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Cleanup Action Plan

Cornet Bay Marina, Whidbey Island, Washington

15 July 2013

Prepared for

Washington State
Department of Ecology
Toxics Cleanup Program
3190 160th Avenue SE
Bellevue, Washington 98008-5452

K/J Project No. 1396010.00

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Section 1: Introduction

This Cleanup Action Plan (CAP) describes the proposed remediation approach at the Cornet Bay Marina site located at 200 Cornet Bay Road in Oak Harbor, Washington (site). This CAP has been prepared to satisfy the requirements of the Model Toxics Control Act (MTCA) regulations published in Washington Administrative Code (WAC) 173-340 (Ecology 2007). The site is listed on the Washington State Department of Ecology's (Ecology's) Site Information System and Hazardous Sites List as Deception Bay Marina (originally listed as Cornet Bay Marina). The site was assigned a hazard ranking of 5 by Ecology (Ecology 2002).

In January 1993, Ecology entered into a Consent Decree (No. 93-2-00018-3) with Mr. Milton A. Woods, owner of Cornet Bay Marina, to perform a Remedial Investigation and Feasibility Study (RI/FS) at the site. After completion of the RI/FS, the Consent Decree requires performance of a cleanup action to protect human health and the environment in accordance with MTCA regulations.

1.1 General Site Information

Site and project contact information are summarized below.

- **Site Location:** Cornet Bay Marina
  200 Cornet Bay Road, Oak Harbor, Washington 98277
  Ph: (360) 675-5411
  Currently "Deception Pass Marina, Inc."
  Owned and operated by Mr. Milton A. Woods

- **Site Cleanup:** Ecology Site Cleanup No. 2011
  Consent Decree No. 93-2-00018-3,
  established between Mr. Milton A Woods, doing business as (dba) Cornet Bay Marina Company and Ecology
  Effective Date of Decree: 12 January 1993

- **RI/FS Consultant:** Kennedy/Jenks Consultants
  32001 32nd Avenue South, Suite 100, Federal Way, WA 98001
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  Contact: Ty C. Schreiner, LG, LHg, Vice President
  Contract No. C1100140

- **Ecology Administration:**

  Ecology Project Coordinator: Jing Liu
  3190 160th Avenue SE, Bellevue, Washington 98008
  Project Coordinator Phone: 425-649-4310

1.2 Site Discovery and Regulatory Status

The Cornet Bay Marina and associated facilities, including a wooden bulkhead that measures about 330 feet long and separates the upland facilities (general store and parking areas) from the marina, were constructed in the 1960s.

Four underground storage tanks (USTs) were installed at the site in 1964, with a total capacity of 18,000 gallons of gasoline and 3,000 gallons of diesel. In January 1989, a release from ruptured underground fuel lines caused impacts to soil and groundwater behind the bulkhead. A hydrocarbon sheen that extended from the bulkhead was observed on the surface of Cornet Bay.

The USTs and piping were emptied and removed in April 1989. According to the removal documentation, the USTs were located in the same area as the current underground tank vault system [an aboveground storage tank (AST) contained in a below-ground vault], and the piping ran in approximately the same location as the current piping (directly from the vault to the bulkhead).

A limited soil investigation conducted by Roxbury Construction (Nelson 1990) indicated that ruptured underground fuel lines had caused the petroleum release. The four USTs were removed in March 1990 by Technical Services, Inc., under contract to Welch Enterprises. Soil from the tank excavation was reportedly placed back into the excavation. The tank removal activities are summarized in a report by Welch (1990).

The current underground tank vault system was installed within a portion of the former UST excavation in late 1990. Petroleum-containing soil and free product were observed in the excavation at that time. An unknown volume of petroleum-containing water from the excavation was pumped into a drainage ditch along Cornet Bay Road (Ecology 1990). Approximately 10,000 gallons of petroleum-containing groundwater was reportedly pumped out of the excavation and disposed offsite (Nelson 1990). In addition, an unknown volume of petroleum-containing soil was removed from the excavation and disposed offsite.

Test pits were excavated at four widely spaced locations onsite, and soil and groundwater samples were collected for analysis. Elevated concentrations of gasoline-range organics (GRO), diesel-range organics (DRO), and benzene, toluene ethylbenzene, and xylene (BTEX) constituents were detected at the locations sampled (Welch 1990).

After confirmation of the release, a Consent Decree for the site was established between Ecology and the Cornet Bay Marina site owner/operator in accordance with the requirements of MTCA to assess the extent and degree of gasoline and diesel impacts onsite (Ecology 1993). The scope of work outlined in the Consent Decree included completion of a RI/FS as directed by Ecology. Since the Consent Decree was signed in 1993, Ecology has conducted a series of investigations to assess the distribution of hydrocarbon-containing site media.

A draft FS report was prepared for the site in June 2008 by EA Engineering, Science, and Technology, Inc. (EA 2008). In August 2011, Ecology authorized Kennedy/Jenks Consultants to prepare an RI/FS Work Plan (Work Plan) to collect supplemental information regarding the distribution of impacted soil and groundwater, assess the potential for vapor intrusion at the onsite building, evaluate overall site conditions, perform an FS, and select a cleanup action for

the site (Kennedy/Jenks Consultants 2011a). The Work Plan was implemented from September through November 2011. In December 2011, Kennedy/Jenks Consultants prepared a Draft Remedial Investigation/Feasibility Study Report – Cornet Bay Site, Cornet Bay, Washington (Kennedy/Jenks Consultants 2011b).

Complete descriptions of the site history, environmental investigations, and remedial alternatives are provided in the final Remedial Investigation/Feasibility Study Report submitted in July 2013, (Kennedy/Jenks Consultants 2013).

1.3 Purpose of Cleanup Action Plan

As indicated above, the purpose of this report is to satisfy the requirements of WAC 173-340-380 and those established under the 1993 Consent Decree. This includes outlining the actions that will be taken to clean up the site and to provide sufficient information and direction for the engineering plans and specifications. In compliance with these requirements, this CAP:

- Describes the site, including a summary of the site history and extent of contamination known or suspected to exist at the site
- Identifies site-specific cleanup standards
- Summarizes the selected remedy evaluated in the FS
- Identifies the cleanup action work elements
- Summarizes applicable state and federal laws
- Summarizes the performance monitoring and confirmational monitoring that will be performed to demonstrate compliance with cleanup standards.

Section 2: Site Description

The Cornet Bay Marina is located at 200 Cornet Bay Road on Whidbey Island, on the southern side of Deception Pass (Figure 1). The Cornet Bay Marina property is located on Island County Tax Lot No. R13436-506-2420 (ID No. 45249) and C153-000-89-000 (ID No. 438262). The site is located at the northern end of Whidbey Island, Island County, in Section 25 of Township 34 North, Range 01 East. The upland portion of the marina is centered approximately at latitude 48.397640° longitude -122.626689°. The site is bounded on the west by Cornet Bay and on the east by Cornet Bay Road (Figure 2). Deception Pass State Park is north of and adjacent to the site. The tidelands adjacent to the site are privately owned, rather than property of Washington State.

Floating docks for boat moorage and a fuel dock make up the marina located west of the site, which is within Cornet Bay and opening to Deception Pass. Single-family residential homes on large lots lie east of the site, across Cornet Bay Road. A dry (upland) marine service facility belonging to Marine Services is located southeast of the site. Mudflats, including a small manmade excavated depression, are located south of the site on tidelands of Cornet Bay.

The site, which covers approximately 1.1 acres of upland area, includes a flat gravel parking area with a marina store near the western (water) side. An underground fuel tank vault is located on the eastern side of the site within a grassy area. A mounded septic leach field is located north of the tank vault on the western side. A covered shed area on the southern side of the property is used for waste oil storage.

The site was built on fill material that extends the road grade westward to a wooden piling-and-waler bulkhead wall that extends over the tidelands. A ramp extends from near the center of the bulkhead to the floating marina docks, including a fuel dock close to shore. A second ramp extends from the covered shed on the southern end of the property to additional floating docks.

The topography to the east rises on a slope of about 2 feet per foot (ft/ft) on average, with the slope increasing eastward. The site is located at the base of a hillside area that includes residential and other buildings to the east.

In general, no surface water bodies other than Cornet Bay are present onsite. On the northern side of the property, a small drainage pipe intermittently contains surface water and appears to convey surface water runoff from the eastern side of Cornet Bay Road. The drainage pipe discharges directly to Cornet Bay at approximately the high-water mark.

Section 3: Site Characterization

3.1 Geology/Hydrogeology

Soils have been investigated to a total depth of 30 feet below ground surface (bgs) at the site. Based on available information, shallow soils (less than 10 feet bgs) do not correlate well across the site. Shallow soils consist of heterogeneous fill material, including sand and silt with some gravel and clay, together with dredged sediment from nearby Cornet Bay. Below 10 feet bgs, soils consist predominantly of clay and silt. Soils located on the upland side of the wood bulkhead may be indicative of dredge material placed during past dredging activities.

The results of groundwater elevation monitoring indicate a consistent hydraulic gradient toward Cornet Bay, which appears to be influenced primarily by shallow groundwater recharge from upland areas located east of the site and surface water infiltration. The average gradient magnitude was 0.037 ft/ft for high tide and 0.041 ft/ft for low tide. Although groundwater elevation monitoring results indicate a degree of tidal influence, which is also supported by the results of continuous water level monitoring, the overall direction and magnitude of the hydraulic gradient does not appear to vary greatly with tidal changes. Furthermore, hydraulic mounding behind the bulkhead is not evident, and there is no indication of gradient reversal (i.e., a periodic gradient direction away from Cornet Bay toward the site).

3.2 Site Investigations

From 1995 through 2005, Ecology performed a series of investigations at the site to characterize the distribution of soil and groundwater affected by the release (soil sampling and monitoring well locations are shown on Figure 3). Kennedy/Jenks completed an additional upland investigation in 2011. Historical analytical results for samples collected during previous investigations are summarized in the Remedial Investigation/Feasibility Study Report (Kennedy/Jenks Consultants 2013).

The principal objectives of the additional investigations in 2011 were to characterize the nature and extent of chemically affected upland soil and groundwater at the site and to evaluate the potential risks those chemicals pose to human health and the environment. Additionally, the vapor intrusion (VI) exposure pathway was evaluated to determine whether chemicals present in the soil and groundwater could affect indoor air quality within the site buildings.

The phases of site investigations are summarized below.

3.2.1 November 1995

In November 1995, Ecology advanced 10 soil borings (B1 through B10) and collected soil samples at the site. Reconnaissance groundwater samples (BW3 and BW9) were also collected from several soil borings. At several locations sampled, GRO and DRO were detected at concentrations exceeding the current MTCA Method A cleanup levels for groundwater of 800 micrograms per liter (µg/L) for GRO and 500 µg/L for DRO. The highest concentrations of GRO and DRO were detected in the soil from borings B3 and B8 (see Figure 3).

Additionally, a surface water sample from Cornet Bay (near the bulkhead) was collected and analyzed for DRO and GRO. Concentrations of GRO and DRO were detected at 860 µg/L and up to 1,400 µg/L, respectively.

3.2.2 October 1996

In October 1996, Ecology advanced three soil borings (B11 through B13) and collected soil samples at the site (refer to Figure 3). Additionally, Ecology installed three groundwater monitoring wells at the site:

- MW-1 (screened from 10 to 25 feet bgs)
- MW-2 (screened from 5 to 25 feet bgs)
- MW-3 (screened from 5 to 20 feet bgs) (Ecology 1996).

Ecology sampled these monitoring wells in November 1996. Concentrations of GRO, DRO, and benzene exceeded the MTCA Method A cleanup levels for groundwater in samples collected from wells MW-2 and MW-3. At well MW-3, concentrations of GRO and DRO in groundwater were detected at 24,000 µg/L and 98,000 µg/L, respectively. Additionally, concentrations of benzene in groundwater were detected in well MW-2 at 16,400 µg/L, above the MTCA Method A cleanup level for groundwater of 5 µg/L.

3.2.3 June 2003

In June 2003, Ecology advanced and sampled 10 direct-push borings (DP1 through DP10) at the site (Ecology 2003). GRO, DRO, and BTEX were detected at concentrations above MTCA Method A cleanup levels in areas where elevated hydrocarbon concentrations had been detected during the 1995 investigation.

Concentrations of GRO, DRO, and benzene exceeded MTCA Method A cleanup levels for groundwater in samples collected from wells MW-2 and MW-3 for each sampling event (Ecology 1996, Ecology 2003, Ecology 2005). DRO has been the only petroleum hydrocarbon constituent detected in samples collected from well MW-1, which is screened below the water table [below the potential light non-aqueous phase liquid (LNAPL) interface]. At well MW-2, concentrations of GRO and DRO were detected in 2003 at 21,300 µg/L and 127,000 µg/L, respectively.

During this investigation, hydrocarbon sheen was observed in surface water of Cornet Bay, extending about 3 feet out from the northern edge of the bulkhead.

3.2.4 2005

In April and June 2005, EA advanced and sampled three hand-auger borings (HA-1 through HA-3) and eight direct-push soil borings (GP-1 through GP-8) to investigate petroleum hydrocarbon impacts at the site. The results of this work were presented in the Investigation Report (EA 2005) and a subsequent letter to Ecology that summarized the results of these field investigations (EA 2006). Except for the bulkhead area, the results of these investigations

indicated that soil and groundwater impacts appeared to be generally confined to the site. GRO and DRO concentrations were below MTCA Method A cleanup levels around the perimeter of the site, with the exception of hand-auger boring HA-3, where DRO concentrations in a grab groundwater sample were elevated slightly above cleanup levels. Because this sample was collected hydraulically upgradient of the marina, it can likely be attributed to an offsite source to the south and east.

Also in 2005, Ecology conducted its Screening Survey for Petroleum Contaminants at the Cornet Bay Marina (Island County) (Ecology 2005). Groundwater, surface water, and sediment samples were collected to determine whether petroleum hydrocarbons were migrating into intertidal areas of Cornet Bay. Concentrations of GRO, DRO, and benzene were detected in the samples from wells MW-2 and MW-3 at concentrations exceeding MTCA Method A cleanup levels. The concentrations of petroleum hydrocarbon compounds detected in the sample from well MW-1 (with the screened section completed below the water table) were below MTCA cleanup levels.

Samples of surface water runoff were collected from apparent freshwater drainages located on the northern and southwestern borders of the site; petroleum hydrocarbon compounds were not detected in either sample. Lead was detected at concentrations up to 0.096 µg/L, and ortho-xylene at concentrations up to 1.1 µg/L.

Sediment samples collected along the bulkhead did not show evidence of impacts from BTEX, GRO, or DRO, with the exception of one location at the southern end of the bulkhead that contained low levels of BTEX and DRO (Ecology 2005). Concentrations of PAHs in four of the six sediment samples collected along the bulkhead exceeded cleanup screening levels established under WAC 173-204 (Ecology 1995), suggesting that sediment contains creosote from the timber bulkhead, but was not affected by the fuel release onsite.

3.2.5 2006

In May 2006, LNAPL was observed in monitoring wells MW-2 and MW-3, and sheen was noted seeping from the bulkhead at the southern side of the store (EA 2008). Groundwater samples were collected and analyzed from the monitoring wells, and petroleum hydrocarbon concentrations were consistent or higher than the previous sampling event in 2005.

Additionally in 2006, EA collected one shallow sediment sample for petroleum hydrocarbon analysis. This sample contained no detectable concentrations of GRO or DRO.

In June 2006, EA excavated five test pits (TP1 through TP5) to identify soil types and investigate the possible presence of LNAPL on the water table. Groundwater was encountered from approximately 4 to 6 feet during the test pit excavations, and LNAPL was encountered in three of the five excavations (see Figure 3). Strong odors, sheens, and/or elevated photoionization detector (PID) readings were also noted (with the exception of test pit TP4) during the investigation (EA 2007).

In September 2006, sheen was again observed on the surface of Cornet Bay, and two surface water samples were collected to evaluate petroleum hydrocarbon impacts adjacent to the site. The sampling included one background surface water sample from Cornet Bay and one sample from an area exhibiting visible sheen. Concentrations of GRO and DRO were detected in the sheen sample at 85.4 µg/L and 386 µg/L, respectively.

3.2.6 2011 Remedial Investigation

The principal objectives of the supplemental RI activities conducted from September through November 2011 were to fill data gaps from previous investigations, as needed, and to confirm the current distribution of affected site media (soil and groundwater). The proposed RI activities are presented in the Work Plan (Kennedy/Jenks Consultants 2011a). In summary, the following activities were completed:

- Installation of 67 direct-push soil borings (B-1 through B-67) and collection and analysis of 84 soil samples and nine reconnaissance groundwater samples
- Installation, development and sampling of seven new shallow monitoring wells (MW-4 through MW-10)
- Sampling of groundwater in the three existing monitoring wells (MM-1, MW-2, and MW-3)
- Collection of two soil gas samples (VP-1 and VP-2) in the vicinity of the existing building to evaluate possible vapor intrusion
- Assessment of hydraulic conditions at the site, including measuring water levels at both high and low tide stages, performing continuous water level monitoring in five onsite wells, and performing slug tests to evaluate aquifer characteristics in the shallow (uppermost) formation.

Because previous investigations concluded that sediment and surface water adjacent to the site had experienced no significant impacts, further assessment of these media was not performed during supplemental RI activities. For a detailed description of the procedures used to perform this supplemental RI, refer to the Work Plan (Kennedy/Jenks Consultants 2011a).

The results of the 2011 investigations are summarized below and discussed in detail in the Remedial Investigation/Feasibility Study Report (Kennedy/Jenks Consultants 2013).

3.2.6.1 Soil Investigation

The primary objective of the soil investigation was to characterize the vertical and horizontal distribution of chemicals of concern (COCs) at the site.

The distribution of site soils containing hydrocarbon compounds at concentrations exceeding MTCA Method A soil cleanup levels for unrestricted land use was established using additional data from the 2011 investigation (see Figure 4). The primary COCs exceeding cleanup levels

include gasoline-range hydrocarbons and benzene. In general, the approximate footprint of petroleum-affected soils covers about 0.8 acre, or 70 to 75 percent of the property.

In general, petroleum-affected soils are typically encountered within 2 feet to 5 feet of the ground surface and extend to approximately 5 feet to 12 feet below grade, but these depths vary with proximity to the bulkhead. The thickness of impacted soils is generally greatest in the central portion of the site and adjacent to the northern portion of the bulkhead. The thickness of petroleum-affected soils generally thins toward Cornet Bay Road and toward the northeastern and southwestern portions of the site.

Concentrations of total carcinogenic PAHs are well below MTCA Method B soil cleanup levels.

Results of metals analyses indicate lead or other metals analytes were not detected at concentrations above MTCA Method A/B residential soil cleanup values. The detected chromium concentrations ranged from 16 to 47 milligrams per kilogram (mg/kg). Seven of the eight samples submitted for chromium analysis contained total chromium at concentrations exceeding the MTCA Method A cleanup level for hexavalent chromium of 19 mg/kg. While no speciation of chromium was performed as part of these analyses, there does not appear to be a source for hexavalent chromium at the site. Furthermore, the detected chromium concentrations fall within the range of background concentrations measured in Puget Sound, where the maximum background concentration was 235 mg/kg (Ecology 1994).

3.2.6.2 Groundwater Investigation

During performance of supplemental RI activities, groundwater samples were collected from nine reconnaissance borings and 10 new or existing monitoring wells.

GRO concentrations ranged from below detectable levels (<250 µg/L) to 3,400 µg/L; the highest GRO concentration in a completed monitoring well (MW-4) was 3,400 µg/L. DRO concentrations ranged from below detectable levels (<100 µg/L) to 3,600 µg/L, which was detected in reconnaissance groundwater sample from boring B-21. Benzene concentrations ranged from below detectable levels (<1 µg/L) to 4,000 µg/L, which was detected in a sample from monitoring well MW-2.

In addition to GRO, DRO, and benzene, other gasoline components (toluene, ethylbenzene, and xylenes) were also detected in groundwater samples from the site. The range of concentrations of these compounds is as follows:

- Toluene -- ranged from below detectable levels (<1 µg/L) to 170 µg/L
- Ethylbenzene – ranged from below detectable levels (<1 µg/L) to 1,200 µg/L
- Total xylene – ranged from below detectable levels (<1 µg/L) to 1,752 µg/L.

Dibenzofuran,1-methylnaphthalene, 2-methylnapthalene, and total and dissolved arsenic were detected in groundwater at concentrations exceeding MTCA Method B surface water cleanup levels. The source of these compounds at the site is not certain; however, they may be present in coal tar and creosote products. Therefore, the anticipated source of these compounds at the site is likely the creosote-treated bulkhead. Total and dissolved arsenic concentrations

[detected at a maximum concentration of 0.18 milligram per liter (mg/L) in well MW-7] appear to be indicative of naturally occurring background concentrations. Total or dissolved arsenic was not detected in other site wells above the laboratory reporting limit of 0.05 mg/L. All carcinogenic PAHs were reported at concentrations below the laboratory reporting limit.

3.2.6.3 Soil Vapor Sampling

Soil vapor samples were collected as grab samples from two locations at the site, VP-1 and VP-2, shown on Figure 3. Aliphatic hydrocarbons in the C_5 to C_8 range were detected at concentrations of 30,000,000 and 19,000,000 micrograms per cubic meter ($\mu g/m^3$) in samples VP-1 and VP-2, respectively. Additionally, aliphatic compounds in the C_9 to C_{12} range were detected at concentrations of 690,000 and 680,000 in samples VP-1 and VP-2, respectively. The concentrations of aliphatic hydrocarbons detected in the soil vapor samples exceed the MTCA Method B screening level for shallow soil vapor of 2,700 $\mu g/m^3$ for the C_5 to C_8 range and 140 $\mu g/m^3$ for the C_9 to C_{12} range.

Benzene was detected at 1,400,000 and 780,000 $\mu g/m^3$ in vapor samples VP-1 and VP-2, respectively. These concentrations exceed the MTCA Method B screening level for shallow soil vapor of 0.32 $\mu g/m^3$. The detected ethylbenzene concentrations of 120,000 and 130,000 $\mu g/m^3$ in samples VP-1 and VP-2, respectively, exceeded the MTCA screening level for shallow soil vapor is 457 $\mu g/m^3$. Total xylenes were also detected at 14,000 and 16,000 $\mu g/m^3$, respectively, in the vapor, exceeding the MTCA Method screening level for shallow soil vapor of 46 $\mu g/m^3$.

3.3 Areas Requiring Cleanup

During performance of the RI, several COCs were detected at concentrations above applicable site cleanup levels. Although some constituents such as toluene, ethylbenzene, toluene, and lead were detected in soil and/or groundwater at concentrations above cleanup levels, gasoline-range hydrocarbons and benzene are the primary COCs that warrant remediation. For purposes of the alternative evaluation, it is assumed that remediation of gasoline-range hydrocarbons and benzene in soil and groundwater will also remediate other COCs to acceptable site cleanup levels.

3.3.1 Soil

The primary COCs exceeding soil cleanup levels include gasoline-range hydrocarbons and benzene. The current distribution of site soils exceeding the MTCA Method A cleanup levels (unrestricted land use) for gasoline-range hydrocarbons and benzene is shown on Figure 4. The lateral extent of petroleum-containing soils for both gasoline-range hydrocarbons and benzene is lower than for benzene alone. The area of petroleum-containing soils is estimated at approximately 0.8 acre (34,850 square feet).

Petroleum-containing soils at the site consist primarily of fill material and do not appreciably extend into the upper portion of the native materials underlying the fill. In general, petroleum-affected soils are encountered from a few feet below grade to 12 feet bgs, but extend down to 18 feet bgs at some locations, particularly in the western portion of the site (adjoining Cornet Bay) near the bulkhead.

Laboratory analytical results and field screening information (i.e., visually stained soils, odor, and sheen) were used to estimate the volume of assumed clean overburden and petroleum-affected soils. The estimated volumes, as presented in the Remedial Investigation and Feasibility Study Report (Kennedy/Jenks Consultants 2013) are as follows:

- Assumed clean overburden – 6,700 cubic yards
- Petroleum-affected soils – 8,400 cubic yards.

3.3.2 Groundwater

In general, the distribution of petroleum hydrocarbon compounds in groundwater is consistent with the extent of petroleum-affected soils at the site. Similarly to petroleum-affected soils, the lateral extent of benzene impacts is greater than gasoline-range hydrocarbon in groundwater. Assuming an area of 34,850 square feet, an average groundwater zone of 7 feet, and total porosity of 25 percent (consistent with fine-grained soils), the volume of petroleum-affected groundwater is estimated to be approximately 460,000 gallons (Kennedy/Jenks Consultants 2013).

Section 4: Proposed Cleanup Action

4.1 Cleanup Standards

The objective of the cleanup action is to reduce potential risks to human health and the environment. Because the site is zoned as RV (rural village use) the proposed soil cleanup standards must be protective of unrestricted land use.

Specific risk-based cleanup objectives include:

- Reduce the potential for human contact or exposure to vapors (primarily vapor intrusion into buildings) associated with soil containing COCs at concentrations exceeding the selected cleanup levels.
- Reduce the potential for impacts to terrestrial and aquatic organisms in the vicinity of the site.
- Protect groundwater and surface water quality by addressing the source hydrocarbons to the extent required to limit their mobility in the environment.

The cleanup standards for soil and groundwater include:

- MTCA Method A soil cleanup levels for unrestricted land use. For those compounds where MTCA Method A levels may not be available, soil cleanup levels will be based on MTCA B values.
- For groundwater and surface water, MTCA Method A values for fuel components (GRO, DRO, and BTEX) will be used. Because groundwater at the site is not used for drinking water and discharges directly to surface water, MTCA Method B surface water standards for all other compounds will be protective of both groundwater and surface water.
- For the vapor intrusion exposure route, cleanup levels will be based on MTCA Method B air cleanup level values as presented in Ecology's Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology 2009).

4.1.1 Justification for Cleanup Levels

MTCA Method A or Method B soil cleanup levels are protective of human exposure (direct contact pathway) and protective of groundwater and surface water. Groundwater cleanup levels selected for the site are based on a combination of MTCA Method A groundwater cleanup levels for fuel components (GRO, DRO, and BTEX) and MTCA Method B surface water standards for all other compounds. MTCA Method A groundwater cleanup levels for GRO, DRO, and BTEX were selected for fuel components because they are the most applicable and protective standards for gasoline-range and diesel-range hydrocarbon compounds (including BTEX). However, because site groundwater discharges directly to surface water, use of MTCA Method B surface water standards for all other compounds will be protective for human health

and the environment. MTCA allows the use of potable drinking water standards for non-potable water when these standards are protective of human health and the environment and completion of a site-specific risk assessment is not warranted.

4.1.2 Points of Compliance

The point of compliance, based on the expected exposure route, is the point (or points) where cleanup levels established for the site are to be achieved. The points of compliance for site media were established as follows:

- Soil: Throughout the site to a depth of 15 feet bgs for direct contact.
- Soil: Throughout the site to the depth of groundwater for groundwater protection and protection of terrestrial ecological receptors.
- Groundwater: Typically, the groundwater point of compliance is throughout the site unless a conditional point of compliance is approved by Ecology because it is not practicable to meet the cleanup level throughout the site within a reasonable restoration timeframe. Groundwater is not a potable water source at the site, and protection of surface water and sediments is the primary objective. Therefore, the point of compliance will be throughout the site in groundwater and in surface water as close as technically possible to the point where groundwater flows to surface water. This will be assessed in monitoring wells located onsite, including wells located directly adjacent to the point where groundwater discharges to surface water.
- Surface Water: In general, no surface water bodies other than Cornet Bay are present or in proximity to the site. On the northern side of the property, a small drainage pipe intermittently contains surface water and appears to convey surface water from the eastern side of Cornet Bay Road. The drainage pipe discharges to Cornet Bay at approximately the high-water mark. The point of compliance for surface water will be in Cornet Bay.
- Ambient Air: The point of compliance for air will be throughout the site.

4.2 Applicable and Relevant and Appropriate Requirements

MTCA requires that cleanup actions comply with applicable state and federal requirements [WAC 173-340-360(2)]. MTCA defines applicable state and federal laws to include “legally applicable requirements” and “relevant and appropriate requirements” (ARARS). ARARS for implementation of this cleanup action include:

Federal Requirements

- Clean Water Act (Section 404)
- Resource Conservation and Recovery Act (RCRA)
- Occupational Safety and Health Act (29 CFR 1910)
- Rules for Transport of Hazardous Waste (29 CFR 107, 49 CFR 171)

- Safe Drinking Water Act
- National Pollutant Discharge Elimination System (NPDES)

State Requirements

- Model Toxics Control Act (WAC 173-340)
- Dangerous Waste Regulations (WAC 173-303)
- Minimum Standards for Construction and Maintenance of Wells (WAC 173-160)
- State Clean Air Act (RCW 70.94)
- Washington Industrial Safety and Health Act Regulations (WAC 296-62)
- Water Pollution Control Act (RCW 90.48)
- Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A)
- Water Quality Standards for Groundwater of the State of Washington (WAC 173-200)
- Maximum Environmental Noise Levels (WAC 173-60)
- Shoreline Management Act of 1971 (RCW 90.58)

Local Requirements

- Island County Shoreline Development review
- Island County Plumbing and Mechanical review
- Puget Sound Clean Air Agency Regulations.

All actions carried out by Ecology or Ecology's contractor must be performed in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits, except as provided in RCW 70.105D.090. The permits or other federal, state, or local requirements that the agency has determined are applicable and that are known at this time are listed above. Under RCW 70.105D.090(1), Ecology and its consultants are exempt from the procedural requirements of Chapters 70.94, 70.95, 70.105, 77.55, 90.48, and 90.58 RCW and of any laws requiring or authorizing local government permits or approvals. However, Ecology and its consultants shall comply with the substantive requirements of such permits or approvals.

During remedial action, Ecology and its consultants must continue to determine whether additional permits or approvals addressed in RCW 70.105D.090 (1) would otherwise be required for the remedial action under the Consent Decree. Ecology will be responsible for contacting the appropriate state and/or local agencies and working with those agencies to determine the substantive requirements those agencies believe are applicable to the remedial action. Pursuant to RCW 70.105D.090(2), in the event Ecology determines that the exemption from complying with procedural requirements of the laws referenced in RCW 70.105D.090 (1) would result in the loss of approval from a federal agency that is necessary for the State to administer any federal law, the exemption will not apply and Ecology and its consultants will comply with both the procedural and substantive requirements of the laws referenced in RCW 70.105D.090 (1) including any requirements to obtain permits.

4.3 Selected Remedial Alternative

The Remedial Investigation/Feasibility Study Report (Kennedy/Jenks Consultants 2013) identified alternatives for addressing site conditions using the requirements and expectations established in MTCA (WAC 173-340-360). MTCA recognizes that treatment may not be practicable for all sites. Treatment is required, wherever practicable, for sites containing liquid wastes, areas contaminated with high concentrations of hazardous substances, highly mobile materials, or discrete areas of hazardous substances that lend themselves to treatment.

MTCA also recognizes that engineering controls (such as containment, caps, and covers) are appropriate for sites or portions of sites that contain large volumes of materials with relatively low levels of hazardous substances where treatment is impracticable [WAC 173-340-370(3)]. For sites located adjacent to surface water bodies, Ecology expects that active measures will be taken to prevent/minimize releases to surface water and groundwater at concentrations above cleanup levels [WAC 173-340-370 (6)].

Based on the considerations provided above, the following alternative was selected for this site.

Alternative 1: Excavation and Off-Site Disposal

This alternative involves replacing the existing timber bulkhead with a steel sheet pile wall, excavating and disposing of impacted soils offsite, *in situ* bioremediation through strategic placement of biologically amended backfill, and groundwater compliance monitoring. This alternative includes the following elements (see Figure 5):

- Site preparation activities will include, but will not be limited to, obtaining permits [e.g., 404 Water Quality Permit, National Pollutant Discharge Elimination System (NPDES), grading, etc.], and waste profiling and designation.

- The store, waste oil storage building (including two aboveground waste oil tanks), and site utilities will be temporarily relocated onsite. Temporary sanitary facilities will be provided when the septic tank is removed. The mounded drainfield and existing fuel system underground reinforced concrete vault will remain undisturbed. Seven of the existing monitoring wells (MW-1, MW-2, MW-3, MW-5, MW-6, MW-8, and MW-10) will be abandoned prior to excavation activities.

- The existing timber bulkhead consisting of pilings, walers, and supports will be demolished and removed at the base of the excavation or mudline in Cornet Bay. The wood may be recycled or, if deemed to contain creosote, disposed of as a non-hazardous waste at a licensed Subtitle D landfill facility. The sheet pile wall will be installed parallel to the existing timber bulkhead extending approximately 330 feet along the shoreline. Water quality monitoring (i.e., turbidity sampling) will be performed during remediation activities performed adjacent to the waterway.

- The excavation area includes the area where soil concentrations exceed MTCA Method A soil cleanup levels for gasoline-range hydrocarbons and benzene. Excavation depths are estimated to be between approximately 2 and 18 feet bgs, depending on the site location. The total volume of excavated material is estimated to be 15,100 cy and includes the following:

  - Assumed clean overburden will be temporarily stockpiled onsite for potential re-use as backfill. Representative soil samples of the stockpiled material will be submitted for chemical analysis and subsequent re-use evaluation (i.e., comparing laboratory analytical results to applicable MTCA criteria). The volume of clean overburden is estimated to be 6,700 cy.

  - Affected soils will be removed to the maximum extent practicable. Final configuration of the excavation area will be based on physical constraints and performance monitoring (soil sampling) results using a mobile and fixed laboratory. The affected soil will be transported and disposed of at a licensed Subtitle D landfill facility as a non-hazardous waste. The volume of impacted soils is estimated to be 8,400 cy.

- Dewatering will be performed during excavation activities, with the water treated via a temporary onsite constructed groundwater treatment system consisting of particle separation (gravity settling in weir tanks and bag filtration) and granular-activated carbon. The treated water will be discharged directly to the bay under an NPDES permit. Sampling and chemical analysis will be performed to confirm that discharge requirements are met.

- After receipt of favorable performance monitoring results, the excavation will be backfilled to existing grade with stockpiled overburden soil deemed acceptable for re-use and imported clean fill. The volume of imported clean fill is estimated to be 8,400 cy.

- A portion of the imported backfill will be amended with oxygen-releasing compound (or equivalent) to promote biological degradation of residual petroleum hydrocarbons. The amended backfill will be placed strategically along side slopes and the floor of the excavation in areas where affected soils may be inaccessible to further excavation. The volume of imported fill amended with the biological amendment is estimated to be 1,500 cy.

- The new steel sheet pile wall will be designed to prevent upgradient accumulation of groundwater by installing an infiltration system that conveys groundwater around the ends of the wall.

- The temporary relocated store, waste oil storage building (including two above-ground waste oil tanks), site utilities, and septic tank will be restored. Other restoration activities will be completed to return the property to its original functionality.

Three new groundwater monitoring wells will be installed to supplement the existing monitoring well network (MW-4, MW-7, and MW-9). Quarterly confirmational groundwater monitoring will be conducted for at least one year to assess the effectiveness of remediation activities (including biological degradation of petroleum residuals) and evaluate groundwater quality. Groundwater samples will be analyzed for gasoline and diesel-range hydrocarbons, BTEX, and natural attenuation parameters.

For this alternative, it is estimated that soil and groundwater cleanup levels will be attained within 1 year after completion of cleanup activities. The estimate is based on the following assumptions:

- Approximately 95 percent of the contaminant mass will be removed from the site via excavation and offsite disposal of affected soils.

- Petroleum hydrocarbon residuals (if any) will be naturally attenuated or biologically degraded after removal of impacted soils and site restoration.

Compliance monitoring, including sampling during and after construction activities (see Section 7), will assist in determining the need for institutional controls as part of the closure process. No soil or groundwater use restrictions are anticipated for site closure. Institutional controls are not anticipated for the closure of this site.

Section 5: Cleanup Action Rationale

The selected cleanup action is designed to accomplish the following:

Protect Human Health and the Environment - Soil containing petroleum hydrocarbons and benzene above proposed cleanup levels will be removed from the site. Removing petroleum hydrocarbon-containing soil from the site will eliminate human health risks (e.g., dermal contact, ingestion and inhalation of soil particulates, vapor intrusion into site buildings) for this type of site use. These actions will also reduce future impact to groundwater beneath the western portion of the site and minimize (and possibly eliminate) the potential of affected soils remaining onsite to leach to groundwater. Enhanced biodegradation via the application of an oxygen-releasing compound will accelerate the natural attenuation of groundwater COCs in the western portion of the site.

Comply with Cleanup Standards per WAC 173-340-700 through 760 – This alternative is designed to achieve cleanup levels throughout the site. See Section 6 for further details.

Comply with Applicable State and Federal Laws per WAC 173-340-710 – The cleanup action will comply with relevant laws and requirements as required in WAC 173-340-710. Through the Consent Decree that implements this CAP, Ecology will ensure that the cleanup action meets the substantive requirements of all state and local permits that apply to this project. Applicable state and federal laws are summarized in Section 4.

Provide Compliance Monitoring per WAC 173-340-410 – Performance monitoring soil sampling will be conducted during excavation activities to assess the effectiveness of the source removal. Compliance groundwater monitoring to assess the effectiveness of the source removal and evaluate groundwater quality will be performed after completion of the remedial action.

Use Permanent Solutions to the Maximum Extent Practicable per WAC 173-340-360(3) – A permanent solution is a cleanup action in which cleanup standards of WAC 173-340-700 through 173-340-760 can be met without further action being required at the site, or any other site involved with the cleanup action, other than the approved disposal of any residue from the treatment of hazardous substances (WAC 173-340-200). The selected alternative involves removing the source material from the entire site by excavation and transport offsite for landfill disposal. Residual petroleum, if any, will be biologically degraded, enhanced by the introduction of an oxygen-releasing compound. Biological treatment is irreversible.

Long-Term Effectiveness – Long-term effectiveness [WAC 173-340-360(3)(iv)] is measured in terms of the magnitude of residual risk and the adequacy and reliability of the cleanup action. Excavation of affected soils removes more than 95 percent of the contaminant mass from the site. Installation of the sheet pile wall will serve as a containment measure. Petroleum residuals, if any, will be biologically degraded via strategically placed amended backfill. Excavation permanently removes contaminated soils from the site. The long-term effectiveness of the licensed landfill facility is expected to be adequate.

Confirmational monitoring will be used to demonstrate the long-term effectiveness of the cleanup action.

Short-Term Effectiveness – Short-term effectiveness [WAC 173-340-360(3)(v)] considers how the cleanup action will affect human health and the environment during implementation and prior to achievement of cleanup standards. The cleanup action will involve earthmoving and excavation activities that will disrupt affected soil and create the potential for producing fugitive dust and/or organic vapors. Risks will be present for construction workers due to potential contact with petroleum-affected media during removal of the existing timber bulkhead, installation of sheet pile wall, and excavation/dewatering activities. The potential also exists for unintentional offsite transport of affected soil by vehicles. These potential impacts will be mitigated by the use of personal protective equipment, implementing dust control and surface water runoff control measures, and decontaminating vehicles and equipment prior to leaving the site.

Contaminant runoff could occur during rain events. Stockpiled soils will require daily cover with plastic to reduce the potential for contaminant runoff.

Soil cleanup levels will be attained after excavation of affected soils throughout the site. With source mass removal, it is that estimated groundwater cleanup levels will be attainted immediately, but complete remediation could require up to 1 year.

Permanent Reduction of Toxicity, Mobility, or Volume – Removal of petroleum hydrocarbon-impacted soil and associated free product to an offsite permitted landfill facility is a permanent measure to reduce toxicity, mobility, and volume of contamination onsite. Remediation of site groundwater via enhanced biodegradation of residual soils will also permanently reduce the toxicity and volume of affected groundwater, especially after the removal of petroleum hydrocarbon-containing soil.

Ability to be Implemented – The selected cleanup action involves conventional technologies that should be implemented easily. Adequate offsite facilities, services, and materials are available to complete the project. The dry (recreational) season is more suitable for construction activities, and portions of the remediation activities will require completion during the fishing season. The remediation activities completed adjacent to the waterway (e.g., demolition, excavation) will require scheduling and traffic control for soil transport. Excavation activities will be completed in stages to provide continued access to the marina.

Cleanup Cost – The cleanup cost for the selected alternative is the highest of the three alternatives presented on the Remediation Investigation/Feasibility Study Report, dated July 2013 (Kennedy/Jenks Consultants 2013).

Consideration of Public Concerns – This CAP will be provided to the public for a 30-day comment period. Ecology will consider public comments received and prepare a summary of responses.

Section 6: Cleanup Action Work Elements

6.1 Engineering Plans and Specifications Preparation

Engineering plans and specifications will be developed to provide details of the cleanup action and to serve as a basis for contractor bidding. The remediation work will be bid in accordance with Ecology's current contractor procurement process.

6.2 Permitting and Public Notice

Ecology will coordinate with relevant federal, state, and local agencies regarding permits needed for the cleanup action. In most cases, Ecology is not required to obtain permits, but will need to meet the substantive requirements of the permits.

Public notice and participation will be provided in accordance with WAC 173-340-600. The RI/FS and CAP will be available for public review and comment. The comment period will be a minimum of 30 days, and a public meeting will be held if ten or more persons request such a meeting.

6.3 Construction Mobilization

The following activities are projected to be part of the construction mobilization:

- Prepare plans, including Health and Safety Plan, Work Plan and a Construction Stormwater Pollution Prevention Plan (SWPPP).
- Provide temporary utilities, including power and sanitation.
- Place a temporary work trailer at the site or a nearby adjacent property (State Park to the north, if possible).
- Place signs announcing the construction activities.
- Construct clean soil and contaminated soil holding and transport areas.
- Construct a decontamination facility for site equipment and construction personnel.
- Mobilize equipment and materials to the site.
- Construct erosion and sedimentation control best management practices for upland areas and a silt curtain for in-water work.
- Install temporary construction fencing to prevent access to work areas.

6.4 Phases of Work

A project construction sequence has been prepared to present the phases of work involved in implementing the selected remedy.

For purposes of the construction project, the site has been divided into two areas: Cell 1 and Cell 2. Cell 1 consists of the southern and western portion of the site, and Cell 2 consists of the northern and eastern portion of the site (see Figure 6). Depending on conditions encountered, it is not expected that the fuel storage facility will be demolished for the cleanup excavation. If petroleum-affected soils are not encountered below the fuel storage facility, it will be left in place and braced to prevent tipping from an unbalanced loading.

This project will be constructed in phases so that access to the boat dock and slips can be maintained continuously during construction. Operation of the store will be postponed during construction activities and resumed after completion of the remedial action. These phases are summarized as follows:

- Phase 1 – Demolish all onsite utilities interfering with the remedial action and provide temporary replacement for construction to continue with later phases of work, including new utility access to the docks and slips. Do not demolish utilities that do not interfere with the remediation work.

- Phase 2 – Construct a new steel sheet piling bulkhead wall on the waterward side of the existing wood bulkhead.

- Phase 3 – Complete Cell 1 remediation, including excavation and transportation of contaminated material to an approved landfill for final disposal. Import clean fill, backfill it into the excavation area, and compact to specifications.

- Phase 4 – Move the existing building and ancillary facilities to Cell 1.

- Phase 5 – Prepare for construction of Phase 6. Demolish the building foundation, septic tank, and utilities. Reconnect water with temporary piping for construction activities. Install temporary gasoline and diesel piping from the existing fueling tanks to the dock dispensers and a temporary power feed to docks.

- Phase 6 – Complete Cell 2 remediation, which includes excavation and transportation of affected material to an approved landfill for final disposal. Import clean fill, backfill it into the excavation area, and compact to specifications.

- Phase 7 – Construct a new foundation and septic tank for the moved building. Provide utilities in the location to support the move of the building onto the new foundation. Move the building onto the new foundation and connect the utilities. Install double-contained piping for all fuel lines back to the dock. Replace the dock access walkways to current code requirements. Construct a new guardrail along the new bulkhead. Replace existing marina items that were removed during previous phases of construction with new items, as appropriate.

Section 7: Compliance Monitoring

A Compliance Monitoring Plan (CMP) as specified in WAC 173-340-410 will be prepared as part of the remedial design phase. A Sampling and Analysis Plan (SAP) meeting the requirements of WAC 173-340-820 will be included in the CMP. The SAP will identify the soil and groundwater sampling frequencies and analytical tests to be performed during cleanup activities (protection and performance monitoring) and for the duration of the compliance period (confirmational monitoring).

Monitoring wells may be demolished during construction activities. A portion of those wells will be replaced with new wells in similar locations as needed for monitoring needs (see Figure 5). Soil and groundwater testing are summarized below, with more detail to be provided in the CMP after completion of the remedial design.

7.1 Protection Monitoring

Health and safety measures are required for those individuals working at and visiting the site. The construction contractor will prepare a site Health and Safety Plan. Health and safety measures, including any protection monitoring necessary during construction activities, will be described in the Health and Safety Plan.

7.2 Performance Monitoring

Performance monitoring to be completed during construction activities will include soil screening and sampling. Excavation areas will be sampled, including sidewalls and bottom of the excavation. Sampling frequency will be determined in the CMP as part of the remedial design.

Grab soil samples from within the excavation areas will be collected for field-screening purposes, including:

- Visual assessment of soil conditions, soil type logging, and documentation of visible stains and odors.
- Water/hydrocarbon sheen testing.
- Volatile organic compound (VOC) head-space screening.

Field-screening techniques and laboratory analyses to be performed are identified in Table 1, Summary of Soil Sampling and Analyses.

Table 1: Summary of Soil Sampling and Analyses

Sample Type	Number of Samples	Field Screening	Laboratory Analyses
Soil	TBD	HS, ST, VI	NWTPH-Gx
Soil	TBD	HS, ST, VI	NWTPH-Dx
Soil	TBD	HS, ST, VI	BTEX

Definitions:
TBD = to be determined
HS = headspace VOC screening for soils
ST = water/hydrocarbon sheen test for soils
VI = visual inspection of soils

Soil samples will be submitted for chemical analysis of total petroleum hydrocarbons as gasoline- and diesel-range hydrocarbons by Northwest Total Petroleum Hydrocarbon Method NWTPH-Gx and NWTPH-Dx, and BTEX using EPA Method 8021B. Soil samples for chemical analysis will be stored in a cooled ice chest pending transportation to a certified analytical laboratory under chain-of-custody protocol.

Quality assurance/quality control (QA/QC) samples to be collected during each field sampling activity and the data quality objectives (DQOs) will be provided in the CMP and will be consistent with those previously submitted (see Appendix D of the RI/FS Work Plan, Kennedy/Jenks 2011a).

7.3 Confirmation Monitoring

A post-remediation confirmation groundwater monitoring plan will be completed that identifies the specific requirements for future groundwater monitoring activities at the site. The well locations, sampling methods, analyses performed and sampling frequency will be identified in the plan.

7.4 Soil Disposal Profiling

The soil disposal facility selected to receive the excavated soils will require analytical data characterizing the soils. The remediation contractor will be responsible for collecting samples, obtaining the appropriate laboratory data for profiling, and coordinating with the disposal facility for soil disposal.

References

EA Engineering, Science, and Technology, Inc. (EA). 2008. Draft Remedial Investigation/Feasibility Study. Prepared for Washington State Department of Ecology. July 2007 (incomplete reference).

EA. 2006. Summary of Results for 29 June 2005 Field Investigation. Letter to Washington State Department of Ecology. 3 March 2006.

EA. 2005. Investigation Report for Washington State Department of Ecology Mixed Funding LUST Sites. June 2005.

Kennedy/Jenks Consultants. 2011a. Draft Remedial Investigation and Feasibility Study Work Plan, Coronet Bay Marina, Whidbey Island, Washington, Kennedy/Jenks Consultants, 6 September 2011.

Kennedy/Jenks Consultants. 2011b. Draft Remedial Investigation and Feasibility Study, Cornet Bay Marina, Whidbey Island, Washington, Kennedy/Jenks Consultants, December 2011.

Kennedy/Jenks Consultants. 2013. Remedial Investigation and Feasibility Study, Cornet Bay Marina, Whidbey Island, Washington, Kennedy/Jenks Consultants, July 2013.

Nelson 1990. Letter from Earl V. Nelson to Mr. Joe Hickey, dated 22 October 1990.

Washington State Department of Ecology. 2009. Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action, Review Draft. Washington State Department of Ecology. Publication No. 09-09-047. October 2009.

Washington State Department of Ecology. 2008. Minimum Standards for Construction and Maintenance of Wells, Chapter 173-160 WAC. Washington State Department of Ecology. Publication No. 08-11-051. 19 December 2008.

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

Washington State Department of Ecology. 2005. Screening Survey for Petroleum Contamination at Cornet Bay Marina (Island County). Washington State Department of Ecology. Publication No. 05-03-033. September 2005.

Washington State Department of Ecology. 2003. Cornet Bay Marina Field Investigations 2003. Prepared by Washington State Department of Ecology.

Washington State Department of Ecology. 2002. Hazardous Sites List. 26 February 2002.

Washington State Department of Ecology. 1996. Cornet Bay Marina RI. Prepared by Washington State Department of Ecology.

Washington State Department of Ecology. 1995. Sediment Management Standards (SMS), Chapter 173-204 WAC. Publication No. 96-252. 29 December 1995.

Washington State Department of Ecology. 1994. Natural Background Soil Metals Concentrations in Washington State. Publication No. 94-115. October 1994.

Welch 1990. Cornet Bay Marina, 5191 N. Cornet Bay Rd., Oak Harbor, WA 98277. (No other title or date). Report on 1990 Site Investigation prepared by Welch Enterprises, Inc.

Figures

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Cleanup Action Plan
Cornet Bay, Washington

Site Location Map

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Figure 1

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Legend

Approximate Property Boundary

Timber Bu khead

NOTE:
Approximate property boundary obtained from Survery performed on 17 November 2011.Boundary located on east portion of site is identified as right-of-way. Aerials Express 0.3 to 0.6m resolution imagery for metropolitan areas and the best available United States Department of Agriculture (USDA) National Agriculture Imagery Program (NAIP) imagery and enhanced versions of United States Geological Survey (USGS) Digital Ortho Quarter Quad (DOQQ) imagery for other areas. For more information on this map, visit us online at http://goto.arcgisonline.com/maps/World_Imagery

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Scale: Feet
1 inch = 50 feet

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Cleanup Action Plan
Cornet Bay, Washington

Site Plan

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Figure 2

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Legend

- 2011 Soil Boring
- 2011 Soil Boring with Groundwater Sample
- 2011 Monitoring Well
- 2011 Vapor Sample
- Prior Soil Boring
- Prior Monitoring Well
- Prior Test Pit
- Approximate Property Boundary
- Timber Bulkhead

NOTE:
All locations are approximate.
Approximate property boundary obtained from Survery performed on 17 November 2011.Boundary located on east portion of site is identified as right-of-way.
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Scale: Feet
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Cleanup Action Plan
Cornet Bay, Washington

Sampling Location Map - All Investigations

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Figure 3

Legend

- 2011 Soil Boring
- 2011 Soil boring and Groundwater
- 2011 Monitoring Well
- Benzene Area Exceeding MTCA Method A Soil Cleanup Levels
- Gas and Benzene Area Exceeding MTCA Method A Soil Cleanup Levels
- Timber Bu khead
- Approximate Property Boundary

(#) Indicates depth of soil sample.
GRO - Gasoline Range Organics (mg/kg)
DRO - Diesel Range Organics (mg/kg)
BENZ - Benzene (µg/kg)
< - Indicates a nondetect at the laboratory reporting limit.
BOLD - Indicates the value may exceed current MTCA Method A Soil Cleanup Levels
GRO - 30 mg/kg
DRO - 2000 mg/kg
BENZ - 30 µg/kg

NOTE:
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Scale: Feet
1 inch = 30 feet

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Cleanup Action Plan
Cornet Bay, Washington

2011 Soil Investigation Results Petroleum Hydrocarbon and Benzene Affected Area

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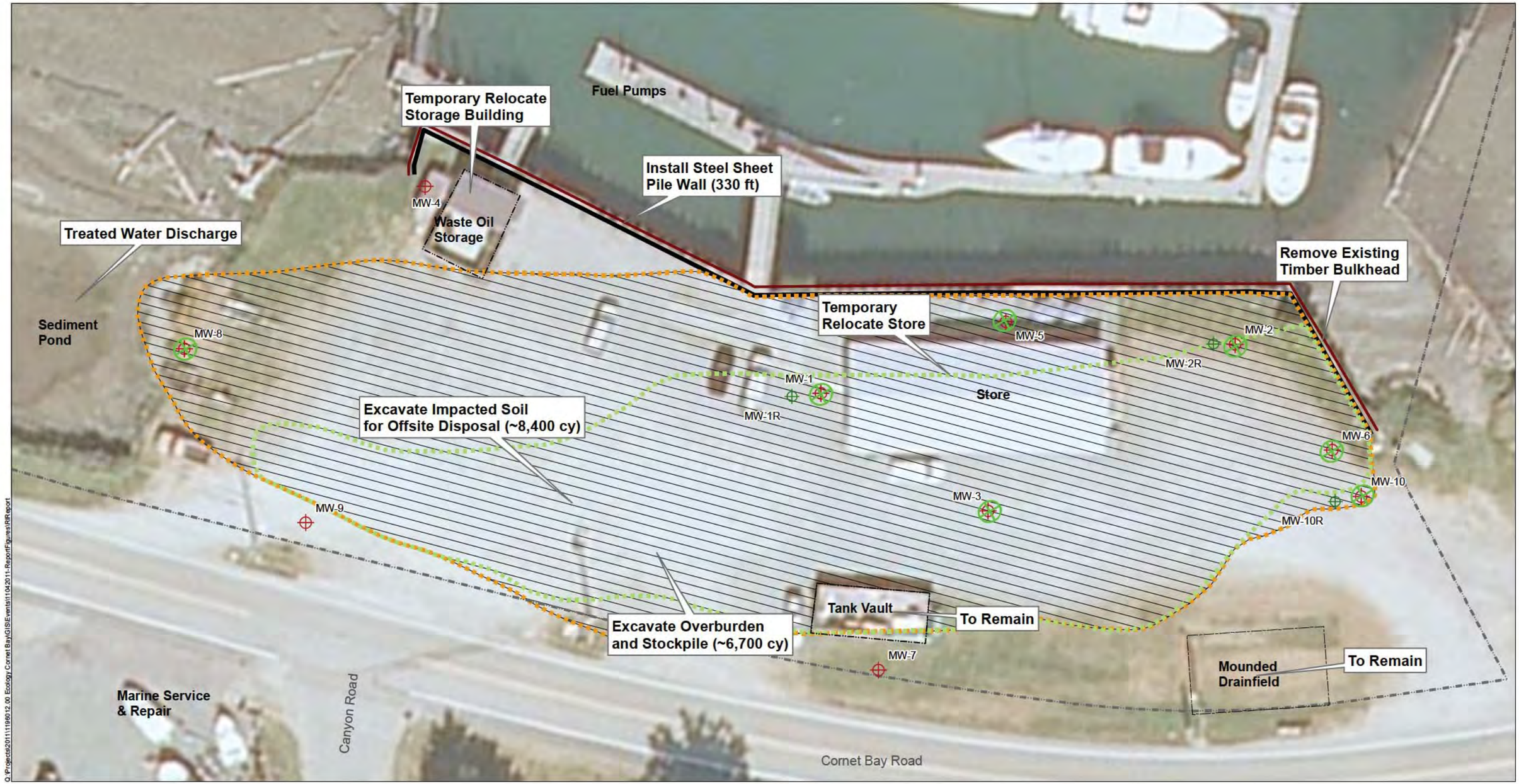
Figure 4



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Legend

- Existing Monitoring Wells (Total of 10)
- Abandon Monitoring Wells (Total of 6)
- Proposed New Monitoring Well (Total of 3)
- New Steel Sheet Pile Wall
- Approximate Property Boundary
- Existing Timber Bu khead
- Gas and Benzene Area Exceeding MTCA Method A Soil Cleanup Levels
- Benzene Area Exceeding MTCA Method A Soil Cleanup Levels
- Excavation Area

NOTE:
All locations are approximate.
Approximate property boundary obtained from Survery performed on 17 November 2011.Boundary located on east portion of site is identified as right-of-way.
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Cleanup Action Plan
Cornet Bay, Washington

Alternative 1: Excavation and Offsite Disposal

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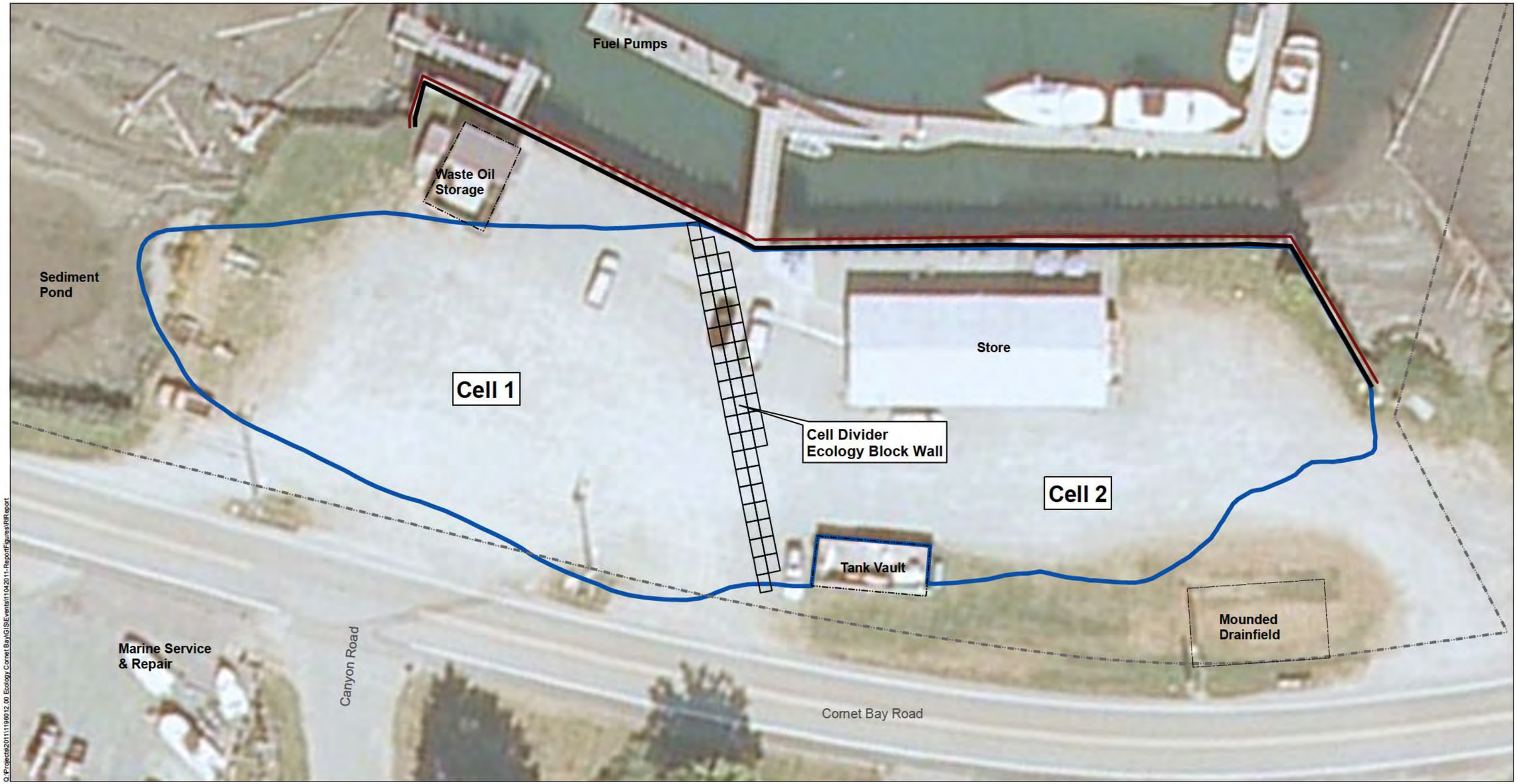
Figure 5



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Legend

- New Steel Sheet Pile Wall
- Existing Timber Bulkhead
- Approximate Property Boundary
- Excavation Area

NOTE:
All locations are approximate.
Approximate property boundary obtained from Survery performed on 17 November 2011.Boundary located on east portion of site is identified as right-of-way.
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Cleanup Action Plan
Cornet Bay, Washington

Cell 1 and Cell 2 Cleanup Areas

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Figure 6