soil at the Site for treatment, off-site disposal, or on site reuse and to confirm the limits of soil with elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration on the eastern portion of the Site. The specific procedures for performing additional characterization for evaluating and determining appropriate treatment and/or disposal and for confirming the area with elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration will be identified in a Compliance Monitoring Plan included in the EDR prepared for performing remedial actions and redevelopment construction activities. The Compliance Monitoring Plan will be prepared in accordance with MTCA requirements (WAC 173-340-410). Possible approaches include performing insitu characterization prior to remedial and redevelopment construction and/or characterization during construction.

Pre-construction insitu characterization could include advancement of test pits and/or soil borings in the proposed excavation and remedial action areas and sampling and analysis of various fill and soil at the Site. Analysis would include Site contaminants as well as analytes and analyses required by potential treatment and disposal facilities including compliance with the Dangerous Waste Regulations (Chapter 173-303 WAC). The results of the insitu characterization would be compared to site-specific cleanup standards, requirements specified by potential disposal facilities, as well as evaluated for potential treatment. Additional testing including geotechnical analyses could be performed to evaluate potential reuse onsite of soil meeting the site-specific cleanup standards.

Characterization during remedial and redevelopment construction would include excavation, stockpiling, and sampling and analysis to evaluate treatment, disposal, and reuse and sampling and analysis to confirm the extent of fill and soil with elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration on the eastern portion of the Site. A combination of the results from previous remedial investigations and field screening

during remedial and redevelopment construction could be used to segregate fill and soil for evaluation for treatment, off-site disposal, or on site reuse as well as confirm the extent of fill and soil with elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration. Field screening would include, but not be limited to, evaluation for the following:

- Fill of various types that would have similar contaminant characteristics and/or similar disposal designations including debris such as: asphalt; concrete; creosote-treated wood; slag; ash, cinders, burned debris; coal; or other material types;
- Fill and soil having visual signs of contamination including, but not limited to, staining, oxidation or discoloration as well as olfactory indication of contamination (i.e., odor);
- Fill and soil with oil residue or other indications of petroleum contamination (i.e., sheen, tar, etc.);
- Fill and soil that register "hits" or signs of potential contamination on field screening devices (i.e., organic vapor analyzer).

Similar to insitu characterization, analysis of stockpiled materials and fill/soil sampled to confirm the extent of elevated nickel concentrations and lead at concentrations greater than the maximum soil contaminant concentration would include Site contaminants as well as analytes and analyses required by potential treatment and disposal facilities. The results would be compared to site-specific cleanup standards, requirements specified by potential disposal facilities, as well as evaluated for potential treatment. Additional testing including geotechnical analyses could be performed to evaluate potential on site reuse of soil meeting the site-specific cleanup levels.

The evaluation of the applicability of treatment, off-site disposal, or on site reuse will be based on fill and soil type and characteristics and the results of sampling and analysis. The following will be considered when evaluating treatment and off-site disposal of excavated fill and soil:

- Thermal desorption is potentially applicable for cPAH and petroleum hydrocarbon contaminated soil with relatively low levels of metals and minimal to no debris. This is a preferred remediation method as contaminants are permanently destroyed in the process of treatment. Thermal desorption can either be conducted on Site or performed at an off-site treatment facility.

- Subtitle D landfill disposal is potentially applicable for contaminated fill and soil that does not designate as hazardous or Dangerous Waste (Chapter 173-303 WAC) based on the results of analysis and testing or designation based on material type (i.e., creosote-treated wood). Disposal at a specific Subtitle D landfill is subject to the landfill's approval.

- Subtitle C landfill disposal is potentially applicable for contaminated fill and soil that designates as hazardous or Dangerous Waste. Fill and soil that designates as hazardous or Dangerous Waste is required to be managed in accordance with the Dangerous Waste regulations (Chapter 173-303 WAC). Disposal at a Subtitle C landfill is subject to the landfill's approval. Fill or soil designating as hazardous or Dangerous Waste based on the presence of leachable metals may require treatment by stabilization prior to disposal. Stabilization can be performed by the landfill prior to disposal or could be performed on Site prior to disposal.

- On site reuse is potentially applicable for soil that contains contaminant concentrations less than the site-specific cleanup standards and that is not a source of or contributing to groundwater concentrations greater than the cleanup standards. Additionally, soil reused on Site will need to meet other redevelopment considerations (i.e., geotechnical requirements). In general, soil reused on Site should contain minimal debris and be free of organic materials (i.e., wood) and large debris (i.e., concrete).

6.3. Isolation Beneath Soil or Pavement Caps

Soil or pavement caps will be required in redevelopment areas where soil remains with contaminant concentrations greater than site-specific cleanup standards. Asphalt and concrete pavement is anticipated to be utilized to isolate contaminated soil in public access areas including esplanade areas, sidewalks, and vehicle driveways and parking. Soil is anticipated to be utilized to isolate contaminated soil in areas where vegetation (i.e., grass, bushes, etc.) will be installed including open space and landscape areas (Figures 8 and 9).

Asphalt and concrete pavement installed to cap contaminated soil will be constructed for the intended purpose (i.e., esplanade, vehicle driveway and parking, etc.) in accordance with local and state requirements. Additionally, concrete structures including building foundations or concrete slabs can also provide isolation and containment of residual contaminated soil.

Soil caps are required to be comprised of 3 feet of imported or Site soil meeting the site-specific cleanup standards. Analytical testing will be required to confirm that imported or Site soil used for Site caps meet the site-specific standards. The sampling and analysis of soil used for Site caps will be described in a Compliance Monitoring Plan included in the EDR prepared in accordance with MTCA requirements (WAC 173-340-410). The testing will include analysis for Site contaminants to ensure compliance with the site-specific cleanup standards as well as other physical testing as necessary to support the proposed use.

Locations or areas of transition between the cap types (i.e., pavement types or soil to pavement) will be constructed to meet the requirements of the CD and CAP as well as local and state requirements for the intended use. Areas of transition between cap types will be constructed to ensure isolation and containment of residual contaminated soil.

All contaminated soil that is excavated to install Site caps will be required to be remediated as described in Section 5.4.2. Excavation of soil for installation of Site caps is anticipated to include removal of soil to allow placement of base course materials (i.e., gravel) prior to paving and Site grading to support stormwater conveyance as well as transition between Site structures and Site surface features and between Site surface features and surface features on adjacent Sites.

6.4. Over-Excavation or Lining of Excavation Areas

Utility trenches and corridors excavated as part of Site redevelopment are required to be constructed to meet state and local standards for the utilities to be installed. Additionally, as specified in Section 5.4.3, utility trenches and corridors or other areas with contaminant concentrations greater than the cleanup standards where repeated excavation is anticipated to occur in the future, over-excavation and backfilling with clean soil or lining the excavation with geotextile fabric before backfilling with clean soil is required to limit future exposure to contaminated soil by utility or other

workers. Fill and soil with contaminant concentrations greater than site-specific cleanup standards that are excavated to install utilities are required to be treated or disposed as described in Section 5.3.1.

6.5. Institutional Controls

Institutional controls will be required as contamination will remain following remedial actions and redevelopment of the Site. The institutional controls are required to be implemented to control future land use and excavations, provide for long-term maintenance of caps (i.e., soil and pavement caps), prohibit use of groundwater for potable water, and to provide compliance monitoring. Institutional controls will be implemented in accordance with MTCA requirements (WAC 173-340-440).

6.6. Compliance Monitoring

Compliance monitoring consists of protection monitoring, performance monitoring and confirmational monitoring. Protection monitoring is conducted to confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of a cleanup action. Performance monitoring is conducted to confirm that the remedial action has attained cleanup standards. Confirmational monitoring (soil, groundwater, and/or sediment) is conducted to confirm the long-term effectiveness of the remedial action once cleanup standards or other performance standards have been attained. Compliance monitoring will be performed according to the MTCA criteria specified in WAC 173-340-410 and -360(8) and the requirements of the CD and CAP.

Protection monitoring will be performed during construction to ensure that site workers are appropriately trained in health and safety and that appropriate health and safety plans and procedures are implemented during remedial actions. Additionally, appropriate erosion and sedimentation controls and site drainage control measures will be implemented to ensure that no discharge occurs to the Thea Foss Waterway during remedial activities.

Performance monitoring will be performed to ensure construction quality control measurements and monitoring are performed in accordance with the EDR and plans and specifications as well as all sampling and analysis necessary to evaluate compliance with cleanup standards and to evaluate treatment, disposal, and reuse. Additionally, performance monitoring will be performed to monitor and ensure compliance with environmental requirements related to permits and substantive requirements for remedial actions and redevelopment.

Confirmational monitoring will include groundwater sampling and analysis to verify compliance with site-specific groundwater cleanup standards. The groundwater monitoring will be performed after completion of remedial actions to verify that remedial actions performed at the Site results in contaminant concentrations in groundwater being less than the cleanup standards.

The protection, performance, and confirmational monitoring to be performed during and after remedial actions and redevelopment at the Site will be described in a Compliance Monitoring Plan prepared in accordance with MTCA requirements (WAC 173-340-410) and submitted as part of the EDR.

7.0 CLEANUP ACTION EVALUATION CRITERIA

This section presents a description of the threshold requirements for cleanup actions and the additional criteria used to evaluate cleanup actions under MTCA. This section also describes how the remedial actions to be performed at the Site meet the evaluation criteria.

7.1. Threshold Requirements

Remedial actions performed under MTCA must comply with basic threshold requirements. Remedial actions that do not comply with the threshold requirements are not considered suitable remedial actions under MTCA. As identified in CAP and MTCA [WAC 173-340-360(2)(a)], the four threshold requirements for remedial actions are that they must:

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

Each of the threshold requirements are discussed in the following sections.

7.1.1. Protection of Human Health and the Environment

The results of remedial actions performed under MTCA must ensure that both human health and the environment are protected.

The cleanup action specified in this SCAP protects human health and the environment by eliminating direct contact with contaminants in soil present at the Site. Contaminated soil at the Site will be isolated below pavement and soil caps as well as buildings. Additionally, contaminated soil that is excavated will be treated or disposed at an appropriate off-site disposal facility reducing the volume of contaminated material present at the Site.

Nickel has been detected in groundwater at a concentration greater than the site-specific cleanup level at monitoring location HB-MW02 (Figure 5). Fill and soil with the highest concentrations of nickel was observed in three test pits (i.e., HB-TP05, HB-TP06 and HB-TP07) nearest to monitoring well HB-MW02 indicating that soil in this area is the likely source of nickel in groundwater. The remedial actions performed at the Site will remove the fill and soil that is the likely source of nickel in groundwater. Confirmational monitoring of groundwater will verify that the remedial actions at the Site are protective of groundwater and surface water in the Thea Foss Waterway.

7.1.2. Compliance with Cleanup Standards

Compliance with cleanup standards requires that cleanup standards are met at the applicable points of compliance.

Where a remedial action involves containment of soil with contaminant concentrations exceeding cleanup standards, the remedial action may be determined to comply with cleanup standards, provided the requirements specified in WAC 173-340-740(6)(f) are met. The selected cleanup action will comply with the cleanup standards specified in the CAP and WAC 173-340-740(6)(f) as the

cleanup action is protective of human health and the environment, includes implementation of institutional controls that limit activities that could interfere with the long-term integrity of the caps, and includes compliance monitoring to ensure the long-term integrity of the caps.

7.1.3. Compliance with Applicable State and Federal Laws

Remedial actions conducted under MTCA must comply with state and federal laws that are applicable or relevant and appropriate requirements (ARARs). Applicable state and federal laws include legally applicable requirements and those requirements that Ecology determines to be relevant and appropriate (WAC 173-340-710). The ARARs that have been identified to be applicable or potentially applicable to the remedial actions to be performed as part of the cleanup action and redevelopment of Development Sites 8 and 9 are presented in Table 2.

As the remedial actions at Development Sites 8 and 9 are being conducted under a CD with Ecology, the remedial actions meet the procedural exemption provisions of MTCA (WAC 173-340-710[9]) and therefore, are not required to follow the procedural requirements of most State and local laws that would otherwise apply to the action. The remedial action will, however, comply with the substantive requirements of the applicable State and local laws. The exemption is not applicable if Ecology determines that the exemption would result in the loss of approval from a federal agency that may be necessary for the state to administer any federal law. The laws that are subject to the procedural requirements exemption include the following:

- Washington Shoreline Management Act - The Washington Shoreline Management Act (RCW 90.58) and its implementing regulations establish requirements for substantial developments occurring within water areas of the state or within 200 feet of the shoreline. The Site remedial actions will comply with substantive requirements set forth by the City, but a shoreline permit will not be required for the remedial action components of the Site redevelopment.
- Washington Hydraulic Code - The Washington Hydraulic Code (WAC 220-110) establishes regulations for the construction of any hydraulic project or the performance of any work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh water of the State. The code requires that a Hydraulic Project Approval (HPA) permit (administered by the Washington Department of Fish and Wildlife) be obtained for any activity that could adversely affect fisheries and water resources. Although an HPA permit will not be required for planned remedial actions, substantive timing restrictions and technical requirements under the code are potentially applicable to any remedial actions and shoreline restoration activities performed below MHHW.

7.1.4. Provision for Compliance Monitoring

The remedial action must include compliance monitoring in accordance with WAC 173-340-410. As stated above, a Compliance Monitoring Plan will be prepared and submitted as part of the EDR. The Compliance Monitoring Plan will identify the monitoring requirements for each of the elements of the remedial actions.

7.2. Additional Evaluation Criteria

The CAP identifies additional criteria that are to be evaluated for remedial actions performed on Development Sites 8 and 9. The additional evaluation criteria include the following:

- Short-term effectiveness;
- Long-term effectiveness;
- Permanent reduction of toxicity, mobility, or volume;
- Implementability and technical feasibility; and
- Cost.

Each of the additional evaluation criteria are discussed in the following sections.

7.2.1. Short-Term Effectiveness

The short-term effectiveness considers how the cleanup action impacts human health and the environment during the construction phase and prior to the attainment of cleanup standards.

Human health risks associated with remedial action construction include worker and community exposure to contaminants in Site media (i.e., soil and groundwater) during excavation and other remedial actions as well as physical injury from construction activities. Exposure to contaminated Site media during construction will be addressed through development and implementation of site-specific health and safety plans as part of the remedial action construction plans. Health and safety plans will identify the risks associated with the remedial actions to be performed at the Site and the procedures to address the identified risks.

Risks to the environment associated with remedial action construction include the potential for contaminant discharges to the Thea Foss Waterway. The potential for releases to the Thea Foss Waterway will be addressed through development and implementation of temporary erosion and sediment controls (TESC) and a Construction Stormwater Pollution Prevention Plan (SWPPP) that identifies best management practices (BMPs) to prevent off-site transport of Site media. The TESC and SWPPP will be prepared as part of development of the EDR and project plans and specifications.

7.2.2. Long-Term Effectiveness

The long-term effectiveness of the cleanup action is evaluated in terms of the magnitude of residual risk and the adequacy and reliability of the cleanup action.

The residual risk at the Site will be substantially reduced by removal and treatment and/or disposal at an appropriate disposal facility of contaminated fill and soil. Additionally, the long-term risk of exposure to contaminants in fill and soil will be substantially reduced by isolating the contaminated fill and soil at the Site beneath pavement and soil caps. The risk to future workers will also be reduced by constructing utility trenches and corridors with clean backfill.

Compliance monitoring and implementation of institutional controls will ensure the long-term reliability and adequacy of the cleanup action. As stated above, compliance monitoring will include periodic review of the remedial actions to evaluate the integrity of the cap surfaces to ensure isolation of the fill and soil remaining on Site with contaminant concentrations greater than the cleanup standards. Groundwater monitoring will also be performed to ensure that groundwater at the Site is protective of surface water in the Thea Foss Waterway. Institutional controls including

deed restrictions will limit activities that would affect the remedial actions (i.e., excavation of the capped areas) and prohibit groundwater extraction and for use as potable water.

7.2.3. Permanent Reduction of Toxicity, Mobility, or Volume

This evaluation criterion addresses the preference for treatment technologies that permanently and significantly reduce toxicity, mobility, and volume of the hazardous substances present at the Site.

All contaminated, excavated fill and soil will require treatment or off-site disposal. Treatment will be utilized, if appropriate based on the contaminant types and material characteristics, to reduce the toxicity, mobility, and volume of contaminated Site fill and soil. Off-site disposal at an appropriate disposal facility will reduce the overall volume of contamination present at the Site and the potential mobility of contaminants in fill and soil.

7.2.4. Implementability and Technical Feasibility

Implementability and technical feasibility includes consideration of whether the remedial actions are technically possible considering, but not limited to, the following:

- Administrative and regulatory requirements;
- Availability of required materials, facilities, or services;
- Access for construction and monitoring; and
- Integration with existing facility operations and other remedial actions.

The remedial actions to be performed at the Site have been implemented and used reliably elsewhere including at other upland properties adjacent to the Thea Foss Waterway to remediate contaminated soil with similar characteristics and therefore, are proven to be technically feasible and implementable. The administrative and regulatory requirements are manageable and there are readily available materials, facilities, and service providers to complete the remedial actions. The remedial actions that were selected in the CAP that are to be implemented at Development Sites 8 and 9 are designed to be integrated with the land use and redevelopment at the Site.

7.2.5. State and Community Acceptance

Acceptance of the cleanup action will be evaluated based on review of the Draft SCAP. The draft SCAP will be submitted for public comment. Based on the information gathered from the public, Ecology arrive at the final cleanup action for Development Sites 8 and 9. The final cleanup action will be documented in the final SCAP prepared by Ecology.

7.2.6. Cost

The estimated cost to implement the remedial actions at Development Sites 8 and 9 based on the conceptual redevelopment plan presented in Section 5.2 and as shown on Figures 8 and 9 is presented in Table 3. Table 3 includes the assumptions used to develop the remedial action cost estimate. The actual remedial action costs will be determined based on the actual redevelopment that is constructed and design prepared by a developer of the Site.

8.0 IMPLEMENTATION OF THE CLEANUP ACTION

Implementation of the cleanup action will require development of remedial design documents and plans and preparation of permit applications and agency approval, where applicable, prior to remedial action construction. Remedial design documents, plans, and permits and agency approval will be developed based on the actual development plans put forth by the future developer of the Site following approval of this SCAP.

An EDR will be prepared that includes the information required under MTCA [WAC 173-340-400(4)(a)] and shall include sufficient information for the development and review of construction plans and specifications. The following information shall be included in the EDR, as appropriate:

- Goals of the cleanup action including specific cleanup or performance requirements;
- General information on the Site including a summary of information as necessary to reflect the current conditions;
- Identification of who will own, operate, and maintain the cleanup action during and following construction;
- Site maps showing existing site conditions and proposed location of the cleanup actions;
- Characteristics, quantity, and location of materials to be treated or otherwise managed;
- A schedule for final design and construction;
- A description and conceptual plan of the actions and processes required to implement the cleanup action;
- Engineering justification for design and operation of the cleanup actions including design criteria for all components of the cleanup action, expected treatment and containment efficiencies, and demonstration that the cleanup action will achieve compliance with cleanup requirements;
- Design features for control of hazardous materials, spills, and accidental discharges;
- Design features to assure long-term safety of workers and local residences;
- Methods for management or disposal of any treatment residual and other waste materials containing hazardous substances generated as a result of the cleanup action;
- Site specific characteristics that may affect design, construction, or operation of the cleanup action;
- A general description of construction testing that will be used to demonstrate adequate quality control;
- A general description of compliance monitoring that will be performed during and after construction to meet the requirements of MTCA (WAC 173-340-410);
- A general description of construction procedures proposed to assure that the safety and health requirements of MTCA (WAC 173-340-810) are met;
- Information needed to fulfill the applicable requirements of the State Environmental Policy Act (SEPA) (Chapter 43.21C RCW);

- Any additional information needed to address the applicable state, federal and local requirements including the substantive requirements for any exempted permits; and
- Any Site access issues which need to be resolved to implement the cleanup action.

Construction plans and specifications will be prepared that detail the cleanup actions to be performed and will be prepared in conformance with currently accepted engineering practices and techniques. The construction plans and specifications will include the following information, as applicable:

- A general description of the work to be performed and a summary of the engineering design criteria from the EDR;
- Location map and existing Site conditions map;
- A copy of any permits and approvals;
- Detailed plans, procedures, and material specifications necessary for construction of the cleanup action;
- Specific quality control tests to be performed to document the construction, frequency of testing, acceptable results, and other documentation methods;
- Additional information to address applicable state, federal, and local requirements including the substantive requirements for any exempted permits;
- A compliance monitoring plan prepared under MTCA (WAC 173-340-410) describing monitoring to be performed during construction as well as a sampling and analysis plan meeting MTCA requirements (WAC 173-340-820);
- Provisions to assure safety and health requirements of MTCA (WAC 173-340-810) are met.

Permits and approvals and any substantive requirements for exempted permits, if required for construction or to otherwise implement the cleanup action, shall be identified and where possible, resolved before, or during, the design phase to avoid delays during construction and implementation of the cleanup action.

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

8.1. Anticipated Schedule for Design and Implementation

The schedule for development of an EDR, plans, and specifications and implementation of the cleanup action is not known at this time. The schedule for the cleanup action will be based on redevelopment of the Site.

9.0 LIMITATIONS

We have prepared this report for the exclusive use of the Foss Waterway Development Authority for Site Specific Cleanup Action Plan for Development Sites 8 and 9 in Tacoma, Washington. Foss Waterway Development Authority may distribute copies of this report to regulatory agencies as may be required for the Project.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. The conclusions and opinions presented in this report are based on our professional knowledge, judgment and experience. No warranty, express or implied, applies to this report.

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

10.0 REFERENCES

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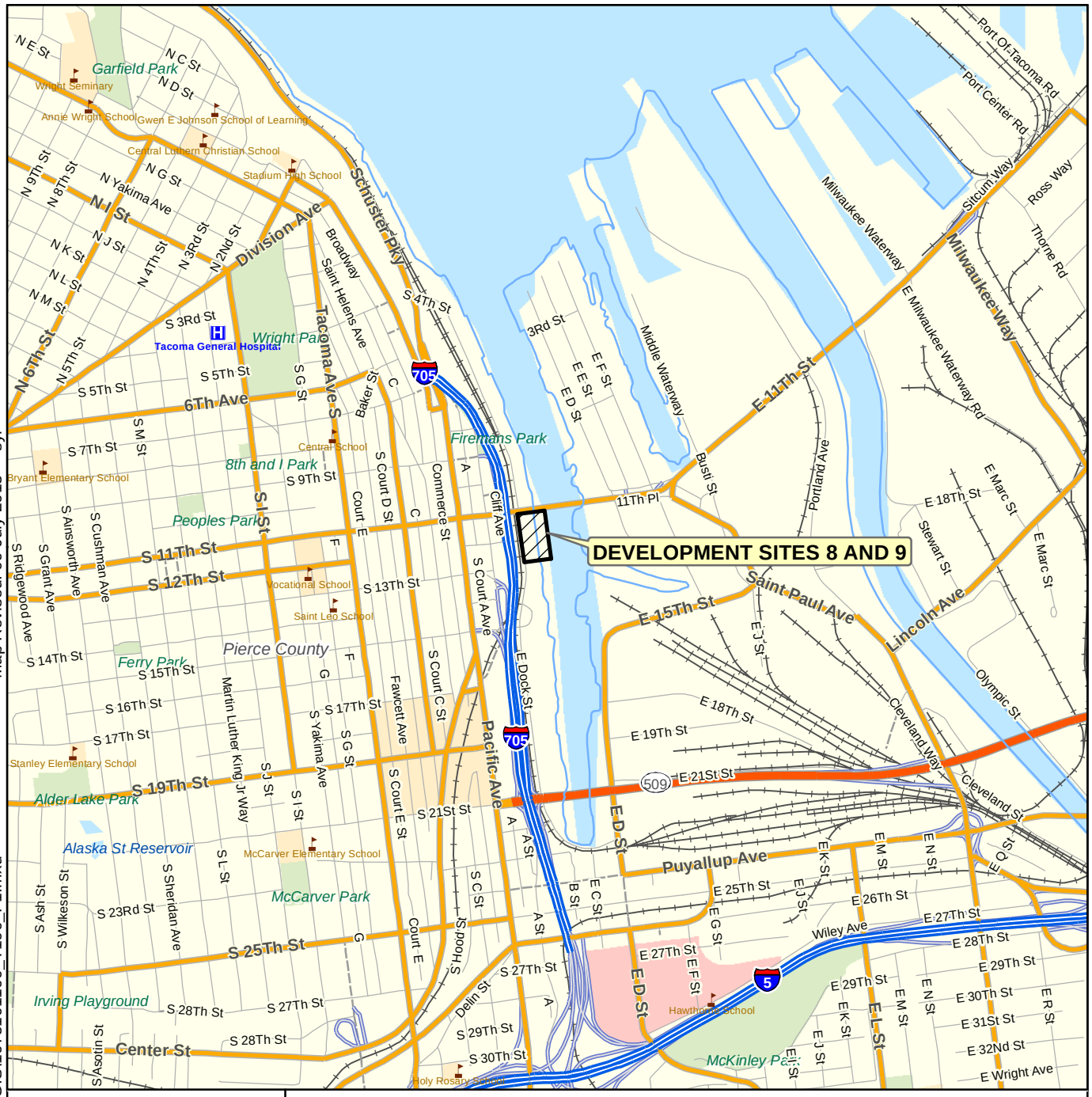

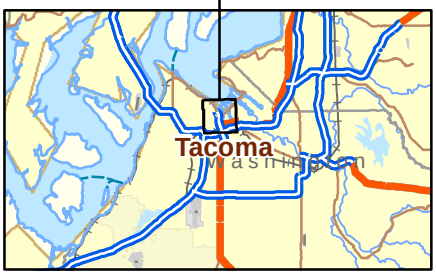

N
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S

2,000 0 2,000
Feet

Notes:
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Data Sources: ESRI Data & Maps, Street Maps 2005

Transverse Mercator, State Plane South, North American Datum 1983
North arrow oriented to grid north

Vicinity Map

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 1

Office: TACO Path: W:\Tacoma\Projects\10\107510111\GIS\1075101100_T100_F1.mxd Map Revised: 09 July 2013 syi

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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

LEGEND

PARCEL BOUNDARY LINE

ROW ROW RIGHT OF WAY LINE

APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.

N E S W

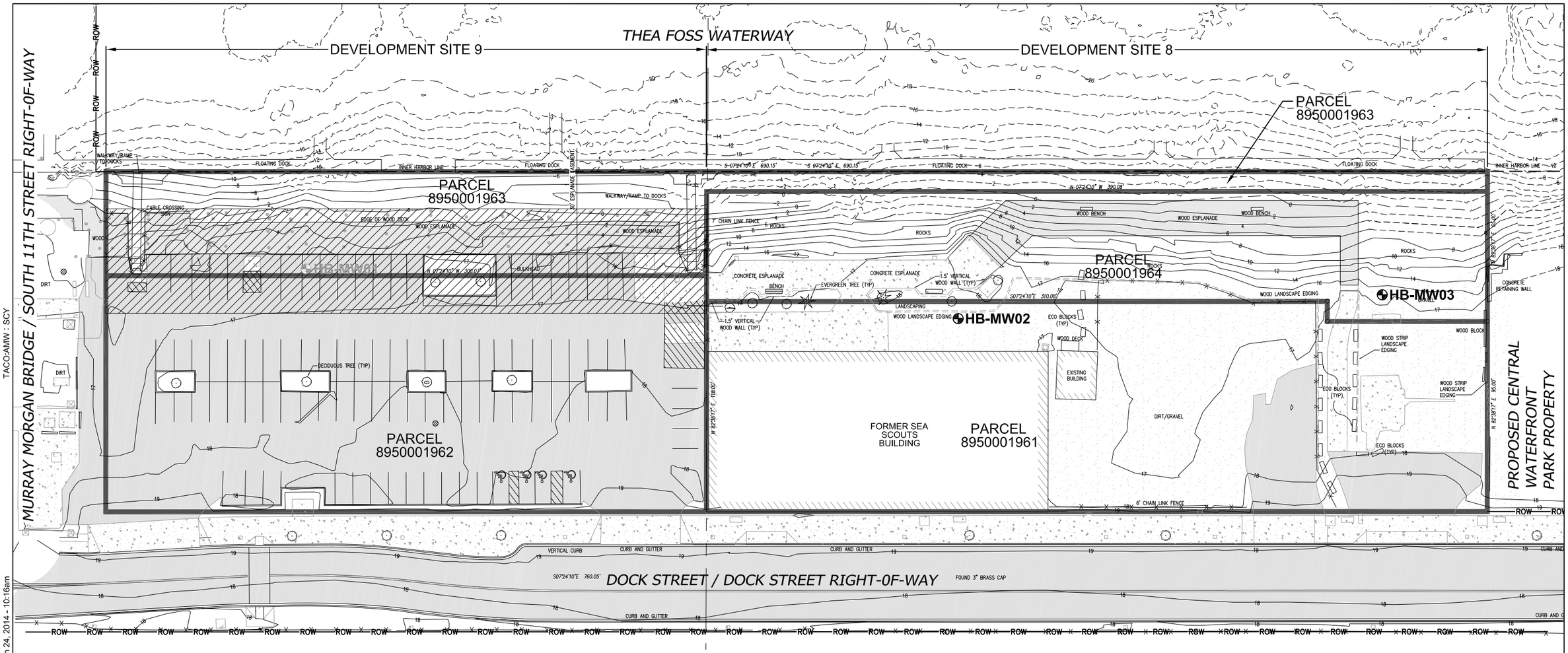
60 0 60
Feet

Site Aerial

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 2



TACO-AMW : SCY

LEGEND

- PARCEL BOUNDARY LINE
- RIGHT OF WAY LINE (ROW — ROW)
- INNER HARBOR LINE
- CHAIN LINK FENCE
- MINOR CONTOUR (MLLW) (13)
- MAJOR CONTOUR (MLLW) (10)
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.
- HB-MW02 — MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE

N E S W

50 0 50
Feet

Notes:
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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

Site Plan

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 3

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THEA FOSS WATERWAY

DEVELOPMENT SITE 9

DEVELOPMENT SITE 8

COMM PAINT MARK, AS MARKED BY APS LOCATES NOVEMBER 15, 2011, AND FIELD LOCATED BY SITTS & HILL ENGINEERS ON NOVEMBER 21, 2011. SITTS & HILL ENGINEERS WAS MADE AWARE THAT APS LOCATES WAS UNABLE TO GET ADEQUATE SIGNALS ON THE U/G COMM LINE DUE TO IT BEING ENCASED IN A STEEL CONDUIT. SITTS & HILL MAKES NO GUARANTEES TO THE ACCURACY OF THE PAINT MARK IN RELATION TO THE ACTUAL U/G UTILITY.

S 82°38'17" W 1882.18'

MURRAY MORGAN BRIDGE / SOUTH 11TH STREET RIGHT-OF-WAY

PARCEL 8950001963

PARCEL 8950001962

WALKWAY/RAMP TO DOCKS

FLOATING DOCK

INNER HARBOR LINE

30' ESPLANADE EASEMENT

S 07°24'10" E 690.15'

CABLE CROSSING SIGN

BRIDGE COLUMN

WOOD

DIRT

EDGE OF WOOD DECK

WOOD ESPLANADE

ARC LIGHTS (TYP)

COLUMN (TYP)

N 07°24'10" W 308.07'

BULKHEAD

7' CHAIN LINK FENCE

6 ROCKS

CONCRETE ESPLANADE

BENCH

EVERGREEN TREE (T

1.5' VERTICAL WOOD WALL (TYP)

FENCE/GATE POST (TYP)

MATCHLINE (SEE FIGURE 4B)

COMMUNICATION MANHOLE (TYP)

DECIDUOUS TREE (TYP)

BOLLARD (TYP)

POWER METER (TYP)

UTILITY CONDUIT PAD

EXTRUDED CURB IN PARKING LOT (TYP/2AL)

HANDICAP PARKING (TYP)

SOUTH 12TH STREET VIEW CORRIDOR

POWER VAULT (TYP)

COMMUNICATION VAULTS (TYP)

POWER TRANSFORMER (TYP)

CATCH BASIN (TYP)

SIGN (TYP)

WATER VAULT (TYP)

SURVEY CONTROL POINT (TYP)

BRIDGE FOOTING(TYPICAL)

FOUND MONUMENT (TYP)

GATE VALVE (TYP)

COMMUNICATION VAULT

VERTICAL CURB

CURB AND GUTTER

FOUND 3" BRASS CAP

STORM DRAIN MANHOLE (TYP)

UTILITY POLE (TYP)

TELEPHONE / TV RISER (TYP)

GUY ANCHOR (TYP)

JUNCTION BOX (TYP)

DOCK STREET / DOCK STREET RIGHT-OF-WAY

S 07°24'10" E 760.05'

Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- ROW — ROW — RIGHT OF WAY LINE
- INNER HARBOR LINE
- SD — SD — BURIED STORM DRAIN LINE
- SS — SS — BURIED SANITARY SEWER LINE
- BP — BURIED POWER LINE
- OHP — OVERHEAD POWER LINE
- W — W — BURIED WATER LINE
- TEL — BURIED COMMUNICATION LINE
- GAS — GAS — BURIED GAS LINE
- MU — MU — UNKNOWN UTILITY CONDUIT
- X X X X — CHAIN LINK FENCE
- 13 — MINOR CONTOUR (MLLW)
- 10 — MAJOR CONTOUR (MLLW)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.
- **HB-MW02** — MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

40 0 40
Feet

Site Conditions - Development Site 9

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 4A

TACO:AMW : SCY

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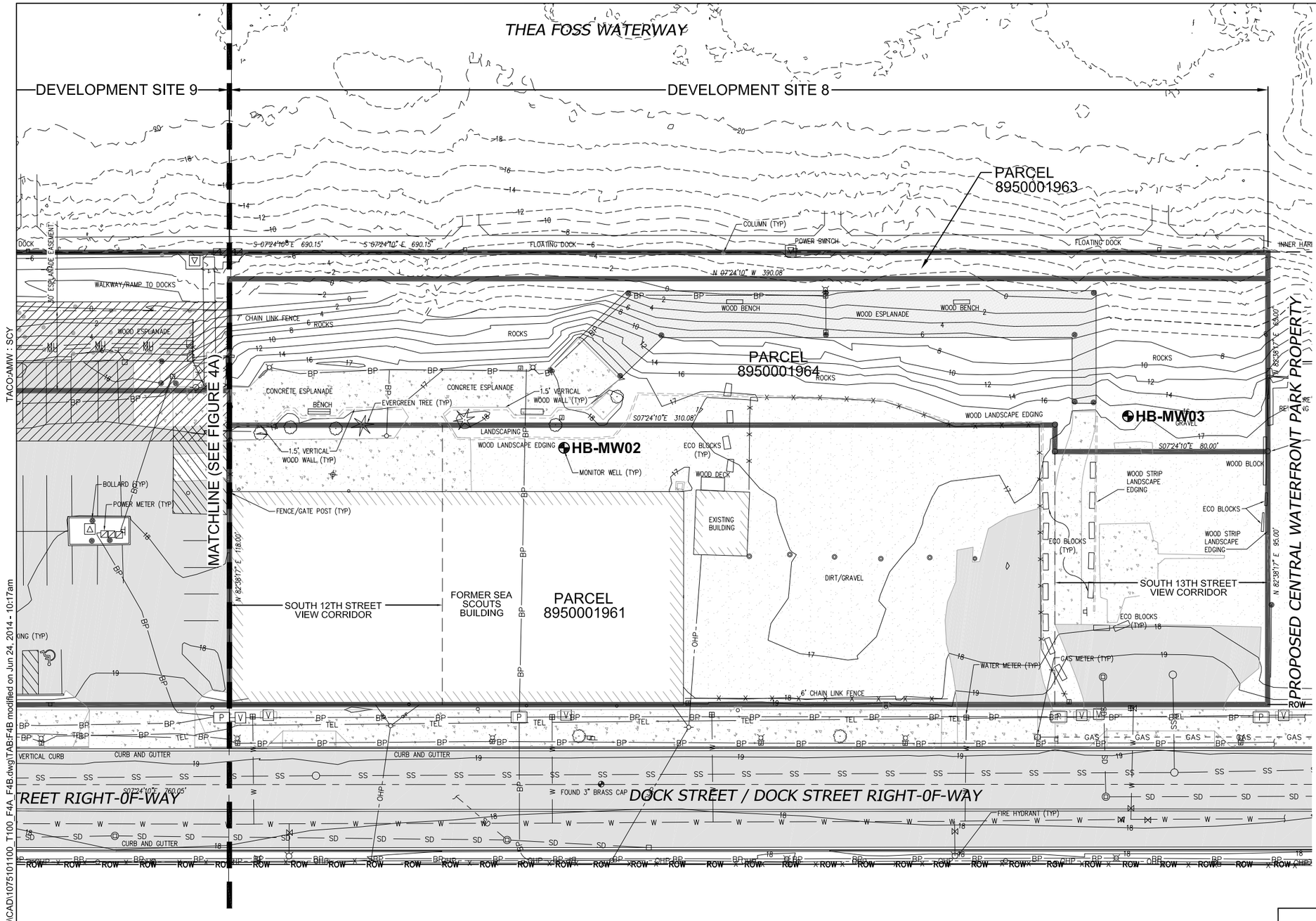

Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- RIGHT OF WAY LINE
- INNER HARBOR LINE
- BURIED STORM DRAIN LINE
- BURIED SANITARY SEWER LINE
- BURIED POWER LINE
- OVERHEAD POWER LINE
- BURIED WATER LINE
- BURIED COMMUNICATION LINE
- BURIED GAS LINE
- UNKNOWN UTILITY CONDUIT
- CHAIN LINK FENCE
- MINOR CONTOUR (MLLW)
- MAJOR CONTOUR (MLLW)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE

APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.

HB-MW02 MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

40 0 40
Feet

Site Conditions - Development Site 8

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 4B

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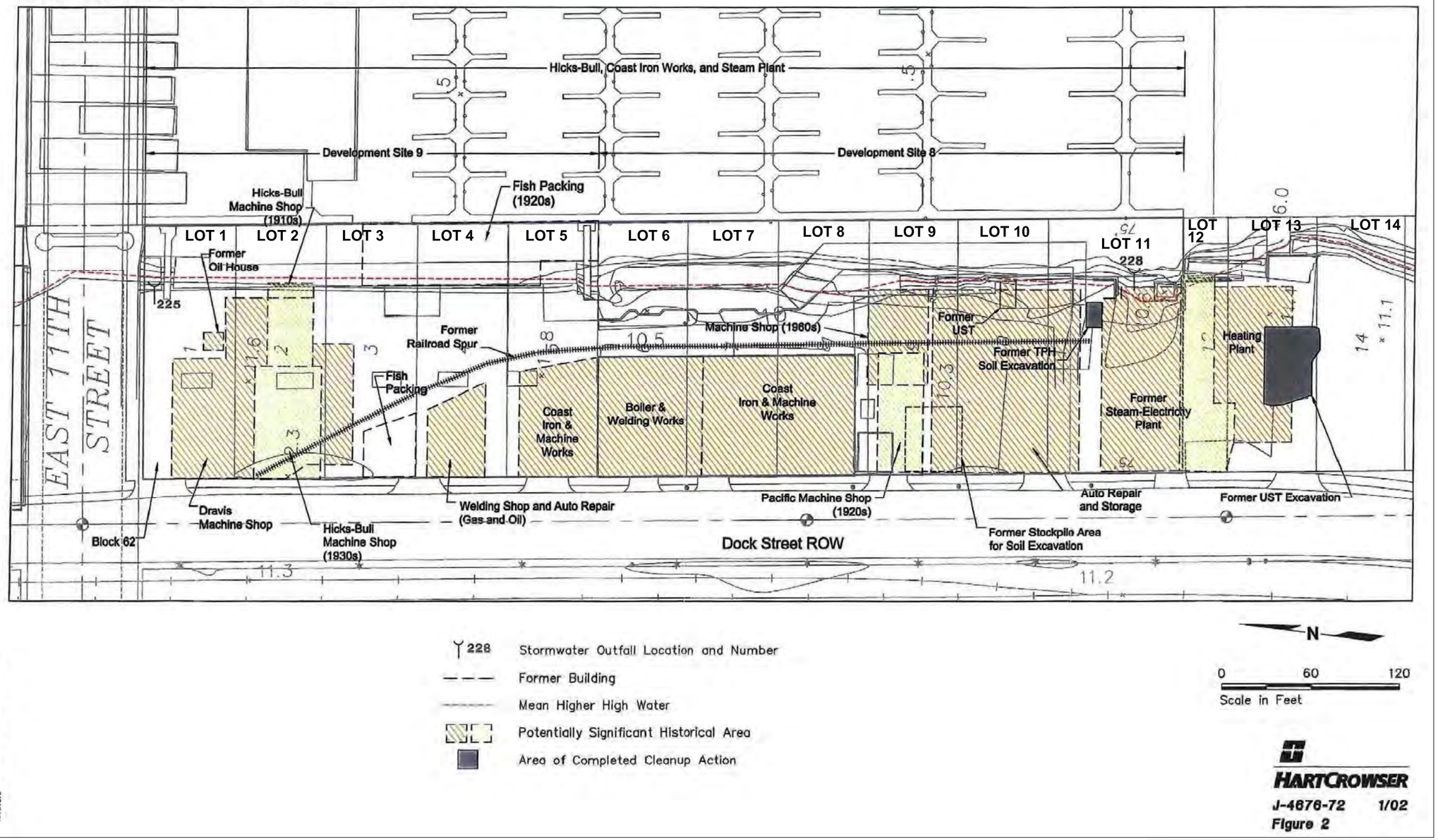
TACO-AMW : SCY

Significant Historical Features Map

Hicks-Bull, Coast Iron Works, and Steam Plant



NOT TO SCALE

LEGEND

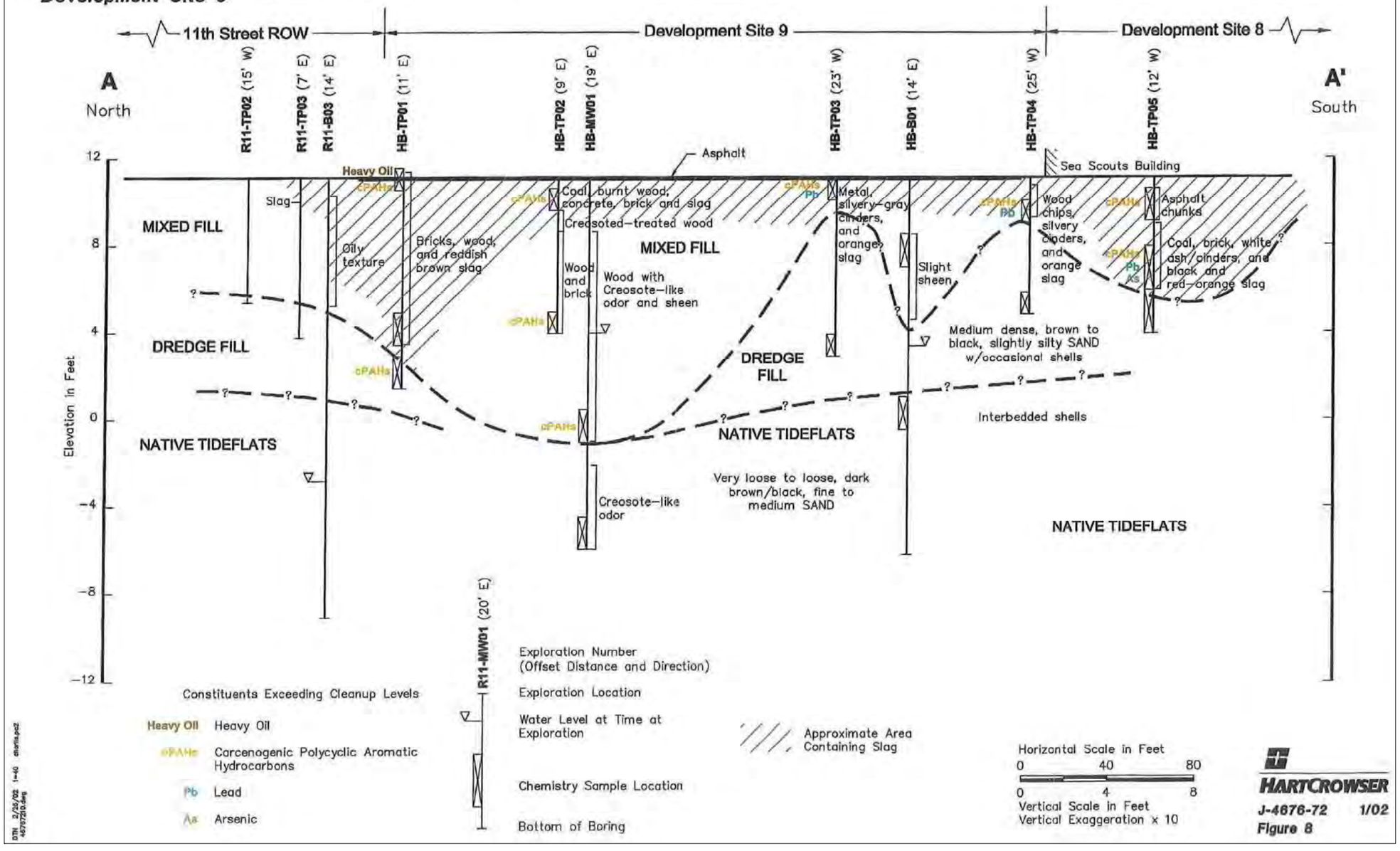
LOT 1 FORMER CITY OF TACOMA LEASE LOTS

Historical Land Use	
Development Sites 8 and 9 Tacoma, Washington	
GeoEngineers	Figure 5

Reference: Figure 2 from the draft Hicks-Bull, Coast Iron Works, and Steam Plant Properties Site-Spefic Remedial Investigation Report, dated February 26, 2002.

Generalized Subsurface Cross Section

Development Site 9



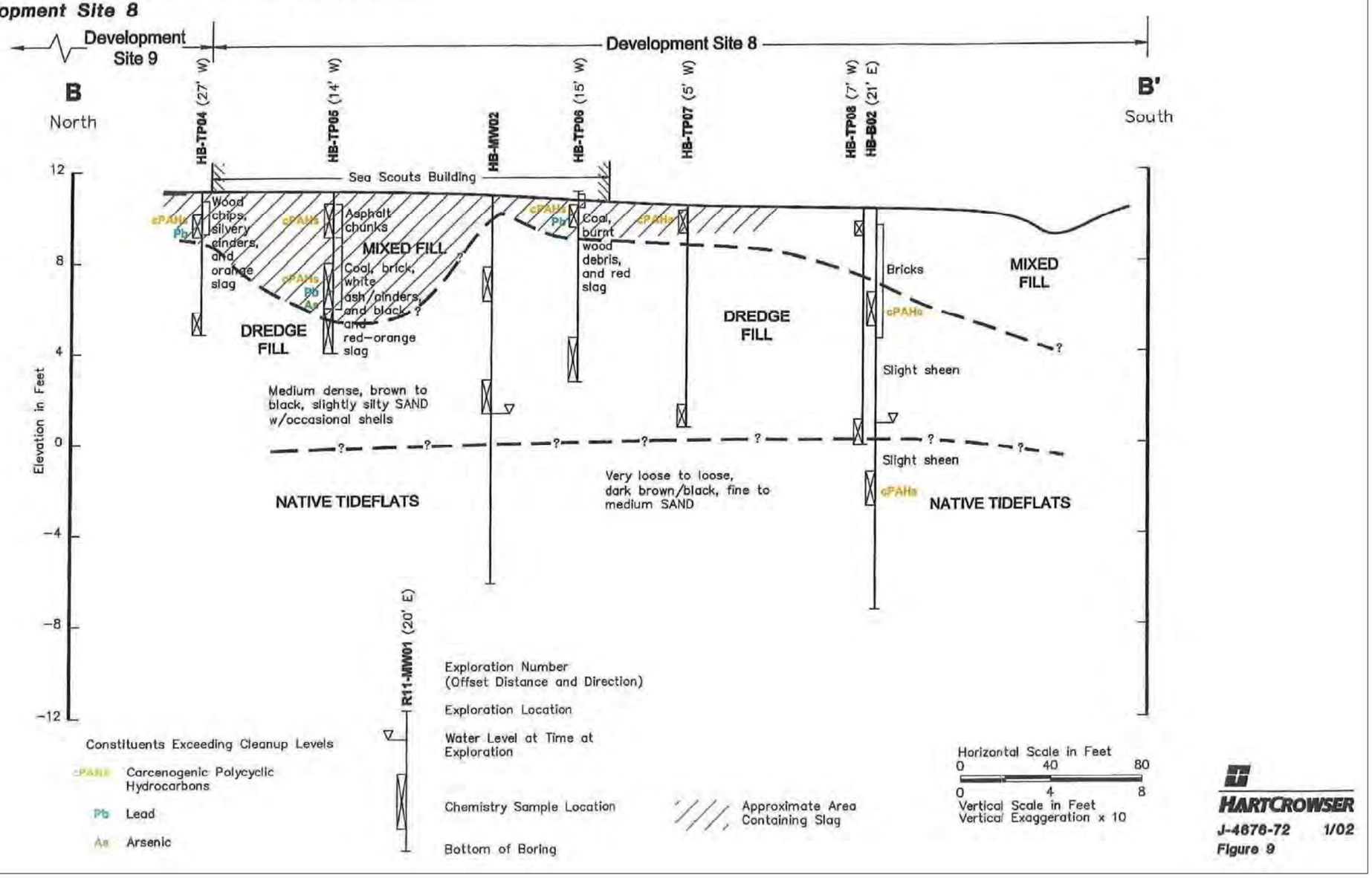
NOT TO SCALE

Cross Section - Development Site 9	
Development Sites 8 and 9 Tacoma, Washington	
GeoEngineers	Figure 6A

Reference: Figure 8 from the draft Hicks-Bull, Coast Iron Works, and Steam Plant Properties Site-Spefic Remedial Investigation Report, dated February 26, 2002.

Generalized Subsurface Cross Section

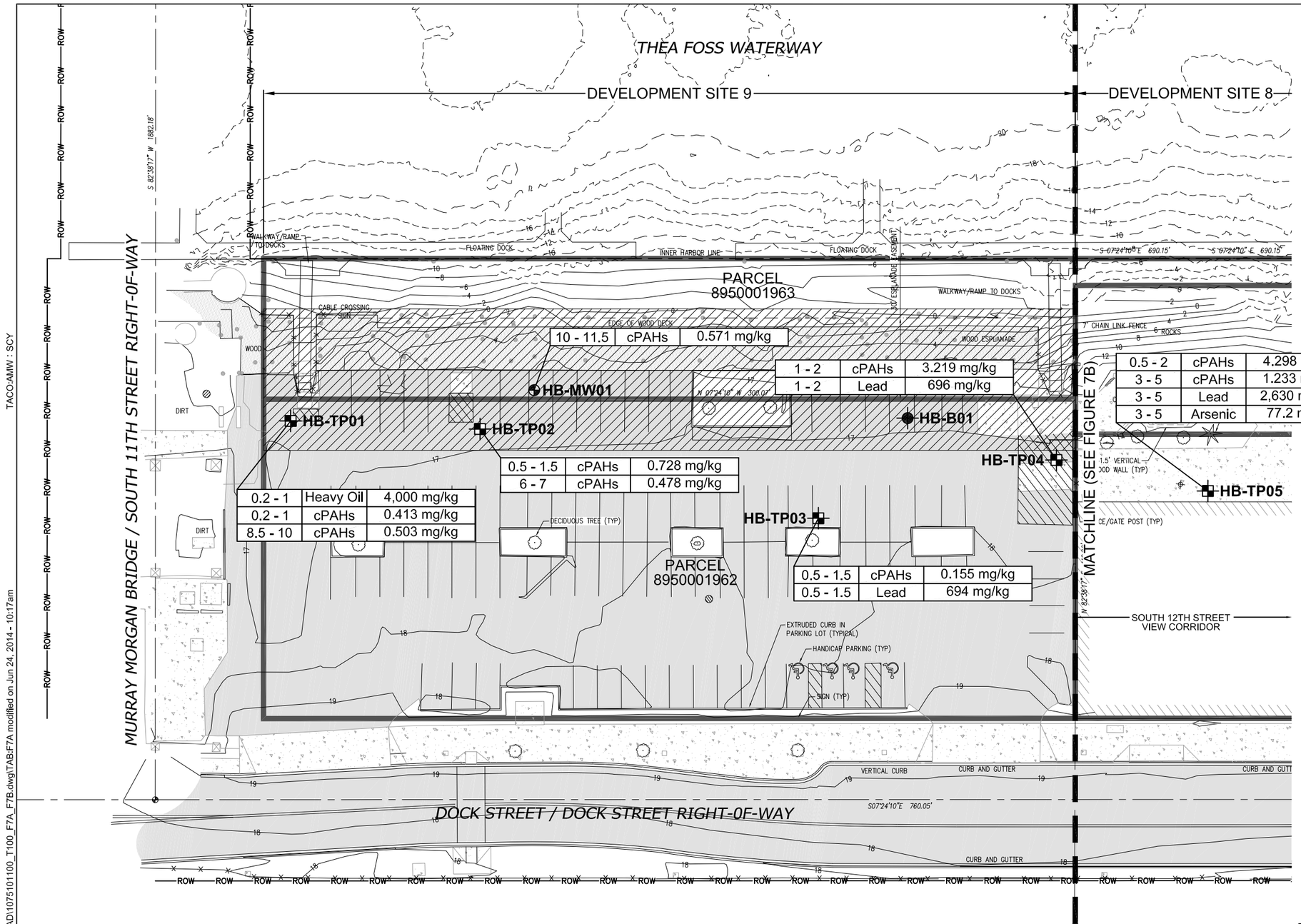
Development Site 8



NOT TO SCALE

Cross Section - Development Site 8	
Development Sites 8 and 9 Tacoma, Washington	
GeoEngineers	Figure 6B

Reference: Figure 9 from the draft Hicks-Bull, Coast Iron Works, and Steam Plant Properties Site-Spefic Remedial Investigation Report, dated February 26, 2002.



Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- RIGHT OF WAY LINE
- INNER HARBOR LINE
- CHAIN LINK FENCE
- MINOR CONTOUR (MLLW)
- MAJOR CONTOUR (MLLW)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.

HB-MW02 MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

HB-TP01 TEST PIT NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

HB-B01 BORING NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

DEPTH IN FEET | ANALYTE | CONCENTRATION IN mg/kg

0.5 - 2	cPAHs	4.298 mg/kg
3 - 5	cPAHs	1.233 mg/kg
3 - 5	Lead	2,630 mg/kg*
3 - 5	Arsenic	77.2 mg/kg

* INDICATES CONCENTRATION EXCEEDS CONSENT DECREE MAXIMUM SOIL CONCENTRATION

CALLOUT BOXES SHOW CHEMICALS OF CONCERN DETECTED AT CONCENTRATIONS GREATER THAN THE CONSENT DECREE CLEANUP LEVELS DURING THE REMEDIAL INVESTIGATION AND ASSOCIATED DEPTH BELOW EXISTING GROUND SURFACE (CITY OF TACOMA, 2002)

Notes:
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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

cPAHs	CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS
ULU	UNRESTRICTED LAND USE
MTCA	MODEL TOXICS CONTROL ACT
mg/kg	MILLIGRAMS PER KILOGRAM

N W E S

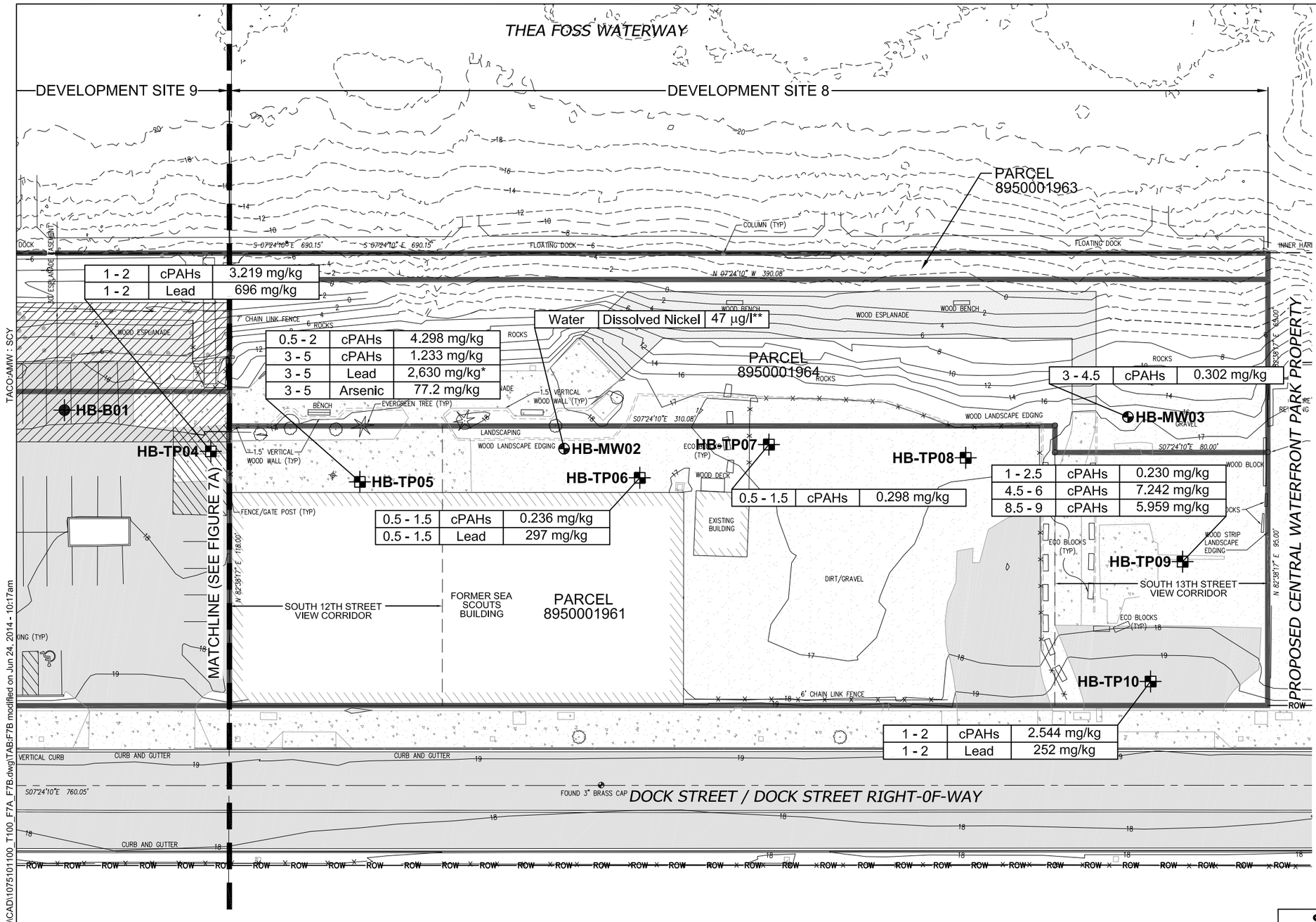
40 0 40
Feet

Summary of Exceedances in Soil and Groundwater - Development Site 9

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 7A



Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- RIGHT OF WAY LINE
- INNER HARBOR LINE
- CHAIN LINK FENCE
- MINOR CONTOUR (MLLW)
- MAJOR CONTOUR (MLLW)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.
- **HB-MW02** MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)
- **HB-TP01** TEST PIT NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)
- **HB-B01** BORING NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

DEPTH IN FEET	ANALYTE	CONCENTRATION IN mg/kg
0.5 - 2	cPAHs	4.298 mg/kg
3 - 5	cPAHs	1.233 mg/kg
3 - 5	Lead	2,630 mg/kg*
3 - 5	Arsenic	77.2 mg/kg

* INDICATES CONCENTRATION EXCEEDS CONSENT DECREE MAXIMUM SOIL CONCENTRATION

DEPTH IN FEET	ANALYTE	CONCENTRATION IN µg/l
Water	Dissolved Nickel	47 µg/l**

** INDICATES CONCENTRATION EXCEEDS PROTECTION OF MARINE SURFACE WATER - CHRONIC CRITERIA (CHAPTER 173-201A-240 WAC)

CALLOUT BOXES SHOW CHEMICALS OF CONCERN DETECTED AT CONCENTRATIONS GREATER THAN THE CONSENT DECREE CLEANUP LEVELS DURING THE REMEDIAL INVESTIGATION AND ASSOCIATED DEPTH BELOW EXISTING GROUND SURFACE (CITY OF TACOMA, 2002)

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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

cPAHs	CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS
ULU	UNRESTRICTED LAND USE
MTCA	MODEL TOXICS CONTROL ACT
mg/kg	MILLIGRAMS PER KILOGRAM
µg/l	MICROGRAMS PER LITER

N E S W

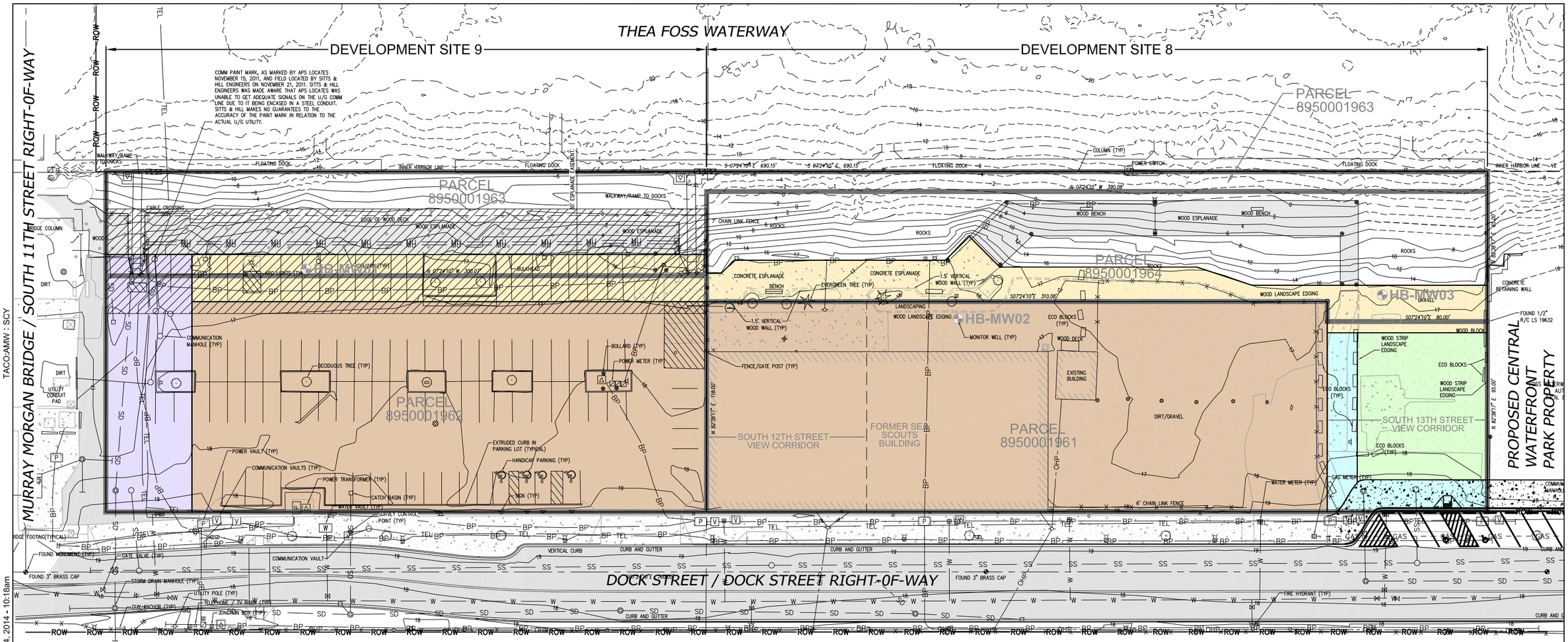
40 0 40
Feet

Summary of Exceedances in Soil and Groundwater - Development Site 8

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 7B



TACOMA:MW : SCY

Legend

- PARCEL BOUNDARY LINE
- MONUMENT LINE
- EASEMENT LINE
- RIGHT OF WAY LINE
- INNER HARBOR LINE
- BURIED STORM DRAIN LINE
- BURIED SANITARY SEWER LINE
- BURIED POWER LINE
- OVERHEAD POWER LINE
- BURIED WATER LINE
- BURIED COMMUNICATION LINE
- BURIED GAS LINE
- HB-MW02 — MONITORING WELL NUMBER AND APPROXIMATE LOCATION (CITY OF TACOMA, 2002)

- UNKNOWN UTILITY CONDUIT
- CHAIN LINK FENCE
- MINOR CONTOUR (MLLW)
- MAJOR CONTOUR (MLLW)
- BUILDING
- ASPHALT SURFACE
- CONCRETE SURFACE
- GRAVEL SURFACE
- WOOD ESPLANADE
- APPROXIMATE AREA WHERE AN EMERGENCY INTERIM ACTION WAS PERFORMED IN 2014. AREA STRUCTURES AND FEATURES WERE MODIFIED FROM WHAT IS SHOWN. SEE DOCUMENTATION IN APPENDIX D FOR MORE INFORMATION CONCERNING THE SCOPE OF INTERIM ACTION ACTIVITIES PERFORMED AT THE SITE.

- AREA WITH BUILDING WITH BELOW GRADE STRUCTURE AND RESIDENTIAL USE ON GROUND FLOOR OR AREA WITH BUILDING AT EXISTING SURFACE GRADE AND COMMERCIAL USE ON GROUND FLOOR
- AREA WITH UTILITY / ACCESS CORRIDOR
- ESPLANADE AREA
- PUBLIC PARK / OPEN SPACE / LANDSCAPE AREA
- PUBLIC ACCESS AREA

50 0 50
Feet

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Reference: Drawing provided by Sitts & Hill Engineers, Inc.

Conceptual Redevelopment
Site-Specific Cleanup Action Plan

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 8

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PROPERTY BOUNDARY

PROPERTY BOUNDARY

PUBLIC / VEHICLE ACCESS

AREA WITH BUILDING AT EXISTING SURFACE GRADE AND COMMERCIAL USE ON GROUND FLOOR

AREA WITH BUILDING WITH BELOW GRADE STRUCTURE AND RESIDENTIAL USE ON GROUND FLOOR

PUBLIC ACCESS / ESPLANADE

PUBLIC PARK / OPEN SPACE / LANDSCAPE AREA

EXISTING GRAVEL / PAVEMENT

PAVEMENT CAP

BUILDING WALL

PAVEMENT CAP (i.e. GROUND FLOOR SLAB)

BUILDING WALL

BUILDING WALL

BUILDING WALL

PAVEMENT CAP

SOIL CAP

EXISTING SOIL / GRAVEL

EXISTING FILL / SOIL

SHORING / BUILDING WALL

PAVEMENT CAP (i.e. GROUND FLOOR SLAB)

EXISTING FILL / SOIL

EXISTING FILL / SOIL

FOUNDATION STRUCTURE

EXISTING UTILITIES

BACKFILL MEETING SITE CLEANUP STANDARDS

NEW UTILITY TRENCH / CORRIDOR

EXISTING FILL / SOIL

BACKFILL MEETING SITE CLEANUP STANDARDS

Legend

- Existing ground surface
- Groundwater surface
- Pavement cap consisting of concrete or asphalt
- Soil cap / backfill consisting of soil meeting site cleanup standards
- Wall comprised of concrete

NOT TO SCALE

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Reference: Drawing created from sketch provided by GeoEngineers' personnel.

Conceptual Redevelopment
Site-Specific Cleanup Action Plan Cross Section

Development Sites 8 and 9
Tacoma, Washington

GeoEngineers

Figure 9

TACOMA : SCY

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Table 1

Soil and Groundwater Cleanup Levels and Soil Contamination Maximums

Site Specific Cleanup Action Plan
Development Sites 8 and 9
Tacoma, Washington

Constituent	Soil Cleanup Level (mg/kg)	Maximum Soil Concentration (mg/kg)	Groundwater Cleanup Level (µg/L)
Total Petroleum Hydrocarbons (TPH) [1]			
Gasoline-Range Petroleum Hydrocarbons (Benzene Present)	**30**	5,000	**800**
Gasoline-Range Petroleum Hydrocarbons (w/out Benzene)	**100**	5,000	**1,000**
Diesel-Range Petroleum Hydrocarbons	**2,000**	5,000	**500**
Oil-Range Petroleum Hydrocarbons	**2,000**	5,000	**500**
Volatile Organic Compounds (VOCs)			
Benzene	34.5	250	71[6]
Toluene	16,000	5,000	200,000[6]
Ethylbenzene	8,000	5,000	29,000[6]
Xylenes	160,000	5,000	**1,600**[7]
Total Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) [2]	0.137	10	0.031
Metals			
Antimony	32	320	4,300[6]
Arsenic	**0.7** (20)[4]	200	0.14[6]
Cadmium	80.0	400	**9.3**[8]
Chromium (VI)[3]	**240**	4,000	50.0[8]
Copper	2,960	29,600	**2.4**[9]
Lead	250[5]	2,500	**8.1**[8]
Mercury	24.0	240	0.025[8]
Nickel	1,600	16,000	**8.2**[8]
Zinc	24,000	240,000	**81.0**[8]
PCBs (Total)	**0.5**	50	0.030[8]

Notes:

Bold - Values have been revised from original Table 4-1 in the Consent Decree to reflect new MTCA Amendments of February 2001.

[1] TPH cleanup criteria are based on MTCA Method A Cleanup Standards.

[2] Total cPAHs calculated using toxicity equivalent methodology presented in Chapter 173-340-708(8) WAC.

[3] The chromium VI cleanup standards are based on an updated oral reference dose of 0.03 mg/kg/day (previous oral RfD was 0.005 mg/kg/day).

[4] The arsenic Method B risk-based cleanup standard is 0.7 mg/kg, while the cleanup level based on Washington State background is 20 mg/kg.
The arsenic Method B and C soil cleanup criteria no longer use a GI absorption fraction of 0.4.

[5] Soil cleanup levels for lead are not defined under Method B or C. The Method A cleanup standard is used for the direct contact value.

[6] Cleanup standard based on National Toxics Rule - Ambient Water Quality Criteria (40 CFR 131.36D) for human consumption of aquatic organisms.

[7] The xylenes cleanup standard based on Chapter 173-340-720 WAC Groundwater Method B Non-carcinogen, Standard Formula Value (previous

[8] Cleanup standard based on Chapter 173-201A-240 WAC Marine Water Chronic.

[9] Cleanup standard based on National Toxics Rule - Saltwater Criterion (40 CFR 131.36C) continuous concentration value.

Table 2

Site Specific Applicable or Relevant and Appropriate Requirements (ARARS)

Site Specific Cleanup Action Plan

Development Sites 8 and 9

Tacoma, Washington

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

Authorizing Statute	Implementing Regulation	Description	Rationale
Potential Action-Specific ARARs			
Ecology Area of Contamination Policy	8/20/1991 Interprogram Policy	Allows movement/placement of excavated contaminated material within the regulated site without triggering dangerous waste designation.	Could be applicable for containment remedial alternatives.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Ecology Construction Stormwater General Permit	Requires obtaining a NPDES permit, development of Stormwater Pollution Prevention Plan (SWPPP) and implementation of a sediment erosion and pollution prevention controls.	Applies to construction activities that disturb one or more acres.
Water Well Construction; Chapter 18.104 RCW	Minimum Standards for Construction and Maintenance of Wells; Chapter 173-160 WAC	Applies to the construction and maintenance of monitoring wells	Potentially applicable to wells constructed for groundwater withdrawal and monitoring and decommissioning of existing or future wells.
Resource Conservation and Recovery Act (RCRA): 40 CFR 761	RCRA Subtitle C 40 CFR Parts 260-299	Establishes a "cradle-to-grave" system for governing hazardous waste from the point of generation to disposal.	Potentially applicable to fill and soil excavated as part of remedial actions.
Hazardous Waste Management; Chapter 70.105 RCW	Dangerous Waste Regulations; Chapter 173-303 WAC	Applies if dangerous wastes are generated during remedial program	These regulations must be fully complied with for any off site disposal of waste determined to be dangerous waste. This would only apply to upland remedial options as dredged sediment is exempt from waste classification.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	NPDES Permit Program; Chapter 173-220 WAC	Applicable to the discharge of pollutants and other wastes and materials to the surface waters of the state	NPDES may be required for discharges related to ongoing remedial actions or discharge of stormwater/drainage.
State Environmental Policy Act (SEPA); Chapter 43.21C.110 RCW	SEPA Rules; Chapter 197-11 WAC	Applies if future construction/remedial action occurs at the site	Applies if future construction/ remedial action occurs at the site.
Solid Waste Management; Chapter 43.21A RCW	Minimum Functional Standards for Solid Waste Handling WAC 173-304	Establishes minimum functional standards for the handling of solid waste.	Applies if non-dangerous wastes are generated during remedial action
Transportation of Hazardous Material; 49 USC 5101-5127	Hazardous Materials Regulations; 49 CFR Parts 171 through 180	Regulations that govern the transportation of hazardous materials.	Applies to any hazardous materials transported off-site as part of remediation.
Hazardous Waste-Land Disposal Restrictions; USEPA	40 CFR 268/22 CCR 66268	Establishes land disposal restrictions and treatment standards for hazardous wastes applicable to generators.	Any hazardous wastes generated as a result of on-site activities or by treatment systems must meet land disposal restriction requirements.
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Federal Water Pollution Control Act Certification; Chapter 173-225 WAC	Applies to activities that may result in a discharge into navigable waters.	Applies to remedial actions that may result in a discharge into navigable waters (i.e., dredging). \\
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Mixing Zones; WAC 173-201A-400	Applies to the allowable size and location of a mixing zone.	Potentially applicable to remedial alternatives that would require substantive compliance with NPDES permit requirements.

Authorizing Statute	Implementing Regulation	Description	Rationale
Potential Action-Specific ARARs			
Washington State Water Pollution Control Act; Chapter 90.48 RCW	Short Term Modifications (to State Water Quality Criteria); Chapter 173-201A-410	Criteria may be modified for a specific water body on a short-term basis when necessary to accommodate essential activities, respond to emergencies, or to otherwise protect the public interest, even though such activities may result in a temporary reduction.	Potentially applicable to remedial alternatives involving excavation/dredging of sediment.
USACE permit	Section 404 Permit Program	Applies to dredging or filling in the waters of the U.S.	A permit will be required to perform dredging of sediment and/or placing fill associated with sediment capping or backfilling of dredged areas.
Archeological and Historic Preservation	Federal Archeological and Historical Preservation Act; 16 USCA 496a-1	The Archeological and Historical Preservation Act (16 USCA 496a-1) would be applicable in areas or potential cultural resources if any subject materials are discovered during site excavation and dredging activities.	Potentially applicable for remedial alternatives that include excavation and dredging activities.
Washington State Clean Air Act; Chapter 70.94 RCW	General Requirements for Air Pollution Sources; Chapter 173-400 WAC. Controls for New Sources of Toxic Air Pollutants; Chapter 173-460 WAC	Establishes technically feasible and reasonably attainable standards and rules generally applicable to the control and/or prevention of the emission of air contaminants.	May apply to remedial alternatives that produce emissions to air.
Occupational Safety and Health Act; Public Law 91-596	Hazardous Waste Operations and Emergency Response; 29 CFR Subpart 1910.120	Provides Federal standards to assure safe working conditions.	Potentially applicable for redevelopment and remedial construction activities in contaminated areas.
Washington Industrial Safety and Health Act; Chapter 49.17 RCW	Safety Standards for Construction Work; Chapter 296-155 WAC. Hazardous Waste Operations; Chapter 296-843 WAC	Provides Washington State standards to assure safe working conditions.	Potentially applicable for redevelopment and remedial construction activities.

Table 3

Remedial Action Cost Estimate[1]

Site Specific Cleanup Action Plan
Development Sites 8 and 9
Tacoma, Washington

Item No.	Description	Quantity	Unit	Unit Price	Amount	Notes and Assumptions
REMEDIAL ACTION CONSTRUCTION						
Mobilization, Construction Facilities and Site Controls						
1	Mobilization/Demobilization	1	LS	$88,000.00	$88,000	For Contractor mobilization to and demobilization from Site to perform remedial construction activities. Assumes that remedial action construction activities will be performed as one event. Assumed to be 5 percent of total construction cost.
2	Temporary Facilities and Site Controls	1	LS	$25,000.00	$25,000	Assumed cost for facilities and site controls to include a construction trailer, security fencing, portable toilets, power supply and water supply.
3	TESC-Silt Fencing, Wattles and Sand Bags	930	LF	$10.00	$9,300	Assumed cost to establish and maintain TESC BMPs during remedial construction activities. Assumes TESC controls will be established along the northern, eastern and southern perimeters of the upland portion of the Site which is approximately 825 linear feet. Includes procurement of materials, installation and maintenance of TESC BMPs.
4	TESC-Stabilized Construction Entrances	2	LS	$4,000.00	$8,000	Assumed cost to establish and maintain stabilized construction entrance TESC BMPs including quarry spall entrance/exit and wheel wash facilities at two locations. Includes procurement of materials, installation and maintenance of TESC BMPs.
5	TESC-Soil Stockpile Management	1	LS	$25,000.00	$25,000	Assumed cost to establish and maintain TESC BMPs related to stockpiling of contaminated soil including creating a stockpile area or areas, lining stockpiles area(s) with visqueen and covering stockpiles with visqueen. Includes procurement of materials, installation and maintenance of TESC BMPs.
6	Stormwater Collection, Management and Disposal	1	LS	$50,000.00	$50,000	Assumed cost to collect, manage, and dispose of stormwater runoff that enters the Site during remedial action construction activities. Assumed to include equipment and materials and installation, operation and maintenance of system necessary to collect, transfer, store, provide minimal on-site treatment (i.e., sand filtration) and to transfer or transport the stormwater runoff off-site for disposal.
7	Clearing and Grubbing	1	LS	$10,000.00	$10,000	Assumed cost to remove and recycle and/or dispose of existing trees and vegetation at the Site. Assumed to include transportation and recycling and/or disposal fee.
8	Temporary Traffic Controls	1	LS	$10,000.00	$10,000	Assumed cost to facilitate traffic flow on and off the Site during remedial action construction activities. Includes planning and implementation of traffic control revisions during construction.
	Subtotal				**$225,300**	
Demolition						
9	Building Abatement	1	LS	$54,810.00	$54,800	Estimated cost for performing abatement of regulated building materials including asbestos, lead based paint and fluorescent light fixtures on/in existing buildings. See report presenting regulated building materials survey results provided in Appendix E of SCAP.
10	Building Dismantling/Demolition and Recycling/Disposal	1	LS	$15,000.00	$15,000	Assumed cost for dismantling/demolition of existing, approximately 13,600 square foot and 480 square foot buildings and transport and recycling/disposal of building materials.
11	Asphalt Demolition	4,425	SY	$4.00	$17,700	Assumed cost for demolition of visible asphalt surfacing at the Site.
12	Asphalt Recycling/Disposal	665	TON	$15.00	$10,000	Assumed cost for transport and off-site recycling/disposal of demolished asphalt. Asphalt assumed to be 3 inches thick. Assumed 1.8 tons/cubic yard conversion factor for asphalt volume to weight.
13	Concrete Demolition	380	CY	$25.00	$9,500	Assumed cost for demolition of visible concrete structures and surfacing including visible building footings, pads, slabs, walkways, curbs and wheel stops. Assumes variable thicknesses of concrete structures.
14	Concrete Recycling/Disposal	760	TON	$22.00	$16,700	Assumed cost for transport and off-site recycling/disposal of demolished concrete. Concrete assumed to have variable thicknesses. Assumed 2.0 tons/cubic yard conversion factor for concrete volume to weight.
15	Utilities Decommissioning/Demolition	1	LS	$10,000.00	$10,000	Assumed cost for decommissioning, demolition and disposal of utilities in remedial action areas. Assumed to include removing utilities within remedial action excavations and plugging the ends of stormwater and sewer pipes that are trunkaded at the limits of the excavations and disposal of utilities that are removed.
	Subtotal				**$133,700**	
Remedial Excavation for Building Construction with Residential Use on Ground Level and Below-Grade Stucture [2]						
16	Remedial Excavation and Stockpiling of Fill/Soil[3]	9,000	CY	$11.00	$99,000	Assumed cost for excavation of 32,330 square foot area to depth of groundwater. Groundwater assumed to be at an average depth of 7.5 feet. Assumes rehandling of a portion of the excavated material for stockpiling prior to off-site treatment, disposal and/or for reuse on site.
17	Transport and Disposal of Fill/Soil Designated Hazardous/Dangerous Waste	1,700	TON	$235.00	$399,500	Assumed cost for transportation and disposal of fill/soil that designates as Hazardous/Dangerous Waste. Assumes 10 percent of excavated fill/soil designates as Hazardous/Dangerous Waste requiring disposal at Subtitle C landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
18	Transport, Treatment and Disposal of Fill/Soil	1,700	TON	$50.00	$85,000	Assumed cost for transportation, treatment and disposal of fill/soil. Assumes 10 percent of excavated fill/soil will be treated via incineration and disposed of at an appropriate off-site facility. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
19	Reuse of Soil On Site	1,700	TON	$0.00	$0	Assumes 10 percent of excavated soil will be reused on site for soil capping and backfill because the soil meets the site-specific cleanup standards. No cost is assumed to be associated with this item. Cost for excavation and temporary stockpiling is included in remedial excavation unit cost. Assumed cost for placement and compaction is identified in separate tasks.
20	Transport and Disposal of Fill/Soil as Solid Waste	12,200	TON	$35.00	$427,000	Assumed cost for transportation and disposal of fill/soil that is characterized as solid waste. Assumes 70 percent of excavated fill/soil disposed of as solid waste at Subtitle D landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
21	Placement of Reusable Soil as Backfill	1,280	TON	$4.00	$5,120	Assumed cost for reuse on site of soil that meets the site-specific cleanup standards. Assumed cost for placement and compaction of soil as backfill around building below grade structure/foundation from the groundwater surface to Site surface.
	Subtotal				**$1,015,620**	

Item No.	Description	Quantity	Unit	Unit Price	Amount	Notes and Assumptions
Remedial Excavation for Building Construction At-Grade with Commercial Use on Ground Floor [2]						
22	Remedial Excavation and Stockpiling of Fill/Soil[3]	2,000	CY	$11.00	$22,000	Assumed cost for excavation of 26,820 square foot area to depth of 2 feet below ground surface to allow for installation of foundation structures, structural backfill and slab on grade for above-ground building. Assumes rehandling of portion of excavated material for stockpiling prior to off-site disposal.
23	Transport and Disposal of Fill/Soil Designated Hazardous/Dangerous Waste	380	TON	$235.00	$89,300	Assumed cost for transportation and disposal of fill/soil that designates as Hazardous/Dangerous Waste. Assumes 10 percent of excavated fill/soil designates as Hazardous/Dangerous Waste requiring disposal at Subtitle C landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
24	Transport and Disposal of Fill/Soil as Solid Waste	3,400	TON	$35.00	$119,000	Assumed cost for transportation and disposal of fill/soil that is characterized as solid waste. Assumes 90 percent of excavated fill/soil disposed of as solid waste at Subtitle D landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
25	Temporary Utilities Rerouting	1	LS	$25,000.00	$25,000	Assumed cost for temporary rerouting of utilities (ex., electric, water) during construction to maintain utilities for marina operation.
	Subtotal				**$255,300**	
Remedial Actions for Public Park/Open Space Area						
26	Remedial Excavation and Stockpiling of Fill/Soil to Support Capping	520	CY	$11.00	$5,700	Assumed cost for excavation of fill/soil to average depth of 2 feet in open space/park area to allow placement of 3-foot-thick soil cap that transitions from new to existing surface elevations. Assumes rehandling of portion of excavated material for stockpiling prior to off-site disposal.
27	Transport and Disposal of Fill/Soil as Solid Waste	1,000	TON	$35.00	$35,000	Assumed cost for transportation and disposal of fill/soil that is characterized as solid waste. Assumes all excavated fill/soil from park area/open space disposed of as solid waste at Subtitle D landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
28	Procure and Install Geotextile Layer	530	SY	$5.50	$2,900	Assumed cost for geotextile fabric layer installed to provide visual indication of limit of soil cap.
29	Install 3-Foot-Thick Soil Cap - Imported Material	420	TON	$14.00	$5,900	Assumed cost for procurement of imported cap material and placement of 1/2 of soil needed to install 3-foot-thick soil cap over park area/open space. Assumes 1/2 of cap material is imported to the Site for the cap.
30	Install 3-Foot-Thick Soil Cap - Reuse of Site Soil	420	TON	$4.00	$1,700	Assumed cost for placement and compaction of 1/2 of soil needed to install 3-foot-thick soil cap. Assumes 1/2 of soil used for soil cap is Site soil with contaminant concentrations less than site-specific cleanup standards excavated from area where building is to be constructed with residential use on ground floor and with below grade structure. Cost assumes handling and placement of reused Site soil.
31	Install Concrete Cap	260	SY	$32.00	$8,300	Assumed cost for installation of concrete sidewalk as cap in southwest portion of Site between Dock Street and the esplanade on Development Site 8 and adjacent to Dock Street as part of parking revisions. Unit cost assumes 4-inch-thick concrete for sidewalk.
	Subtotal				**$49,500**	
Remedial Actions for Utility Corridor Area						
32	Remedial Excavation and Stockpiling of Fill/Soil to Support Capping	140	CY	$11.00	$1,500	Assumed cost for excavation of fill/soil to average depth of 1 foot in utility corridor area to allow placement of concrete cap that transitions from new to existing surface elevations. Assumes rehandling of portion of excavated material for stockpiling prior to off-site disposal.
33	Remedial Excavation and Stockpiling of Fill/Soil for New Utility Trench	350	CY	$11.00	$3,900	Assumed cost for excavation of fill/soil to install a new utility trench in the utility corridor area. Assumed dimensions of the utility trench are 12 feet wide by 6 feet deep from the Dock Street right-of-way to the esplanade area. Assumes rehandling of portion of excavated material for stockpiling prior to off-site disposal.
34	Transport and Disposal of Fill/Soil Designated Hazardous/Dangerous Waste	90	TON	$235.00	$21,200	Assumed cost for transportation and disposal of fill/soil that designates as Hazardous/Dangerous Waste. Assumes 10 percent of excavated fill/soil designates as Hazardous/Dangerous Waste requiring disposal at Subtitle C landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
35	Transport and Disposal of Fill/Soil as Solid Waste	850	TON	$35.00	$29,800	Assumed cost for transportation and disposal of fill/soil that is characterized as solid waste. Assumes 90 percent of excavated fill/soil disposed of as solid waste at Subtitle D landfill. Assumes 20 percent expansion from insitu to loose fill/soil and 1.6 tons/cubic yard conversion factor for fill/soil volume to weight.
36	Procure and Install Geotextile Layer in New Utility Trench	170	SY	$5.50	$900	Assumed cost for geotextile fabric layer installed to provide visual indication of limit of clean backfill within new utility trench.
37	Procure and Place Backfill Material for New Utility Trench	550	TON	$14.00	$7,700	Assumed cost for procurement, placement and compaction of clean backfill material for the new utility trench.
38	Procure and Place Backfill Material for Concrete Cap	230	TON	$14.00	$3,200	Assumed cost for backfill needed to change existing grade an average of 1 foot within utility corridor area to match grades resulting from new building and esplanade construction. Cost assumes procurement of backfill material, placement and compaction.
39	Install Concrete Cap	600	SY	$32.00	$19,200	Assumed cost for installation of concrete pavement as cap in northern portion of Site adjacent to 11th Street right-of-way. Cost assumes 4-inch-thick concrete for cap area.
40	Manhole/Catch Basin Modifications	7	EA	$1,000.00	$7,000	Includes modification of manholes/catch basins to match grade that is changed by placement of concrete pavement cap. Assumes 7 manholes/catch basins are modified. Assumes that existing underground utilities will not be modified for the purposes of installing concrete pavement cap.
	Subtotal				**$94,400**	
Remedial Actions for Esplanade Area [4]						
41	Install Concrete Cap at Site 8	1,060	SY	$32.00	$33,900	Assumed cost for installation of concrete pavement sidewalk as cap on eastern portion of Site adjacent to Thea Foss Waterway. Assumes concrete pavement cap placed at elevations at or above top of shoreline slope/bank. Unit cost assumes 4-inch-thick concrete for sidewalk.
	Subtotal				**$33,900**	

Item No.	Description	Quantity	Unit	Unit Price	Amount	Notes and Assumptions
Site Restoration and Survey						
42	Site Restoration	1	LS	$20,000.00	$20,000	Assumed cost for seeding open space/park area, restoration of sidewalks in Dock Street right-of-way and other restoration associated with or repairs resulting from remedial construction activities.
43	Post-Construction (As-Built) Survey	1	LS	$15,000.00	$15,000	Assumed cost for preparation of as-built survey to document remedial actions and post-construction Site conditions.
	Subtotal				**$35,000**	
Contractor Overhead and Taxes						
44	Contractor Overhead	10%	%		$184,300	Assumed to be 10 percent of total remedial action construction costs.
45	Sales Tax	8%	%		$166,200	Assumed to be 8 percent of total remedial action construction costs including contractor overhead.
REMEDIAL ACTION CONSTRUCTION SUBTOTAL					**$2,193,000**	
46	Construction Management and Monitoring	10%	%		$219,300	Assumed cost for construction management tasks as well as monitoring and documentation of field activities and compliance with environmental requirements including sampling and analysis for compliance monitoring and waste characterization, remedial action construction reporting and agency coordination and communication. Assumed to be 10 percent of total construction cost.
REMEDIAL ACTION CONSTRUCTION TOTAL					**$2,412,000**	
47	Contingency	15%	%		$361,800	Assumed contingency cost to account for additional construction management and monitoring requirements and/or currently unidentified Site conditions during construction. Examples of currently unidentified Site conditions during construction include identification, demolition, removal and recycling/disposal of additional below ground structure(s), unforeseen environmental conditions or contamination [i.e., underground storage tank(s), additional fill/soil designated at Hazardous Waste, etc.], or other identified changes in Site conditions during construction.
CONSTRUCTION TOTAL WITH CONTINGENCY					**$2,774,000**	
Indirect Construction Costs						
48	Pre-Remedial Design Investigation	1	LS	$100,000.00	$100,000	Assumed cost for performing additional investigation of Development Sites 8 and 9 to support the actual remedial design to characterize fill/soil for disposal and reuse, confirm extent of contamination above cleanup standards and to identify depth to groundwater across Site.
49	Engineering Design and Agency Authorizations	1	LS	$250,000.00	$250,000	Assumed cost for preparing Engineering Design Report (EDR), construction plans and specifications, contractor solicitation bid package, Compliance Monitoring Plan, submittals for agency authorizations and approvals and coordination and communication with regulatory agencies.
50	Existing Tenant Parking Relocation	1	LS	$10,000.00	$10,000	Assumed cost associated with relocation of existing parking for marina tenants.
	Subtotal				**$360,000**	
TOTAL PROJECT COST					**$3,134,000**	

General Assumptions:

[1] Based on conceptual redevelopment plan described in the Site-specific Cleanup Action Plan (SCAP) and presented in Figures 8 and 9 of the SCAP. The actual cleanup action costs will be based on actual redevelopment and remedial actions performed at the Site by a future developer of the Site.

[2] Remedial action costs presented do not include construction of new building structures, foundations, or slabs that would provide a cap for fill/soil with contaminant concentrations greater than the site-specific cleanup standards beneath the building

[3] Excavation shoring not included in remedial costs. Assumed to be included as part of building construction costs.

[4] Remedial action costs presented do not include construction of new esplanade.

BMPs Best Management Practices

TESC Temporary Erosion and Sediment Controls