Final Cleanup Action Plan
Port of Tacoma/Parcel 88
Pierce County, Washington

1621 Marine View Drive
Tacoma, WA 98422

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TACOMA, WASHINGTON

1.0 INTRODUCTION

This Cleanup Action Plan (CAP) describes the cleanup action chosen for Port of Tacoma's (Port) Parcel 88 cleanup site. The selected cleanup action described in this document fulfills the requirements for the Model Toxics Control Act (MTCA), Chapter 70.105D RCW. This document was prepared in accordance with WAC 173-340-380 and addresses the requirements for developing a cleanup action laid out in WAC 173-340-350 through 173-340-390.

Supporting information is presented in the Remedial Investigation/Feasibility Study (RI/FS) (Hart Crowser 2012), the Environmental Assessment Report (Hart Crowser 2010), and the Previous Cleanup Activities Report (Hart Crowser 2011); these documents are incorporated by reference into this CAP.

2.0 BACKGROUND

2.1 Location and Setting

The Site is referred to as Parcel 88 (Facility Site # 34114562) and is generally Pierce County Tax Parcel 0421313048, at the street address of 1621 Marine View Drive, Port of Tacoma, Tacoma, WA 98422, but also includes portions of Pierce County Tax Parcels 0421313049 and 0420062130 where contaminants were found to have been spread (Figure 1).

A large portion of the Site now lies within the Port's recently completed Parcel 88 Combined Habitat Mitigation Area. The mitigation area includes constructed tidal channels connected to Hylebos Creek, adjacent intertidal marsh and vegetated shorelands in the southwestern portion of the Site, and upland habitat in the south central and southeastern portions of the Site. This area is bounded to the south by Hylebos Creek (a tributary to Commencement Bay via the Hylebos Waterway), to the west by Morningside Drain and Marine View Drive, and to the north and east by steep slopes (Figure 2).

Native soil at the Site consists of alluvium at the lowest elevations (lower area) and glacial outwash deposits on the slopes. The alluvium was deposited by

rivers and streams and typically consists of granular and fine-grained soils ranging from silty sand to sandy silt with occasional gravel and wood. Zones of coarser sand and gravel also occur locally in the alluvium. The glacial outwash soils are typically granular and include poorly- to well-graded sand and gravel to silty sand and gravel.

Groundwater elevations indicate that groundwater flows southerly to southwesterly from the uplands north and east of the property (recharge areas) toward Hylebos Creek and Morningside Drain (discharge areas).

2.2 Site History

2.2.1 Ownership and Land Use

The Port has owned the Site since 2006. From 1996 until it was sold to the Port, the Site was owned by Michael Parsons and/or Marine View, Inc., a business in which Mr. Parsons held an interest. From the 1960s to 1996, the Site was owned by William Fjetland, Camille Fjetland, and/or business interests in which one or both of these individuals held an interest. Before this timeframe, the ownership of the Site is unknown.

Prior to the 1950s, the Site was undeveloped. Approximately 9 acres in the southwest corner of tax parcel 0421313048 were lowlands abutting Hylebos Creek, and the rest of the Site consisted of steep slopes and upland ridgelines and bluffs. From the 1950s through 2006, the Site was used as a sand and gravel mine and an inert solid waste recycling facility. During that time, a significant volume of material (soil, concrete, asphalt, wood waste, and metal debris) was imported and used as fill at the Site, primarily within the 9-acre lowlands. This fill raised the grade substantially over much of the lowlands; in places, the post-fill surface elevation was 20 feet or more above the original surface elevation.

The Port purchased the Site in May 2006. Under the Port's ownership, Site activities were limited to: 1) removal of recycled material stockpiles and equipment the previous owner had left on the lower portion of the Site; 2) temporary use of the lower portion of the Site by the neighboring tenant for truck turnaround and scales; and occasional use of the lower portion of the property by Port maintenance for temporary staging.

In 2010, the Port undertook an environmental cleanup of the Site that involved the removal of contaminated fill and underlying soil. This work was done in

conjunction with the construction of the Parcel 88 Combined Habitat Mitigation Area and is described in more detail below.

2.2.2 Cleanup Actions to Date

2.2.2.1 Pre-Cleanup Conditions

The primary areas of environmental contamination before Site cleanup were the Main Fill Area and the Metals Contamination Area which are located in the lower part of the Site. In addition, an area in the north central upland portion of the Site was also used to store concrete and asphalt debris/rubble for reprocessing and sale. Historical environmental site conditions are shown on Figures 3 through 6 and are summarized below.

Main Fill Area (MFA). Before the 2010 Port cleanup, much of the MFA was underlain by a thick prism of fill. The fill composition was variable, consisting primarily of soil and manmade debris (mostly concrete, asphalt and wood waste, but also including creosote-treated pilings, brick, glass, plastic, and metal). Some areas of the Site were underlain by fill consisting mostly or entirely of wood chips. Historically, several underground storage tanks (USTs) and above ground storage tanks (ASTs) were located within the MFA and activities including equipment maintenance, vehicle fueling, and debris/rubble stockpiling took place here.

Fill and soil in the MFA were impacted by petroleum hydrocarbons, as evidenced by analytical results and by the observations of sheen and odor documented in the 2005 ESA report and the 2009 investigation report. Petroleum impacts were generally confined to the fill prism, but did extend into the underlying soil in a few areas. Diesel detections ranged from 6.4 to 5,900 milligrams per kilogram (mg/kg), and motor oil detections ranged from 62 to 5,000 mg/kg.

Fill and soil in some parts of the MFA were also impacted by metals. Arsenic concentrations ranged up to 153 mg/kg. In a few locations, copper and lead detections were also elevated, ranging up to 154 mg/kg and 303 mg/kg, respectively.

Groundwater impacts within the MFA were limited. Petroleum hydrocarbons were detected in groundwater at only one of the 13 sampling locations (MW-2). The maximum concentrations detected for diesel range organics (DRO) and oil range organics (ORO) were 1,900 ug/L and 750 ug/L, respectively. Copper and mercury concentrations were also elevated (4 ug/L and 0.05 ug/L in samples from MW-109 and P-1, respectively).

Metals Contamination Area (MCA). Before the 2010 cleanup activities, the MCA was underlain by several feet of slag-bearing sand and gravel fill. The fill was placed over native materials to form a flat building lot for the residence that was once on the Site and to form the base for the unpaved roadway between the MCA and the MFA. In some locations in the MCA, the fill contained pebble-size and larger pieces of slag that were used to fill former drainage pathways, providing a more solid base for roads while allowing natural flows to continue to Hylebos Creek.

Arsenic and lead were detected at elevated concentrations (maximum of 523 and 314 mg/kg, respectively) in every sample of the fill material in the MCA. Other metals, including copper and zinc, were detected in a number of soil samples at elevated concentrations within the fill in this area. Only low levels of metals were detected in groundwater samples from the MCA.

Upland Portion of the Site. An area in the north central upland portion of the Site was previously used to store concrete and asphalt debris/rubble for reprocessing and sale. GeoEngineers (2005) estimated there were about 26,000 cubic yards of these materials.

GeoEngineers (2005) collected two samples of the concrete and asphalt debris/rubble for analysis of petroleum hydrocarbons and metals. Neither DRO nor gasoline-range organics (GRO) were detected in either sample. ORO were detected in one sample at 470 mg/kg. The detection of ORO without DRO is consistent with the documented presence of asphalt. No elevated metals were detected in either sample. As described below, the rubble was later removed.

Because a relatively low concentration of ORO was detected in the debris/rubble, and because heavy-range petroleum fractions like asphalt are relatively immobile, groundwater impacts in the uplands were judged to be very unlikely. Therefore, groundwater monitoring wells were not installed in the upland portion of the Site. Subsequent groundwater monitoring in lowland wells (MW-107 and MW-108) downgradient from the former location of the debris/rubble did not detect petroleum hydrocarbons. These results support the conclusion that that there were no groundwater impacts associated with the concrete and asphalt debris/rubble.

2.2.2.2 Cleanup Activities

Previous cleanup activities at the Site consisted of several tank closures in the 1990s, a number of pre-sale cleanup actions conducted by Parsons in 2006, and

the Port's major cleanup in 2010. These activities are described in detail in Hart Crowser (2011), shown on Figure 7, and summarized below.

UST Removals (1990s). In 1991 four USTs were removed from the lower area of the Site by employees of Portside Recycling, which was the operator at the time (ATEC Associates 1993). Little additional information is available regarding these USTs or this removal action, but the ATEC report indicates that no soil assessment was completed at the time of the removals.

In 1997 West Pac Environmental, Inc. of Seattle removed three additional USTs and an associated pump island from the MFA. These tanks were located northwest of the Maintenance Building. The associated UST Site Assessment was completed by Neuston Consulting of Burien, Washington (Neuston Consulting 1997). The last known use of the USTs reported was for diesel truck and heavy equipment fueling, and at the time of removal they were estimated to be over 25 years old. Approximately 100 tons of contaminated soil were excavated and disposed of off site, and post-excavation samples documented that remaining soil did not exceed the MTCA Method A level for diesel.

Rubble Removal and Other Cleanup Activities (2006). Before the Port purchased the property in 2006, Marine View, Inc. removed about 30,000 cubic yards of debris from the Site. This material included unprocessed concrete and asphalt rubble from the upland portion of the property; about 4,000 tons of glass, window frames, and wood debris from near the Maintenance Building; and about 5,000 cubic yards of scattered debris including wood, plastic, metal, rubber, and building remains from within the MCA and MFA. Marine View, Inc. also contracted Environmental Chemical Solutions of Gig Harbor, Washington, to remove approximately 25 cubic yards of petroleum-contaminated surficial soil from two 15-square-foot areas between the Maintenance Building and the former log cabin office building in the MFA.

Port of Tacoma Cleanup (2010). As described above, the remaining areas of environmental contamination at the time of the Port's 2010 cleanup actions and redevelopment were the MFA and the MCA, which occupied the lower portion of the Site.

The cleanup approach for the MFA involved mass excavation of the entire fill prism down to native material except along the eastern hillside where some untreated wood waste was left in place. During the MFA excavation, a UST was discovered and removed along with two extensive areas of petroleum-impacted native soil. All soil exhibiting field indications of petroleum impacts (sheen, odor, etc.) was removed. Figure 8 shows the relationship between the extent of the pre-cleanup petroleum impacts and the extent of the remedial excavation. This

figure demonstrates that the lateral and vertical extent of the excavation encompassed the impacted soil. Post-excavation soil samples further confirmed that contaminated material was successfully removed from the MFA (Figure 10).

The cleanup approach for the MCA involved excavation of slag-bearing fill. The fill was removed down to native material or to the elevation where the pre-cleanup sampling indicated there was no longer impacted material. Figure 9 shows the relationship between the extent of the pre-cleanup metal impacts and the extent of the fill removal. This figure demonstrates that the lateral and vertical extent of the removal encompassed the impacted fill. Post-excavation samples further confirmed that contaminated material was successfully removed from the MCA (Figure 10).

Uncontaminated concrete rubble from the MFA was crushed and hauled offsite for beneficial reuse, and all contaminated fill and soil from the Site was disposed of at LRI Landfill (LRI) in Graham, Washington.

2.2.3 2012 Remedial Investigation/Feasibility Study

In 2012 the Port conducted an RI/FS to evaluate the nature and extent of any contamination remaining following the Port's 2010 cleanup action and to evaluate the need for any further cleanup actions. This work was conducted pursuant to Section VII(C) of Agreed Order DE8400.

The RI/FS report (Hart Crowser 2012) was prepared in accordance with WAC 173-340-350 and included: 1)the development of a conceptual site model, 2) identification of contaminants of concern, 3) establishment of cleanup standards for soil and groundwater, and 4) identification of the nature and extent of contamination.

3.0 PROPOSED CLEANUP ACTION AND ALTERNATIVES CONSIDERED

The main conclusions of the RI/FS were that, following the Port's 2010 cleanup action:

- Soil at the Site now meets cleanup standards and does not pose a risk to human health or terrestrial organisms;
- Soil/sediment in areas that are below the high tide level now meet cleanup standards and do not pose a risk to benthic organisms; and

- Because the contaminant source(s) were removed during soil cleanup, groundwater that discharges to surface water now appears to meet cleanup standards and does not pose a risk to aquatic organisms.

No further soil/sediment cleanup actions appear warranted. However, because the conclusion regarding groundwater discharging to surface water was based on a single post-cleanup monitoring round, additional post-cleanup groundwater monitoring is warranted to confirm that surface water is protected.

The Port considered several alternatives for conducting post-cleanup groundwater monitoring. These approaches involved various locations and types of monitoring points (e.g., wells versus seeps), and also considered the length and frequency of the monitoring program.

The Port proposes to prepare a Compliance Monitoring plan with the following approaches which will provide a high degree of protectiveness:

- Groundwater will be monitored in wells that are located just upgradient from where groundwater discharges to surface water;

- Monitoring wells will be located to monitor the areas where pre-cleanup groundwater impacts were detected. Groundwater monitoring, conducted before the 2010 cleanup, indicated that metals concentrations at two former MFA monitoring points (P-1 and MW-109) exceeded groundwater cleanup levels:

    - At station P-1, mercury was detected at 0.054 ug/L; this exceeded the cleanup level for mercury (based on protection of surface water) of 0.025 ug/L by a factor of about 2.2. Well MW-201 was installed at the former location of P-1.

    - At station MW-109, copper was detected at 4 ug/L; this exceeded the cleanup level for copper (based on protection of surface water) of 3.1 by a factor of about 1.3. Well MW-202 was installed near the shore, immediately downgradient from the former location of MW-109.

- Sampling will be conducted quarterly. A minimum of four concurrent sampling rounds with results below cleanup values will be obtained.

4.0 CONTAMINANTS OF CONCERN AND CLEANUP LEVELS

4.1 Contaminants of Concern

Pre-cleanup investigations included the analysis of soil and groundwater samples for petroleum hydrocarbons, carcinogenic polynuclear aromatic hydrocarbons (cPAHs), polychlorinated biphenyls (PCBs), and metals (GeoEngineers 2005; Hart Crowser 2010 and 2011). Based on the analytical results, DRO, and ORO, and metals (arsenic, lead, copper, mercury, and zinc) were identified as contaminants of concern (COCs) in soil and groundwater at the MFA. At the MCA, the contaminants of concern were metals (arsenic, lead, copper, and zinc) in soil.

4.2 Site Cleanup Standards

As defined in WAC 173-340-700, cleanup standards consist of cleanup levels for hazardous substances present at the Site along with the location where these cleanup levels must be met (point of compliance). A cleanup level is the concentration of a hazardous substance in soil, water, air, or sediment that is determined to be protective of human health and the environment under specified exposure conditions.

4.2.1 Soil Cleanup Standards

The following cleanup levels for soil—including for portions of the Site that were excavated to below the high tide level and are now periodically inundated—are based on the conceptual site model described in Section 6.0:[1]

- Method A soil cleanup levels apply to DRO, ORO, arsenic, mercury, and lead. These standards address the exposure pathway from soil/sediment to humans.

[1] The Site does not pose a threat of significant adverse effects to terrestrial ecological receptors; therefore, soil cleanup levels based on this pathway were not developed. Under the terrestrial ecological evaluation procedures outlined in WAC 173-340-7491(1)(a) and -7492(2)(c)(i), the Site may be removed from further ecological consideration if no hazardous substances listed in Table 749-2 are or will be present in the soil above the point of compliance established under WAC 173-340-7490(4). Post-cleanup monitoring documented in the IRAR (Hart Crowser 2011) and the RI/FS (Hart Crowser 2012) demonstrates that these conditions have been met.

- Method B cleanup levels apply to copper and zinc (which do not have Method A levels). These standards address the exposure pathway from soil/sediment to humans.

- Sediment quality standards listed in WAC 173-204-320 apply to metals and the relevant toxic components of DRO and ORO (polynuclear aromatic hydrocarbons [PAHs]) in the portions of the Site that now lie below high tide. These standards apply to address exposure to benthic organisms.

Cleanup levels for soil/sediment are presented in Table 1.

In accordance with WAC 173-340-7490(4)(b), the standard point of compliance for soil is 15 feet below the ground surface. This represents a reasonable estimate of the depth of soil that could be excavated and distributed at the soil surface as a result of site development activities. For sites with institutional controls to prevent excavation of deeper soil, a conditional point of compliance may be set at the biologically active soil zone, assumed to extend to a depth of 6 feet, to prevent exposure of terrestrial organisms (WAC 173-340-7490(4)(a)).

For pathways involving exposure of benthic organisms, compliance is assessed within the biologically active zone (WAC 173-204-200(26)), commonly considered to be the upper 10 centimeters (approximately 4 inches).

4.2.2 Groundwater Cleanup Standards

Cleanup levels for groundwater are presented in Table 2. These cleanup levels were identified based on the conceptual site model presented in the RI/FS:

- Method A surface water cleanup levels for groundwater address the exposure pathway of metals to aquatic organisms from discharge of groundwater into surface water. As stipulated in WAC 173-340-730[2], Method A surface water cleanup levels are based on state surface water standards (WAC 173-201A), federal water quality criteria under section 304 of the Clean Water Act, and federal surface water criteria under the National Toxics rule (40 CFR Part 131).

- Method A groundwater cleanup levels also address the exposure pathway of petroleum hydrocarbons to aquatic organisms. No numeric standards for total petroleum hydrocarbons exist for surface water; however, Method A refers to a narrative standard of concentrations that will not cause a sheen on surface water.

As described in the RI/FS, the drinking-water based Method A cleanup levels are not appropriate cleanup levels for this site. The MFA and MCA are not currently a source of drinking water, and are now largely located below the high tide level, precluding future groundwater development. Development of groundwater along the shoreline of the MFA and MCA is similarly not practicable for several reasons:

1. A large portion of the Site, including the MFA and MCA and surrounding land, is now a mitigation area providing restored native habitat for terrestrial plants and animals and aquatic organisms. The Port developed the Site to mitigate for habitat lost during construction of other Port-related projects; as such, the Port is required to maintain these areas as habitat in perpetuity (a restrictive covenant filed with Pierce County—record number 201005260144—restricts use to only natural resources restoration and access for incidental maintenance of overhead electrical transmission lines). Accordingly, the Site is fenced and gated and is only accessible to maintenance workers.

2. Topography, stratigraphy, and water table elevation data from the pre-cleanup monitoring well network indicate that groundwater in this vicinity is hydraulically connected to the adjacent surface water (the tidal waters of the Hylebos Waterway), such that pumping in these areas would induce intrusion of tidally influenced surface water. As documented in the RI/FS, post-cleanup sampling of two new wells installed along the shoreline documented exceedances of the state drinking water criteria for specific conductivity (SC) and total dissolved solids (TDS) of 700 uS/cm and 500 mg/L, respectively. In well MW-201, SC and TDS exceeded criteria in two out of two sampling rounds, ranging to 1,300 uS/cm and 871 mg/L, respectively. In well MW-202, SC and TDS exceeded criteria in one out of three sampling rounds, ranging to 1,490 uS/cm and 978 mg/L, respectively.

3. As documented in the RI/FS, shoreline wells MW-201 and -202 also exceed drinking water criteria adopted by the Tacoma-Pierce County Health Department (Environmental Health Code, Chapter 3) for SC and TDS. These criteria are based on the state's standards and the exceedances mentioned above also apply to the local standards.

In general, the standard point of compliance for groundwater under MTCA is throughout the site from the top of the saturated zone extending vertically to the lowest point which could potentially be affected by the site. However, where the groundwater cleanup level is based on protection of surface water and the property containing the source of contamination abuts the surface water, a

conditional point of compliance may be defined that is located within the surface water as close as technically possible to the point or points where groundwater flows into the surface water (WAC 720(8)(d)(i)). Because the Site meets these criteria, the appropriate point of compliance for groundwater is defined as the point(s) where groundwater flows into surface water.

5.0 SCHEDULE

The Port will prepare a compliance monitoring plan to verify that the ground water meets the cleanup levels outlined in Table 2. The compliance monitoring plan will be reviewed and approved by Ecology. The plan will include testing for the following analytes: Petroleum hydrocarbons (DRO and ORO), and metals (arsenic, lead, copper, mercury, and zinc) and will be conducted quarterly. The port will test the two remaining wells (MW-201 and MW-202). The initial round of post-cleanup groundwater monitoring from MW-201 and MW-202 was completed on October 12, 2012; results from this round were presented in the RI/FS report (Hart Crowser 2012). Simplified data reports will be submitted to Ecology within 45 days of completion of each round. A final comprehensive summary report would be submitted within 60 days of completion of the final round.

6.0 INSTITUTIONAL CONTROLS

The Site is now a mitigation area providing restored native habitat for terrestrial plants and animals and aquatic organisms. The Port developed the Site to mitigate for habitat lost during construction of other Port-related projects; as such, the Port is required to maintain the Site as habitat indefinitely. A restrictive covenant filed with Pierce County (record number 201005260155) requires that the Site be used only for natural resources restoration and access for incidental maintenance of overhead electrical transmission lines.

7.0 APPLICABLE STATE AND FEDERAL LAWS

The overarching law that addresses the cleanup action at the Site is Washington's Model Toxics Control Act (MTCA) (Chapter 70.105D RCW) along with the MTCA cleanup regulations (Chapter 173-340 WAC). Specific laws and regulations that are most pertinent to the remaining cleanup action (groundwater monitoring) include MTCA Method A surface water cleanup levels (WAC 173-340-730[2]), state surface water standards (WAC 173-201A), federal water quality criteria under section 304 of the Clean Water Act, and federal

surface water criteria under the National Toxics rule (40 CFR Part 131). Also relevant are the state regulations pertaining to the construction and maintenance of monitoring wells (Chapter 173-160 WAC).

8.0 COMPLIANCE WITH MTCA

MTCA describes the minimum requirements and procedures for selecting cleanup actions. As detailed in the following paragraphs, the proposed cleanup action for the Site, groundwater monitoring, complies with the provisions of this section.

8.1 Threshold Requirements

WAC 173-340-360[2][a] requires that cleanup actions protect human health and the environment; comply with MTCA cleanup standards, including applicable state and federal laws; and provide for compliance monitoring.

As described in the RI/FS report (Hart Crowser 2012) and summarized above, the Port's cleanup action removed fill and impacted soil that exceeded cleanup levels and provided a potential source to groundwater and surface water. Post cleanup monitoring confirmed that the remaining soil/sediment meets cleanup levels and does not pose a risk to human health or the environment. Initial results indicate that source removal has reduced contaminants in groundwater to below state and federal levels for protection of surface water. The remaining proposed cleanup action is compliance monitoring to confirm that groundwater cleanup levels have been met.

8.2 Other Requirements

WAC 173-340-360[2][b] requires that when selecting from cleanup action alternatives that fulfill the threshold requirements, the selected action shall: a) Use permanent solutions to the maximum extent practicable; b) Provide for a reasonable restoration time frame; and c) Consider public concerns. As described in the following subsections, the Port's cleanup action at the Site fulfills these requirements.

8.2.1 Permanence

Under WAC 173-340-360[3][f][ii], permanence refers to the degree to which the alternative permanently reduces the toxicity, mobility or volume of hazardous substances, including the adequacy of the alternative in destroying the

hazardous substances, the reduction or elimination of hazardous substance releases and sources of releases, the degree of irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.

The Port's cleanup action removed fill and impacted soil that exceeded cleanup levels and provided a potential source to groundwater and surface water. The complete removal of contaminated fill and soil from the Site and its disposal in a permitted landfill is considered highly permanent.

8.2.2 Restoration Time Frame

The Port's cleanup action removed fill and impacted soil that exceeded cleanup levels and provided a potential source to groundwater and surface water. Post cleanup monitoring confirmed that the remaining soil/sediment meets cleanup levels and does not pose a risk to human health or the environment. Initial results indicate that source removal has reduced contaminants in groundwater to below state and federal levels for protection of surface water. The remaining proposed cleanup action is compliance monitoring to confirm that groundwater cleanup levels have been met. Because cleanup levels are expected to be met at the site, the MTCA requirement that the selected cleanup action achieve a reasonable restoration time frame has been met.

8.2.3 Consideration of Public Concern

Ecology will solicit public comments on the CAP and will modify the cleanup approach as appropriate to take into account public concerns.

9.0 REFERENCES

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