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Remedial Investigation/ Feasibility Study Report

Cornet Bay Marina, Whidbey Island, Washington

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Volume 1 of 2

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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List of Acronyms and Definitions

ARARs	Applicable, Relevant, and Appropriate Requirements
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	cleanup action plan
cm/sec	centimeters per second
COC	chemical(s) of concern
cy	cubic yards
dba	doing business as (legal abbreviation)
DNR	Washington State Department of Natural Resources
DRO	diesel-range organic(s)
EA	EA Environmental Science & Technology, Inc.
Ecology	Washington State Department of Ecology
EDB	ethylene dibromide
EDC	ethylene dichloride
EDR	Environmental Data Resources, Inc.
FEMA	Federal Emergency Management Agency
footprint	area of site affected by petroleum hydrocarbon(s)
ft/ft	feet per foot
ft/yr	feet per year
gpm	gallons per minute
GRO	gasoline-range organic(s)
Kennedy/Jenks	Kennedy/Jenks Consultants, Federal Way, Washington
LNAPL	light non-aqueous phase liquid
LUST	leaking underground storage tank
m	meter
m/sec	meters per second
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
$\mu g/m^3$	micrograms per cubic meter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MTBE	methyl tert-butyl ether
MTCA	Model Toxics Control Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRCS	United States Department of Agriculture Natural Resource Conservation Service
NWTPH-Dx	Northwest Total Petroleum Hydrocarbons as Diesel and Oil Extended
NWTPH-Gx	Northwest Total Petroleum Hydrocarbons as Gasoline
ORO	oil-range organic(s)
PAH	polynuclear aromatic hydrocarbon(s)
PID	photoionization detector

PVC	polyvinyl chloride
RCRA	Resource Conservation Recovery Act
RI/FS	Remedial Investigation / Feasibility Study
RV	rural village
site	Cornet Bay Marina
SVE	soil vapor extraction
TEE	Terrestrial Ecological Evaluation
UIC	Underground Injection Control
UST	underground storage tank(s)
WAC	Washington Administrative Code
WDFW	Washington Department of Fish and Wildlife
Work Plan	RI/FS Work Plan

Executive Summary

This Remedial Investigation/Feasibility Study (RI/FS) report was prepared for the Cornet Bay Marina property located adjacent to Cornet Bay on the northern end of Whidbey Island, Island County, in Oak Harbor, Washington (site). In 1989, leaking underground fuel transfer lines associated with onsite underground storage tanks (USTs) resulted in a release of gasoline-range and possibly diesel-range hydrocarbons to soil and groundwater.

This RI report summarizes previous investigations and presents the results of recent investigations designed to provide sufficient information to evaluate the feasibility of cleanup options for addressing the site conditions. The FS summarizes the cleanup options evaluated for the site, with the goal of identifying the most effective cleanup strategy that is protective of human health and the environment and meets requirements of the Washington State Department of Ecology (Ecology) Model Toxics Control Act (MTCA) regulations (Washington Administrative Code [WAC] 173-340).

ES.1 Remedial Investigation Objectives

The purpose of the RI portion of this report is to summarize and evaluate previous investigation data and to identify data gaps that need to be filled, to perform supplemental RI activities to address these data gaps, and to provide adequate information to develop a cleanup strategy for the site that is consistent with MTCA regulations.

ES.2 Remedial Investigation Activities

Several investigations have been conducted at the site since the release of petroleum hydrocarbons was discovered in 1989. From September through November 2011, Kennedy/Jenks Consultants (Kennedy/Jenks) conducted supplemental RI activities to fill data gaps and assess current site conditions.

ES.3 Remedial Investigation Results

Recent investigations confirmed the distribution of soil and groundwater containing gasoline-range organic and diesel-range organic (GRO and DRO) hydrocarbons that exceed MTCA cleanup standards. GRO, DRO, and benzene are the principal compounds that exceed cleanup standards at the site.

The hydrocarbons are primarily associated with soil materials at the site. Affected soils are typically encountered from a few feet below grade to 12 to 14 feet below ground surface (bgs), but extend up to 18 feet bgs at some locations. The lateral distribution of hydrocarbon-containing soils (footprint) covers approximate 70 to 75 percent of the site. According to both recent and prior investigations, the highest GRO and DRO concentrations in soil were 9,400 and 7,700 milligrams per kilogram (mg/kg), respectively. The highest benzene concentration in soil was 150 mg/kg. Previous investigations indicated that sediment adjacent to the site was not affected by the hydrocarbon release to the site.

Groundwater investigations at the site evaluated groundwater flow conditions and confirmed the distribution of petroleum hydrocarbon compounds in groundwater. These investigations indicate

a steep hydraulic gradient in shallow groundwater from upland areas to the east toward Cornet Bay. Onsite shallow groundwater adjacent to the waterfront is tidally influenced; however, tidal effects are negligible beyond approximately 70 feet from Cornet Bay and dissipate completely approximately 125 feet from Cornet Bay. The distribution of hydrocarbon compounds in groundwater is generally consistent with the footprint of hydrocarbon hydrocarbon-containing soils encountered onsite.

ES.4 Feasibility Study

Kennedy/Jenks has completed an FS to evaluate remedial alternatives to address hydrocarbon-containing soil and groundwater at the site. After evaluating a range of options, the FS focused on three remedial alternatives:

1. Excavation of petroleum hydrocarbon-containing soils at the site and disposal at a permitted offsite facility. This includes installation of a new sheet pile bulkhead to facilitate soil removal.

2. Capping the site and using hydraulic controls and groundwater treatment to prevent offsite migration of hydrocarbon compounds. Soil vapor extraction was included to mitigate the effects of vapor intrusion into the onsite building.

3. Focused removal of “hot spot” soils followed by bioremediation of residual hydrocarbon-containing areas. Bioremediation would be performed using direct placement of a biological enhancement compound in the excavation pit and vertical injection of the enhancement compound outside the footprint of excavated soils.

Based on analysis of the FS options presented above, Alternative 1 is recommended for implementation at the site.

Section 1: Introduction

This Remedial Investigation/Feasibility Study (RI/FS) report was prepared on behalf of the Washington Department of Ecology (Ecology) for the Cornet Bay Marina (site) located at 200 Cornet Bay Road, Island County, Washington (Figure 1). The RI/FS report was prepared in accordance with Ecology's Model Toxics Control Act (MTCA) regulations published in WAC 173-340.

1.1 Site and Project Contact 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

- **RI/FS Consultant:** Kennedy/Jenks Consultants
  32001 32nd Avenue South, Suite 100, Federal Way, WA 98001
  Ph: (253) 835-6400
  Contact: Ty C. Schreiner, LG, LHg, Vice President
  Contract No. C1100140

1.2 Purpose of Investigation

The purpose of the RI was to identify the distribution of chemicals present in environmental media (soil, groundwater, and soil gas) at the site. This RI/FS report summarizes RIs performed on the upland portion of the site from 1995 through 2011. Specifically, this report includes the following:

- A summary of the site history; previous and current soil, sediment, surface water, and groundwater investigation results; and previous remedial actions.
- A summary of geologic and hydrologic conditions that may influence selection of a remedial action for the site.
- Identification of cleanup levels for soil, groundwater, and surface water at the site.

- New information from the supplemental RIs conducted from September through November 2011 that included additional soil, groundwater, and soil gas sample collection at the site.

- A conceptual model that identifies the approximate site conditions, exposure pathways, and potentially exposed populations.

- Delineation and approximate volumes of site media that contain chemical concentrations exceeding proposed cleanup levels.

The FS, provided in Sections 9 through 14 of this report, was performed in accordance with WAC 173-340-350 through 173-340-350-370. The FS presents and evaluates cleanup alternatives for the site and recommends a cleanup action. Specifically, the FS includes the following:

- Screening of remedial technologies that are suitable for addressing site conditions.

- Development of remedial alternatives to address site media warranting remedial action.

- Evaluation of remedial alternatives using criteria identified in WAC 173-340-360.

- A recommended remedial action for the site.

Section 2: Site Identification and Description

2.1 Site Discovery and Regulatory Status

The Cornet Bay Marina and associated facilities were constructed in the 1960s, including a wooden bulkhead about 300 feet long, which separates the upland facilities (general store and parking areas) from the marina.

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 and was contained by absorbent booms. No other remediation was conducted at that time.

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 above-ground 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. At that time, petroleum-containing soil and free product were observed in the excavation. 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 pit excavations were performed 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 to assess the extent and degree of gasoline and diesel impacts onsite in accordance with the requirements of MTCA (Ecology 1993). The scope of work outlined in the Consent Decree included completion of an RI and 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.

In 2008, EA Engineering, Science, and Technology, Inc. (EA) prepared a draft FS report (EA 2008). This draft FS evaluated a range of remedial alternatives for the site, including

containment, *in situ* thermal desorption, excavation, *ex situ* bioremediation, *in situ* biological degradation, and *in situ* chemical oxidation. The 2008 draft FS selected *in situ* thermal desorption as the proposed remedial alternative for the site.

In August 2011, Ecology authorized Kennedy/Jenks to prepare an RI/FS Work Plan (Work Plan) to collect supplemental information regarding the distribution of affected soil and groundwater, assess the potential for vapor intrusion at the onsite building, evaluate overall site conditions, and select a cleanup action for the site (Kennedy/Jenks 2011a). The Work Plan was implemented from September through November 2011.

2.2 Site and Property Location/Definition

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.

A legal description of the site, information on the present owner and operator, and a chronological list of past owners and operators of the site are summarized in Table 1. A complete history of site ownership is presented in the Chain-of-title Report prepared by Environmental Data Resources (EDR 2011a) included in Appendix A. Supporting title and boundary documents are also provided in Appendix A.

The title search data indicates that a number of private owners and entities have operated the since its development in the early 1960s, including Premcor Production Company; Lomax and Lurie LLC; Bay on Cornet; the Woods, Morse, Masters, Kistler, Bustad, Sanders, Nelson, and Kraining families; and Deception Pass Marina, Inc.

The tidelands adjacent to the site are privately owned rather than property of Washington State. A 1929 deed grants ownership to Nellie B. Blout (Deed 1929, see Appendix A). A separate title search for the tidelands was not conducted; however, it is assumed to have followed ownership of the marina property. Kennedy/Jenks contacted the Washington State Department of Natural Resources (DNR) and verified that the tidelands are privately owned (DNR 1977, see Appendix A).

2.3 Neighborhood Setting

Deception Pass State Park is located north of the site. The marina, adjoining the site to the west, consists of floating docks for boat moorage and a fuel dock. The marina lies within Cornet Bay, which opens to Deception Pass. Single-family residential homes on large lots are present 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, apparently manmade excavated pond, are located southwest of the site on tidelands of Cornet Bay.

2.4 Physiographic Setting/Topography

The site, which covers approximately 1.1 acres of upland property, includes a flat gravel parking area, a 330-foot-long wooden bulkhead that separates the upland facilities from the marina (to the west), and a marina store on the western side of the site (Figure 2). The underground fuel tank vault is on the eastern side of the site within a grassy area. A mounded septic leach field is located north of the tank vault. A covered shed used for waste oil storage is located at the southwestern corner of the property (Figure 2).

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

Based on the subsurface lithologic conditions encountered, shallow soils may represent, in part, dredge spoils produced during construction of the marina. On the southern side of the property, a depression exists that appears to be man-made. This depression might have been associated with past dredging activities at the site (possibly used for hydraulic dredge water return).

The site sits at the base of a hillside that rises steeply away from Cornet Bay to the east and south. The steep topographic conditions surrounding the site likely influence local groundwater flow.

Section 3: Property Development and History

3.1 Past Site Uses and Facilities

The site was probably undeveloped before construction of the marina. The following changes have occurred since construction was completed in the early 1960s.

- Four USTs were installed in 1964: a 10,000-gallon regular gasoline, a 6,000-gallon regular gasoline, a 3,000-gallon diesel, and a 2,000-gallon gasoline/oil "pre-mix" tank for two-stroke engines.
- In 1990, the four USTs were removed by Technical Services, Inc. (under contract to Welch Enterprises) in response to the 1989 release previously described. Soil from the tank excavation was placed back into the excavation. (Welch 1990).
- In late 1990, the current fueling system, consisting of a two-compartment 12,000-gallon tank (9,000-gallon gasoline and 3,000-gallon diesel) enclosed in an underground reinforced concrete vault, was installed within a portion of the former UST excavation. Two galvanized steel product lines, encased in one large-diameter polyvinyl chloride (PVC) pipe, run underground from the tank to the bulkhead and out to the fueling dock.

3.2 Current Site Use and Facilities

The site continues to be used as a marina and general store. Other structures onsite include the tank vault system described above; a storage shed; two aboveground waste oil tanks; and floating docks that consist of a fuel dock and transient and permanent moorage (one row plus additional covered boat slips). On some historical aerial photographs, dredged areas can be seen within the marina and as a channel leading out of Cornet Bay (refer to Appendix B).

EDR completed a detailed records review in October 2011. Reports from EDR are listed below and presented in Appendix B.

- EDR Environmental LienSearchTM Report (EDR 2011b)
- EDR Radius MapTM Report with GeoCheck® (EDR 2011c)
- Certified Sanborn® Map Report (EDR 2011d)
- EDR Historical Topographic Map Report (EDR 2011e)
- EDR Aerial Photo Decade Package (EDR 2011f)
- EDR-City Directory Abstract (EDR 2011g)
- EDR Building Permit Report (EDR 2011h).

According to EDR's recent database review (Appendix B), the site appears on the following environmental permits/database records:

- FINDS, a consolidation of other databases maintained by Ecology, including Air Quality, Dam Safety, Hazardous Waste, Toxics Cleanup, and Water Quality programs.
- SPILLS program, with reported diesel fuel release (sheen) to surface water in January 1999 and July 2007.
- UST program, showing closure of four USTs in January 2001. The current fuel tanks are not registered as USTs because they are aboveground tanks enclosed within a vault.

3.3 Proposed or Potential Future Site Uses

The marina is part of the local economy and will likely continue its use for permanent and temporary boat moorage and retail sale of fuel and goods.

3.4 Zoning

According to Island County zoning maps (presented in Appendix C), the site and surrounding area are zoned as rural village (RV) (Island County 2005). Permitted and conditional uses of the RV zoning include banks, cultural centers, daycare centers, eating and drinking establishments, public facilities, fire stations, government services, healthcare facilities, group homes, mixed-use residential, retail sales and services, major utilities, and veterinary clinics. A review of Island County Critical Areas Ordinance maps indicates the presence of estuarine wetlands south of the site. The submerged portions of the marina are within an urban shoreline designation.

3.5 Transportation/Roads

The site is located on Cornet Bay Road, a major thoroughfare that connects Deception Pass State Park at the northeastern tip of Whidbey Island to Washington State Route 20 southwest of the site. Washington State Route 20 runs north across the bridge over Deception Pass and south down Whidbey Island to the Coupeville ferry terminal at Fort Casey. Several small roads in the vicinity of the site, including Canyon Road (formerly Bayview Road), lead southeast to residential developments.

3.6 Utilities, Water Supply

Puget Sound Energy provides electric power to the site and surrounding area. Water service is provided by a private well located approximate 1/8 mile east of the site. Other properties east of Cornet Bay Road are serviced by the Cornet Bay Heights Water Association. The residential area southeast of the site is listed as a wellhead protection zone with a high susceptibility rating. The site uses an onsite septic system that includes the original septic tank and a mounded leach field. The area is served by the Island County Sheriff's Department, North Whidbey Fire and Rescue, and Whidbey Emergency Medical Services.

3.7 Potential Sources of Site Chemicals

The former USTs and fuel lines are the primary source of petroleum hydrocarbons in soil and groundwater at the site. The UST system appears to have released gasoline- and diesel-range hydrocarbons to soil and groundwater. Other potential sources of petroleum hydrocarbon compounds may include dredge spoils from Cornet Bay and creosote-treated pilings and walers that form the wooden bulkhead and piling for marina docks. Used oil from marine engines is reportedly collected for recycling at the site and stored within a contained shed. It is not clear when this oil shed was constructed or how used oil was handled before it construction. It does not appear that significant boat maintenance (e.g., bottom preparation and painting) has taken place at the site.

3.8 Potential Sources of Chemicals from Neighboring Properties

Marine Services, located at 221 Cornet Bay Road (directly south and across the street from the site), operates a boat yard on its property. Marine Services offers a number of services, including boat maintenance and repairs, painting, and fabrication. During an investigation conducted by EA in 2005, diesel-range hydrocarbons were detected at 0.531 milligrams per liter (mg/L) in a grab groundwater sample (HA-3-GW-5) collected in the right-of-way adjacent to this property (EA 2005). This sample was collected from an area hydraulically upgradient of Cornet Bay Marina and does not appear to be attributed to the marina activities.

EQ Harbor Service, Inc., located at 265 Cornet Bay Road (Ecology Facility No. 19678), is approximately 1/8 mile south of the site, across Cornet Bay Road. This site is listed in Ecology's Facility database because it has held a Boatyard General Stormwater permit since 1994. The EQ Harbor Service site is not listed as a hazardous waste generator or for any known environmental cleanup. Given its location relative to the site, activities at EQ Harbor Services are probably not a source of hydrocarbon impacts to soil or groundwater at the Cornet Bay Marina.

Washington Parks Department Deception Pass State Park (Ecology Facility No. 87274616) and Washington Parks Marine Crew Yard (Ecology Facility No. 25187227) are both located about 1/4 mile north of the site. The Deception Pass State Park listing includes the following:

- Hazardous waste generation (inactive as of February 2004)
- Leaking Underground Storage Tank (LUST) facility (inactive, closed in 2002)
- UST (active, permitted in 2000)
- Hazardous waste management (active)
- Non-enforcement action (active, permit issued in 2005)
- 401 Coastal Zone Management Project Site (active, permit issued in 2005).

As of September 2011, no other facilities in the immediate vicinity of the site were shown on Ecology's Facility Mapper website or identified through EDR's regulatory agency database search (see Appendix B).

Section 4: Natural Conditions

4.1 Geologic Setting

Regional geology in the Puget Sound is complex, formed through glaciations, tectonic processes, changing sea levels, and erosion. Site geology has been modified as a result of anthropogenic filling activities.

According to the geologic map of Washington, the geology of the area consists of Pleistocene continental glacial drift, Fraser-age, including Vashon Stade units (DNR 2005). The tidelands south of the site are Quaternary peat deposits. A suspected fault runs southeast to northwest about 2,000 feet southwest of the site. The Natural Resource Conservation Service (NRCS) soil map for the area indicates that the upland areas of the site are Sholander-Limepoint complex, 0 to 8 percent slopes. The surrounding tidelands are Beaches-Endoaquents, tidal-Xerorthents association, 0 to 5 percent slopes (NRCS 2011). Sholander-Limepoint complex soils are somewhat poorly drained and are derived from glacial drift over dense glaciomarine deposits. Beaches-Endoaquents are very poorly drained and have very high transmissivity. This complex consists of gravel and course sand.

4.2 Soil

Soils were investigated to a total depth of up to 30 feet bgs at the site during the current and previous investigations. Investigation activities have included soil borings, test pits, and monitoring well installations, with locations shown on Figure 3. Soil types encountered at each soil boring location for the 2011 investigation are shown on the soil boring logs (Appendix D). Generalized geologic cross-section locations based on the 2011 soil borings are shown on Figure 4 and presented in detail on Figures 5 and 6.

Soil types encountered onsite are predominantly fine-grained, including silt and clay with varying amounts of sand and/or gravel. Coarser materials (primarily sand and/or gravel with varying amounts of silt and/or clay) are also present, mainly in the uppermost 5 feet, but also locally at greater depths. Soil materials in the upper portion of the stratigraphic sequence (from ground surface to depths of approximately 7 to 15 feet bgs, depending on location) appear to be fill, presumably placed to expand the usable land surface when the marina was constructed. The presence of shell fragments at some soil boring locations suggests that fill material might be derived, in part, from sediments dredged nearby from Cornet Bay. Materials beneath the fill are primarily stiff clay and silt with some sand and gravel. At some boring locations, peat- or topsoil-like materials were present above the stiff clay/silt and likely represent the former ground surface.

Fill materials in the upper 7 to 15 feet are heterogeneous and include a mixture of different soil textures that typically do not correlate well across the site, except for the uppermost gravel/sand materials, which are present at the ground surface at most locations and extend to depths of approximately 2 to 7 feet bgs, depending on location. The fill materials encountered beneath the upper gravel/sand typically occur as lenses or discontinuous layers, or as undifferentiated sediments with generally similar texture (soft silt and clay with varying amounts of sand and fine gravel) but without distinct layering.

Materials encountered beneath the fill primarily include stiff clay and silt, locally containing variable amounts of sand and/or fine gravel, and appear to be contiguous across the site. The depth to the top of the stiff clay/silt is generally shallowest at the eastern end of the site (near Cornet Bay Road) and increases toward Cornet Bay. Clay/silt was observed in borings advanced to 30 feet bgs during the 2011 investigations. Sand and silty sand layers, typically a few inches thick but up to several feet thick at some locations, are interbedded with the clay/silt at some locations. The sand and silty sand materials appear to represent localized lenses rather than laterally contiguous units.

4.3 Groundwater

This section summarized shallow groundwater conditions onsite based on the current and previous investigations.

4.3.1 Previous Investigations

Previous investigations indicated that site groundwater occurs at approximately 3 to 7 feet bgs. Groundwater depths fluctuate with the tides, and groundwater flows generally to the west toward Cornet Bay (EA 2008). In June 2006, a groundwater level study conducted by EA showed that water levels rise and fall over a range of 0.2 to 2.5 feet in monitoring wells MW-1, MW-2, and MW-3. Tidal fluctuations vary based on proximity to the bulkhead and the local soil permeability.

4.3.2 Current Investigation

Seven new monitoring wells (MW-4 through MW-10) were installed onsite during the 2011 investigation. Groundwater was encountered within a shallow saturated zone, which primarily comprised the fill materials encountered throughout the site above the stiff silt/clay material described in Section 4.2. Saturated conditions were also observed in sandier materials locally interbedded with the stiff clay/silt material, but these sandier beds were typically not laterally continuous between adjacent soil borings. Saturated conditions were initially encountered in soil borings at depths of approximately 3 to 10 feet bgs, with the depth increasing with proximity to Cornet Bay. Approximate depths to saturated conditions at each soil boring are indicated on the boring logs provided in Appendix D.

Hydrogeologic studies performed during the 2011 investigation to evaluate site groundwater conditions included groundwater elevation monitoring during high- and low-tidal conditions, continuous water level fluctuation monitoring over an 18-day period, and aquifer slug tests. The results of the 2011 investigation are consistent with, and expand upon, the previous findings and are discussed in the following sections. Documentation and supporting materials for hydrogeologic studies performed in 2011 are provided in Appendix E.

4.3.3 Groundwater Elevation Monitoring

Groundwater elevation monitoring was performed during both low (10 November 2011) and high (11 November 2011) tidal conditions at all 10 site monitoring wells to evaluate the groundwater gradient at the site. The monitoring wells were opened and allowed to equilibrate, and groundwater levels were then measured at each monitoring well within approximately 15

minutes. Water levels were converted to elevations using the surveyed top-of-casing elevations. Water level measurements and elevations are summarized in Table 2.

The hydraulic gradient direction was essentially the same for both high and low tidal conditions, but, as expected, the magnitude was greater during low tidal conditions. The gradient direction was generally to the north-northwest (directly toward Cornet Bay) in the central portion of the site, but deflected slightly outward around the margins of the bulkhead (see Figures 7 and 8). The highest water elevations were measured in well MW-7, and the lowest in MW-4, for both high and low tidal conditions. The difference in water elevation between these two wells was 4.73 and 5.88 feet for monitoring performed during high and low tidal conditions, respectively.

The magnitude of the hydraulic gradient during high tidal conditions [approximate 10-foot tide height based on tidal prediction data obtained from the National Oceanic and Atmospheric Administration (NOAA), Yokeko Point, Deception Pass Station (NOAA 2011)] ranged from 0.030 feet/foot (ft/ft) to 0.043 ft/ft and was greatest in the central portion of the site. The gradient during low tidal conditions (approximate 1-foot tide height) ranged from 0.033 ft/ft to 0.047 ft/ft and was greatest in the central portion of the site. The average gradient magnitude was 0.037 ft/ft for high tide and 0.041 ft/ft for low tide. The potentiometric surface and approximate hydraulic gradient based on groundwater elevation monitoring are depicted on Figures 7 and 8.

The results of groundwater elevation monitoring indicate a consistent 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. Although groundwater elevation monitoring results indicate a degree of tidal influence, which is also supported by the results of continuous water level monitoring (discussed in greater detail in Section 4.3.4), 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).

4.3.4 Continuous Water Level Fluctuation Monitoring

Continuous water level monitoring was performed between 22 October and 9 November 2011 at five monitoring wells (MW-3, MW-4, MW-5, MW-6, and MW-7) using water level loggers to record water depths at 15-minute intervals. Water depths were converted to groundwater elevations referenced to surveyed top-of-casing elevations for each well. Continuous water level monitoring was performed to evaluate the effect of tidal fluctuation on groundwater levels at the site.

Water elevations ranged from approximately 5 to 8 feet (6 to 9 feet bgs) for wells located nearest Cornet Bay (MW-4 and MW-5) to 11.5 to 12.5 feet (1.5 to 2.5 feet bgs) for well MW-7, located approximately 125 feet east of Cornet Bay. The water elevations are consistent with those measured during the water level monitoring performed for all 10 site monitoring wells on 10 and 11 November 2011 (see Section 4.3.3). The results of continuous water level monitoring are shown on Chart 1 in Appendix E.

The results of continuous water level monitoring indicate a strong tidal influence on water levels for the wells located nearest Cornet Bay and the bulkhead (MW-4 and MW-5). Daily water level

fluctuations of approximately 1.25 to 2.75 feet were recorded during the monitoring interval and corresponded to the tidal fluctuations predicted for Cornet Bay (NOAA 2011). The daily fluctuations were greatest in well MW-5, which is located in the central portion of the bulkhead and closest to Cornet Bay. The maximum daily tidal height difference for Cornet Bay during the monitoring period was approximately 14 feet. Tide prediction charts for Cornet Bay for October and November 2011 are included in Appendix E for reference.

Unlike the wells located nearest Cornet Bay, the water levels in wells MW-3 and MW-6, located 60 to 70 feet east of Cornet Bay, appear to be influenced primarily by surface water infiltration and shallow groundwater flow onto the site from the upland areas located east of the site. The overall variation in water levels in wells MW-3 and MW-6 was approximately 0.75 foot during the monitoring period.

The pattern of water level fluctuation at wells MW-3 and MW-6 is irregular, but similar between the two wells, indicating a common influence. Water levels at wells MW-3 and MW-6 displayed less than 0.1 foot of tidally influenced daily fluctuation, which is superimposed on the more gradual and irregular water level fluctuation pattern. Overall, the water level fluctuation at wells MW-3 and MW-6 appears to be more indicative of shallow groundwater recharge than tidal fluctuation.

The water levels recorded for MW-7, located approximately 125 feet east of Cornet Bay, display an overall water level fluctuation pattern similar to that observed at wells MW-3 and MW-6, but with no obvious indication of tidal influence. Water levels at well MW-7 appear to be predominantly influenced by shallow groundwater recharge from the upland areas east of the site and surface water infiltration.

The relatively sudden increases in shallow groundwater elevations evident on the plot for MW-7, and to a lesser extent on those for MW-3 and MW-6, appear to correspond to precipitation events reported by the NOAA for weather stations located in Arlington, Everett, and Bellingham (reports obtained from www.nws.noaa.gov), which is consistent with water levels in these wells being influenced by upgradient recharge (i.e., rises in groundwater levels following precipitation events). Copies of the NOAA weather station data are provided in Appendix E for reference.

4.3.5 Aquifer Slug Tests

Slug testing was performed at wells MW-4, MW-5, MW-6, and MW-7. Falling heads in response to an instantaneous increase in water level were recorded at 1-second intervals for at least 30 minutes in each well. The falling head data collected in each well was used to calculate the hydraulic conductivity of the aquifer in the vicinity of the well screen. The analysis was performed using the Hvorslev (1951) equation, which may be applied to unconfined conditions:

$$K = \frac{r^2 \ln(L_e / R)}{2 L_e T_0}$$

where K is the hydraulic conductivity [in meters per second (m/sec)], r the radius of casing [in meters (m)], L_e the length of the screen (m), R the radius of packing material (m), and T_0 is a value obtained from semilogarithmic plots (Hvorslev 1951) (see the slug test plots provided in Appendix E). This method can be applied to unconfined conditions for most piezometers where

the length (L_e) of the screen is quite a bit greater than the radius of the well screen (r) (Fetter 1994).

Slug test results for wells MW-4, MW-5, MW-6, and MW-7 are summarized in Table 3. Hydraulic conductivities calculated from the slug test results range from 1.22E-04 to 1.19E-03 centimeters per second (cm/sec), with an average value for the four wells of 5.3E-04 cm/sec. These values are consistent with the types of materials in which the wells are screened (predominantly silts and clays). Estimated groundwater seepage velocities, based on the calculated hydraulic conductivities, ranged from 15 to 142 feet per year (ft/yr), with an average for the four wells of 64 ft/yr.

4.4 Surface Water

The site is directly adjacent to Cornet Bay, which tidally fluctuates in height up to 14 feet. Tidal predictions for Cornet Bay for October and November 2011, obtained from the Yokeko Point, Deception Pass Station (NOAA 2011), are included in Appendix E.

4.4.1 Property Drainage

In general, no surface water bodies are present onsite other than Cornet Bay. 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. A man-made depression on the southwestern end of the site contains water from Cornet Bay at high tide.

4.4.2 Area Surface Water/Floodplain Issues

A review of Island County and Federal Emergency Management Agency (FEMA) flood maps indicates that the site is within a Flood Zone A designation (FEMA 2007), which corresponds to areas subject to inundation by the 1-percent-annual-chance flood event generally determined using approximate methodologies.

4.5 Natural Resources and Ecological Receptors

Kennedy/Jenks reviewed the Washington Department of Fish and Wildlife (WDFW) Priority Habitats and Species List, the Washington DNR Washington Natural Heritage Program GIS database, and aerial photographs of the site and vicinity (provided in Appendix B, EDR 2011f) to identify potential natural resources and ecological receptors that could be affected by the release at the site. The results are summarized in Table 4 and discussed below.

4.5.1 Greenbelts and Other Natural Habitat

The site is not located within a greenbelt; however, the area is zoned as RV. The site is adjacent to Cornet Bay, which includes eelgrass beds, mudflats, sandy/gravel beaches, and rocky intertidal zones. This habitat is considered a special aquatic habitat of Washington State. Douglas Fir/Hemlock *Gaultheria shallon* forest habitats are present in the hills above the site. The DNR database indicates the presence of a special status lichen and plant species at least 1 mile west of the site (DNR 2011).

4.5.2 Wildlife

A review of the WDFW Priority Habitats and Species List (WDFW 2008) found no indication of special status species at the site. However, federal and Washington State lists indicate that salmonids may be present in Cornet Bay. Several commercially important invertebrates, including Dungeness crab and pinto abalone, may also be present in Cornet Bay; these invertebrates are not protected. Washington State protected (sensitive) bald eagle nesting ranges are present about 2 miles east of the site. Osprey and great blue heron nesting sites are present about 3,300 feet and as close as 300 feet from the site, respectively.

Townsend's big-eared bats, which are a federal species of concern and a state candidate species, roost and forage throughout the Cornet Bay area.

Orca whales, which are federal and Washington State endangered species, may forage and migrate through the area. Pacific harbor porpoises, a Washington State candidate species, may also use the area, as do other non-listed marine mammals.

4.6 Summary of Terrestrial Ecological Evaluation

Kennedy/Jenks completed a Terrestrial Ecological Evaluation (TEE) for the site to assess potential terrestrial ecological receptors and assist in developing cleanup standards (Kennedy/Jenks 2011b). The TEE concluded that the only potential exposure pathway to terrestrial wildlife at the site is through direct contact with soil (no vegetation or other food sources for wildlife are present in the upland portions of the site).

The site-specific TEE was completed by conducting a risk-based screening of historical soil data collected during previous and current site investigations with wildlife protection screening values. Three constituents (GRO, DRO, and arsenic) were detected in soil above their corresponding wildlife protection values. However, the ecological screening values are greater than MTCA soil cleanup levels for protection of human health or below natural background, in the case of arsenic. Therefore, use of the MTCA Method A soil cleanup levels for protection of human health (unrestricted land use) will also be protective of terrestrial ecological receptors.

As previously described, most of the site is covered by gravel or buildings, so the potential exposure of terrestrial ecological receptors to onsite soil is considered insignificant. By addressing potential human health risks, remedial actions also will be protective for terrestrial ecological receptors.

Section 5: Cleanup Standards

5.1 Development of 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 with soil containing chemicals of concern (COCs) at concentrations that exceed 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 proposed 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) are proposed. Because site groundwater is not used for drinking water and discharges directly to surface water, MTCA Method B surface water standards are proposed for all other compounds and 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 and screening level values as presented in Ecology's Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology 2009).

These cleanup standards are provided in the tables presenting the analytical results for each medium.

5.2 Justification for Cleanup Levels

MTCA Method A or Method B (when a Method A cleanup level is not available) soil cleanup levels for unrestricted land uses are proposed as part of the cleanup standards for this site. These standards 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 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 of 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.

5.3 Points of Compliance

The points of compliance, based on the expected exposure routes, are those points where cleanup levels established for the site shall 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.
- 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 achieve 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 point will typically be assessed in monitoring wells located onsite directly adjacent to surface water.
- Surface water: In general, no surface water bodies are present onsite other than Cornet Bay. A small drainage pipe on the northern side of the property intermittently contains surface water and appears to convey surface water from the eastern side of Cornet Bay Road. The drainage pipe discharges directly to Cornet Bay at approximately the high-water mark. The point of compliance for surface water will be in Cornet Bay.

Section 6: Summary of Historical Investigation

After the initial release of petroleum hydrocarbons at the site in 1989, Ecology and its contractors completed a series of investigations. This section summarizes the previous RI activities at the site and lists the COCs detected during the investigations. A complete summary of historical analytical results for samples collected from various media onsite is provided in Appendix F. Concentrations of COCs are summarized in Tables 5 through 8, and historical analytical results of GRO and DRO in the soil are shown on Figure 9.

6.1 Chemicals of Concern

Past investigations have identified the primary source of COCs onsite as petroleum hydrocarbons (gasoline, diesel, and associated compounds) from the leaking fuel lines. The following petroleum hydrocarbons and associated compounds have been identified as potential COCs for the site:

- GRO compounds: aliphatic hydrocarbons – including C_4 to C_{12} carbon chains.
- Aromatic hydrocarbons: benzene, toluene, ethylbenzene, and ortho-, meta-, and para-xylene (collectively termed BTEX).
- Lead, historically used as a gasoline additive.
- Methyl tert-butyl ether (MTBE), also a gasoline additive.
- DRO compounds: aliphatic hydrocarbons – including C_{12} to C_{28} carbon chains.
- Oil Range Organic (ORO) compounds: aliphatic hydrocarbons – including C_{10} to C_{32} carbon chains.
- Polynuclear aromatic hydrocarbons (PAHs).

Results of past investigations indicate that the primary COCs affecting site media appear to be GRO, DRO, and benzene.

6.2 Previous Investigation Activities

From 1995 through 2005, Ecology performed a series of investigations onsite to characterize the distribution of hydrocarbon-containing soil and groundwater from the release. Soil borings, test pits, and monitoring well locations are shown on Figure 3. Previous onsite investigations attempted to define the distribution of petroleum hydrocarbon COCs (primarily GRO, DRO, and BTEX) in soil and groundwater across the site. Soils were investigated to a total depth of up to 30 feet bgs at the site, and impacts extend in all directions from the tank and fuel source areas, tapering off at the northern and southern ends of the site and to the east near Cornet Bay Road. Historical investigation activities are summarized in the following sections.

6.2.1 November 1995

In November 1995, Ecology advanced 10 soil borings (B1 through B10) and collected soil samples onsite (see Figure 3 for previous sampling locations, Ecology 1996). Reconnaissance groundwater samples (BW3 and BW9) were also collected from several soil borings. 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 at several locations sampled. The highest concentrations of GRO and DRO were detected in soil samples from borings B3 and B8. Soil and reconnaissance groundwater analytical results from the November 1995 investigation are summarized in Tables 5 and 6, respectively, and soil results are shown on Figure 9.

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.

6.2.2 October 1996

In October 1996, Ecology advanced three soil borings (B11 through B13) and collected soil samples onsite (see Figure 3 for previous sampling locations, Ecology 1996). Ecology also installed three onsite groundwater monitoring wells:

- 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 collected samples from 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, GRO and DRO in groundwater were detected at 24,000 µg/L and 98,000 µg/L, respectively. Additionally, benzene in groundwater was detected in well MW-2 at 16,400 µg/L, above the MTCA Method A cleanup level of 5 µg/L for groundwater.

Soil and groundwater analytical results from this investigation are summarized in Tables 5 and 6, respectively, and soil results are shown on Figure 9.

6.2.3 June 2003

In June 2003, Ecology advanced and sampled 10 direct-push borings (DP1 through DP10) onsite (Ecology 2003). GRO, DRO, and BTEX were detected at concentrations above the 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 the MTCA Method A cleanup levels for groundwater in samples collected from wells MW-2 and MW-3. 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, GRO and DRO detected in 2003 were 21,300 µg/L and 127,000 µg/L, respectively.

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

Soil and reconnaissance groundwater analytical results from this investigation are summarized in Tables 5 and 6, respectively, and soil results are shown on Figure 9.

6.2.4 April and June 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. Because this sample was collected hydraulically upgradient of the marina, it can likely be attributed to an offsite source to the south and east. Soil and reconnaissance groundwater analytical results from this investigation are summarized in Tables 5 and 6, respectively, and soil results are shown on Figure 9.

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. Groundwater analytical results from this investigation are summarized in Table 6.

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 orthoxylene at concentrations up to 1.1 µg/L. Surface water analytical results are summarized in Table 7.

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 sediment contains creosote from the timber bulkhead. Sediment analytical results are summarized in Table 8.

6.2.5 Investigations in 2006

During an investigation in May 2006, LNAPL was also observed in monitoring wells MW-2 and MW-3, and sheen was noted to be 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 with or higher than the previous sampling event in 2005. Groundwater analytical results from this investigation are summarized in Table 6.

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 bgs during the test pit excavations, and LNAPL was encountered in three of the five excavations (see Figure 3 for test pit sampling locations). Strong odors, sheens, and/or elevated photoionization detector readings were also noted (with the exception of test pit TP4) during the investigation (EA 2008). Soil analytical results from this investigation are summarized in Table 5.

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 with visible sheen. Concentrations of GRO and DRO were detected in the sheen sample at 85.4 µg/L and 368 µg/L, respectively. Surface water analytical results are summarized in Table 7.

Section 7: Summary of 2011 Remedial Investigation Activities and Results

7.1 2011 Remedial Investigation Activities

The principal objectives of the supplemental RI investigation activities conducted from September through November 2011 were to fill data gaps from previous investigations, as needed, and to confirm the current distribution of hydrocarbon-containing site media (soil and groundwater). The investigative activities conducted in 2011 are described in the Work Plan (Kennedy/Jenks 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 (MW-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 site hydraulic conditions, including water level measurements at both high and low tide stages, continuous water level monitoring in five onsite wells, and slug tests to evaluate aquifer characteristics in the shallow (uppermost) formation.

Because previous investigations had concluded that no significant impacts from the hydrocarbon release were present in sediment and surface water adjacent to the site, these media were not assessed during supplemental RI activities. For a detailed description of the procedures used to perform this supplemental RI, refer to the Work Plan (Kennedy/Jenks 2011a).

Boring logs and field forms documenting groundwater sampling activities are provided in Appendix D.

7.2 2011 Remedial Investigation Results

Supplemental investigation activities were conducted at the site from September through November 2011. These activities are discussed in more detail in the following sections. Analytical results are summarized in Tables 9 through 13 and shown on Figures 10 and 11. The summary tables present analytical data for the COCs onsite (detected analytes only). Comprehensive results of all chemical analyses by method are presented in Appendix F. Chain-of-custody records and copies of laboratory analytical reports are provided in Appendix G.

7.2.1 Soil Results

The primary objective of the soil investigation was to characterize the vertical and horizontal distribution of COCs (primarily petroleum hydrocarbon) in site soils. The following activities were completed to delineate soil impacts onsite:

- Advancing and sampling 67 soil borings, including seven that were completed as monitoring wells.

- Analyzing 84 soil samples for GRO using Northwest Total Petroleum Hydrocarbons as Gasoline (NWTPH-G), DRO using Northwest Total Petroleum Hydrocarbons as Diesel and Oil Extended (NWTPH-Dx) and BTEX using EPA Method 8021B. In addition, selected soil samples were also submitted for analysis of polynuclear aromatic hydrocarbons (PAHs) using EPA Method 8270C, ethylene dibromide (EDB), MTBE and ethylene dichloride (EDC) by EPA Method 8260B, and Resource Conservation and Recovery Act (RCRA) metals using EPA 6000/7000 series methods.

These activities delineated the distribution of site soils containing COCs at concentrations exceeding MTCA Method A soil cleanup levels for unrestricted land use. The results are displayed on Figure 10. 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.

The vertical distribution of hydrocarbon-containing soils is displayed on Generalized Geologic Cross Sections A-A', B-B' and C-C' on Figures 5 and 6. In general, petroleum-affected soils are typically encountered within 2 to 5 feet of the ground surface and extend to approximately 5 to 12 feet below grade, but these depths vary with proximity to the bulkhead.

The thickness of hydrocarbon-containing 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. The distribution of affected soil is discussed in greater detail in Section 8.1.

GRO concentrations ranged from below detectable levels (<5.6 mg/kg) to 9,400 mg/kg and, as expected, tend to be higher near the water table and lower in the deeper samples (10 feet or deeper) collected in native soil.

DRO concentrations ranged from below detectable levels (<5.3 mg/kg) to 7,700 mg/kg and exceeded the MTCA Method A soil cleanup level of 2,000 mg/kg in only one of the 84 samples submitted for NWTPH-Dx analysis.

Benzene concentrations ranged from below detectable levels (<0.0.013 mg/kg) to 150 mg/kg, with several of the deeper samples collected from native soil containing benzene concentrations above the MTCA Method A soil cleanup level of 0.030 mg/kg, especially adjacent to the bulkhead. The presence of deeper benzene impacts adjacent to the bulkhead may be attributed in part to tidally influenced groundwater fluctuations.

Coincident with the benzene exceedances, elevated concentrations of toluene, ethylbenzene and xylenes at concentrations above MTCA Method A cleanup levels were observed. However,

these exceedances do not affect the overall footprint or volume of hydrocarbon-containing soils present onsite that warrant remedial action.

Other VOCs (EDB, EDC, and MTBE) were not detected in soil samples at concentrations above the laboratory reporting limits.

Concentrations of individual non-carcinogenic PAHs are well below applicable MTCA Method A/B soil cleanup levels. Total carcinogenic PAH concentrations ranged from 3.1 to 33 micrograms per kilogram (µg/kg), below the MTCA Method A soil cleanup level of 100 µg/kg (see Table 10).

Results of metals analyses indicate lead or other metals analytes were not detected at concentrations above MTCA Method A/B cleanup levels. Detected chromium concentrations ranged from 16 to 47 mg/kg. Seven of the eight samples submitted for chromium analysis contained 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 the Puget Sound, where the maximum background concentration was 235 mg/kg (Ecology 1994).

7.2.2 Groundwater Results

During performance of supplemental RI activities, groundwater samples were collected from nine reconnaissance borings and 10 new or existing monitoring wells. The results of groundwater sample analyses are summarized in Tables 11 and 12. The analytical results of GRO, DRO, and benzene are also displayed on Figure 11.

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 a 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 summarized below:

- Toluene -- from below detectable levels (<1 µg/L) to 170 µg/L.
- Ethylbenzene –from below detectable levels (<1 µg/L) to 1,200 µg/L
- Total xylene –from below detectable levels (<2 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 sources of 1-methylnaphthalene, 2-methylnapthalene, and dibenzofuran at the site are not certain; however, these compounds 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 (the highest concentrations were detected in samples from MW-2 and MW-4, both located in proximity to the bulkhead).

Total and dissolved arsenic concentrations (detected at a maximum concentration of 0.18 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.

Total and dissolved lead were not detected in groundwater samples at concentrations above the laboratory reporting limits.

Other VOCs (EDB, EDC, and MTBE) were either not detected in groundwater samples at concentrations above the laboratory reporting limits, or were detected at concentrations below the applicable MTCA Method A/B groundwater cleanup levels.

7.2.3 Soil Vapor

Soil vapor samples were collected from two locations onsite, VP-1 and VP-2, shown on Figure 3. Analytical results for the soil vapor samples are summarized in Table 13. Soil vapor probe construction details are provided in the boring logs presented in Appendix D. Soil vapor sample collection was conducted in general accordance with Ecology's Guidance for Evaluating Soil Vapor Intrusion in Washington State (Ecology 2009), and with procedures provided in the Work Plan.

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 $\mu g/m^3$ 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 27,000 $\mu g/m^3$ for C_5 to C_8 range and 1,400 $\mu g/m^3$ for 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 3.2 $\mu g/m^3$. 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 of 4,600 $\mu g/m^3$. Total xylenes (m,p-xylene plus o-xylene) were also detected at 19,000 and 21,000 $\mu g/m^3$, respectively, in the vapor, exceeding the MTCA Method screening level for shallow soil vapor of 2.8 $\mu g/m^3$.

7.3 Natural Resources/Wildlife

No additional studies related to natural resources or wildlife were conducted at the site.

7.4 Cultural History/Archeology

The project area consists of entirely fill material. The marina building was constructed in the early 1960s and is not expected to be of historical significance. In December 2011, Cultural Resource Consultants, Inc. (CRC) conducted an evaluation of potential cultural resources that could be affected by future work at the site (CRC 2011). Based on the cultural resources report prepared by CRC dated 20 June 2013, no cultural resources were identified within the project's area of potential effects were and consequently, no further cultural resource evaluation was recommended by CRC.

Section 8: Occurrence of Chemicals of Concern and Conceptual Site Model

This section summarizes the overall occurrence and extent of impacts to site media, including a conceptual site model showing contaminant migration and potential exposure pathways.

8.1 Distribution of COC Impacts

Impacts to onsite soil occur primarily within fill material, but they do extend into the upper portion of the native materials underlying the fill at some locations. Impacts to shallow groundwater generally correlate with the area of soil impacts (see Figures 10 and 11).

In the central portion of the site, hydrocarbon-containing soil is present from approximately 2 feet bgs to approximately 10 to 12 feet bgs, with an average affected soil thickness of approximately 10 feet. The thickness of affected soil decreases to the east toward Cornet Bay Road and to the north toward the northern property boundary and northern bulkhead segment (see Figure 12).

The initial depth to affected soil generally increases to 4 to 8 feet bgs in the southern portion of the site and decreases to approximately 3 to 8 feet bgs toward the sediment pond southwest of the site. The depth to the bottom of affected soil is similar to the central portion of the site (up to approximately 12 feet bgs).

In the western portion of the site (adjoining Cornet Bay) near the bulkhead, the initial depth to soil impacts increases to approximately 7 to 14 feet bgs and extends to depths of up to 18 feet bgs. Soil impacts extend up to the margins of the bulkhead in the central and northern portions of the site, but do not appear to extend to the bulkhead in the southern portion (see Figure 12). The thickness of affected soil that abuts the central and northern portions of the bulkhead ranges from approximately 2 to 11 feet and is thickest at the northern end. The thickness of affected soil in the southwestern portion of the site (where affected soil approaches Cornet Bay but does not extend to the bulkhead) decreases to 2 to 3 feet.

Soil materials affected by both GRO and benzene have a smaller vertical and lateral extent than those affected only by benzene (see Figure 10). GRO impacts to soil (typically coincidental with benzene impacts) generally dissipate below 6 to 7 feet bgs and are less laterally extensive than soil affected only by benzene. Soil affected only by benzene is present both beneath the GRO and benzene-affected areas and laterally away from the GRO and benzene-affected areas, primarily to the west and southwest toward Cornet Bay. The lateral extents of the GRO and benzene and benzene-only areas are depicted on Figure 10.

Groundwater impacts generally correlate with the affected soil area described above. Groundwater samples (collected from both reconnaissance borings and monitoring wells) containing GRO and benzene were collected from the area with GRO and benzene soil impacts described above. Groundwater samples containing benzene only were collected from the area of benzene-only soil impacts described above, except for one sample collected from MW-4, which contained benzene but is located west of the affected soil area. GRO and benzene

impacts were not identified in samples collected from reconnaissance borings and wells located upgradient (east) of the affected soil area.

8.2 Conceptual Site Model

A conceptual site model based on the findings of this investigation is shown on Figure 13 and discussed below.

8.2.1 Contaminant Transport

Contaminant transport appears to be influenced primarily by the shallow groundwater gradient onsite. As previously discussed**,** the onsite groundwater gradient is relatively steep (up to 7 feet of head difference across the site) and toward Cornet Bay. A tidal influence occurs near the bulkhead, with up to approximately 3 feet of tidally induced fluctuation, but the overall gradient appears to be similar regardless of tidal conditions. Groundwater movement, influenced by recharge from upland areas to the east and direct infiltration of stormwater through unpaved ground surfaces, appears to be a primary transport mechanism for onsite COCs.

In addition, the local stratigraphy has likely influenced the current COC distribution. Surficial fill materials overlie native clay/silt materials at the site. The native clay/silt layer was identified throughout the site and presents a natural impediment to downward groundwater migration. Consequently, lateral movement of COCs along the top surface of the clay/silt would be expected to be more extensive than vertical movement.

The depth to the top of the clay/silt ranges from approximately 7 to 15 feet bgs and is shallowest in the southeastern portion of the site. The top of the clay/silt material slopes downward to the north (slightly) and to the west toward Cornet Bay. The overall distribution of COC impacts in soil appears to be consistent with lateral movement of COCs along the slope of the upper surface of the clay/silt material.

As discussed in Section 8.1, the lateral and vertical extent of benzene is greater than that of GRO. This may be related to selective partitioning and transport of benzene laterally and vertically away from the GRO plume.

8.2.2 Exposure Pathways

Potential exposure pathways for the site include direct contact for soil and groundwater, leaching (soil to groundwater), groundwater to surface water, groundwater to sediments (including consumption of affected aquatic organisms), and vapor intrusion to surface receptors. For ecological receptors, direct contact was identified as the only exposure pathway for wildlife, as discussed in the site-specific TEE (Kennedy/Jenks 2011b), which is summarized in Section 4.6. Potential exposure pathways are illustrated on Figure 13 and discussed below.

- Direct contact with affected soil is possible for workers performing invasive work, but hydrocarbon-containing soils are not exposed at the ground surface. Ingestion of shallow groundwater is unlikely because shallow groundwater is not a potable water source. Direct contact of groundwater is possible during work at onsite groundwater monitoring wells. Based on the findings of the TEE, direct contact of affected soil is also possible, though not likely, for wildlife.

- The soil-to-groundwater leaching pathway is complete. Most of the site is unpaved, allowing for direct infiltration of surface water through hydrocarbon-containing soils. In addition, soil containing COC is in direct contact with shallow groundwater, and groundwater migration is considered a primary transport mechanism for onsite COCs.

- The groundwater-to-surface-water pathway is complete based on the likelihood of groundwater seepage through and/or around the existing bulkhead. Potential receptors include humans and aquatic organisms.

- The groundwater-to-sediment pathway is complete based on the likelihood of groundwater seepage through and/or around the existing bulkhead, although previous sediment screening results suggest that COCs have not migrated beyond the bulkhead. Potential receptors include humans, aquatic organisms, and terrestrial organisms (direct contact during low tidal conditions).

- The vapor pathway appears to be complete based on the results of soil vapor samples collected during the 2011 RI. Upward migration of vapors is considered likely because most of the surface area onsite is unpaved.

Section 9: Introduction to Feasibility Study

The purpose of a FS is to develop and evaluate various remedial action alternatives that would reduce or mitigate current and potential future risks to human health and the environment associated with petroleum-containing soils and groundwater at the site. Sections 10 through 14 constitute the FS for the site. This FS will assist Ecology in selecting the most appropriate remedial action for implementation at the site. This FS was prepared in general accordance with MTCA requirements specified in WAC 173-340-360 through 173-340-390.

The FS includes the following components:

- Section 10 – Definition of the areas and volumes of affected site media that warrant cleanup under MTCA regulations.
- Section 11 – Screening of remedial technologies and development of remedial alternatives to address site conditions and COCs.
- Section 12 – Evaluation of the remedial alternatives based on MTCA criteria.
- Section 13 – Comparative analysis and disproportionate cost analysis of the alternatives.
- Section 14 – Recommendations of the most appropriate alternative for the site.

Section 10: Area and Volume of Affected Material Above Cleanup Levels

This section presents an estimate of the area and volume of site media (soil and groundwater) requiring remedial action. During performance of the RI, several COCs were detected at concentrations above applicable site cleanup levels. Although some constituents such as toluene, ethylbenzene, and xylene 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 address other COCs that are present at concentrations above cleanup levels.

10.1 Soil

As discussed above, the primary COCs exceeding soil cleanup levels include gasoline-range hydrocarbons and benzene. The current distribution of site soils exceeding MTCA Method A cleanup levels (unrestricted land use) for gasoline-range hydrocarbons and benzene is shown on Figure 10. As indicated on Figure 10, the lateral extents of petroleum-containing soils for both gasoline-range hydrocarbons and benzene are less than for benzene alone. The area of petroleum-containing soils is estimated to be approximately 0.8 acre (34,850 square feet).

Petroleum-containing soils consist primarily of fill material and do not appreciably extend into the upper portion of the underlying native materials. The vertical distribution of petroleum-containing soils is presented in generalized cross-sections on Figures 5 and 6 (see Figure 4 for cross-section locations). In general, petroleum-containing soils are encountered from a few feet below grade to 12 feet bgs, but extend down to 18 feet bgs at some locations, particularly at 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 depth intervals and volumes of assumed clean overburden and petroleum-containing soils. The approximate depth intervals of petroleum-containing soils are shown on Figure 12. The estimated volumes are as follows:

- Assumed clean overburden – 6,700 cubic yards (cy)
- Petroleum-containing soils – 8,400 cy.

10.2 Groundwater

Gasoline/diesel-range hydrocarbons and benzene groundwater monitoring data is shown on Figure 11. The groundwater samples were collected from reconnaissance borings and monitoring wells located within the area of petroleum-containing soils as described in Section 2.1 (see Figure 10). In general, the distribution of petroleum hydrocarbon compounds in groundwater is consistent with the extent of petroleum-containing soils at the site. Similarly to the petroleum-containing soils, the lateral extent of benzene impacts is greater than gasoline-range hydrocarbons in groundwater. Assuming an area of 34,850 square feet, average groundwater zone of 7 feet, and total porosity of 25 percent (consistent with fine-grained soils), the volume of petroleum-containing groundwater is estimated to be approximately 460,000 gallons.

Section 11: Technology Screening and Alternative Development

This section presents the rationale for identifying remedial alternatives to address soil and groundwater containing COCs at concentrations exceeding site cleanup levels. Section 11.1 presents an initial evaluation (i.e., screening) to identify potentially applicable remedial methods (i.e., process options). In Section 11.2, remedial methods passing the initial screening process are combined to create potentially feasible remedial alternatives. The remedial alternatives are described in detail for further evaluation as presented in Section 12.0.

11.1 Identification and Evaluation of Potential Remedial Methods

General response actions, remedial technologies, and process options that may be appropriate for addressing site conditions and COCs were identified. General response actions are broad categories of remedial methods that can address the cleanup of a specific matrix (i.e., soil or groundwater). Remedial technologies are various techniques within the general response actions. Process options are specific processes within each remedial technology category. The identification and evaluation of general response actions, remedial technologies, and process options for soil and groundwater are presented in Tables 14 and 15, respectively. (Note: remedial technologies were not evaluated for surface water because actions taken for soil and groundwater will also address surface water receptors.) Bold text in Tables 14 and 15 indicates that the process option is included for further consideration in the FS.

Process options were initially screened using three criteria: effectiveness, ability to be implemented, and relative cost, as summarized below:

- Effectiveness involves consideration of a process option's ability to process the anticipated volume of soil and groundwater, meet cleanup standards, and protect human health and the environmental during construction and implementation.

- Ability to be implemented includes technical and administrative considerations. This criterion focuses on the ability to technically address COCs in soil and groundwater at concentrations detected during the RI. It also evaluates the permits necessary for onsite and offsite activities and discharges, and the availability of offsite facilities, services, and materials.

- Cost is based on engineering judgments rather than detailed estimates. Process options that are judged to be similar in effectiveness and ability to be implemented, yet costing several times more than other process options in the same technology category, were eliminated from further consideration.

Process options that are not appropriate for site conditions, planned future site uses, or COCs contained in soil and groundwater at concentrations detected during the RI were eliminated from further consideration. In addition, process options that are innovative but unproven were also eliminated. If more than one process option in a remedial technology group was identified as

potentially appropriate for the site, further screening was performed, and one process option was selected to represent that technology group.

Based on the initial evaluation, the general response actions and process options with the greatest potential for success in addressing petroleum-containing soil and groundwater at the site include:

- Removal. Excavation and offsite disposal of accessible soils.
- Containment. Vertical barriers restrict migration and protect surface water receptors. Low-permeability ground covers reduce infiltration and migration.
- In Situ Treatment. Treatment technologies include physical removal through groundwater or soil vapor extraction and bioremediation.

Performance monitoring and/or confirmational monitoring are required components of all response actions. Performance monitoring includes sampling performed during removal or treatment to assess progress and/or achievement of cleanup levels. Confirmational monitoring is required to assess long-term effectiveness and compliance with cleanup levels.

MTCA requires that the process options used minimize the amount of untreated COC remaining at the site and that attention be given to a permanent solution and hierarchy of preferred remedial methods. In general, technologies that reuse, recycle, destroy, or detoxify hazardous substances will result in permanent solutions.

Table 16 summarizes the results of the process option evaluation, as completed in Tables 14 (soil) and 15 (groundwater). As indicated in Table 16, the selected process options passing the initial evaluation include a range of technologies that reuse, recycle, destroy, or detoxify affected site media, resulting in a potential permanent solution.

11.2 Development of Alternatives

This section identifies alternatives that could be appropriate for addressing petroleum-containing soils and groundwater at the site. These alternatives are identified using the requirements and expectations described in MTCA (WAC 173-340-360), which include:

- Meeting threshold requirements for remedial alternatives (refer to Section 12.1)
- Using permanent solutions to the maximum extent practicable
- Providing for a reasonable restoration time frame
- Addressing public concerns raised during public comment on the Draft Cleanup Action Plan (CAP).

Ecology has the following expectations for cleanup action alternatives (WAC 173-340-370):

- Use treatment technologies whenever practicable.

- Minimize the need for long-term management of contaminated materials by destroying, detoxifying, or removing hazardous substances that are above cleanup levels.

- Recognize the need to use engineering controls, such as containment for sites with large volumes of relatively low levels of hazardous substances.

- Implement measures to prevent precipitation and runoff from contacting affected soils and waste materials.

- Consolidate hazardous substances to the maximum extent practicable if the hazardous substances remain onsite.

- Prevent/minimize releases to surface water via runoff and groundwater discharges exceeding cleanup levels.

- Consider the use of natural attenuation of hazardous substances, which may be appropriate under some circumstances.

- Do not undertake cleanup actions that will result in a greater overall threat to human health and the environment than will other alternatives.

MTCA recognizes that treatment may not be practicable for all sites. Treatment is required, wherever practicable, for sites containing liquid wastes, areas containing 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 or minimize releases to surface water and/or groundwater at concentrations above cleanup levels [WAC 173-340-370(6)].

Based on the considerations provided above, Kennedy/Jenks' experience, and extensive published literature regarding the remediation of petroleum-affected sites, the following alternatives were developed for this site.

11.2.1 No Action

The No Action alternative is a baseline alternative included for comparison to the other alternatives. The No Action alternative assumes that no action is taken, no monitoring is performed, and no costs are incurred. This alternative would not achieve the required cleanup levels.

11.2.2 Alternative 1 - Excavation and Offsite Disposal

This alternative involves replacing the existing timber bulkhead with a steel sheet pile wall, excavating and disposing of affected soils offsite, performing *in situ* bioremediation through strategic placement of biologically amended backfill, and conducting groundwater compliance monitoring. Alternative 1 consists of the following elements (see Figure 14):

- Site preparation activities would include, but are not limited to, CAP preparation and design, obtaining permits [e.g., 404 Water Quality, 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 would be temporarily relocated onsite. Temporary sanitary facilities would be provided when the septic tank is removed. The mounded drainfield and existing fuel system's underground reinforced concrete vault would remain undisturbed. Seven of the existing monitoring wells (MW-1, MW-2, MW-3, MW-5, MW-6, MW-8, and MW-10) would be abandoned prior to excavation activities.

- The existing timber bulkhead, consisting of pilings, walers, and supports, would be demolished and removed at the base of the excavation or mudline in Cornet Bay. Unaffected wood would 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 would be installed parallel to the existing timber bulkhead extending approximately 330 feet along the shoreline. Water quality monitoring (i.e., turbidity sampling) would 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 2 and 18 feet bgs. The total volume of excavated material is estimated at 15,100 cy and includes the following:

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

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

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

- After receipt of favorable performance monitoring results, the excavation would be backfilled to existing grade with stockpiled clean overburdened 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 would be amended with an oxygen-releasing compound (or equivalent) to promote biological degradation of residual petroleum hydrocarbons. The amended backfill would be strategically placed alongside slopes and the floor of 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 would 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 aboveground waste oil tanks), site utilities, and septic tank would be restored. Other restoration activities would be completed to return the property to its original functionality.

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

11.2.3 Alternative 2 - Containment with Groundwater and Soil Vapor Extraction

This alternative involves installing a new steel sheet pile wall, constructing groundwater and soil vapor extraction (SVE) systems (or combination high vacuum-extraction system to simultaneously remove groundwater and vapor from wells), installing an asphalt cover, and conducting performance/ confirmational monitoring. The steel sheet pile wall would serve as containment, with hydraulic control provided by the groundwater extraction system. Contaminant mass removal would be conducted via long-term operation of the groundwater extraction and SVE systems. The SVE system would also serve as a mitigation system for potential vapor intrusion into buildings. An asphalt surface cover would be installed to prevent direct contact, infiltration, and enhance vapor extraction. Alternative 2 includes the following elements (see Figure 15):

- Site preparation activities would include, but would not be limited to, CAP preparation and design, obtaining permits (e.g., 404 Water Quality, NPDES, air discharge, etc.), and waste profiling and designation.

- A sheet pile wall would be installed parallel to the existing timber bulkhead extending approximately 330 feet along the shoreline. The existing timber bulkhead would remain in place.

- A groundwater pump-and-treat system would be installed to provide hydraulic control (i.e., steel sheet pile wall system is not completely impervious; minimize contaminant migration around physical barrier), remove contaminant mass, and dewater the zone of petroleum impacts to facilitate vapor extraction from the unsaturated zone. The system

would include groundwater extraction from 9 wells, with treatment consisting of bag filtration and granular-activated carbon. The treated water would be discharged directly to the bay under an NPDES permit. System sampling and chemical analyses would be performed to confirm that discharge requirements are met.

- An SVE system would be installed to remove contaminant mass in the unsaturated zone and mitigate potential vapor intrusion into site buildings. The system would include vapor extraction from 3 wells, with treatment consisting of granular-activated carbon or equivalent. System sampling and chemical analyses would be performed to estimate mass removal, assess treatment performance (includes verifying vapor mitigation), and satisfy air discharge requirements. [Note: An influx of air into the subsurface will increase oxygen concentrations and promote biological degradation of diesel-range hydrocarbons (i.e., bioventing).]

- The groundwater extraction and SVE system components would be housed in an onsite constructed building. Due to low-permeability soils at the site, the groundwater and SVE systems could be combined as a high vacuum-extraction system to simultaneously remove groundwater and vapor from installed wells.

- Approximately 36,000 square feet of the site (most of the property) would be paved with asphalt to reduce infiltration and assist with vapor extraction. The asphalt pavement cover will also prevent direct contact with affected soils.

- Quarterly confirmational groundwater monitoring would be conducted until cleanup standards are met; to verify maintenance of hydraulic control, assess treatment effectiveness, and evaluate groundwater quality. Groundwater samples would be analyzed for total petroleum hydrocarbons as gasoline and diesel-range hydrocarbons, BTEX, and natural attenuation parameters.

- A deed restriction would be structured to prevent human exposure during potential future onsite excavation or subgrade utility work.

11.2.4 Alternative 3 - Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation

This alternative involves partial excavation and offsite disposal of affected soils, *in situ* bioremediation via strategic placement of biologically amended backfill and direct-push injections, construction of a SVE system, and performance/confirmational monitoring. Affected soils would be removed from the area where soil concentrations exceed the MTCA A cleanup levels for gasoline-range hydrocarbons and benzene, except from beneath the store (i.e., temporary relocation/restoration of the building is not required). An SVE system (or high vacuum extraction system) would be installed to remove contaminant mass from the unsaturated zone and to serve as a mitigation system for potential vapor intrusion into site buildings. Direct-push injections would be performed to deliver an oxygen release compound (or equivalent) to the smear/saturated zone to promote biological degradation. Alternative 3 includes the following elements (see Figure 16):

- Site preparation activities would include, but would not be limited to, CAP preparation and design, obtaining permits [e.g., 404 Water Quality, NPDES, air discharge, Underground Injection Control (UIC)], grading, etc.), and waste profiling and designation.

- Site utilities would be temporary relocated to facilitate excavation. Temporary sanitary facilities would be provided when the septic tank is removed. The mounded drainfield and existing fuel system underground reinforced concrete vault would remain undisturbed. Three of the existing monitoring wells (MW-3, MW-5, and MW-10) would be abandoned prior to excavation activities.

- 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 2 and 12 feet bgs. The volume of excavated material is estimated to be 7,900 cy and includes the following:

    - Assumed clean overburden would be temporarily stockpiled onsite for potential re-use as backfill. Representative soil samples of the stockpiled material would be submitted for chemical analyses and subsequent re-use evaluation (i.e., comparing laboratory analytical results to applicable MTCA criteria). The volume of clean overburden is estimated to be 3,200 cy.

    - Excavated affected soils would be transported and disposed of at a licensed Subtitle D landfill facility as a non-hazardous waste. The volume of affected soils is estimated to be 4,700 cy.

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

- After receipt of favorable performance monitoring results, the excavation would be backfilled to existing grade with stockpiled overburdened soil deemed acceptable for re-use and imported clean fill. The volume of imported clean fill is estimated to be 4,700 cy.

- A portion of the imported backfill would be amended with an oxygen-releasing compound (or equivalent) to promote biological degradation of residual petroleum hydrocarbons. The amended backfill would be strategically placed alongside slopes and the floor of the excavation in areas where petroleum hydrocarbon-containing soils may be inaccessible to further excavation. The volume of imported fill amended with the biological amendment is estimated to be 750 cy.

- Direct-push injections would be performed on a grid over the remaining portion of the petroleum-affected area (i.e., soil concentrations exceed the MTCA Method A soil cleanup levels for benzene only) to deliver a biological solution to the subsurface. The solution would provide a long-term oxygen source to promote biological degradation of petroleum hydrocarbons within the smear/saturated zone (i.e., between 3 and 12 feet

bgs). It is estimated that approximately 135 injections locations would be performed on approximate 10-foot centers.

- The biological amendment longevity is estimated up to 2 years; due to site heterogeneity and longevity of the biological amendment it is anticipated two follow-up injection events would be required.

- An SVE system (or high vacuum-extraction system to simultaneously remove groundwater and vapor) would be installed to include vapor extraction from three wells installed at the perimeter of the store to target mass removal beneath the building and induced vacuum for vapor intrusion suppression. Extracted vapors would be treated using granular-activated carbon or equivalent (if needed). System sampling and chemical analyses would be performed to estimate mass removal, assess treatment performance (including verifying vapor mitigation), and satisfy air discharge requirements. The SVE system components would be housed in an onsite constructed building.

- Approximately 36,000 square feet of the site (most of the property) would be paved with asphalt to reduce infiltration and assist with vapor extraction. Site restoration activities would include replacement of utilities and septic tank and other related activities to return the property to its original functionality.

- Quarterly confirmational groundwater monitoring would be conducted until cleanup standards are met; to assess removal/treatment effectiveness and evaluate groundwater quality. Groundwater samples would be analyzed for gasoline and diesel-range hydrocarbons, BTEX, and natural attenuation parameters.

- A deed restriction would be structured prevent human exposure during potential future onsite excavation or subgrade utility work.

Section 12: Evaluation of Remedial Alternatives

The section presents a preliminary analysis of the remedial alternatives against the MTCA threshold criteria in Section 12.1, followed by detailed analyses in Section 12.2.

12.1 MTCA Threshold Criteria

A remedial action must meet certain threshold criteria to be considered under the MTCA [WAC 173-340-360 (2)(a)]. An alternative cannot be selected if it cannot meet the following threshold requirements:

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

A cleanup is presumed to be protective of human health and the environment at the site if it achieves the cleanup levels. Compliance with cleanup standards involves achieving cleanup levels at an appropriate point of compliance and complying with applicable federal and state laws.

Compliance monitoring assesses the protection of human health and the environment during construction and the operation and maintenance period of a cleanup action. Compliance monitoring confirms that the remedial action has met cleanup standards and verifies its long-term effectiveness. Compliance with the threshold requirements does not imply that untreated hazardous substances cannot remain onsite. MTCA recognizes that non-treatment alternatives can comply with cleanup standards, provided that compliance monitoring is included to ensure system integrity.

Table 17 summarizes the evaluation of the alternatives in relation to MTCA's threshold criteria. Based on this evaluation, all alternatives except the No Action alternative meet the threshold criteria. All alternatives can achieve cleanup levels; have an acceptable point of compliance; and provide for compliance monitoring.

12.2 Detailed Analyses of Alternatives

This section evaluates each remedial alternative against seven criteria set in WAC 173-340-360(3)(f) in order to establish whether a cleanup is permanent to the maximum extent practical. The seven criteria are:

1. Protectiveness
2. Permanence
3. Cost

4. Effectiveness over the long term
5. Management of short-term risks
6. Technical and administrative implementability
7. Consideration of public concerns.

These criteria, as well as a discussion of providing a reasonable restoration time frame and compliance with federal and state Applicable, Relevant, and Appropriate Requirements (ARARs), are evaluated below.

12.2.1 Protectiveness

This criterion includes the degree to which existing risks are reduced, the time required to reduce risk at the site and attain cleanup standards, onsite and offsite risks resulting from implementing the alternative, and improvement of the overall environmental quality.

The overall protectiveness evaluation is included in Table 18.

12.2.2 Permanence

A permanent cleanup achieves cleanup standards without requiring further action such as long-term monitoring or institutional controls. The remedial action alternatives were compared based on their adequacy in destroying hazardous substances, reducing or eliminating hazardous substance releases and sources, the irreversibility of waste treatment process, and the characteristics and quantity of treatment residuals generated.

The overall permanence evaluation is included in Table 19.

12.2.3 Cost

The costs to implement the alternatives, including the cost of construction and the net present value of any long-term costs, were estimated to determine practicability (see Section 13.1.3). Long-term costs include operation and maintenance costs, monitoring costs, equipment replacement costs, and the costs of maintaining institutional controls.

12.2.4 Long-Term Effectiveness

Long-term effectiveness is defined as the degree of certainty that the alternative will be successful, the reliability of the alternative during the period of time hazardous substances are expected to remain onsite at concentrations that exceed cleanup levels, the magnitude of residual risk with the alternative in place, and the effectiveness of controls required to manage treatment residues or remaining wastes.

The results of the evaluation of these sub-criteria are presented in Table 20.

12.2.5 Short-Term Risks

Short-term risks include traffic, noise, and safety concerns. The risk to human health, public, and the environment associated with each alternative during construction and implementation, and the effectiveness of measures that would need to be taken to manage such risks, were considered.

This evaluation is included in Table 21.

12.2.6 Ability to Implement

This criterion evaluates an alternative's ability to be implemented, including whether it is technically possible, availability of necessary offsite facilities, services and materials, administrative and regulatory requirements, scheduling, size, complexity, monitoring requirements, access for construction operations and monitoring, and integration with existing facility operations and other current or potential remedial actions.

The implementability evaluation is included on Table 22.

12.2.7 Consideration of Public Concerns

Ecology would address public concerns, if any, during selection of the remedial action. A Public Notice and Participation period is required (WAC 173-340-600) before implementation of the action.

12.2.8 Restoration Timeframe

The time required to attain cleanup levels for each remedial alternative was estimated and summarized below.

12.2.8.1 Alternative 1 – Excavation and Offsite Disposal

For Alternative 1, it is estimated that soil cleanup levels will be attained immediately, and groundwater cleanup levels will be attained within 2 years (i.e., 1 year to complete remediation activities followed by 1 year of quarterly groundwater monitoring for compliance). This estimate is based on the following assumptions:

- More than 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 within 1 year after removing affected soils and restoring the site. The installed steel sheet pile wall will provide added protection through containment.

12.2.8.2 Alternative 2 – Containment with Groundwater and Soil Vapor Extraction

For Alternative 2, it is estimated that soil and groundwater cleanup levels will be attained within 10 years. The estimate is based on the following assumptions:

- Upon installation, the steel sheet pile wall, in conjunction with operation of the groundwater extraction system, will provide containment and hydraulic control to

minimize COC migration to surface water. Operation of the SVE system will reduce the potential for leaching to groundwater and mitigate vapor intrusion to site buildings. The asphalt pavement cover and deed restriction will prevent direct contact with affected media.

- Assuming a 100-time pore volume flush is required to reduce COC concentrations in groundwater to below cleanup levels (total volume of 46 million gallons), it is estimated that the groundwater extraction system will operate for 9 years, based on a conservative groundwater extraction rate of 10 gallons per minute (gpm). It is anticipated soil cleanup levels would be managed or attained within this timeframe.

12.2.8.3 Alternative 3 – Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation

For Alternative 3, it is estimated that soil and groundwater cleanup levels will be attained within 8 years. Soil cleanup levels will be attained within a portion of the site as soon as the affected soil is removed. The estimate is based on the following assumptions:

- Approximately 70 percent of the contaminant mass will be removed from the site via excavation and offsite disposal of affected soils. Soil cleanup levels would be attained immediately within a portion of the site.

- Natural attenuation data suggest biological degradation is occurring at the site (i.e., low oxidation-reduction potential suggests oxygen consumption and potential depletion of electron acceptors). Biological degradation would be accelerated through addition of oxygen; repeat injections would likely be required due to low permeability soils and heterogeneity (i.e., contact with affected media). Assuming the biological amendment longevity of 2 years and up to three repeat injections, groundwater cleanup levels would be attained within 8 years.

12.2.9 Compliance with Applicable or Relevant and Appropriate Requirements

Action-specific ARARs regulate technologies or activities that involve handling or treating hazardous wastes. Action-specific ARARs are typically technology- or activity-based requirements or limitations. Table 23 summarizes the potential action-specific ARARs.

Section 13: Comparative Analyses and Disproportionate Cost Analysis

This section presents a comparative analysis using the MTCA criteria presented in the detailed analyses of alternatives presented in Section 12.0. A detailed analysis of alternatives for each MTCA criterion/sub-criterion is presented in Tables 17 through 22. In each table, the alternatives are ranked on a scale of 1 to 5 based on how completely each alternative satisfies the MTCA criteria (1 = does not meet criterion; 5 = meets criterion completely). The comparative analyses scoring is summarized in Table 24. The following discussion presents the rationale for the comparative evaluation.

13.1 Comparative Analyses

13.1.1 Protectiveness

For this criterion, the alternatives were ranked based on the degree that risk is reduced and/or managed and the time required to attain cleanup levels. The No Action alternative is not protective.

Alternative 1 was ranked as the most protective, as risk would be reduced significantly via affected soil removal (i.e., direct contact, leaching to groundwater, and vapor intrusion pathways eliminated). Any residual contaminant mass would be contained within the installed sheet pile wall and naturally attenuated/biologically degraded, minimizing the potential for COC migration to surface water. It is estimated that soil and groundwater cleanup levels would be attained within 2 years for Alternative 1 (i.e., 1 year following construction).

Although contaminant mass removal would be slow via long-term operation of the groundwater and SVE systems for Alternative 2, risk pathways would be addressed immediately. The installed sheet pile in conjunction with groundwater extraction would minimize the potential for COC migration to surface water; the direct contact pathway would be addressed by the installed asphalt cover and deed restriction; and SVE would reduce the potential for leaching to groundwater and vapor migration into buildings. The estimated timeframe to attain soil and groundwater cleanup is approximately 10 years for Alternative 2.

Alternative 3 was ranked the least protective because bulk affected soils are not removed adjacent to the existing timber bulkhead, and containment measures (e.g., steel sheet pile wall or groundwater extraction) are not in place to minimize COC migration to surface water. Risk reduction for the surface water pathway would be realized through effective SVE operation and bioremediation. It is estimated that soil and groundwater cleanup levels would be attained within 8 years for Alternative 3.

13.1.2 Permanence

Rankings of the alternatives for this criterion were based on the ability to permanently reduce toxicity, mobility, and volume of affected media. All alternatives except No Action were considered permanent, based to some extent on the degree of contaminant mass removal. Alternative 1 was considered the most permanent alternative, as the majority of affected soils

(estimated above 95 percent contaminant mass removal) would be removed from the site. Alternative 3 was ranked the next permanent alternative, as most of the contaminant mass (approximately 70 percent) would be initially removed via affected soil removal, followed by continued removal through soil vapor extraction and biological remediation.

For Alternative 2, installation of the steel sheet pile wall and hydraulic control provided by groundwater extraction would reduce the potential for migration of COCs to surface water; however, contaminant mass removal would be slow during the long-term operation of the groundwater and SVE systems, predominantly due to geologic matrix heterogeneity (low permeability) and mass transfer limitations.

13.1.3 Cost

Cost estimates were developed for each alternative based on capital and long-term costs. Long-term costs were estimated using a discount rate of 2.5 percent. Estimated costs are summarized as follows:

- No Action ($0)
- Alternative 1 ($3,990,000) – Table 25
- Alternative 2 ($3,214,000) – Table 26
- Alternative 3 ($3,431,000) – Table 27

The cost estimates for each evaluated remedial action alternative are estimated with an accuracy of -30/+50 percent of actual cost based on available information. The estimated costs, including capital and long-term costs, were prepared for the purpose of relative comparison among alternatives.

THE PREPARED COSTS ARE NOT INTENDED FOR BUDGETARY PURPOSES.

13.1.4 Long-Term Effectiveness

The alternatives were ranked for this criterion based on the degree of certainty that the alternative would be successful and its reliability during the period of time that affected media above cleanup levels remain onsite. Alternative 1 was ranked the highest, as most of the affected soils (estimated above 95 percent contaminant mass removal) would be removed from the site; residual contamination (if any) would be contained within the installed sheet pile wall and/or naturally attenuated or biologically degraded. Alternative 3 was ranked next, with approximately 70 percent of the contaminant mass initially removed via impacted soil removal; contaminant mass removal would be performed over the long term, provided reliable operation of the SVE system and a positive biological response to the injected treatment solution to the smear/saturated zone. In addition, vapor mitigation would require continual operation of the SVE system.

Alternative 2 was ranked last because affected soil is not removed (i.e., initial contaminant mass not removed as with to Alternative 1 and 3); containment is maintained provided the sheet pile wall and groundwater extraction system reliably provides hydraulic control, minimizing

contaminant transport to surface water. Contaminant mass removal would be performed over the long term provided reliable operation of the groundwater and SVE systems; vapor mitigation maintained through continual operation of SVE system. The No Action alternative is not considered reliable.

13.1.5 Short-Term Risks

The alternatives were ranked for this criterion based on potential impacts to workers, the community, and environment during remediation activities. The No Action alternative carries no short-term risk.

Alternative 1 carries the highest short-term risk based on the highest potential for remediation workers to contact affected media (i.e., existing timber bulkhead demolition/removal, steel sheet pile wall installation, and excavation/dewatering activities), potential for vehicular spillage during transport of affected soils to the offsite disposal site (i.e., approximately 400 truckloads), and potential sediment and contaminant transport to the surface during remediation activities.

Compared to Alternative 1, Alternative 3 carries a lower short-term risk due to less handling of impacted soils and minimal potential for sediment and contaminant transport to the surface water (i.e., excavation completed upland and not adjacent to the bay).

Alternative 2 carries the lowest short-term risk, as potential remediation worker contact with impacted soil or groundwater is limited (i.e., during installation/operation/maintenance of the groundwater and SVE systems), and it presents minimal risk to the community and environment (i.e., discharge of treated water and vapor).

13.1.6 Ability to Be Implemented

The alternatives were ranked based on the ease or difficulty of implementing the remedial action. The No Action alternative was considered the most easily implemented. Alternative 1 would be the most difficult to implement and would cause the most disturbances to site infrastructure and marina operations. Alternative 1 includes significant permitting requirements and challenges associated with removing the existing timber bulkhead, installing the steel sheet pile wall, and handling approximately 15,100 cy of soils while maintaining marina operations.

Alternative 3 was considered less difficult to implement than Alternative 2 because work would not be conducted in proximity to the bay; less soil handling would be necessary (approximately 7,900 cy); installation, operation, and maintenance of an SVE system is relatively straightforward; and biological direct-push injections should not be complicated unless difficulty is encountered injecting into the low-permeability soil matrix.

Although installation of the steel sheet pile wall would be complicated by physical restraints, Alternative 2 was considered the easiest of the alternatives to implement, because installation, operation, and maintenance of the groundwater and SVE treatment systems are relatively straightforward. Alternative 2 remedial activities result in the least disturbance to site infrastructure and operations.

13.2 Comparative Analysis Results

The alternative recommendation is based on meeting MTCA threshold requirements and evaluating the scoring conducted as part of the detailed evaluation and comparative analysis. The comparative analysis scoring is summarized in Table 24. Based on the comparative analysis, Alternative 1 was ranked as the preferred alternative due to its highest scores in protectiveness, permanence, and long-term effectiveness. Although Alternative 1 carries the highest estimated capital cost, long-term costs are minimal (minimum of one year of compliance groundwater monitoring).

13.3 Disproportionate Cost Analyses

MTCA specifies that when selecting a remedial action, preference shall be given to actions that are "permanent to the maximum extent practicable." To determine whether a remedial action uses permanent solutions to the maximum extent possible, a disproportionate cost analysis shall be used (WAC 173-340-360[3][b]). A disproportionate cost analysis is not required if Ecology agrees that a permanent cleanup action (WAC 173-240-200) achieves cleanup standards without further action being required.

As stated in Section 13.2, Alternative 1 was ranked the preferred alternative, primarily due to its high degree of permanence (i.e., majority of contaminant mass is removed from the site).

Section 14: Recommended Alternative

Alternative 1 (Excavation and Offsite Disposal) is the recommended remedial alternative for the site. Overall, this remedial action provides the shortest time frame for completion and the greatest certainty of attaining site soil and groundwater cleanup levels. In addition, demolishing and removing the existing timber bulkhead and replacing it with a steel sheet pile wall will improve site infrastructure and access to marina operations.

The recommended alternative includes the removal of affected soils containing COCs above cleanup levels. The excavation and offsite disposal of affected soils (i.e., coinciding with the lateral and vertical distribution of groundwater COCs) is estimated to remove more than 95 percent of the contaminant mass from at the site. Petroleum residuals, if any, will be naturally attenuated or biologically degraded via strategically placed amended backfill (oxygen-releasing compound of equivalent). Although not completely impermeable, the installed steel sheet pile wall will serve as additional protection through containment, minimizing the potential for COC migration to surface water. After remediation and restoration activities, groundwater monitoring will be performed to assess the effectiveness of the affected soil removal and to evaluate groundwater quality for compliance.

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Tables

Table 1: Cornet Bay Marina Chain-of-Title Summary

Date Recorded	From	To
20 January 1929	State of Washington (Tidelands only)	Nellie B. Blout
15 February 1932	Phillip E. O'Donnell and Peggy M. O'Donnell	Gene M. Holmes and Greta R. Holmes
3 June 1944	Gene M. Holmes and Greta R. Holmes	Roy Davis and Vickey Davis
8 December 1948	Roy Davis and Vickey Davis	Lorenzo Richards and Paula Richards
20 May 1954	Lorenzo Richards and Paula Richards	Premcor Production Company
9 November 1963	Premcor Production Company	Lomax and Lurie LLC
26 August 1972	Lomax and Lurie LLC	Bay on Cornet
1 September 1980	Bay on Cornet	Milton A. Woods and P. Tuulikki Woods, Charles H. Morse, Robert R. Masters and Carol A. Masters, Walter Paul Kistler and Olga Kistler, Ronald K. Bustad and Shirley L. Bustad, Michael R. Sanders and Leida K. Sanders, Mary Ann Nelson, Dundee A. Woods and Darlene L. Woods, William J. Kraing and Kathleen Kranig
6 April 2000	Milton A. Woods and P. Tuulikki Woods, Charles H. Morse, Robert R. Masters and Carol A. Masters, Walter Paul Kistler and Olga Kistler, Ronald K. Bustad and Shirley L. Bustad, Michael R. Sanders and Leida K. Sanders, Mary Ann Nelson, Dundee A. Woods and Darlene L. Woods, William J. Kraing and Kathleen Kranig	Deception Pass Marina, Inc.

Source: EDR 2011a. The EDR Chain of Title Report. Cornet Bay Marina, 200 Cornet Bay Road, Oak Harbor, WA, 98277. Environmental Data Resources, Inc. Dated 10 October 2011.

Table 2: Groundwater Elevation Monitoring Summary - 2011

Well Number	Top of Well Casing Elevation (ft)[(a)]	Depth to Water (ft)[(a,b)]		Water Elevation (ft)[(a)]	
		High Tide (11/10/11)	Low Tide (11/11/11)	High Tide (11/10/11)	Low Tide (11/11/11)
MW-1	14.98	6.80	7.14	8.18	7.84
MW-2	14.16	6.56	7.36	7.60	6.80
MW-3	14.07	3.76	3.92	10.31	10.15
MW-4	14.13	6.95	8.14	7.18	5.99
MW-5	14.21	6.68	7.76	7.53	6.45
MW-6	13.81	4.49	4.69	9.32	9.12
MW-7	13.64	1.73	1.77	11.91	11.87
MW-8	12.13	4.29	5.20	7.84	6.93
MW-9	12.82	2.81	2.95	10.01	9.87
MW-10	13.40	3.55	3.94	9.85	9.46

Notes:

(a) Vertical elevation in feet relative to mean sea level (MSL) based on a well elevation survey performed by KPG surveyors on 14 November 2011.

(b) Depth to water measured from the top of the inner well casing.

ft = feet

Table 3: Estimated Horizontal Hydraulic Conductivity and Groundwater Seepage Velocity from Slug Testing

	Horizontal Hydraulic Conductivity (Kh)[(a)]			Estimated Groundwater Seepage Velocity (V)[(c,d,)]
Well #	**Test**	**(ft/min)**	**(cm/sec)**	**(ft/year)**
MW-4	Falling Head	4.35E-04	2.21E-04	26
MW-5	Falling Head	2.40E-04	1.22E-04	15
MW-6	Falling Head	2.34E-03	1.19E-03	142
MW-7	Falling Head	1.18E-03	5.99E-04	72
Average Values		**1.0E-03**	**5.3E-04**	**64**

Notes:

(a) Graphs of all slug tests are included in Appendix E.
(b) Average hydraulic conductivity calculated as geometric mean.
(c) Groundwater seepage velocity (V) = (Kh * (hydraulic gradient(d) / porosity[(d)]))
(d) Hydraulic gradient = 0.04; Porosity = 0.45

ft/min = feet per minute
cm/sec = centimeters per second
ft/year = feet per year

Table 4: Summary of Special Status Habitat and Species in Vicinity of Cornet Bay Marina

Species/Habitat	Scientific Name	Activity in Area	Federal Status	State Status
Habitats				
Estuarine intertidal	--	Aquatic habitat	Not listed	Aquatic habitat
Gaultheria shallon forest	--	Forest habitat	Not listed	Forest habitat
Plants				
Flavoparmelia lichen	*Flavoparmelia caperata*	Presence	Not listed	Review
White meconella	*Meconella oregana*	Presence	Species of concern	Threatened
Invertebrates				
Red sea urchin	*Strongylocentrotus franciscanus*	Occurrence	Not listed	Not listed
Pinto abalone	*Haliotis kamtschatkana*	Presence	Not listed	Not listed
Dungeness crab	*Cancer magister*	Presence	Not listed	Not listed
Fish				
Chinook salmon	*Oncorhynchus tshawytscha*	Presence	Threatened	Candidate
Chum salmon	*Oncorhynchus keta*	Presence	Threatened	Candidate
Coho	*Oncorhynchus kisutch*	Presence	Species of concern	Not listed
Sockeye salmon	*Oncorhynchus nerka*	Presence	Not listed	Candidate
Steelhead	*Oncorhynchus mykiss*	Presence	Threatened	Candidate
Birds				
Osprey	*Pandion haliaetus*	Point	Not listed	Monitored
Great blue heron	*Ardea herodias*	Breeding area	Not listed	Monitored
Bald eagle	*Haliaeetus leucocephalus*	Breeding area	Species of concern	Sensitive
Mammals				
Townsend's big-eared bat	*Corynorhinus townsendii*	Communal roost	Species of concern	Candidate
Dall's porpoise	*Phocoenoides dalli*	Occurrence	Not listed	Not listed
Harbor seal	*Phoca vitulina*	Haul out	Not listed	Not listed
Orca	*Orcinus orca*	Foraging/Migration	Endangered	Endangered
Pacific harbor porpoise	*Phocoena phocoena*	Foraging/Migration	Not listed	Candidate

Table 5: Soil Analytical Data from Previous Investigations – BTEX, Petroleum Hydrocarbons, and Lead

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	Total Xylenes	Gasoline Range Organics	Diesel Range Organics	Lube Oil Range Organics	Lead
B-1	2.5 - 3.5	11/1995	1,2	mg/kg	**0.547 J**		< 0.273	< 1.09	< 0.273		13	50		
B-1	6.2 - 7.2	11/1995	1,2	mg/kg	**2.63**	0.177 J	2.04	7.78	1.31		**380**	670		
B-2	2.5 - 3.8	11/1995	1,2	mg/kg	**10.3**	**18.1 J**	**18.8**	**21.7 J**	7.55 J		**1,300**	53		
B-2	5.0 - 6.2	11/1995	1,2	mg/kg	**0.352 J**	0.617	0.506	2.14	0.762		**110**	63		
B-3	2.5 - 3.7	11/1995	1,2	mg/kg	**6.29**	**9.71**					**4,900**	**4,030**		
B-3	4.2 - 5.4	11/1995	1,2	mg/kg	**0.759 J**	0.386 J	0.732	2.28	0.261 J		**47**	63		
B-4	12 - 13.2	11/1995	1,2	mg/kg	**< 0.529**	< 0.264	< 0.264	0.266 J	0.0023 J		11	59		
B-4	2.5 - 3.7	11/1995	1,2	mg/kg	**0.347 J**	< 0.204	< 0.204	0.215 J	0.0045 J		12	51		
B-5	6.0 - 7.2	11/1995	1,2	mg/kg	**3.25**	0.532	**11.9 J**	**42.7**	6.19 J		**990**	**2,300**		
B-6	2.5 - 3.7	11/1995	1,2	mg/kg	< 0.464	< 0.232	< 0.232	0.319 J	0.019 J		11	57		
B-6	7.2 - 8.4	11/1995	1,2	mg/kg	**2.1**	< 0.588	0.083 J	< 0.615 J	< 0.588		13	48		
B-8	3.0 - 4.2	11/1995	1,2	mg/kg	**4.44**	**44**	**23.1**	**86.6**	**32.1**		**2,200**	**7,400**		
B-8	5.5 - 6.7	11/1995	1,2	mg/kg	**35.5**	5.28	**44.9**	**107**	**33.1**		**2,600**	**2,700**		
B-9	2.5 - 3.7	11/1995	1,2	mg/kg	**0.656 J**	0.87 J	2.45	**10.5**	2.26		**260**	180 A		
B-9	4.5 - 5.7	11/1995	1,2	mg/kg	**0.668 J**	< 1.09	4.93	**14.4**	1.06 J		**620**	1,470		
B-10	2.7 - 3.9	11/1995	1,2,3	mg/kg	< 2.42	< 1.21	< 1.21	< 4.84	< 1.21		11	58		6.1
B-10	5.5 - 6.7	11/1995	1,2,3	mg/kg	< 2.68	< 1.34	< 1.34	< 1.34	< 1.34		13	64		4.5
B-11	15	10/1996	1,3,4	mg/kg	< 0.075	< 0.075	< 0.075	< 0.15	< 0.075		< 9	< 70		4.6
B-11	30	10/1996	1,3,4	mg/kg	< 0.13	< 0.13	< 0.13	< 0.27	< 0.13		< 16	< 100 J		2.2
B-12	10	10/1996	1,3,4	mg/kg	**0.34**	< 0.11	0.066 J	0.049 J	< 0.11		< 13	< 89		2.6
B-12	15	10/1996	1,3,4	mg/kg	**0.59**	< 0.12	< 0.12	< 0.24	< 0.12		< 14	< 110		4.3
B-12	5	10/1996	1,3,4	mg/kg	**0.79**	0.16	2.3	1.7	0.18		**440**	870		3.4
B-13	10	10/1996	1,3,4	mg/kg	**0.096 J**	0.042 J	0.44	1.4	0.03 J		**100**	110		3.9
B-13	15	10/1996	1,3,4	mg/kg	**0.098 J**	0.029 J	0.3	0.92	0.015 J		**92**	160		6.6
B-13	20	10/1996	1,3,4	mg/kg	< 0.091	< 0.091	< 0.091	< 0.18	< 0.091		< 11	< 99		< 2
DP-1	3	6/25/2003	5,6,7	mg/kg	**0.0901**	< 0.05	0.124			0.239	13.8	108	32.3	
DP-1	5	6/25/2003	5,6,7	mg/kg	**4.29**	0.949	**39.3**			**22.2**	**2,730**	**7,050**	< 1,000	
DP-2	5	6/25/2003	5,6,7	mg/kg	**0.260**	0.0612	0.175			0.795	7.67	13.4	< 25.0	
DP-3	3	6/25/2003	5,6,7	mg/kg	< 0.300	< 0.500	**9.25**			3.36	**769**	1,850	< 250	
DP-4	3	6/25/2003	5,6,7	mg/kg	**0.0668**	< 0.100	1.46			1.30	**173**	98.9	<25.0	
DP-5	3	6/25/2003	5,6,7	mg/kg	**10.7**	**202**	**47.6**			**219**	**5,150**	158	54.9	
DP-5	5	6/25/2003	5,6,7	mg/kg	**1.26**	2.21	0.728			4.02	**44.7**	16.8	27.6	
DP-6	5	6/25/2003	5,6,7	mg/kg	**0.594**	0.0960	0.146			0.584	< 5.0	16.6	38.9	
DP-7	5	6/25/2003	5,6,7	mg/kg	**0.164**	< 0.0500	0.100			< 0.100	< 5.0	< 10.0	< 25.0	
DP-8	5	6/25/2003	5,6,7	mg/kg	**0.643**	0.0991	0.700			3.32	**41.3**	23.6	37.4	
DP-9	5	6/25/2003	5,6,7	mg/kg	**5.88**	1.40	**25.8**			**54.8**	**1,910**	**5,170**	< 1,000	
DP-10	5	6/25/2003	5,6,7	mg/kg	**4.89**	< 2.50	**10.4**			**40.1**	**5,310**	73.4	< 25.0	
GP1	5	6/29/2005	6,8,9	mg/kg	< 0.0217	< 0.0361	< 0.0361			< 0.0723	< 3.61	< 10	< 25	
GP2	5	6/29/2005	6,8,9	mg/kg	< 0.0204	< 0.034	< 0.034			< 0.068	< 3.40	< 10	< 25	
GP3	5	6/29/2005	6,8,9	mg/kg	< 0.0193	< 0.0322	< 0.0322			< 0.0644	< 3.22	< 10	31.2	
GP5	8	6/29/2005	6,8,9	mg/kg	< 0.0219	< 0.0364	< 0.0364			< 0.0729	< 3.64	< 10	< 25	
GP6	7	6/29/2005	6,8,9	mg/kg	**2.39**	0.933	**12.9**			**49.9**	**1,240**	108	32.7	
GP6[(a)]	7	6/29/2005	6,8,9	mg/kg	**3.09**	1.23	**17.6**			**66.9**	**1,960**	57.1	26.6	
GP7	8	6/29/2005	6,8,9	mg/kg	0.03	< 0.0382	< 0.0382			0.102	4.05	< 10	< 25	
MTCA Method A Soil Cleanup Level					0.03	7	6	9	9	9	30	2,000	2,000	250

Table 5: Soil Analytical Data from Previous Investigations – BTEX, Petroleum Hydrocarbons, and Lead

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethylbenzene	m,p-Xylene	o-Xylene	Total Xylenes	Gasoline Range Organics	Diesel Range Organics	Lube Oil Range Organics	Lead
TP1	2	6/1/2006	6,9	mg/kg							4.03	12	< 27	
TP1	4	6/1/2006	6,9	mg/kg							**2,470**	719	< 76.8	
TP2	2	6/1/2006	6,9	mg/kg							21.5	< 11.7	< 29.3	
TP2	4	6/1/2006	6,9	mg/kg							**1,900**	174	< 32.2	
TP2	6	6/1/2006	6,9,10	mg/kg							**218**	208	< 30.7	
TP3	1.5	6/1/2006	6,9	mg/kg							**396**	277	28.6	
TP3	4	6/1/2006	6,9	mg/kg							**37.2**	25.5	42.6	
TP3	6	6/1/2006	6,9,10	mg/kg							**61.5**	15.2	< 27.7	
TP4	2	6/1/2006	6,9	mg/kg							< 4.5	< 12.3	< 30.7	
TP4	4	6/1/2006	6,9	mg/kg							9.52	< 12.2	< 30.6	
TP5	4	6/1/2006	6,9,10	mg/kg							**43.9**	569	< 63.6	
TP5[(a)]	4	6/1/2006	6,9	mg/kg							**33.3**	85.6	< 32.1	
MTCA Method A Soil Cleanup Level					0.03	7	6	9	9	9	30	2,000	2,000	250

Notes:

(a) A duplicate sample was collected at location GP6 and TP5 and submitted to the laboratory for analysis.

Table lists detected analytes only.
Bold indicates exceedance of MTCA cleanup level.
< = Indicates analyte not detected above laboratory reporting limits.
feet bgs = feet below ground surface
MTCA = Model Toxics Control Act
mg/kg = milligrams per kilogram
"J" denotes an estimated value.
"A" denotes the value is an estimate, as a small fraction may represent gasoline

Analytical Method Codes:

1 Soil samples were analyzed for BTEX compounds by EPA Method 8020.
2 Soil samples were analyzed for gasoline range and diesel range organics by EPA Method 8020.
3 Soil samples were analyzed for lead by EPA Method 200.7.
4 Soil samples were analyzed for gasoline range and diesel range organics by Washington Method NWTPH.
5 Soil samples were analyzed for BTEX compounds by EPA Method 8021B.
6 Soil samples were analyzed for gasoline and diesel range organics by Methods NWTPH-Gx and NWTPH-Dx.
7 Soil samples were analyzed for heavy fuel oil range hydrocarbons by Method NWTPH-Dx.
8 Soil samples were analyzed for BTEX compounds by Method NWTPH-Gx.
9 Soil samples were analyzed for lube oil range hydrocarbons by Method NWTPH-Dx.

Table 6: Groundwater Analytical Data from Previous Investigations – BTEX, Petroleum Hydrocarbons, and Lead

Location	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethylbenzene	o-Xylene	m, p-Xylene	Total Xylenes	Gasoline Range Organics	Diesel Range Organics	Lead
Reconnaissance Groundwater Data												
BW-3	11/17/1995	1,2,3,10	µg/L	**4,200**	1,000	1,800			**7,600**	**41,000**	**2,800**	**134**
BW-9	11/17/1995	1,2,3,10	µg/L	**1,700**	510	2,400			**10,400**	**130,000**	**65,000**	**31.5**
DP-1	6/1/2003	4,5,8	µg/L	**276**	5.58	75.2			23.6	**1,220**	**739**	
DP-2	6/1/2003	4,5,8	µg/L	**7,410**	34.6	72.6			39.2	**20,100**	**4,570**	
DP-3	6/1/2003	4,5,8	µg/L	**84.8**	3.22	56.7			10.3	689	**1,190**	
DP-4	6/1/2003	4,5,8	µg/L	**22.9**	2.04	97.1			43.8	**930**	445	
DP-5	6/1/2003	4,5,8	µg/L	**803**	358	3.13			27.5	**1,280**	343	
DP-7	6/1/2003	4,5,8	µg/L	**2,390**	7.09	24.5			10.4	**5,740**	380	
DP-8	6/1/2003	4,5,8	µg/L	**2,390**	781	348			**2,210**	**12,800**	**1,310**	
DP-9	6/1/2003	4,5,8	µg/L	**15,700**	103	613			820	**40,700**	**2,860**	
DP-10	6/1/2003	4,5,8	µg/L	**27.9**	3.23	23.1			91.5	**2,060**	**763**	
HA1	4/27/2005	4,5,11	µg/L	< 0.50	< 0.50	< 0.50			< 1.0	< 50	< 250	<1
HA2	4/27/2005	4,5,6	µg/L	< 0.20	< 0.20	< 0.20	< 0.25	< 0.5		< 50	< 581	
HA3	4/27/2005	4,5,6,11	µg/L	< 0.20	< 0.20	< 0.20	< 0.25	< 0.5		< 50	**531**	<1
HA3[(a)]	4/27/2005	4,5,6,11	µg/L	< 0.20	< 0.20	< 0.20	< 0.25	< 0.5		< 50	301	<1
GP1	6/29/2005	4,5	µg/L	< 0.50	< 0.50	< 0.50			< 1.0	< 50	< 439	
GP2	6/29/2005	4,5	µg/L	< 0.50	< 0.50	< 0.50			< 1.0	< 50	< 250	
GP3	6/29/2005	4,5	µg/L	< 0.50	< 0.50	< 0.50			< 1.0	< 50	< 250	
GP4	6/29/2005	4,5	µg/L	< 0.50	< 0.50	< 0.50			< 1.0	< 5.0	< 250	
GP5	6/29/2005	4,5	µg/L	**13.8**	< 2.5	< 2.5			< 5.0	< 25	< 250	
GP5[(b)]	6/29/2005	4,5	µg/L	**27.8**	< 2.5	< 2.5			< 5.0	< 25	< 250	
GP6	6/29/2005	4,5	µg/L	**2,300**	5.03	59			95.6	**6,530**	**504**	
GP7	6/29/2005	4,5	µg/L	**89.3**	< 0.50	0.796			4.68	292	374	
GP8	6/29/2005	4,5	µg/L	< 0.50	< 0.50	< 0.50			< 1.0	< 50	< 250	
MTCA Method A Groundwater Cleanup Level				5	1,000	700	1,000	1,000	1,000	800	500	15

Table 6: Groundwater Analytical Data from Previous Investigations – BTEX, Petroleum Hydrocarbons, and Lead

Location	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethylbenzene	o-Xylene	m, p-Xylene	Total Xylenes	Gasoline Range Organics	Diesel Range Organics	Lead
Monitoring Well Data												
MW-1	11/7/1996	2,3,9,10	µg/L	< 1.0	< 1.0	< 1.0	< 1 .0	< 2 .0		< 120	< 180	2.4 J
MW-1	6/1/2003	4,5,8	µg/L	< 0.50	< 0.50	< 0.50			< 1.0	< 50	294	
MW-1	6/1/2006	1,4,5	µg/L	< 0.50	< 0.50	< 0.50			< 1.0	< 50	**529**	
MW-1	4/28/2005	4,5,7	µg/L	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0		< 140	< 48	
MW-2	11/7/1996	2,3,9,10	µg/L	**16,400**	23	170	4.5 J	93		**1,900**	< 1,900	2.2 J
MW-2	6/1/2003	4,5,8	µg/L	**9,000**	< 50	354			< 100	**21,300**	**127,000**	
MW-2	4/28/2005	4,5,7	µg/L	**7,300 J**	< 10	84	< 10	< 20		**2,600**	< 3,000 J	
MW-2	6/1/2006	1,4,5	µg/L	**7,150**	16.6	88.6			29.6	**20,300**	< 505	
MW-3	11/7/1996	2,3,9,10	µg/L	**7,800**	130	**1,300**	29	3600		**24,000**	**98,000**	9.9 J
MW-3	6/1/2003	4,5,8	µg/L	**185**	4.63	86.7			29.4	**1,170**	**17,200**	
MW-3	4/28/2005	4,5,7	µg/L	**260**	< 10	91	< 10	< 20		**1,400**	**31,000**	
MW-3[(c)]	4/28/2005	4,5,7	µg/L	**270**	< 10	97	< 10	< 20		**1,300**	**7,600**	
MW-3	6/1/2006	1,4,5	µg/L	**643**	15.3	324			34.8	**3,900**	< 515	
MW-3[(d)]	6/1/2006	1,4,5	µg/L	**643**	16	324			34.7	**3,880**	**2,020**	
MTCA Method A Groundwater Cleanup Level				5	1,000	700	1,000	1,000	1,000	800	500	15

Notes:

(a) A duplicate sample was collected at location HA3 and submitted to the laboratory for analysis.
(b) A duplicate sample was collected at location GP5 and submitted to the laboratory for analysis.
(c) A duplicate sample was collected at location MW-3 and submitted to the laboratory for analysis.
(d) A duplicate sample was collected at location MW-3 and submitted to the laboratory for analysis.

Bold indicates exceedance of MTCA cleanup level.
< = Indicates analyte not detected above laboratory reporting limits.
"J" denotes an estimated value.
MTCA = Model Toxics Control Act
µg/L = micrograms per liter

Analytical Method Codes:

1 Groundwater samples were analyzed for BTEX by an unspecified analytical method.
2 Groundwater samples were analyzed for gasoline range organics by Washington Method TPH-G
3 Groundwater samples were analyzed for diesel range organics by Washington Method TPH-D
4 Groundwater samples were analyzed for gasoline range organics by NWTPH-Gx.
5 Groundwater samples were analyzed for diesel range organics by NWTPH-Dx.
6 Groundwater samples were analyzed for BTEX by EPA Method 8260B.
7 Groundwater samples were analyzed for BTEX by EPA Method 8021.
8 Groundwater samples were analyzed for BTEX by EPA Method 8021B.
9 Groundwater samples were analyzed for BTEX by EPA Method 8020.
10 Groundwater samples were analyzed for lead by EPA Method 239.2.
11 Groundwater samples were analyzed for dissolved lead by EPA Method 6020.

Table 7: Surface Water Analytical Data from Previous Investigations -- BTEX, Petroleum Hydrocarbons, and Lead

Location	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethyl-benzene	m,p-Xylene	o-Xylene	Total Xylenes	Gasoline Range Organics	Diesel Range Organics	Lead
Surface Water (near bulkhead)	11/17/1995	1, 2	µg/L	ND	ND	ND			ND	860	1,400	
CBMSW-1 (at culvert opening)	4/27/2005	3, 4	µg/L	<1	<1	<1	<2	< 1.0		<140	<49	0.085
CBMSW-2 (at culvert opening)	4/27/2005	3, 4	µg/L	<1	<1	<1	<2	1.1		<140	<48	0.096
CB-Bay-Bkgd (from Bay)	9/7/2006	5, 6	µg/L	<0.5	<0.5	<0.5			<1	< 50	< 236	
CB-Sheen1 (near bulkhead)	9/7/2006	5, 6	µg/L	<0.5	<0.5	<0.5			<1	85.4	386	
MTCA Method B Surface Water Cleanup Levels				23	19,000	6,900	NA	NA	NA	NA	NA	8.1[(a)]/0.54[(b)]

Notes:

(a) Surface Water ARAR - Aquatic Life - Marine/Chronic - Ch. 173-201A WAC.

(b) Surface Water ARAR - Aquatic Life - Freshwater/Chronic - Ch.173-201A WAC.

< = Indicates analyte not detected above laboratory reporting limtis.

ARAR = applicable and relevant or appropriate requirements

Ecology = Washington State Department of Ecology

µg/L = micrograms per liter

MTCA = Model Toxics Control Act

NA = screening value or ARARs not available for analyte in surface water

ND = analyte not detected at laboratory reporting limit (reporting limit not available)

Analytical Method Codes:

1 Surface water samples were analyzed for diesel range organices by method TPH-Dx.

2 Surface water samples were analyzed for gasoline range organics by method TPH-Gx

3 Surface water samples were analyzed for lead by method EPA Method 200.8.

4 Surface water samples were analyzed for BTEX by EPA Method 8021.

5 Surface water samples were analyzed for diesel range organices by method NWTPH-Dx.

6 Surface water samples were analyzed for gasoline range organices by method NWTPH-Gx.

Table 8: Sediment Analytical Data from Previous Investigations - Lead and PAHs

Analyte	Analytical Method	Units	SQS[a]	CSL[b]	SED-1	SED-2	SED-3	SED-3 (Dup)[c]	SED-4	SED-5	SED-6	SED-7	SED-9	SED-10	SD1[d] 0-5"
					4/27/2005	4/27/2005	4/27/2005	4/27/2005	4/27/2005	4/27/2005	4/27/2005	4/27/2005	4/27/2005	4/27/2005	6/1/2006
Non-ionizable Organic Compounds (PAHs)[e]															
Naphthalene	2	mg/kg	99	170	13	23	18	23	5.7	17	23	0.35 J	1.4 U	0.2 J	--
Acenaphthylene	2	mg/kg	66	66	4.6	11	12	24	5.6	12	8.8	0.080 U	1.4 U	0.45 U	--
Acenaphthene	2	mg/kg	16	57	47	55	94	120	4.7	33	21	0.080 J	1.4 U	0.45 U	--
Fluorene	2	mg/kg	23	79	36	77	100	190	8.7	66	24	0.3 J	1.4 U	0.20 J	--
Phenanthrene	2	mg/kg	100	480	260 J	700 J	790 J	1,400 J	57 J	860 J	140 J	2.0 J	20 J	1.7 J	--
Anthracene	2	mg/kg	220	1,200	42	83	170	220	38	73	65	0.66	1.4 U	0.87	--
2-Methylnaphthalene	2	mg/kg	38	64	2.5	16	5.9	18	2.8	4.9	13	0.63	1.4 U	0.46	--
Total LPAH		mg/kg	370	780	403 J	949 J	1,184 J	1,977 J	120 J	1,061 J	282 J	3 J	20 J	3 J	
Fluoranthene	2	mg/kg	160	1,200	710	1,000	1,600	2,900	410	1,200	940	5.3	48	3.5	--
Pyrene	2	mg/kg	1,000	1,400	570	850	1,400	2,700	310	1,100	980	6.3	36	5.27	--
Benzo(a)anthracene	2	mg/kg	110	270	66	140	250	480	55	180	110	1.7	4.4	1.5	--
Chrysene	2	mg/kg	110	460	290	500	540	1,100	330	480	600	3.8	17	3.8	--
Benzo(b+k)fluoranthene	2	mg/kg	230	450	150 J	260 J	230 J	680 J	130 J	300 J	210 J	3.8 J	14 J	4.2	--
Benzo(a)pyrene	2	mg/kg	99	210	38	78	88	190	42	89	73	1.4	2.8	1.7	--
Indeno(1,2,3-cd)pyrene	2	mg/kg	34	88	19	34	38	69	20	42	33	1.0	2.0	1.1	--
Dibenzo(a,h)anthracene	2	mg/kg	12	33	7.5	15	18	34	9.0	20	14	0.5	0.64 J	0.47	--
Benzo(g,h,i)perylene	2	mg/kg	31	78	18	32	34	61	18	39	30	1.4	2	1.50	--
Total HPAH		mg/kg	960	5,300	1,869	2,909	4,198 J	8,124 J	1,324 J	3,450 J	2,990 J	25 J	127 J	23 J	
Other Non-ionizable Organic Compounds [e]															
1-Methylnaphthalene	2	mg/kg	NA	NA	18	15	16	24	2.2	9.2	12	0.4 J	1.4 U	0.33 J	--
Carbazole	2	mg/kg	NA	NA	5.2	33	29	57	4.0	20	15	0.44 U	1.4 U	0.45 U	--
Dibenzofuran	2	mg/kg	15	58	25	58	51	86	6.2	34	20	0.2 J	1.4 U	0.16 J	--
Retene	2	mg/kg	NA	NA	7.5	19	0.69 U	0.72 U	1.5	0.66 U	5	2.0	3.6	0.97	--
Other															
Total Organic Carbon (TOC)		%	--	--	0.61	0.41	0.75	0.72	0.68	0.83	0.50	1.37	0.36	2.07	
Metals															
Lead	1	mg/kg	--	--	4.83	4.1	3.61	4.07	4.73	5.17	6.92	6.17	3.2	9.42	--

Notes:

(a) Sediment Quality Standard (SQS) Chapter 173-204 WAC.
(b) Cleanup Screening Level (CSL) Chapter 173-204 WAC.
(c) SED-3 (Dup) is a laboratory duplicate split sample of SED-3.
(d) No analytes were detected in sample SD1 (0-5"), which was analyzed for hydrocarbons by NWTPH-Gx and NWTPH-Dx.
(e) Non-ionizable Organic Compounds and Other Non-ionizable Organic Compounds are presented as TOC-normalized values.

"J" denotes an estimated value.
< -- indicates analyte not detected above laboratory reporting limit.
PAHs = polycyclic aromatic hydrocarbons
SQS = sediment quality standard
CSL = cleanup screening level
mg/kg = milligrams per kilogram
NA = not available

Analytical Methods Codes:

1 Sediment samples were analyzed for lead by EPA Method 200.8.
2 Sediment samples were analyzed for PAHs by EPA Method 8270.

Table 9: Soil Analytical Data from 2011 Investigation -- BTEX and Petroleum Hydrocarbons

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethyl-benzene	m, p-Xylene	o-Xylene	Gasoline Range Organics	Diesel Range Organics	Lube Oil Range Hydrocarbons
B1	4	9/12/2011	1,2	mg/kg	< 0.029	< 0.029	< 0.029	< 0.058	0.043	< 12	< 6.6	16
B2	12	9/12/2011	1,2	mg/kg	**0.60**	< 0.017	0.025	< 0.034	0.046	< 6.9	< 6.1	< 12
B3	9	9/12/2011	1,2	mg/kg	**1.3**	< 0.018	0.079	0.081	< 0.018	< 7.0	< 6.1	< 12
B4	6	9/12/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.029	0.018	< 5.9	< 5.8	< 12
B5	4	9/12/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.03	0.16	< 6.0	9.6	53
B6	7	9/12/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.03	< 0.015	< 5.9	< 5.8	< 12
B7	8	9/12/2011	1,2	mg/kg	**0.29**	< 0.018	0.15	0.088	0.10	8.3	< 6.1	< 12
B7	13	9/12/2011	1,2	mg/kg	**0.48**	< 0.016	0.025	< 0.031	0.23	10	< 6.2	< 12
B8	14	9/12/2011	1,2	mg/kg	< 0.016	0.019	< 0.016	< 0.031	0.033	< 6.2	< 5.9	< 12
B9	13	9/12/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	0.055	< 5.8	< 5.9	< 12
B10	8	9/12/2011	1,2	mg/kg	**1.7**	< 0.014	0.46	0.43	0.073	15	< 5.9	< 12
B11	5	9/13/2011	1,2	mg/kg	< 0.021	1.6	0.14	0.61	0.47	**1,200**	41	< 11
B12	6	9/13/2011	1,2	mg/kg	0.025	0.024	< 0.014	< 0.028	0.75	< 5.6	< 5.8	< 12
B13	4	9/13/2011	1,2	mg/kg	< 0.021	< 0.021	< 0.021	< 0.042	0.059	< 8.4	< 6.5	< 13
B14	3	9/13/2011	1,2	mg/kg	< 0.014	0.022	0.022	0.031	< 0.014	11	13	< 10
B15	4	9/13/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.03	0.043	< 6.1	< 5.8	< 12
B16	4	9/13/2011	1,2	mg/kg	< 0.015	0.044	< 0.015	< 0.031	< 0.015	< 6.1	11	72
B17	4	9/13/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.028	< 0.014	< 5.7	< 5.7	< 11
B18	4	9/13/2011	1,2	mg/kg	**0.050**	< 0.014	< 0.014	< 0.028	0.033	< 5.6	< 5.5	< 11
B18 (Dup)[(a)]	4	9/13/2011	1,2	mg/kg	< 0.013	< 0.013	< 0.013	< 0.027	0.029	15	< 5.3	< 11
B19	5	9/13/2011	1,2	mg/kg	**54**	**420**	**96**	**380**	**140**	**9,400**	69	< 12
B19	7	9/13/2011	1,2	mg/kg	**2.8**	4.3	1.9	5.4	1.6	**310**	27	< 11
B20	7	9/13/2011	1,2	mg/kg	**0.58**	6.6	**9.2**	**33**	**12**	**760**	20	< 12
B20	10	9/13/2011	1,2	mg/kg	**0.56**	0.027	0.10	0.064	< 0.018	< 7.0	< 6.1	< 12
B21	3	9/13/2011	1,2	mg/kg	**15**	**14**	3.0	**12**	4.4	**230**	64	< 12
B22	5	9/13/2011	1,2	mg/kg	**4.9**	**89**	**50**	**200**	**72**	**4,600**	520	< 60
B22	9	9/13/2011	1,2	mg/kg	0.023	< 0.014	< 0.014	< 0.029	< 0.014	< 5.8	< 5.6	< 11
B23	8	9/14/2011	1,2	mg/kg	**0.19**	0.026	0.72	0.97	0.04	13	< 6.1	< 12
B24	7	9/14/2011	1,2	mg/kg	< 0.016	< 0.016	< 0.016	< 0.033	0.034	< 6.5	< 6.1	< 12
B25	4	9/14/2011	1,2	mg/kg	< 0.018	< 0.018	< 0.018	< 0.036	< 0.018	< 7.1	< 6.3	< 13
B26	8	9/14/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	0.078	< 5.8	< 6.0	< 12
B27	12	9/14/2011	1,2	mg/kg	**0.13**	< 0.017	< 0.017	< 0.034	0.061	< 6.9	< 6.0	< 12
B28	7	9/14/2011	1,2	mg/kg	**22**	0.061	1.8	0.32	< 0.018	**180**	810	< 61
B28	12	9/14/2011	1,2	mg/kg	**0.45**	< 0.014	< 0.014	< 0.029	< 0.014	< 5.8	< 5.8	< 12
B28	16	9/14/2011	1,2	mg/kg	**1.5**	< 0.017	< 0.017	< 0.034	< 0.017	< 6.8	< 5.9	< 12
B29	7	9/14/2011	1,2	mg/kg	**1.4**	0.014	0.046	0.047	0.018	7.5	< 6.0	< 12
B29	18	9/14/2011	1,2	mg/kg	**0.67**	< 0.017	0.03	< 0.034	< 0.017	< 6.9	< 5.8	< 12
MTCA Method A Soil Cleanup Level					0.03	7	6	9	9	30	2,000	2,000

Table 9: Soil Analytical Data from 2011 Investigation -- BTEX and Petroleum Hydrocarbons

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethyl-benzene	m, p-Xylene	o-Xylene	Gasoline Range Organics	Diesel Range Organics	Lube Oil Range Hydrocarbons
B30	8	9/14/2011	1,2	mg/kg	**1.2**	0.23	4.4	1.4	0.19	**500**	1,200	< 110
B30	17	9/14/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.029	< 0.015	< 5.9	< 5.6	< 11
B31	4	9/14/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	< 5.8	< 5.4	< 11
B32	4	9/14/2011	1,2	mg/kg	0.018	0.093	0.60	0.12	0.057	**250**	98	< 10
B33	4	9/15/2011	1,2	mg/kg	**0.073**	< 0.014	< 0.014	< 0.029	< 0.014	< 5.7	37	< 11
B34	5	9/15/2011	1,2	mg/kg	**1.1**	< 0.18	**15**	1.5	< 0.18	**2,400**	710	< 63
B34 (Dup)[(b)]	5	9/15/2011	1,2	mg/kg	< 0.180	< 0.18	**8.2**	< 0.36	< 0.18	**1,400**	760	< 57
B35	4	9/15/2011	1,2	mg/kg	**3.0**	< 0.14	**13**	2.4	< 0.14	**1,000**	970	< 120
B35	8	9/15/2011	1,2	mg/kg	< 0.018	< 0.018	< 0.018	< 0.036	< 0.018	< 7.3	< 6.2	< 12
B36	8	9/15/2011	1,2	mg/kg	**150**	**7.2**	**72**	**33**	2.5	**4,000**	**7,700**	< 600
B37	9	9/16/2011	1,2	mg/kg	< 0.019	< 0.019	< 0.019	< 0.039	< 0.019	< 7.7	< 7.0	< 14
B38	7	9/16/2011	1,2	mg/kg	**22**	0.061	1.8	0.32	0.018	**180**	810	< 61
B38	13	9/16/2011	1,2	mg/kg	**1.5**	< 0.015	< 0.015	< 0.031	< 0.015	< 6.1	< 6.1	< 12
B39	8	9/16/2011	1,2	mg/kg	**2.9**	0.024	0.070	0.23	< 0.015	7.8	6.0	< 12
B40	4	9/16/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	< 5.7	< 5.6	< 11
B41	6	9/16/2011	1,2	mg/kg	**0.70**	0.29	2.1	5.0	0.39	**1,000**	45	64
B42	8	9/16/2011	1,2	mg/kg	**0.36**	< 0.018	0.55	0.098	< 0.018	12	< 5.8	< 12
B43	4	9/16/2011	1,2	mg/kg	< 0.070	< 0.070	0.36	< 0.14	0.49	**940**	27	< 12
B44	4	9/17/2011	1,2	mg/kg	**0.12**	0.098	< 0.015	0.24	0.18	**320**	20	< 11
B45	7	11/10/2011	1,2	mg/kg	< 0.017	< 0.017	< 0.017	< 0.035	< 0.017	< 6.9	< 6.0	< 12
B45	15	11/10/2011	1,2	mg/kg	**0.38**	< 0.018	< 0.018	< 0.035	< 0.018	< 7.1	< 6.0	< 12
B46	11	11/10/2011	1,2	mg/kg	**0.04**	< 0.018	< 0.018	< 0.036	< 0.018	< 7.2	< 6.0	< 12
B46	15	11/10/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.031	< 0.015	< 6.1	< 6.1	< 12
B47	13	11/10/2011	1,2	mg/kg	**11**	< 0.021	< 0.021	< 0.042	< 0.021	< 8.4	< 6.8	< 14
B48	3	11/10/2011	1,2	mg/kg	**1.2**	2.2	**13**	**50**	**9.3**	**1,600**	50	18
B49	13	11/10/2011	1,2	mg/kg	< 0.018	< 0.018	< 0.018	< 0.037	< 0.018	< 7.4	< 6.2	< 12
B50	10	11/10/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	< 5.8	< 6.0	< 12
B51	7	11/10/2011	1,2	mg/kg	< 0.020	< 0.020	< 0.020	< 0.039	< 0.020	< 7.8	< 6.4	< 13
B52	5	11/10/2011	1,2	mg/kg	**1.4**	< 0.018	0.56	0.14	< 0.018	13	< 6.3	< 13
B53	3	11/10/2011	1,2	mg/kg	**0.032**	0.054	< 0.014	0.06	< 0.014	12	14	< 11
B54	6	11/10/2011	1,2	mg/kg	< 0.017	< 0.017	< 0.017	< 0.035	< 0.017	< 7.0	< 6.0	< 12
B55	3	11/10/2011	1,2	mg/kg	< 0.015	0.32	0.32	0.22	0.13	**400**	34	< 12
B56	3	11/11/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	< 5.8	< 5.8	< 12
B57	5	11/11/2011	1,2	mg/kg	< 0.016	< 0.016	< 0.016	< 0.033	< 0.016	< 6.5	< 5.9	< 12
B58	3	11/11/2011	1,2	mg/kg	**0.061**	0.015	< 0.015	0.047	< 0.015	< 5.8	< 5.7	< 11
MTCA Method A Soil Cleanup Level					0.03	7	6	9	9	30	2,000	2,000

Table 9: Soil Analytical Data from 2011 Investigation -- BTEX and Petroleum Hydrocarbons

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethyl-benzene	m, p-Xylene	o-Xylene	Gasoline Range Organics	Diesel Range Organics	Lube Oil Range Hydrocarbons
B59	2	11/11/2011	1,2	mg/kg	**16**	**30**	4.2	**18**	6.6	**360**	16	< 12
B59	9	11/11/2011	1,2	mg/kg	< 0.016	0.016	< 0.016	< 0.031	< 0.016	< 6.2	< 6.0	< 12
B60	14	11/11/2011	1,2	mg/kg	**0.3**	< 0.014	< 0.014	< 0.029	< 0.014	< 5.8	< 5.7	< 12
B60	20	11/11/2011	1,2	mg/kg	< 0.019	< 0.019	< 0.019	< 0.038	< 0.019	< 7.7	6.5	< 13
MW4	13	9/15/2011	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	< 5.8	9.4	< 12
MW5	12	9/15/2011	1,2	mg/kg	< 0.017	< 0.017	< 0.017	< 0.034	< 0.017	11	< 6.2	< 12
MW6	4	9/15/2011	1,2	mg/kg	< 0.12	< 0.12	2.1	< 0.25	< 0.12	**1,300**	1,800	< 210
MW6	14	9/15/2011	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.03	< 0.015	< 6.0	< 6.0	< 12
MW7	5	9/15/2011	1,2	mg/kg	< 0.018	< 0.018	< 0.018	< 0.037	< 0.018	< 7.4	< 6.7	< 13
MW8	7	11/9/2011	1,2	mg/kg	**0.091**	< 0.019	0.23	0.31	< 0.019	21	170	370
MW8	10	11/9/2011	1,2	mg/kg	**2.0**	< 0.019	0.39	0.30	0.024	20	< 6.4	< 13
MW9	5	11/9/2011	1,2	mg/kg	< 0.016	< 0.016	< 0.016	< 0.032	< 0.016	< 6.4	< 6.2	30
MW10	6	11/9/2011	1,2	mg/kg	**0.048**	< 0.014	< 0.014	0.054	< 0.014	12	36	30
MTCA Method A Soil Cleanup Level					0.03	7	6	9	9	30	2,000	2,000

Notes:

(a) A duplicate sample was collected at location B18 and submitted to the laboratory for analysis as "B100".

(b) A duplicate sample was collected at location B34 and submitted to the laboratory for analysis as "B101".

Table lists detected analytes only.

Bold indicates exceedance of MTCA cleanup level.

< = Indicates analyte not detected above method laboratory limits.

feet bgs = feet below ground surface

MTCA = Model Toxics Control Act

mg/kg = milligrams per kilogram

Analytical Method Codes:

1 Soil samples were analyzed for BTEX by EPA Method 8021B.

2 Soil samples were analyzed for gasoline range and diesel range organics by methods NWTPH-Gx and NWTPH-Dx.

Table 10: Soil Analytical Data from 2011 Investigation -- Metals and PAHs

Analyte	Analytical Method	Units	Location	B2	B10	B20	B27	B30	B35	B38	MW6	MTCA Method A Soil Cleanup Level
			Sample Depth (feet bgs)	12	8	7	12	8	4	7	14	
			Sample Date	9/12/2011	9/12/2011	9/13/2011	9/14/2011	9/14/2011	9/15/2011	9/16/2011	9/15/2011	
Metals												
Arsenic	1	mg/kg		6.0	20	6.0	9.0	9.0	11	7.0	8.0	20
Barium	1	mg/kg		26	74	27	46	65	63	37	43	16,000[(a)]
Cadmium	1	mg/kg		< 0.20	< 0.6	< 0.20	0.20	< 0.20	< 0.20	< 0.30	< 0.20	2
Chromium	1	mg/kg		16	**39**	**25**	**44**	**45**	**47**	**23**	**34**	20,000 / 19[(b)]
Lead	1	mg/kg		< 2.0	< 6.0	< 2.0	4.0	4.0	5.0	< 3.0	3.0	250
Selenium	1	mg/kg		< 6.0	< 10	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	400[(a)]
Silver	1	mg/kg		< 0.30	< 0.80	< 0.30	< 0.40	< 0.40	< 0.30	< 0.40	< 0.30	400[(a)]
Mercury	2	mg/kg		< 0.03	0.03	< 0.02	0.03	< 0.03	0.02	0.03	< 0.02	2
Polycyclic Aromatic Hydrocarbons												
1-Methylnaphthalene	3	µg/kg		64	72	1,800	12	6,200	13,000	8,300	64	NA
2-Methylnaphthalene	3	µg/kg		77	61	3,500	15	9,300	21,000	13,000	120	NA
Acenaphthene	3	µg/kg		110	61	28	56	2,100	2,600	2,600	12	4,800,000[(a)]
Acenaphthylene	3	µg/kg		< 5	< 5	8	< 5	< 4	< 5	< 5	< 4	NA
Anthracene	3	µg/kg		18	< 4.6	5.9	64	260	280	410	16	24,000,000[(a)]
Benzo(g,h,i)perylene	3	µg/kg		< 5	< 5	< 4.6	11	< 4	< 5	< 5	< 4	NA
Dibenzofuran	3	µg/kg		50	28	6.4	15	460	960	690	< 4.4	80,000[(a)]
Fluoranthene	3	µg/kg		38	5.1	14	220	57	49	87	< 4.4	3,200,000[(a)]
Fluorene	3	µg/kg		77	29	14	32	840	1,600	1,400	6	3,200,000[(a)]
Naphthalene	3	µg/kg		390	190	2,300	13	2,700	9,000	4,000	49	160,000
Phenanthrene	3	µg/kg		130	37	26	42	1,900	3,200	2,800	14	NA
Pyrene	3	µg/kg		24	5.4	14	160	84	200	160	< 4.4	2,400,000[(a)]
Carcinogenic Polycyclic Aromatic Hydrocarbons												
Benzo(a)anthracene	3	µg/kg		< 4.6	< 4.6	< 4.6	51	12	7.2	17	< 4.4	NA
Benzo(a)pyrene	3	µg/kg		< 4.6	< 4.6	< 4.6	21	4.6	< 4.6	6.7	< 4.4	NA
Chrysene	3	µg/kg		< 4.6	< 4.6	< 4.6	63	17	20	27	< 4.4	NA
Dibenzo(a,h)anthracene	3	µg/kg		< 4.6	< 4.6	< 4.6	< 4.8	< 4.4	< 4.6	< 4.9	< 4.4	NA
Indeno(1,2,3-cd)pyrene	3	µg/kg		< 4.6	< 4.6	< 4.6	8.1	< 4.4	< 4.6	< 4.9	< 4.4	NA
Total Benzofluoranthenes	3	µg/kg		< 4.6	< 4.6	< 4.6	48	10	5.6	14	< 4.4	NA
Total cPAHs (calculated)[(c)]	--	µg/kg		3.2	3.2	3.2	33	7.4	4.2	11	3.1	100[(d)]

Notes:

(a) MTCA Method B cleanup level for soil (Ecology 2007).

(b) Cleanup level for Chromium III is 20,000 milligrams per kilogram (mg/kg). Cleanup level for Chromium VI (hexavalent) is 19 mg/kg.

(c) Total carcinogenic PAHs (cPAHs) were calculated using the toxicity equivalency factor (TEF) methodology described in MTCA [WAC 173-340-708(8)(e)]. For non-detected cPAH analytes, the TEF factor was applied to a value of one-half the laboratory reporting limit prior to summation. The TEF for benzo(a)pyrene is 1; the TEF for benzo(a)anthracene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and total benzofluoranthenes [benzo(a)- and benzo(k)- fluoranththene] is 0.1; the TEF for chrysene is 0.01.

(d) Cleanup level for cPAH mixtures based on the summation of cPAH analytes using TEF methodology.

Table lists detected analytes only.

Bold indicates exceedance of MTCA cleanup level.

< = Indicates analyte not detected above laboratory reporting limits.
cPAHs = carcinogenic polycyclic aromatic hydrocarbons
feet bgs = feet below ground surface
mg/kg = milligrams per kilogram
MTCA = Model Toxics Control Act
NA = not available
ND = not detected
TEF = toxicity equivalency factor
µg/kg = micrograms per kilogram
PAHs = polycyclic aromatic hydrocarbons

Analytical Method Codes:

1 Soil samples were analyzed for RCRA metals by EPA Method 6010B.
2 Soil samples were analyzed for mercury by EPA Method 7471A.
3 Soil samples were analyzed for PAHs by EPA Method 8270D with Selective Ion Monitoring (SIM).

Table 11: Groundwater Analytical Data from Current Investigation -- Petroleum Hydrocarbons, BTEX, PAHs, and Metals

Analyte	Analytical Method	Units	Location	MW-1	MW-2	MW-2D	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10	B2-RGW	B6-RGW	B15-RGW	B21-RGW	B46-RGW	B47-RGW	B48-RGW	B53-RGW	B55-RGW	MTCA Method A/B Cleanup Level[a]
			Sample Date	9/19/2011	9/19/2011	9/19/2011	9/19/2011	9/20/2011	9/20/2011	9/20/2011	9/20/2011	11/11/2011	11/11/2011	11/11/2011	9/12/2011	9/12/2011	9/13/2011	9/13/2011	11/10/2011	11/10/2011	11/10/2011	11/10/2011	11/10/2011	
Total Petroleum Hydrocarbons																								
Gasoline Range Organics	1	µg/L		< 250	**3,000**	**2,900**	< 250	**3,400**	640	**900**	< 250	< 250	< 250	< 250	620	< 250	< 250	**2,200**	270	< 250	**2,500**	< 250	**3,100**	800[b]
Diesel Range Organics	2	µg/L		< 100	**850**	**860**	**1,600**	400	170	290	< 100	< 100	< 100	< 100	< 100	< 100	< 100	**3,600**	< 100	< 100	< 100	< 100	**940**	500[b]
BTEX and VOC Compounds																								
Benzene	3	µg/L		< 1.0	**3,900**	**4,000**	**8.0**	**97**	**1,900**	**5.6**	< 1.0	**33**	< 1.0	1.1	**1,400**	1.4	< 1.0	**2,600**	**380**	**1,500**	**24**	< 1.0	**12**	5[b]
Toluene	3	µg/L		< 1.0	14	13	< 1.0	< 1.00	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.1	< 1.0	< 1.0	170	1.4	< 1.0	12	< 1.0	4.1	1,000[b]
Ethylbenzene	3	µg/L		< 1.0	63	59	1.3	< 1.00	5.5	4.1	< 1.0	< 1.0	< 1.0	< 1.0	17	< 1.0	< 1.0	**1,200**	2	3.3	69	< 1.0	32	700[b]
m, p-Xylene	3	µg/L		< 1.0	31	30	< 1.0	< 1.00	2.7	2.6	< 1.0	1.3	< 1.0	< 1.0	17	< 1.0	< 1.0	**1,700**	1.4	< 1.0	200	< 1.0	5	1,000[b]
o-Xylene	3	µg/L		< 1.0	< 1.00	< 1.00	< 1.0	< 1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.2	< 1.0	< 1.0	52	2.4	< 1.0	36	< 1.0	< 1.0	1,000[b]
1,2-Dichloroethane (EDC)	4	µg/L		< 0.2	0.20	< 0.20	< 0.20	< 1.0	0.2 Y	< 0.20	< 0.20													5[c]
Polycyclic Aromatic Hydrocarbons																								
1-Methylnaphthalene	5	µg/L		< 0.10	**120**	**130**	**1.7**	**120**	**34**	**11**	0.12													1.5[c]
2-Methylnaphthalene	5	µg/L		< 0.10	**110**	**110**	1.0	**98**	0.28	0.15	< 0.10													32[c]
Acenaphthene	5	µg/L		0.21	6.1	7.2	0.8	97	5.0	1.9 M	< 0.10													643[d]
Acenaphthylene	5	µg/L		< 0.10	< 0.10	< 0.10	< 0.10	1.2	< 0.10	< 0.10	< 0.10													NA
Anthracene	5	µg/L		< 0.10	0.21 M	0.22	0.31 M	1.8	0.23	0.11	< 0.10													25,925[d]
Dibenzofuran	5	µg/L		< 0.10	1.8 M	2.1 M	0.47 M	**37**	1.4	0.72 M	< 0.10													16[c]
Fluoranthene	5	µg/L		< 0.10	< 0.10	< 0.10	< 0.10	1.7	0.27	< 0.10	< 0.10													90[d]
Fluorene	5	µg/L		< 0.10	3.8	4.5	0.97	37	2.4	1.2	< 0.10													3,457[d]
Naphthalene	5	µg/L		0.11	160	160	1.5	1,200	1.0	1.7	0.31													4900[d]
Phenanthrene	5	µg/L		< 0.10	1.7	1.6	0.11 M	33	1.0	0.23	< 0.10													NA
Pyrene	5	µg/L		< 0.10	< 0.10	< 0.10	< 0.10	0.96	0.2	< 0.10	< 0.10													2,590[d]
Total cPAHs (calculated)[e]	--	µg/L		ND	ND	ND	ND	ND	ND	ND	ND													0.03[d, f]
Metals																								
Arsenic (dissolved)	6	mg/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	**0.17**													0.000098[d]
Arsenic	6	mg/L		< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	**0.18**													0.000098[d]
Barium (dissolved)	6	mg/L		0.103	0.056	0.056	0.071	0.029	0.057	0.053	0.018													NA
Barium	6	mg/L		0.104	0.056	0.056	0.083	0.028	0.097	0.071	0.023													NA
Chromium (dissolved)	6	mg/L		< 0.005	< 0.005	< 0.005	< 0.005	0.009	0.006	< 0.005	< 0.005													0.49[d]
Lead	6	mg/L		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02													NA
Lead (dissolved)	6	mg/L		< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02													NA
Chromium	6	mg/L		< 0.005	< 0.005	< 0.005	0.008	0.013	0.022	0.014	< 0.005													0.49[d]
Selenium (dissolved)	6	mg/L		0.07	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05													2.7[d]

Notes:

(a) MTCA Method A/B cleanup level for groundwater used for fuel components (TPH-G, TPH-Dx, BTEX, MTBE, VOCs); MTCA Method B cleanup level for surface water used for all other compounds.
(b) MTCA Method A cleanup level for groundwater.
(c) MTCA Method B cleanup level for groundwater.
(d) MTCA Method B cleanup level for surface water.
(e) Total carcinogenic PAHs (cPAHs) were calculated using the toxicity equivalency factor (TEF) methodology described in MTCA [WAC 173-340-708(8)(e)]. No cPAH analytes were detected above the laboratory reporting limit. For non-detected cPAH analytes, the TEF factor was applied to a value of one-half the laboratory reporting limit prior to summation. The TEF for benzo(a)pyrene is 1; the TEF for benzo(a)anthracene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and total benzofluoranthenes [benzo(a)- and benzo(k)- fluoranththene] is 0.1; the TEF for chrysene is 0.01.
(f) Cleanup level for cPAH mixture based on the summation of cPAH analytes using TEF methodology.

Bold indicates exceedance of MTCA cleanup level.
< = Indicates analyte not detected above laboratory reporting limits.
mg/L = milligrams per liter
M = Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses
MTCA = Model Toxics Control Act
NA = not available.
ND = not detected.
µg/L = micrograms per liter
Y = The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

Analytical Methods Codes:

1 Groundwater samples were analyzed for gasoline range organics by NWTPH-Gx.
2 Groundwater samples were analyzed for diesel range organics by NWTPH-Dx.
3 Groundwater samples were analyzed for BTEX by EPA Method 8021B.
4 Groundwater samples were analyzed for VOCs by EPA Method 8260C.
5 Groundwater samples were analyzed for PAHs by EPA Method 8270D using selective ion monitoring (SIM).
6 Groundwater samples were analyzed for metals by EPA Method 6010B.

Table 12: Groundwater Analytical Data from Current Investigation - Natural Attenuation Parameters

Location	Sample Date	Analytical Method	N-Nitrate	N-Nitrite	Nitrate + Nitrite	Sulfate	Methane	Iron	Manganese
			mg-N/L	mg-N/L	mg-N/L	mg/L	µg/L	mg/L	mg/L
MW-2	10/21/2011	1,2,3,4	< 0.010	< 0.010	< 0.010	22.0	7,320	17.2	2.51
MW-4	10/21/2011	1,2,3,4	< 0.020	< 0.020	< 0.020	41.3	12,300	0.07	0.042
MW-7	10/21/2011	1,2,3,4	< 0.010	< 0.010	< 0.010	18.8	2,500	12.2	2.57

Notes:
< = Indicates analyte not detected above laboratory reporting limits.
mg-N/L = milligrams of nitrogen per liter
mg/L = milligrams per liter
µg/L = micrograms per liter

Analytical Methods Codes:

1 Groundwater samples were analyzed for methane by Modified RSK 175 Method.
2 Groundwater samples were analyzed for N-Nitrite and Nitrate+Nitrite by EPA Method 353.2.
3 Groundwater samples were analyzed for sulfate by EPA Method 375.2.
4 Groundwater samples were analyzed for Iron and Manganese by EPA Method 6010B.

Table 13: Soil Vapor Analytical Data – BTEX and Petroleum Hydrocarbons

Analyte	Analytical Method	Units	Location	VP-1	VP-2	MTCA Method B Shallow Soil Gas Screening Levels
			Sample Depth (feet bgs)	4	4	
			Sample Date	9/16/2011	9/16/2011	
Benzene	1	µg/m^3		**1,400,000**	**780,000**	3.2
Toluene	1	µg/m^3		<20,000	<20,000	22,000
Ethylbenzene	1	µg/m^3		**120,000**	**130,000**	4,600
m,p-Xylene	1	µg/m^3		**14,000**	**16,000**	2.8
o-Xylene	1	µg/m^3		<10,000	<10,000	2.8
TPHv (C5 - C8) aliphatics	2	µg/m^3		**30,000,000**	**19,000,000**	27,000
TPHv (C9 - C10) aromatics	2	µg/m^3		<200,000	<200,000	1,800
TPHv (C9 - C12) aliphatics	2	µg/m^3		**690,000**	**680,000**	1,400

Notes:

< = indicates analyte not detected above laboratory reporting limits.

Bold indicates exceedance of MTCA Method B Soil Gas Screening Level.

Due to the presence of elevated analyte concentrations, the soil vapor samples were analyzed using EPA Method 8260B rather than EPA Method TO-15.

APH = air-phase hydrocarbons

feet bgs = feel below ground surface

MTCA = Model Toxics Control Act

NA = not available

TPHv = total petroleum hydrocarbons in vapor phase

µg/m^3 = micrograms per cubic meter

Analytical Method Codes:

1 Soil vapor samples were analyzed for VOCs by modified EPA Method 8260B.

2 Soil vapor samples were analyzed for air-phase hydrocarbon fractions by modified Massachusetts Department of Environmental Protection APH Method (MADEP 2008).

Table 14: General Response Actions, Remedial Technologies, and Process Options for Soil

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
Institutional Controls	Access Restrictions	Physical Restrictions	Physical restrictions (e.g., fencing and signs) limit contact with media.	Risk receptor pathways not addressed.
		Deed Restrictions	**Restrictive covenants recorded in the property deed prohibit site activities (e.g., excavation) that could result in exposure to chemicals of concern; requires worker protection and Soil/Groundwater Management Plan.**	**Applicable to reduce human contact with impacted media; excavation or subgrade utility work.**
		Monitoring	Laboratory chemical analyses of soil, groundwater, and/or vapor samples.	Applicable for documenting conditions and concentrations of contaminants in soil, groundwater, and air. Applicable to document effectiveness of treatment technologies.
Containment	Covers	Soil	Clean soil is placed over ground surface to provide a physical barrier to chemicals of concern.	Asphalt cover retained as representative "Cover" process option.
		Clay	Low permeability clay layer overlain with soil over chemically impacted materials provides physical barrier that minimizes potential for contact and infiltration.	Asphalt cover retained as representative "Cover" process option.
		Concrete	Similar to clay cover description with concrete used as low permeability barrier.	Asphalt cover retained as representative "Cover" process option.
		Asphalt	**Similar to clay cover description with asphalt used as low permeability barrier.**	**Applicable to reduce vertical infiltration (i.e., precipitation) and enhance vapor extraction.**
		RCRA	Multi-media barrier consisting of low-permeability layer, synthetic liner, drainage layer, and vegetative cover. Performs functions similar to those described for clay cover.	Asphalt cover retained as representative "Cover" process option.
	Vertical Barriers	Slurry Wall	Subsurface vertical barrier consisting of low-hydraulic conductivity material surrounds a subsurface source to prevent chemical migration.	Sheet Pile Cutoff Wall retained as representative "Vertical Barriers" process option.
		Grout Curtain	Subsurface vertical barrier consisting of low-hydraulic conductivity material is pressure injected into soil or rock. Performs function similar to slurry wall.	Sheet Pile Cutoff Wall retained as representative "Vertical Barriers" process option.

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 14: General Response Actions, Remedial Technologies, and Process Options for Soil

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
Containment (continued)	Horizontal Barriers	**Sheet Pile Cutoff Wall**	**Interlocking sheet piling driven vertically into subsurface to form a low permeability barrier. Performs function similar to slurry wall.**	**Applicable to reduce contaminant migration to surface water.**
		Grout Injection	Injection of grout to form a horizontal barrier in the ground underneath chemical source to reduce the vertical movement of chemicals.	Native soils consisting of low permeable silt/clay are present at depth reducing potential vertical migration.
		Block Displacement	Vertical barrier (slurry trench or grout curtain) surrounds source. Continued injection of grout through injection holes causes displacement of source and forms a barrier beneath source.	Native soils consisting of low permeable silt/clay are present at depth reducing potential vertical migration.
	Surface Controls	Revegetation	Planting grasses, shrubs, or trees to minimize contact with soil, reduce dust generation, and control surface water runoff.	Asphalt cover retained as representative “Cover” remedial technology.
	Dust Suppression	**Wet Suppression**	**Watering ground surface to control dust generation.**	**Applicable as erosion control measure.**
		Chemical Stabilization	A suppressant sprayed on the ground binds dust and surface particles into a protective crust that minimizes dust generation.	Asphalt cover retained as representative “Cover” remedial technology.
		Physical Stabilization	Placing a cover (e.g. rock, soil, straw) on exposed surfaces to prevent particles from becoming airborne.	Asphalt cover retained as representative “Cover” remedial technology.
		Vegetative Stabilization	Same as revegetation above.	Asphalt cover retained as representative “Cover” remedial technology.
		Wind Fences/Screens	Fences or screens are installed around site perimeter to block wind and reduce dust generation.	Asphalt cover retained as representative “Cover” remedial technology.
Removal	Excavation	**Backhoe, Excavators, Loaders, Dozers**	**Excavate material for subsequent aboveground treatment and/or disposal.**	**Applicable for removal of impacted soils.**
Ex Situ (Aboveground) Treatment	Solidification/ Stabilization	Solidification	Siliceous materials are combined with a setting agent (e.g., lime, cement, or gypsum) and soil. Treatment results in a solidified product that resists leaching.	Other more cost effective treatment methods are available.

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 14: General Response Actions, Remedial Technologies, and Process Options for Soil

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
Ex Situ (Aboveground) Treatment (continued)	Solidification/ Stabilization (continued)	Stabilization	Dry or liquid chemical mix which forms insoluble molecular bonds through hydroxyapaptite crystal formations with heavy metals [and polychlorinated biphenyls (PCBs)] which significantly reduces the metals leaching potential.	Not appropriate for chemicals of concern.
	Physical/Chemical	Soil Washing	Removal of inorganic or organic chemicals by washing excavated soil with a liquid medium (e.g., water). The wash water may be augmented with a basic leaching agent, surfactant, pH adjustment, or chelating agent to help remove organics and heavy metals.	Other more cost effective treatment methods are available. Creates secondary waste stream.
		Organic Solvent Extraction	Removal of organics, oil, and grease from soil, using an organic solvent as the mass transfer medium and then recovering the solvent by distillation.	Other more cost effective treatment methods are available. Creates secondary waste stream.
		Vapor Extraction	Removal of low molecular weight organics by creating a vacuum pressure gradient in soil that causes volatile organics to transfer from soil to air stream.	In-Situ Vapor Extraction retained.
		Chemical Dehalogenation	Specially synthesized chemical reagents are used to dehalogenate certain classes of chlorinated organics (e.g., PCBs).	Not appropriate for chemicals of concern.
		Chemical Oxidation/Reduction	Reduction/oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.	Other more cost effective treatment methods are available.
		Solar Detoxification	Solar detoxification is a process that destroys contaminants by photochemical and thermal reactions using the ultraviolet energy in sunlight.	Other more cost effective treatment methods are available.
		Separation/Sieving	Sieving and physical separation processes use different size sieves and screens to effectively concentrate contaminants into smaller volumes. Physical separation can also be used to remove undesirable materials (i.e., debris) which may impact treatment processes.	Soil matrix does not consist of large particles (i.e., cobbles/ boulders).
	Biological/ Bioremediation	Landfarming	Contaminated soil is excavated, applied into lined beds, and periodically turned over or tilled to aerate the waste.	Assumes treated soil would be suitable for re-use as backfill. Extended period of an open excavation (i.e., not backfilled) not acceptable. Ex Situ treatment duration unknown.
		Land Treatment	Contaminated surface soil is treated in-place by tilling to achieve aeration, and if necessary, by addition of amendments. Periodically tilling, to aerate the waste, enhances the biological activity.	Assumes treated soil would be suitable for re-use as backfill. Extended period of an open excavation (i.e., not backfilled) not acceptable. Ex Situ treatment duration unknown.

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 14: General Response Actions, Remedial Technologies, and Process Options for Soil

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
Ex Situ (Aboveground) Treatment (continued)	Biological/ Bioremediation (continued)	Composting	Contaminated soil is excavated and mixed with bulking agents and organic amendments such as wood chips, hay, manure, and vegetative (e.g., potato) wastes. Proper amendment selection ensures adequate porosity and provides a balance of carbon and nitrogen to promote thermophilic, microbial activity.	Assumes treated soil would be suitable for re-use as backfill. Extended period of an open excavation (i.e., not backfilled) not acceptable. Ex Situ treatment duration unknown.
		Biopiles	Excavated soils are mixed with soil amendments and placed in aboveground enclosures. It is an aerated static pile composting process in which compost is formed into piles and aerated with blowers or vacuum pumps.	Assumes treated soil would be suitable for re-use as backfill. Extended period of an open excavation (i.e., not backfilled) not acceptable. Ex Situ treatment duration unknown.
		Fungal Biodegradation	Fungal biodegradation refers to the degradation of a wide variety of organopollutants by using their lignin-degrading or wood-rotting enzyme system. White rot fungus has been tested under two different treatment configurations: in situ and bioreactor.	Other more cost effective treatment methods are available.
		Bio-Reactor System	Degradation with the use of a liquid/solids contact reactor. Reactor environment enhances mass transfer rates and contact between chemicals and microorganisms capable of degrading the chemicals.	Other more cost effective treatment methods are available.
	Thermal	**Thermal Desorption**	**Soils are heated, driving off water and organics with boiling points less than 1,100°F. Organics are incinerated in an afterburner or collected for subsequent treatment.**	**Applicable as an alternative to landfill disposal.**
		Rotary Kiln Incineration	Incineration process (in the presence of oxygen) uses temperatures ranging from 1,500°F to 3,000°F and turbulence caused by rotation to vaporize and destroy organics.	Thermal Desorption retained as representative "Ex Situ Thermal" treatment technology.
In Situ Treatment	Solidification/ Stabilization	Pozzolanic Cement-Based	In situ treatment of soil by the injection and mixing of solidifying agents with soil. Treatment results in a solidified product that resists leaching.	Not appropriate for chemicals of concern.
		Chemical-Based Stabilization	Liquid chemical mix which forms insoluble molecular bonds through hydroxyapaptite crystal formations with heavy metals (and PCBs) which significantly reduces the metals leaching potential.	Not appropriate for chemicals of concern.
	Physical/Chemical	Soil Freezing	Freezing surrounding soil to create a physical barrier to chemical migration.	Not appropriate for site conditions.
		Soil Flushing	In situ extraction of inorganics or organics from soils, accomplished by passing solvents through soil using an injection/recirculation process.	Difficult to control; may result in groundwater contamination.
		Soil Vapor Extraction	**Extraction of volatile organics from subsurface soil by creating a pressure gradient that causes volatile organics to transfer from soil to airstream.**	**Applicable for mass removal and vapor mitigation.**

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 14: General Response Actions, Remedial Technologies, and Process Options for Soil

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
In Situ Treatment (continued)	Physical/Chemical (continued)	Electrokinetic Separation	The Electrokinetic Remediation (ER) process removes metals and organic contaminants from low permeability soil. ER uses electrochemical and electrokinetic processes to desorb, and then remove, metals and polar organics. This in situ soil processing technology is primarily a separation and removal technique for extracting contaminants from soils.	Not appropriate for site conditions.
		Fracturing	Cracks are developed by fracturing beneath the surface in low permeability and over-consolidated sediments to open new passageways that increase the effectiveness of many in situ processes and enhance extraction efficiencies.	Not appropriate for site conditions.
		Precipitation	Application of specific treatment reagents which aid in the formation of insoluble metal precipitates that reduce chemical mobility. Metals could later resolubilize as conditions change.	Not appropriate for organics; may result in groundwater contamination.
		Chemical Oxidation/Reduction	Reduction/oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert.	Applicable; however, potential risk with migration of chemical oxidation solution to surface water during injection events.
	Biological/ Bioremediation	**Enhanced Bioremediation (Aerobic)**	**Application of nutrients, oxygen, and microorganisms to accelerate the natural biodegradation of organic compounds.**	**Applicable for biological treatment of both petroleum-impacted soils and groundwater.**
		Enhanced Bioremediation (Anaerobic)	Same as aerobic process with the omission of oxygen application. The anaerobic process degrades organics generally slower than the aerobic process.	Applicable. "Enhanced Bioremediation (Aerobic)" retained as representative Biological/Bioremediation treatment technology.
		Bioventing	**Oxygen is delivered to contaminated unsaturated soils by forced air movement (either extraction or injection of air) to increase oxygen concentrations and stimulate biodegradation.**	**Applicable. Soil vapor extraction retained as In Situ Treatment treatment technology; influx of air through SVE operation increases oxygen concentrations in unsaturated/smear zone.**
		Phytoremediation	Phytoremediation is a process that uses plants to remove, transfer, stabilize, and destroy contaminants in soil and sediment. Contaminants may be either organic or inorganic.	Not appropriate for site conditions.

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 14: General Response Actions, Remedial Technologies, and Process Options for Soil

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
In Situ Treatment (continued)	Thermal	Vitrification	Using high temperatures to melt soil and bind chemicals in a stable non-crystalline solid that resists leaching. Organics are destroyed by pyrolysis.	Not appropriate for chemicals of concern. More cost-effective methods are available.
		Electrical Resistive Heating	Applying electrical current for heating subsurface soils to volatilize contaminants into the vapor phase for removal by soil vapor extraction.	More cost-effective methods are available.
		Steam-Enhanced Vapor Extraction	Vapor extraction with the addition of steam to increase chemical mobility and removal rate.	More cost-effective methods are available.
		Radio Frequency Heating	Application of radio frequency waves to heat soil and vaporize volatile organics. Volatiles are then collected for destruction or treatment.	Experimental. More tested and cost-effective methods are available.
Disposal	Offsite	**Management Unit**	**Disposal of soil in a permitted offsite management unit.**	**Applicable for offsite disposal at a licensed landfill facility.**
	Onsite	**Containment**	**Containment of soil onsite.**	**Asphalt and Sheet Pile Cutoff Wall retained as representative "Containment" process options.**
Reuse/Recycling	Onsite	**Backfilling**	**Onsite reuse/recycling of site materials for suitable applications in accordance with applicable local, state, and federal regulations.**	**Applicable for excavated overburden soil deemed suitable for re-use; biologically amended backfill.**
		Grading	**Onsite reuse/recycling of site materials for suitable applications in accordance with applicable local, state, and federal regulations. One option may be reuse treated soil onsite to consolidated impacted soils or bring low areas within an impacted zone to grade prior to placement of a cover.**	**Applicable for excavated overburden soil deemed suitable for re-use; biologically amended backfill.**

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 15: General Response Actions, Remedial Technologies, and Process Options for Groundwater

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
Institutional Controls	Addressed under Evaluation of General Response Actions, Remedial Technologies, and Process Options for Soil (see Table 14).			
Containment	Covers	Addressed under Evaluation of General Response Actions, Remedial Technologies, and Process Options for Soil (see Table 14).		
	Vertical Barriers	Addressed under Evaluation of General Response Actions, Remedial Technologies, and Process Options for Soil (see Table 14).		
Collection	Extraction	**Extraction Wells**	**Series of wells to extract contaminated groundwater.**	**Applicable for removal of petroleum-impacted groundwater for above-ground treatment; serve as hydraulic control.**
		Extraction/Injection Wells	Inject treated or uncontaminated groundwater to increase flow to extraction wells.	Not appropriate for site conditions given proximity to surface water.
	Subsurface Drains	**Interceptor Trenches**	**Perforated pipe in trenches backfilled with porous media to collect contaminated water.**	**Interceptor trench to be installed as part of Sheet Pile Cutoff Wall construction. Applicable for removal of petroleum-impacted groundwater for above-ground treatment.**
Aboveground Treatment (assuming extraction)	Physical/Chemical	**Adsorption/ Absorption - Granulated Activated Carbon (GAC)/Liquid Phase Carbon Adsorption**	**In liquid adsorption, solutes concentrate at the surface of a sorbent, thereby reducing their concentration in the bulk liquid phase. Ground water is pumped through a series of canisters or columns containing activated carbon to which dissolved organic contaminants adsorb. Periodic replacement or regeneration of saturated carbon is required.**	**Applicable for above-groundwater treatment of extracted petroleum-impacted groundwater.**
		Air Stripping	Volatile organics are partitioned from extracted ground water by increasing the surface area of the contaminated water exposed to air. Aeration methods include packed towers, diffused aeration, tray aeration, and spray aeration.	GAC treatment retained as representative “Physical/Chemical” process option.
		Ion Exchange	Ion exchange removes ions from the aqueous phase by exchange with counter ions on the exchange medium.	GAC treatment retained as representative “Physical/Chemical” process option.

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 15: General Response Actions, Remedial Technologies, and Process Options for Groundwater

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
Aboveground Treatment (assuming extraction) (continued)	Physical/Chemical (continued)	Precipitation/ Coagulation/ Flocculation	This process transforms dissolved contaminants into an insoluble solid, facilitating the contaminant's subsequent removal from the liquid phase by sedimentation or filtration. The process usually uses pH adjustment, addition of a chemical precipitant, and flocculation.	GAC treatment retained as representative "Physical/Chemical" process option.
		Separation	**Separation techniques concentrate contaminated waste water through physical and chemical means. Includes distillation, filtration. ultrafiltartion/microfiltration, freeze crystallization, membrane pervaporation, and reverse osmosis.**	**Applicable for removal of particles from extracted petroleum-impacted groundwater (e.g., bag filtration.**
		Sprinkler Irrigation	The process that involves the pressurized distribution of volatile organic compound (VOC)-laden water through a standard sprinkler irrigation system.	GAC treatment retained as representative "Physical/Chemical" process option.
		UV Oxidation	Ultraviolet (UV) radiation, ozone, and/or hydrogen peroxide are used to destroy organic contaminants as water flows into a treatment tank. If ozone is used as the oxidizer, an ozone destruction unit is used to treat collected off-gases from the treatment tank and downstream units where ozone gas may collect, or escape.	GAC treatment retained as representative "Physical/Chemical" process option.
	Biological/ Bioremediation	Bioreactors	Contaminants in extracted groundwater are put into contact with microorganisms in attached or suspended growth biological reactors. In suspended systems, such as activated sludge, contaminated groundwater is circulated in an aeration basin. In attached systems, such as rotating biological contractors and trickling filters, microorganisms are established on an inert support matrix.	Not appropriate for chemicals of concern. GAC treatment retained as representative "Physical/Chemical" process option.
		Constructed Wetlands	The constructed wetlands-based treatment technology uses natural geochemical and biological processes inherent in an artificial wetland ecosystem to accumulate and remove metals, explosives, and other contaminants from influent waters. The process can use a filtration or degradation process.	Not appropriate for site conditions.
In Situ Treatment	Physical/Chemical	Air Sparging	Air is injected into saturated matrices to remove contaminants through volatilization.	Injected air may cause migration of petroleum-impacted groundwater; would require operation of extraction system for collection of vapors.
		Bioslurping	Bioslurping combines the two remedial approaches of bioventing and vacuum-enhanced free-product recovery. Bioventing stimulates the aerobic bioremediation of hydrocarbon-contaminated soils. Vacuum-enhanced free-product recovery extracts light non-aqueous phase liquids (LNAPLs) from the capillary fringe and the water table.	LNAPL not present at the site.
		Dual Phase Extraction	A high vacuum system is applied to simultaneously remove various combinations of contaminated groundwater, separate-phase petroleum product (LNAPLs), and hydrocarbon vapor from the subsurface.	LNAPL not present at the site.

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 15: General Response Actions, Remedial Technologies, and Process Options for Groundwater

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
In Situ Treatment (continued)	Physical/Chemical (continued)	**Fluid/Vapor Extraction**	**A high vacuum system is applied to simultaneously remove liquid and gas from low permeability or heterogeneous formations.**	**Applicable in conjunction with soil vapor extraction (see Table 14).**
		Hot Water or Steam Flushing/Stripping	Steam is forced into an aquifer through injection wells to vaporize volatile and semivolatile contaminants. Vaporized components rise to the unsaturated zone where they are removed by vacuum extraction and then treated.	Other more cost-effective treatment options are available.
		Hydrofracturing	Injection of pressurized water through wells into low permeability and over-consolidated sediments. Cracks are filled with porous media that serve as substrates for bioremediation or to improve pumping efficiency.	Not appropriate for site conditions.
		In-Well Air Stripping	Air is injected into a double screened well, lifting the water in the well and forcing it out the upper screen. Simultaneously, additional water is drawn in the lower screen. Once in the well, some of the VOCs in the contaminated groundwater are transferred from the dissolved phase to the vapor phase by air bubbles. The contaminated air rises in the well to the water surface where vapors are drawn off and treated by a soil vapor extraction system.	Other more cost-effective treatment options are available.
		Passive/Reactive Treatment Walls	These barriers allow the passage of water while causing the degradation or removal of contaminants by employing such agents as zero-valent metals, chelators (ligands selected for their specificity for a given metal), sorbents, microbes, and others.	Sheet Pile Cutoff Wall retained as representative "Vertical Barriers" remedial technology (see Table 14).
	Biological/ Bioremediation	Co-metabolic Treatment	Injection of a dilute solution of primary substrate (e.g., toluene, methane) into the contaminated ground water zone to support the co-metabolic breakdown of targeted organic contaminants.	Not appropriate for chemicals of concern.
		Enhanced Biodegradation	**Rate of bioremediation of organic contaminants by microbes is enhanced by increasing the concentration of electron acceptors and nutrients in groundwater. Oxygen is the main electron acceptor for aerobic bioremediation. Nitrate serves as an alternative electron acceptor under anoxic conditions.**	**Applicable for biological treatment of both petroleum-impacted soils and groundwater.**
		Natural Attenuation	**Natural subsurface processes such as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials are allowed to reduce contaminant concentrations to acceptable levels.**	**Applicable.**
		Phytoremediation	Phytoremediation is a set of processes that uses plants to remove, transfer, stabilize and destroy organic/inorganic contamination in groundwater, surface water, and leachate.	Not appropriate for site conditions.

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 15: General Response Actions, Remedial Technologies, and Process Options for Groundwater

General Response Action	Remedial Technologies	Process Options	Description	Evaluation Comments
Disposal/Discharge	**Onsite**	**Storm Drain**	**Discharge of treated groundwater to storm drain.**	**Applicable for disposal/ discharge of treated water to onsite sediment pond under a National Pollutant Discharge Elimination Systems (NPDES) permit.**
	Offsite	Publicly Owned Treatment Works (POTW)	Discharge untreated groundwater for treatment at POTW.	Onsite disposal/discharge of treatment water more applicable to site conditions.
Reuse/Recycling	Onsite/Offsite	Landscape Irrigation	Use of treated groundwater for landscape irrigation.	Not appropriate for site conditions.

Note: Bold text in table indicates the Process Option is included for further consideration.

Table 16: Potential Remedial Process Options for Soil and Groundwater

MTCA Preference[(a)]	General Technology Description	Soil and Groundwater Process Option
1	Reuse or Recycling	Soil Onsite: Soil for backfill/grading Offsite: Soil for daily landfill cover material Debris Offsite: Wood recycling (timber bulkhead) Offsite: Wood for landfill disposal (timber bulkhead)
2	Destruction or Detoxification	Thermal Desorption In Situ Bioremediation
3	Separation Followed by Reuse or Destruction	Excavation Soil Vapor Extraction Groundwater Extraction Fluid/Vapor Extraction
4	Immobilization or Solidification	None
5	Onsite or Offsite Disposal	Offsite Management Unit (Landfill)
6	Containment	Asphalt Cover Sheet Pile Cutoff Wall Groundwater Extraction for Hydraulic Control
7	Institutional Controls and Monitoring	Deed Restriction Compliance Monitoring

Note:

Cleanup action components, in descending order, when assessing relative degree of long-term effectiveness (WAC 173-340-360(3)(C)(iv)).

Table 17: MTCA's Threshold Criteria

Threshold Criteria	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Limited Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Protection of Human Health and Environment	Excavation and offsite disposal of impacted soils eliminates direct human contact, leaching to groundwater, and vapor intrusion risk pathways. The ongoing contaminant source to groundwater is removed, reducing the potential for contaminant migration to surface water.	Installation of sheet pile wall serves as containment, with groundwater extraction providing mass removal and hydraulic control. The sheet pile wall and groundwater extraction system (contaminant mass removal) reduces the potential for contaminant migration to surface water. Soil vapor extraction provides mass removal in the unsaturated zone (prevents leaching to groundwater) and mitigates potential vapor migration into site buildings. Asphalt pavement cover and deed restrictions prevent direct human contact with impacted media.	Excavation and offsite disposal of impacted soils eliminates direct human contact and leaching to groundwater within a portion of the site (excavation not completed adjacent to the Bay). Soil vapor extraction provides mass removal in the unsaturated zone (prevents leaching to groundwater) and mitigates potential vapor migration into site buildings. Bioremediation degrades contaminant mass within the smear/saturated zone reducing the potential for contaminant migration to surface water. Asphalt pavement cover and deed restrictions prevent direct human contact with impacted media.
Applicable State and Federal Laws	Yes.	Yes.	Yes.
Point of Compliance	Soil throughout the site to a depth of 15 feet below ground surface (bgs) for direct contact exposure and groundwater protection. Groundwater point of compliance is one or more groundwater monitoring wells installed immediately upgradient of the installed sheet pile wall.	Soil throughout the site to a depth of 15 feet bgs for direct contact exposure and groundwater protection. Groundwater point of compliance is one or more groundwater monitoring wells installed immediately upgradient of the installed sheet pile wall.	Soil throughout the site to a depth of 15 feet bgs for direct contact exposure and groundwater protection. Groundwater point of compliance is one or more groundwater monitoring wells installed immediately upgradient of the existing timber bulkhead.
Compliance Monitoring	Surface water monitoring (i.e., turbidity) performed during remediation activities completed adjacent to surface water. Confirmation soil samples would be collected and analyzed to evaluate compliance with soil cleanup levels. Groundwater monitoring would be performed to assess the effectiveness of the impacted soil removal and evaluate groundwater quality.	Surface water monitoring (i.e., turbidity) performed during installation of steel sheet pile wall. Long-term vapor monitoring would be performed to estimate mass removal, assess treatment effectiveness (including vapor mitigation), and satisfy air discharge requirements. Long-term groundwater monitoring would be performed to verify hydraulic control is maintained, assess treatment effectiveness, and evaluate groundwater quality.	Confirmation soil samples would be collected and analyzed to evaluate compliance with soil cleanup levels. Long-term vapor monitoring would be performed to estimate mass removal, assess treatment effectiveness (including vapor mitigation), and satisfy air discharge requirements. Long-term groundwater monitoring would be performed to assess treatment effectiveness and evaluate groundwater quality.

Table 18: Protectiveness of Human Health and the Environment

Subcriteria	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Degree to which existing risks are reduced.	Excavation and offsite disposal of impacted soils eliminates direct human contact, leaching to groundwater, and vapor intrusion risk pathways. The ongoing contaminant source to groundwater is removed, reducing the potential for contaminant migration to surface water.	Installation of the steel sheet pile wall serves as containment, with groundwater extraction providing mass removal and hydraulic control. The steel sheet pile wall and groundwater extraction system reduces the potential for contaminant migration to surface water. Soil vapor extraction provides mass removal in the unsaturated zone (prevents leaching to groundwater) and mitigates potential vapor migration into site buildings. Asphalt pavement cover and deed restrictions prevent direct human contact with impacted media.	Excavation and offsite disposal of impacted soils eliminates direct human contact and leaching to groundwater within a portion of the site (excavation not completed adjacent to Bay). Soil vapor extraction provides mass removal in the unsaturated zone (prevents leaching to groundwater) and mitigates potential vapor migration into site buildings. Bioremediation degrades contaminant mass within the smear/saturated zone reducing the potential for contaminant migration to surface water. Asphalt pavement cover and deed restrictions prevent direct human contact with impacted media.
Time required in reducing risk and attaining cleanup standards.	Remediation and site restoration activities completed within one year. Performance groundwater monitoring conducted for an additional year following remediation and restoration activities. It is estimated cleanup levels would be attained within 1 year of completion.	Remedial construction activities completed within one year with long-term operation of groundwater and soil vapor extraction systems. It is estimated cleanup levels would be attained within 10 years.	Remedial construction activities completed within one year with long-term operation of soil vapor extraction system. Repeat biological injection applications likely required. It is estimated cleanup levels would be attained within 8 years.
Onsite and offsite risks from implementing alternative.	Onsite risk includes worker contact with impacted media during remediation activities. Offsite risk includes potential contaminant migration to the surface water during remediation activities performed adjacent to the Bay, potential spillage of impacted soils during transport to landfill facility, potential dust exposure during excavation and biological amendment/backfill activities, and discharge of treated water.	Onsite risk includes worker contact with impacted media during remediation activities. Offsite risk to the community and environment include discharge of treated water and air.	Onsite risk includes worker contact with impacted media during remediation activities. Offsite risk includes potential spillage of impacted soils during transport to landfill facility, potential dust exposure during excavation and biological amendment/backfill activities, and discharge of treated water and air.

Table 18: Protectiveness of Human Health and the Environment

Subcriteria	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Degree to which existing risks are reduced.	Excavation and offsite disposal of impacted soils eliminates direct human contact, leaching to groundwater, and vapor intrusion risk pathways. The ongoing contaminant source to groundwater is removed, reducing the potential for contaminant migration to surface water.	Installation of the steel sheet pile wall serves as containment, with groundwater extraction providing mass removal and hydraulic control. The steel sheet pile wall and groundwater extraction system reduces the potential for contaminant migration to surface water. Soil vapor extraction provides mass removal in the unsaturated zone (prevents leaching to groundwater) and mitigates potential vapor migration into site buildings. Asphalt pavement cover and deed restrictions prevent direct human contact with impacted media.	Excavation and offsite disposal of impacted soils eliminates direct human contact and leaching to groundwater within a portion of the site (excavation not completed adjacent to Bay). Soil vapor extraction provides mass removal in the unsaturated zone (prevents leaching to groundwater) and mitigates potential vapor migration into site buildings. Bioremediation degrades contaminant mass within the smear/saturated zone reducing the potential for contaminant migration to surface water. Asphalt pavement cover and deed restrictions prevent direct human contact with impacted media.
Improvement of overall environmental quality.	Will permanently reduce human exposure and ecological risks. Very little impact to environment for disposal of impacted soils at licensed landfill facility.	Installation of steel sheet pile wall and groundwater extraction system will reduce potential contaminant migration to surface water. Groundwater and soil vapor extraction will reduce contaminant mass removal over the long-term. Soil vapor extraction would reduce potential for vapor intrusion to site buildings.	Removal of impacted soils from within a portion of the site and biological degradation within smear/saturated zone reduces potential contaminant migration to surface water. Soil vapor extraction will reduce contaminant mass over the long-term and reduce potential for vapor intrusion to site buildings. Very little impact to environment for disposal of impacted soils at licensed landfill facility.
"Benefit" Score	5	4	3.5

Note:

Alternatives are ranked on a scale of 1 to 5 based on how each alternative satisfies the listed criteria (1 = does not meet criteria, 5 = meets criteria completely).

Table 19: Permanent Reduction of Toxicity, Mobility, or Volume

Subcriteria	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Reduction or elimination of hazardous substance releases and sources of releases.	Excavation of impacted soils removes majority of contaminant mass from the Site (greater than 95 percent). Petroleum residuals, if any, would be naturally attenuated and/or biological degraded (i.e., portion of backfill amended with oxygen release compound or equivalent).	The installed steel sheet pile wall and groundwater extraction would serve as containment and hydraulic control. Contaminant mass is removed through long-term operation of groundwater and soil vapor extraction systems.	Excavation of impacted soils removes majority of contaminant mass from the site (approximately 70 percent). Contaminant mass is removed through long-term operation of a soil vapor extraction system and biological degradation.
Adequacy of alternative in destroying hazardous substances.	Extracted groundwater (dewatering during excavation activities) treated using granular activated carbon; mass transfer through adsorption as opposed to contaminant destruction. Introduction of biological amendment accelerates natural processes. Contaminant breakdown is complete.	Extracted groundwater and vapor treated using granular activated carbon; mass transfer through adsorption as opposed to contaminant destruction.	Extracted groundwater (dewatering during excavation activities) and vapor treated using granular activated carbon; mass transfer through adsorption as opposed to contaminant destruction. Introduction of biological amendment accelerates natural processes. Contaminant breakdown is complete.
Irreversibility of waste treatment process.	Impacted soils are transported to and managed in a licensed landfill facility. Mass transfer through adsorption as opposed to contaminant destruction. Biological treatment is irreversible; enhancement of a natural process.	Mass transfer through adsorption as opposed to contaminant destruction.	Impacted soils are transported to and managed in a licensed landfill facility. Mass transfer through adsorption as opposed to contaminant destruction. Biological treatment is irreversible; enhancement of a natural process.
Characteristics and quantity of treatment residuals generated.	Biodegradation by-products are inert.	Extracted groundwater and soil vapor would be treated prior to discharge. Treatment residuals are non-hazardous.	Biodegradation by-products are inert. Extracted groundwater and soil vapor treated prior to discharge. Treatment residuals are non-hazardous.
Score	5	3	4

Note:

Alternatives are ranked on a scale of 1 to 5 based on how each alternative satisfies the listed criteria (1 = does not meet criteria, 5 = meets criteria completely).

Table 20: Long-Term Effectiveness

Subcriteria	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Degree of certainty that alternative will be successful.	Excavation of impacted soils removes majority of contaminant mass from the site (greater than 95 percent). Although not impermeable, installation of the steel sheet pile wall would serve as a containment measure. Petroleum residuals, if any, would be naturally attenuated and/or biological degraded via strategically placed amended backfill.	The installed sheet pile wall (not completely impermeable) and groundwater extraction would serve as containment and hydraulic control. Contaminant mass removal via groundwater and soil vapor extraction would be slow and require long-term operation; vapor mitigation maintained through continual operation of soil vapor extraction system.	Excavation of impacted soils removes majority of contaminant mass from the site (approximately 70 percent). Contaminant mass removal would be slow and require long-term operation; vapor mitigation maintained through continual operation. Natural attenuation data indicate biological degradation is occurring. Biological degradation of petroleum hydrocarbons is well documented; may require repeat applications.
Magnitude of residual risk.	Residual risk would be very low. Petroleum residuals, if any, would be naturally attenuated and/or biological degraded or contained within steel sheet pile wall containment.	Contaminant mass is not removed by excavation of impacted soils (compared to Alternatives 2 and 3). Contaminant mass would be removed slowly over the long-term through operation of the groundwater and soil vapor extraction systems. Soil vapor extraction system manages vapor intrusion pathway risk.	Majority of contaminant mass is removed through excavation of impacted soils; mass not removed adjacent to existing timber bulkhead. Contaminant mass would be removed over the long-term through operation of the soil vapor extraction system and biological degradation.
Effectiveness of controls required to manage treatment residues or remaining wastes.	Excavation of impacted soils permanently removes contaminant mass from the Site. Long-term reliability of licensed landfill facility is expected to be adequate. Biological amendments longevity is estimated at approximately one year. Operations and maintenance (O&M) is not required; groundwater monitoring performed.	Although not impermeable, the steel sheet pile wall is a permanent structure and is reliable as containment in conjunction with hydraulic control provided by groundwater extraction system. Contaminant mass removal effective provided reliable operation of groundwater and soil vapor extraction systems. Vapor mitigation maintained by continual operation of soil vapor extraction system.	Excavation of impacted soils permanently removes contaminant mass from the site. Long-term reliability of licensed landfill facility is expected to be adequate. Contaminant mass removal effective provided reliable operation of soil vapor extraction system and positive biological response to injected treatment solution to the smear/saturated zone. Vapor mitigation maintained by continual operation of soil vapor extraction system. Biological amendments longevity is estimated at approximately one year; repeat injection s is likely required.
Score	5	3	4

Note:

Alternatives are ranked on a scale of 1 to 5 based on how each alternative satisfies the listed criteria (1 = does not meet criteria, 5 = meets criteria completely).

Table 21: Short-Term Risks

Subcriteria	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Protection of human health during construction and implementation.	Remediation worker risk due to potential contact with impacted media during removal of the existing timber bulkhead, installation of steel sheet pile wall, and excavation/ dewatering activities. Fugitive dust emissions could be generated during soil handling and mixing of biological amendment (i.e., fine powder) with backfill. Use of water could control fugitive dust. There is potential for contaminant runoff to surface water during remediation activities completed adjacent to the Bay. Erosion control measures would be implemented to minimize sediment and contaminant runoff. Offsite transport of impacted soils would present risks for spillage and vehicle accident.	Remediation worker risk due to potential contact with impacted media during installation, operation, and maintenance of the groundwater and soil vapor extraction systems.	Remediation worker risk due to potential contact with impacted media during excavation/dewatering activities and installation, operation, and maintenance of the soil vapor extraction system. Fugitive dust emissions could be generated during soil handling and mixing of biological amendment (i.e., fine powder) with backfill. Use of water could control fugitive dust. Erosion control measures would be implemented to minimize sediment and contaminant runoff. Offsite transport of impacted soils would present risks for spillage and vehicle accident. There is some risk associated with mixing of biological amendment (i.e., fine powder) with water for preparation of the direct-push injection solution.
Degree of risk prior to attainment of cleanup standards.	High degree of risk to workers (contact with impacted media) and moderate risk to the community and environment (dust, impacted soil spillage, contaminant runoff to surface water, and discharge of treated water).	Moderate degree of risk to workers (contact with impacted media) and minimal risk to the community and environment (discharge of treated water and air).	High degree of risk to workers (contact with impacted media) and moderate risk to the community and environment (dust, impacted soil spillage, and discharge of treated water and air).
Time to achieve objectives	Soil cleanup levels would be attained sitewide following excavation of impacted soils. It is estimated groundwater cleanup levels would be attainted within 1 year of completion.	Groundwater containment would be attained following installation of the steel sheet pile wall and establishing hydraulic control (i.e., groundwater extraction). It is estimated soil and groundwater cleanup levels would be attained within 10 years.	Soil cleanup levels would be attained within a portion of the site following excavation of impacted soils. It is estimated soil and groundwater cleanup levels would be attained within 8 years.
Score	3	4	3

Note:

Alternatives are ranked on a scale of 1 to 5 based on how each alternative satisfies the listed criteria (1 = does not meet criteria, 5 = meets criteria completely).

Table 22: Ability to Implement

Subcriteria	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Consideration of whether alternative is technically possible.	Technically possible, although demolition/removal of existing timber bulkhead, installation of steel sheet pile wall, and excavation is difficult due to physical constraints and proximity to surface water. Temporary relocation and restoration of utilities, store, and waste oil storage buildings is relatively straightforward. Septic tank removal and replacement is also relatively straightforward.	Technically possible, although installation of steel sheet pile wall is difficult due to physical constraints and proximity to surface water. Existing timber bulkhead to remain in place. Groundwater and soil vapor extraction system installation, operation, and monitoring are relatively straightforward.	Technically possible, although excavation is difficult due to physical constraints. Septic tank removal and replacement is relatively straightforward. Soil vapor extraction treatment system installation, operation, and monitoring is relatively straightforward. Biological direct-push injections should not be complicated unless difficulty is encountered with injecting solution into low-permeability soil matrix.
Availability of necessary offsite facilities, services, and materials.	Adequate offsite facilities, services, and materials are available.	Adequate offsite facilities, services, and materials are available.	Adequate offsite facilities, services, and materials are available.
Administrative and regulatory requirements.	Requirements include, but not limited to, the following: general construction permit, Army Corp 404 Water Quality permit, cultural resource assessment, and National Pollutant Discharge Elimination System (NPDES) permit. Permitting process may require up to one year.	Requirements include, but not limited to, the following: general construction permit, Army Corp 404 Water Quality permit, cultural resource assessment, NPDES permit, and air discharge permit. Permit process may require up to one year.	Requirements include, but not limited to, the following: general construction permit, cultural resource assessment, NPDES permit, air discharge permit, and Underground Injection Control (UIC) permit. Permit process may require up to one year.
Scheduling, size, and complexity.	Dry and recreational off-season is more suitable for construction activities. Portions of remediation activities would be completed during the fish window. Remediation activities performed adjacent to surface water (i.e., demolition, sheet piling, and excavation) result in greater complexity. Scheduling/traffic control for transportation of impacted soils offsite (in excess of 400 truck loads).	Dry and recreational off-season is more suitable for construction activities. Installation of the steel sheet pile wall would be completed during the fish window. Installation of 20 groundwater and soil vapor extraction wells. System installation would consist of trenching/piping/backfilling and construction of an onsite building to house system components.	Dry and recreational off-season is more suitable for construction activities. Installation of three soil vapor extraction wells. System installation would consist of trenching/piping/backfilling and construction of an onsite building to house system components. Up to 50 direct-push injections would be performed for delivery of prepared biological solution to smear/saturated zone. Repeat injections would likely be required. Injection points are non-intrusive. Scheduling/traffic control for transportation of impacted soils offsite (in excess of 250 truck loads).

Table 22: Ability to Implement

Subcriteria	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Monitoring requirements.	Surface water monitoring (i.e., turbidity) performed during remediation activities completed adjacent to surface water. Confirmation soil samples would be collected and analyzed to evaluate compliance with soil cleanup levels. Groundwater monitoring would be performed to assess the effectiveness of the impacted soil removal and evaluate groundwater quality.	Surface water monitoring (i.e., turbidity) performed during installation of steel sheet pile wall. Long-term vapor monitoring would be performed to estimate mass removal, assess treatment effectiveness (including vapor mitigation), and satisfy air discharge requirements. Long-term groundwater monitoring would be performed to verify hydraulic control is maintained, assess treatment effectiveness, and evaluate groundwater quality.	Confirmation soil samples would be collected and analyzed to evaluate compliance with soil cleanup levels. Long-term vapor monitoring would be performed to estimate mass removal, assess treatment effectiveness (including vapor mitigation), and satisfy air discharge requirements. Long-term groundwater monitoring would be performed to assess treatment effectiveness and evaluate groundwater quality.
Access for construction, operations, and monitoring.	Available. An alternate upland access route to the marina would be constructed during remediation activities. Remediation activities would be completed in stages (i.e., installation of sheet pile in segments, excavation completed in cells) to provide continued access to docks. Periodic site access for groundwater monitoring.	Available. An alternate upland access route to the marina would be constructed as part of sheet pile construction. Installation of steel sheet pile wall completed in segments. Periodic Site access required for long-term groundwater and soil vapor extraction system operation, maintenance, and monitoring.	Available. An alternate upland access route to the marina would be constructed during remediation activities. Remedial action activities would be completed in stages (i.e., excavation completed in cells) to provide continued access to the docks. Access required for direct-push biological injection events. Periodic Site access required for soil vapor extraction system operation, maintenance, and groundwater monitoring; groundwater monitoring.
Integration with existing facility operations and other current or potential remedial actions.	Site utilities, store, and waste oil storage building would be temporarily relocated and restored to equivalent functionality. The septic system would be removed and replaced; temporary sanitary facilities would be installed. Most disturbances to site infrastructure and marina operations of the evaluated alternatives.	Site utilities would be temporarily relocated/restored as part of steel sheet pile installation. Least disturbances to site infrastructure and marina operations of the evaluated alternatives.	Site utilities would be temporarily relocated and restored. The septic system would be removed and replaced; temporary sanitary facilities would be installed.
"Benefit" Score	3	4	3.5

Note:

Alternatives are ranked on a scale of 1 to 5 based on how each alternative satisfies the listed criteria (1 = does not meet criteria, 5 = meets criteria completely).

Table 23: Potential Action-Specific Applicable, Relevant, and Appropriate Requirements (ARARS)

Federal/State Citation	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Clean Water Act (CWA) Section 404 Water Quality Standards National Pollutant Discharge Elimination System (NPDES)	Applicable for groundwater treatment and discharge.		
Safe Drinking Water Act (National Primary and Secondary Drinking Water Regulations)	The remedial actions are being completed to reduce chemical concentrations in soil and groundwater to MTCA Method A (unrestricted use) cleanup levels.		
Resource Conservation and Recovery Act (RCRA)	Waste generated during the remedial action will be characterized and disposed per RCRA, as implemented by the State of Washington Danger Waste Regulations (WAC 173-303).		
Clean Air Act, as Amended	Applicable for vapor treatment and discharge; production of air emissions.		
Endangered Species Act (ESA)	Threatened or endangered species are known to inhabit the general area, but not the Cornet Bay Marina. Site activities will not jeopardize threatened or endangered species.		
National Historic Preservation Act, Archeological Resources Protect (36 CFR 800)	Historically significant archeological resources are not known to be present at the site. Historically significant properties will not be disturbed by any remedial action proposed.		
Occupational Safety and Health Act (29 CFR 1910)	Site activities will be performed under appropriate Occupation Safety and Health Act standards and WISHA requirements.		
Standards Applicable to Transporters of Hazardous Waste (29 CFR 107, 29 CRF 171)	Hazardous waste, if any, generated at the site will be characterized/waste profiled as required to determine packaging, handling, and transportation requirements.		
STATE or LOCAL			
Dangerous Waste Regulations (WAC 173-303)	Waste generated during the remedial action will be characterized and disposed per RCRA, as implemented by the State of Washington Danger Waste Regulations (WAC 173-303).		
Model Toxics Control Act (WAC 173-340)	Applicable to all aspects of the project. Each remedial alternative would be completed in accordance with MTCA regulations.		
State Clean Air Act (RCW 70.94)	Applicable for vapor treatment and discharge; production of air emissions.		
Washington Industrial Safety and Health Act (WAC 296-62)	Site activities will be performed under appropriate Washington Industrial and Safety and Health Act standards.		
Water Pollution Control Act (RCW 90.48)	Applicable for discharge of effluents from remediation activities.		
Water Quality Standards for Surface Waters of the State of Washington (WAC 173-201A)	Applicable for discharge of effluents from remediation activities.		
Water Quality Standards for Groundwater of the State of Washington (WAC 173-200)	The remedial actions are being completed to reduce chemical concentrations in groundwater to MTCA Method A (unrestricted use) cleanup levels.		
Underground Injection Control (WAC 173-218)	Not applicable.	Not applicable.	Applicable for direct-push biological injections.
Maximum Environmental Noise Levels (WAC 173-60)	Relevant depending on remedial action.		
Shoreline Management Act (RCW 90.58 and WAC 173-60)	Act directs local governments to develop and administer local shoreline master programs for regulation of uses of shoreline of the state.		

Table 23: Potential Action-Specific Applicable, Relevant, and Appropriate Requirements (ARARS)

Federal/State Citation	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Minimum Standards for Construction and Maintenance of Wells (WAC 173-160)	Soil borings and well construction to be completed in accordance with these regulations.		
Maximum Environmental Noise Levels (WAC 173-60)	Applicable to all alternatives, especially those that include installation of a sheet pile bulkhead.		
State Environmental Policy Act (SEPA) (WAC 197-11)	Applicable to each alternative.		
Puget Sound Clean Air Regulatory Requirements	Applicable for vapor treatment and discharge; production of air emissions.		
Onsite Sewerage Systems (WAC 246-272 and 246-272A)	Applicable for removal of septic tank; applicable if drainfield is removed.	Not applicable, septic system not impacted.	Applicable for removal of septic tank; applicable if drainfield is removed.
On-site Sewerage System (ICC 8.07C and 8.07D)	Applicable for removal of septic tank; applicable if drainfield is removed.	Not applicable, septic system not impacted.	Applicable for removal of septic tank; applicable if drainfield is removed.
Land Development Standards (ICC 11)	Compliance with substantive conditions of local permits; storm and surface water regulations, demolition, clearing, and grading.		
Building and Construction (ICC 14)	Compliance with substantive conditions of local building codes; building permits.		
Shoreline Use Regulations (ICC 17.05)	The Shoreline Management Act directs local governments to develop and administer local shoreline master programs for regulation of uses of shoreline of the state.		

Notes:

ARARs = Applicable, relevant, and appropriate requirements
CFR = Code of Federal Regulations
WAC = Washington Administrative Code
RCW = Revised Code of Washington
ICC = Island County Code

Table 24: Comparative Analyses Summary Scoring of Alternatives

Subcriteria	ALTERNATIVE 1 Excavation and Offsite Disposal	ALTERNATIVE 2 Containment with Groundwater and Soil Vapor Extraction	ALTERNATIVE 3 Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation
Protectiveness (Table 18)	5	4	3.5
Permanence (Table 19)	5	3	4
Long-Term Effectiveness (Table 20)	5	3	3
Short-Term Risks (Table 21)	3	4	3
Ability to Implement (Table 22)	3	4	3.5
Cost (see Tables 26, 27, and 28)	$3,990,000	$3,214,000	$3,431,000
Cost	3	4	4
Total	24	22	18

Note:

See Tables 18 through 22 for a summary of alternative scorings for each of the MTCA criteria.

Table 25 - Excavation and Offsite Disposal (Estimated Cost), Feasibility Study

Item Description	Quantity	Unit	Unit Cost	Extension	Assumptions
A. Preliminary Activities					
Cleanup Action Plan (CAP)	1	lump sum	$20,000	$20,000	
Design (plans and specifications)	1	lump sum	$115,000	$115,000	
Topographical Survey	1	lump sum	$10,000	$10,000	
Cultural Assessment	1	lump sum	$5,000	$5,000	
Permitting					
US Army Corp - 404 Water Quality	1	lump sum	$20,000	$20,000	
Biological Assessment	1	lump sum	$15,000	$15,000	
General Demolition/Grading/Construction	1	lump sum	$40,000	$40,000	
National Pollutant Discharge Elimination System (NPDES)	1	lump sum	$10,000	$10,000	
Septic System	1	lump sum	$5,000	$5,000	
Health and Safety Plan	1	lump sum	$5,000	$5,000	
Item A. Estimated Cost				**$245,000**	
B. Existing Timber Bulkhead Demolition/Disposal and Steel Sheet Pile Installation					
Timber Bulkhead Demolition	1	lump sum	$75,000	$75,000	
Timber Bulkhead Material Transport and Disposal					Length - 330 feet; depth - 20 feet.
Recycling (transport and recycling)	50	ton	$20	$1,000	Assumes half of timber volume can be recycled as general construction debris.
Landfill (transport and dispose)	50	ton	$51	$2,525	Creosote impacted. Non-hazardous waste - Subtitle D landfill facility in Seattle, Washington (Robanco/Allied Waste).
Steel Sheet Pile					
Mobilization	1	lump sum	$23,500	$23,500	
Materials	11,900	square feet	$50	$595,000	Length = 340 feet; Depth = 35 feet.
Installation	11,900	square feet	$15	$178,500	
Epoxy Coating	29,000	square feet	$2	$58,000	
Geotextile Soil Reinforcing	3,400	square yard	$5	$17,000	15 feet long, 6 layers, entire face of bulkhead.
Stainless Steel Cable Railing	330	feet	$150	$49,500	
Sidewalk Replacement	2,300	square feet	$10	$23,000	Adjacent to steel sheet pile wall.
Water Quality Monitoring (turbidity)	20	week	$1,600	$32,000	
Item B. Estimated Cost				**$1,055,025**	
C. Impacted Soil Excavation and Disposal/Amend and Backfill/Compaction					Overburden (assumed clean) = 6,700 cy stockpiled for potential re-use, impacted soils = 8,400 cy for offsite transport and disposal.
Mobilization/Demobilization	1	lump sum	$149,188	$149,188	8. percent of construction cost (Item C, excluding construction management).
Private Utility Locate	1	lump sum	$2,000	$2,000	
Site Security	1	lump sum	$7,500	$7,500	Temporary fencing, signage, etc.
Erosion Control	1	lump sum	$15,000	$15,000	Construction entrance, silt fence, catch basin protection, stockpile management, etc.
Abandon Monitoring Wells	7	well	$1,000	$7,000	Wells MW-1, MW-2, MW-3, MW-5, MW-6, MW-8, and MW-10 require abandonment, located within designated excavation area.
Marina Temporary Access Construction	1	lump sum	$15,000	$15,000	
Utility Disconnect/Re-Route	1	lump sum	$30,000	$30,000	
Store/Refrigerator Container/Walk in Cooler Temporary Relocate	1	lump sum	$35,000	$35,000	
Store Foundation Demolition and Disposal	1	lump sum	$15,000	$15,000	
Waste Oil Storage Building Tempoary Re-locate	1	lump sum	$2,500	$2,500	
Waste Oil Storage Tank Foundation Demolition and Disposal	1	lump sum	$5,000	$5,000	
Septic Tank Demolition and Disposal	1	lump sum	$5,000	$5,000	
Excavation and Stockpile (overburden)	6,700	cubic yard	$10	$67,000	Excavation and temporary stockpiling of excavated overburden material for composite soil sampling and backfill re-use detetermination.
Soil Chemical Analyses (waste characterization for re-use as backfill determination)					
TPH-Gasoline	13	sample	$35	$469	One representative soil sample per 500 cy.
Benzene, toluene, ethylbenzene, and xylene (BTEX)	13	sample	$35	$469	
TPH-Diesel	13	sample	$35	$469	
Metals	13	sample	$75	$1,005	
Excavation (landfill disposal)	8,400	cubic yard	$5	$42,000	Load directly to trucks.
Waste Profiling for Landfill Disposal	1	lump sum	$1,000	$1,000	Use existing laboratory analytical data for landfill waste profiling.
Transport to Landfill	12,600	ton	$12.5	$157,500	Deception Pass to Everett, 120 mile roundtrip, 2.5 hour roundtrip, 3 trips/day, and 25 tons/trip; $125/hour trucking.
Landfill Disposal	12,600	ton	$38.5	$485,100	Non-hazardous waste - Subtitle D landfill facility in Seattle, Washington (Robanco/Allied Waste).
Soil Chemical Analyses (confirmation sampling)					
TPH-Gasoline	110	sample	$35	$3,850	Discrete soil samples from excavation floor and sidewalls.
BTEX	110	sample	$35	$3,850	
TPH-Diesel	110	sample	$35	$3,850	
Metals	110	sample	$75	$8,250	
Ecology Black Wall	600	feet	$67	$40,200	Tempoary install to facilitate installation.
On-Site Temporary Water Treatment System Construction/Dismantling	1	lump sum	$50,000	$50,000	Pumps, hoses, weir tanks, bag filters, and activated carbon vessels.
Discharge of Treated Water	1	lump sum	$20,000	$20,000	
Dewatering/Treatment System Management	24	week	$3,000	$72,000	
NPDES Water Chemical Analyses					
TPH-Gasoline	48	sample	$35	$1,680	Weekly collection, influent and effluent water samples.
BTEX	48	sample	$35	$1,680	
TPH-Diesel	48	sample	$35	$1,680	
Placement and Compaction (overburden)	6,700	cubic yard	$5	$33,500	Assumes total volume of overburden is deemed acceptable for re-use.
Imported Backfill (material and transport)	13,860	ton	$30	$415,800	Imported fill and crushed-rock surface. Includes 10% compaction factor in quantity estimate.
Placement and Compaction (imported fill)	6,900	cubic yard	$5	$34,500	
Biological Amendment (material and transport)	1	lump sum	$100,000	$100,000	Oxygen Release Compound (ORC) Advanced by Regenesis (12,000 pounds); 1-foot amended backfill thickness placed a floor of excavation.
Placement/Mixing Amendment/Compaction	1,500	cubic yard	$10	$15,000	
Concrete Foundation Installation for Store	1	lump sum	$10,000	$10,000	
Store/Refrigerator Container Restore	1	lump sum	$75,000	$75,000	
Concrete Foundation Installation for Waste Oil Storage Building	1	lump sum	$20,000	$20,000	
Waste Oil Storage Building Restore	1	lump sum	$10,000	$10,000	
Misc. Concrete Pavement	1	lump sum	$20,000	$20,000	Concrete pad, patio, and sidewalk around building.
Septic Tank and Associated Piping to Drainfield	1	lump sum	$10,000	$10,000	Drainfield to remain undisturbed.
Utility Restoration	1	lump sum	$20,000	$20,000	
Construction Management	1	lump sum	$306,907	$306,907	Project management, oversight, direct expenses, etc.). 10 percent of construction cost (Item B and C).
Item C. Estimated Cost				**$2,320,947**	

Table 25 - Excavation and Offsite Disposal (Estimated Cost), Feasibility Study

Item Description	Quantity	Unit	Unit Cost	Extension	Assumptions
D. Monitoring Well Installation/Groundwater Sampling and Chemical Analyses					
Monitoring Well Installation					Replacement wells for MW-1, MW-2, and MW-10.
Mobilization/Demobilization	1	lump sum	$2,000	$2,000	
Well Installation	3	well	$2,500	$7,500	
Consultant Labor and Equipment	3	day	$1,200	$3,600	
Groundwater Sampling and Chemical Analyses					Following completion of remediation activities, quarterly for 1 year from six monitoring wells.
TPH-Gasoline	24	sample	$35	$840	
BTEX	24	sample	$35	$840	
TPH-Diesel	24	sample	$35	$840	
Natural Attenuation Parameters	24	sample	$150	$3,600	
Consultant Labor and Equipment	4	event	$2,500	$10,000	
Item D. Estimated Cost				**$29,220**	
E. Other					
Construction Report	1	report	$30,000	$30,000	Includes as-built drawings.
Groundwater Monitoring Report	4	report	$4,000	$16,000	Quarterly for 1 year.
Taxes	1	lump sum	$293,710	$293,710	8.7 percent of construction capital cost (Item B and D).
Item E. Estimated Cost				**$339,710**	
Total Estimated Cost				**$3,990,000**	

Notes:
1. Estimated cost was prepared at -30/+50% for relative comparison amongst alternatives. The prepared cost estimate is not intended for budgetary purposes.
2. An engineering cost estimate will be prepared in conjunction with CAP preparation and design (technical specifications and drawings).

Table 26 - Containment with Groundwater and Soil Vapor Extraction (Estimated Cost), Feasibility Study

Item Description	Quantity	Unit	Unit Cost	Extension	Assumptions
A. Preliminary Activities					
Cleanup Action Plan (CAP)	1	lump sum	$20,000	$20,000	
Design (plans and specifications)	1	lump sum	$100,000	$100,000	
Topographical Survey	1	lump sum	$7,500	$7,500	
Cultural Assessment	1	lump sum	$5,000	$5,000	
Permitting					
US Army Corp - 404 Water Quality	1	lump sum	$20,000	$20,000	
Biological Assessment	1	lump sum	$15,000	$15,000	
General Demolition/Grading/Construction	1	lump sum	$10,000	$10,000	
National Pollutant Discharge Elimination System (NPDES)	1	lump sum	$10,000	$10,000	
Health and Safety Plan	1	lump sum	$5,000	$5,000	
Deed Restriction/Soil Management Plan	1	lump sum	$30,000	$30,000	
Item A. Estimated Cost				**$222,500**	
B. Containment/Cover					Existing timber bulhead to remain. Installed on shoreline side of existing timber bulkead.
Temporary Utility Disconnect/Relocate/Restoration	1	lump sum	$20,000	$20,000	Include utility locating.
Steel Sheet Pile					
Mobilization	1	lump sum	$23,500	$23,500	
Materials	11,900	square feet	$50	$595,000	Length = 340 feet; Depth = 35 feet.
Installation	11,900	square feet	$15	$178,500	
Epoxy Coating	29,000	square feet	$2	$58,000	
Stainless Steel Cable Railing	330	feet	$150	$49,500	
Sidewalk Replacement	2,300	square feet	$10	$23,000	Adjacent to steel sheet pile wall.
Asphalt Pavement Cover	38,000	square feet	$5	$190,000	
Item B. Estimated Cost				**$1,137,500**	
C. Groundwater Extraction System Construction					
Mobilization/Demobilization	1	lump sum	$30,000	$30,000	
Extraction Well Installation	9	well	$2,500	$22,500	
Power Drop/Electrical	1	lump sum	$20,000	$20,000	Electrical for both groundwater extraction and soil vapor extraction systems.
Building Construction	1	lump sum	$50,000	$50,000	Building for both groundwater extraction and soil vapor extraction systems.
Groundwater Extraction Pumps	9	pump	$2,000	$18,000	
Vaults/Well Head Appurtenances	1	lump sum	$15,000	$15,000	
Trenching/Piping	1	lump sum	$25,000	$25,000	
Backfilling/Compaction	1	lump sum	$10,000	$10,000	
Bag Filter Assembly	1	lump sum	$5,000	$5,000	
Activated Carbon Vessels	1	lump sum	$18,000	$18,000	Two, 2,000 carbon vessels in series.
Discharge Pipe Installation	1	lump sum	$10,000	$10,000	Treated water discharge to surface water.
System Installation	1	lump sum	$25,000	$25,000	
Consultant Labor (oversight)	40	day	$1,200	$48,000	
Item C. Estimated Cost				**$296,500**	
D. Soil Vapor Extraction System Construction					
Mobilization/Demobilization	1	lump sum	$0	$0	Included in Groundwater Extraction System Contruction (Item C).
Extraction Well Installation	3	well	$2,000	$6,000	Building and electrical cost incorporated in Item C.
Vaults/Well Head Appurtenances	1	lump sum	$4,500	$4,500	
Piping	1	lump sum	$5,000	$5,000	Trenching including in Groundwater Extraction System Construction (Item C).
Backfilling/Compaction	1	lump sum	$0	$0	Included in Groundwater Extraction System Contruction (Item C).
Knockout Tank/Vacuum Blower	1	lump sum	$25,000	$25,000	
Activated Carbon Vessels	1	lump sum	$18,000	$18,000	Two, 2,000 carbon vessels in series.
System Installation	1	lump sum	$15,000	$15,000	
Consultant Labor (oversight)	10	day	$1,200	$12,000	
Item D. Estimated Cost				**$85,500**	
E. Long-Term (Net Present Worth)					Groundwater and soil vapor extraction system operation for 9 years; one additional year of quarterly groundwater monitoring for compliance.
Groundwater Extraction System Operation and Maintenance (O&M)	9	year	$24,000	$191,400	General contractor labor, equipment, replacement equipment, activated carbon changeout, etc.
Groundwater Extraction System Consultant Labor (sampling)	9	year	$19,200	$153,100	
Groundwater Extraction System Chemical Analyses	9	year	$9,240	$73,700	Monthly influent and effluent water samples for TPH-gasoline/diesel and BTEX. Select extraction well sampling and chemical analyses.
SVE System O&M	9	year	$12,000	$95,700	General contractor labor, equipment, replacement equipment, activated carbon changeout, etc.
SVE System Consultant Labor (sampling)	9	year	$0	$0	Included in Groundwater Extraction system Consultant Labor (sampling).
SVE SystemChemical Analyses	9	year	$12,000	$95,700	Monthly influent and effluent vapor samples for volatile organic compounds. Select extraction well sampling and chemical analyses.
Investigation-derived Waste Handling/Disposal	9	year	$15,000	$119,600	Bag filter, activated carbon, etc.
Groundwater Extraction/SVE System Monthly Discharge Reports	9	year	$12,000	$95,700	
Groundwater Monitoring					Quarterly for 10 years from six monitoring wells.
Labor	10	year	$10,000	$87,600	
Chemical Analyses	10	year	$5,280	$46,300	TPH-gasoline/diesel, BTEX, and natural attenuation parameters.
Groundwater Monitoring Report	10	year	$16,000	$140,100	
Annual Report	10	year	$10,000	$87,600	
Item E. Estimated Cost				**$1,186,500**	
F. Other					
Construction Report	1	report	$30,000	$30,000	Includes as-built drawings.
O&M Manuals (Groundwater Extraction and SVE systems)	1	report	$20,000	$20,000	
Taxes	1	lump sum	$235,422	$235,422	8.7 percent of construction capital cost (Item B, C, and D).
Item F. Estimated Cost				**$285,422**	
Total Estimated Cost				**$3,214,000**	

Notes:
1. Estimated cost was prepared at -30/+50% for relative comparison amongst alternatives. The prepared cost estimate is not intended for budgetary purposes.
2. Net present worth cost prepared using discount rate of 2.5 percent (%).
3. An engineering cost estimate will be prepared in conjunction with CAP preparation and design (technical specifications and drawings).

Table 27 - Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation (Estimated Cost), Feasibility Study

Item Description	Quantity	Unit	Unit Cost	Extension	Assumptions
A. Preliminary Activities					
Cleanup Action Plan (CAP)	1	lump sum	$20,000	$20,000	
Design (plans and specifications)	1	lump sum	$100,000	$100,000	
Topographical Survey	1	lump sum	$10,000	$10,000	
Cultural Assessment	1	lump sum	$5,000	$5,000	
Permitting					
US Army Corp - 404 Water Quality	1	lump sum	$20,000	$20,000	
Biological Assessment	1	lump sum	$15,000	$15,000	
General Demolition/Grading/Construction	1	lump sum	$10,000	$10,000	
National Pollutant Discharge Elimination System (NPDES)	1	lump sum	$10,000	$10,000	
Air Discharge	1	lump sum	$5,000	$5,000	
Underground Injection Control (UIC)	1	lump sum	$5,000	$5,000	
Health and Safety Plan	1	lump sum	$5,000	$5,000	
Deed Restriction/Soil Management Plan	1	lump sum	$30,000	$30,000	
Item A. Estimated Cost				**$235,000**	
B. Impacted Soil Excavation and Disposal/Backfill and Compaction/Amendment					Overburden (assumed clean) = 3,200 cy stockpiled for potential re-use, impacted soils = 4,700 cy for off-site transport and disposal.
Mobilization/Demobilization	1	lump sum	$92,957	$92,957	8.0 percent of construction cost (Item B, excluding construction management).
Private Utility Locate	1	lump sum	$1,000	$1,000	
Site Security	1	lump sum	$7,500	$7,500	Temporary fencing, signage, etc.
Erosion Control	1	lump sum	$10,000	$10,000	Construction entrance, silt fence, catch basin protection, stockpile management, etc.
Abandon Monitoring Wells	3	well	$1,000	$3,000	Wells MW-1, MW-2, and MW-10 require abandonment, located within designated excavation area.
Marina Temporary Access Construction	1	lump sum	$7,500	$7,500	
Utility Disconnect/Re-Route	1	lump sum	$20,000	$20,000	
Septic Tank Demolition and Disposal	1	lump sum	$5,000	$5,000	
Excavation and Stockpile (overburden)	3,200	cubic yard	$10	$32,000	Excavation and temporary stockpiling of excavated overburden material for composite soil sampling and backfill re-use detetermination.
Soil Chemical Analyses (waste characterization for re-use as backfill determination)				$0	
TPH-Gasoline	6	sample	$35	$224	One representative soil sample per 500 cy.
Benzene, toluene, ethylbenzene, and xylene (BTEX)	6	sample	$35	$224	
TPH-Diesel	6	sample	$35	$224	
Metals	6	sample	$75	$480	
Excavation (landfill disposal)	4,700	cubic yard	$5	$23,500	Load directly to trucks.
Waste Profiling for Landfill Disposal	1	lump sum	$1,000	$1,000	Use existing laboratory analytical data for landfill waste profiling.
Transport to Landfill	7,050	ton	$12.5	$88,125	Deception Pass to Everett, 120 mile roundtrip, 2.5 hour roundtrip, 3 trips/day, and 25 tons/trip; $125/hour trucking.
Landfill Disposal	7,050	ton	$38.5	$271,425	Non-hazardous waste - Subtitle D landfill facility in Seattle, Washington (Robanco/Allied Waste).
Soil Chemical Analyses (confirmation sampling)				$0	
TPH-Gasoline	75	sample	$35	$2,625	Discrete soil samples from excavation floor and sidewalls.
BTEX	75	sample	$35	$2,625	
TPH-Diesel	75	sample	$35	$2,625	
Metals	75	sample	$75	$5,625	
On-Site Temporary Water Treatment System Construction/Dismantling	1	lump sum	$50,000	$50,000	Pumps, hoses, weir tanks, bag filters, and activated carbon vessels.
Discharge of Treated Water	1	lump sum	$25,000	$25,000	
Dewatering/Treatment System Management	16	week	$3,000	$48,000	
NPDES Water Chemical Analyses					
TPH-Gasoline	32	sample	$35	$1,120	Weekly collection, influent and effluent water samples.
BTEX	32	sample	$35	$1,120	
TPH-Diesel	32	sample	$35	$1,120	
Placement and Compaction (overburden)	3,200	cubic yard	$5	$16,000	Assumes total volume of overburden is deemed acceptable for re-use.
Imported Backfill (material and transport)	7,755	ton	$30	$232,650	Imported fill and crushed-rock surface. Includes 10% compaction factor in quantity estimate.
Placement and Compaction (imported fill)	3,950	cubic yard	$5	$19,750	
Biological Amendment (material and transport)	1	lump sum	$50,000	$50,000	Oxygen Release Compound (ORC) Advanced by Regenesis; 0.3% by weight (12,000 pounds); 20,000 square feet at 1-foot amended backfill thickness.
Placement/Mixing Amendment/Compaction	750	cubic yard	$10	$7,500	
Misc. Concrete Pavement	1	lump sum	$10,000	$10,000	
Septic Tank and Associated Piping to Drainfield	1	lump sum	$10,000	$10,000	Drainfield to remain undisturbed.
Utility Restoration	1	lump sum	$15,000	$15,000	
Asphalt Pavement Cover	38,000	square feet	$5	$190,000	
Construction Management	1	lump sum	$100,394	$100,394	Project management, oversight, direct expenses, etc.). 10 percent of construction cost (Item B).
Item B. Estimated Cost				**$1,355,312**	
C. Soil Vapor Extraction System Construction					
Mobilization/Demobilization	1	lump sum	$20,000	$20,000	
Extraction Well Installation	3	well	$2,000	$6,000	
Power Drop/Electrical	1	lump sum	$10,000	$10,000	
Building Construction	1	lump sum	$25,000	$25,000	
Vaults/Well Head Appurtenances	1	lump sum	$4,500	$4,500	
Piping	1	lump sum	$5,000	$5,000	
Backfilling/Compaction	1	lump sum	$10,000	$10,000	
Knockout Tank/Vacuum Blower	1	lump sum	$25,000	$25,000	
Activated Carbon Vessels	1	lump sum	$18,000	$18,000	Two, 2,000 carbon vessels in series.
System Installation	1	lump sum	$15,000	$15,000	
Consultant Labor (oversight)	20	day	$1,200	$24,000	
Item C. Estimated Cost				**$162,500**	

Table 27 - Partial Excavation and Offsite Disposal with Soil Vapor Extraction and Bioremediation (Estimated Cost), Feasibility Study

Item Description	Quantity	Unit	Unit Cost	Extension	Assumptions
D. Direct Push Injection - Biological Remediation					
Mobilization/Demobilization	1	lump sum	$5,000	$5,000	
Direct-Push Drill Rig and Injection Trailer	45	day	$4,500	$202,500	Injection points completed on a grid; approximatelyd 135 points.
Biological Amendment	1	lump sum	$200,000	$200,000	Oxygen Release Compound (ORC) Advanced by Regenesis.
Consultant Labor (oversight)	45	day	$1,200	$54,000	
Item D. Estimated Cost				**$461,500**	
E. Monitoring Well Installation					
Monitoring Well Installation					Replacement wells for MW-1, MW-2, and MW-10.
Mobilization/Demobilization	1	lump sum	$2,000	$2,000	
Well Installation	3	well	$2,500	$7,500	
Consultant Labor and Equipment	3	day	$1,200	$3,600	
Item E. Estimated Cost				**$13,100**	
F. Long-Term (Net Present Worth)					Soil vapor extraction system operation for 8 years; one additional year of quarterly groundwater monitoring for compliance.
Repeat Biological Injection		Year 3	$115,375	$107,137	1/4 the cost of initial application; applied at year 3.
Repeat Biological Injection		Year 5	$57,688	$53,569	1/8 the cost of initial application; applied at year 5.
SVE System O&M	8	year	$12,000	$86,100	General contractor labor, equipment, replacement equipment, activated carbon changeout, etc.
SVE System Consultant Labor (sampling)	8	year	$19,200	$137,700	
SVE SystemChemical Analyses	8	year	$12,000	$86,100	Monthly influent and effluent vapor samples for volatile organic compounds. Select extraction well sampling and chemical analyses.
Investigation-derived Waste Handling/Disposal	8	year	$8,000	$57,400	Activated carbon.
SVE System Monthly Discharge Reports	8	year	$12,000	$86,100	
Groundwater Monitoring					Quarterly for 10 years from six monitoring wells.
Labor	8	year	$10,000	$71,800	
Chemical Analyses	8	year	$5,280	$37,900	TPH-gasoline/diesel, BTEX, and natural attenuation parameters.
Groundwater Monitoring Report	8	year	$16,000	$114,800	
Annual Report	8	year	$10,000	$71,800	
Item F. Estimated Cost				**$910,406**	
G. Other					
Construction Report	1	report	$25,000	$25,000	Includes as-built drawings.
O&M Manuals (SVE system)	1	report	$15,000	$15,000	
Taxes	1	lump sum	$252,545	$252,545	8.7 percent of construction capital cost (Item B, C, and D).
Item G. Estimated Cost				**$292,545**	
Total Estimated Cost				**$3,431,000**	

Notes:
1. Estimated cost was prepared at -30/+50% for relative comparison amongst alternatives. The prepared cost estimate is not intended for budgetary purposes.
2. Net present worth cost prepared using discount rate of 2.5 percent (%).
3. An engineering cost estimate will be prepared in conjunction with CAP preparation and design (technical specifications and drawings).

Figures

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Remedial Investigation/Feasability Study
Cornet Bay, Washington

Site Location Map

1396010*00
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Figure 1

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Legend

- Approximate Property Boundary
- Timber Bulkhead

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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Remedial Investigation/Feasability Study
Cornet Bay, Washington

Site Plan

1396010*00
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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.
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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Remedial Investigation/Feasability Study
Cornet Bay, Washington

Sampling Location Map - All Investigations

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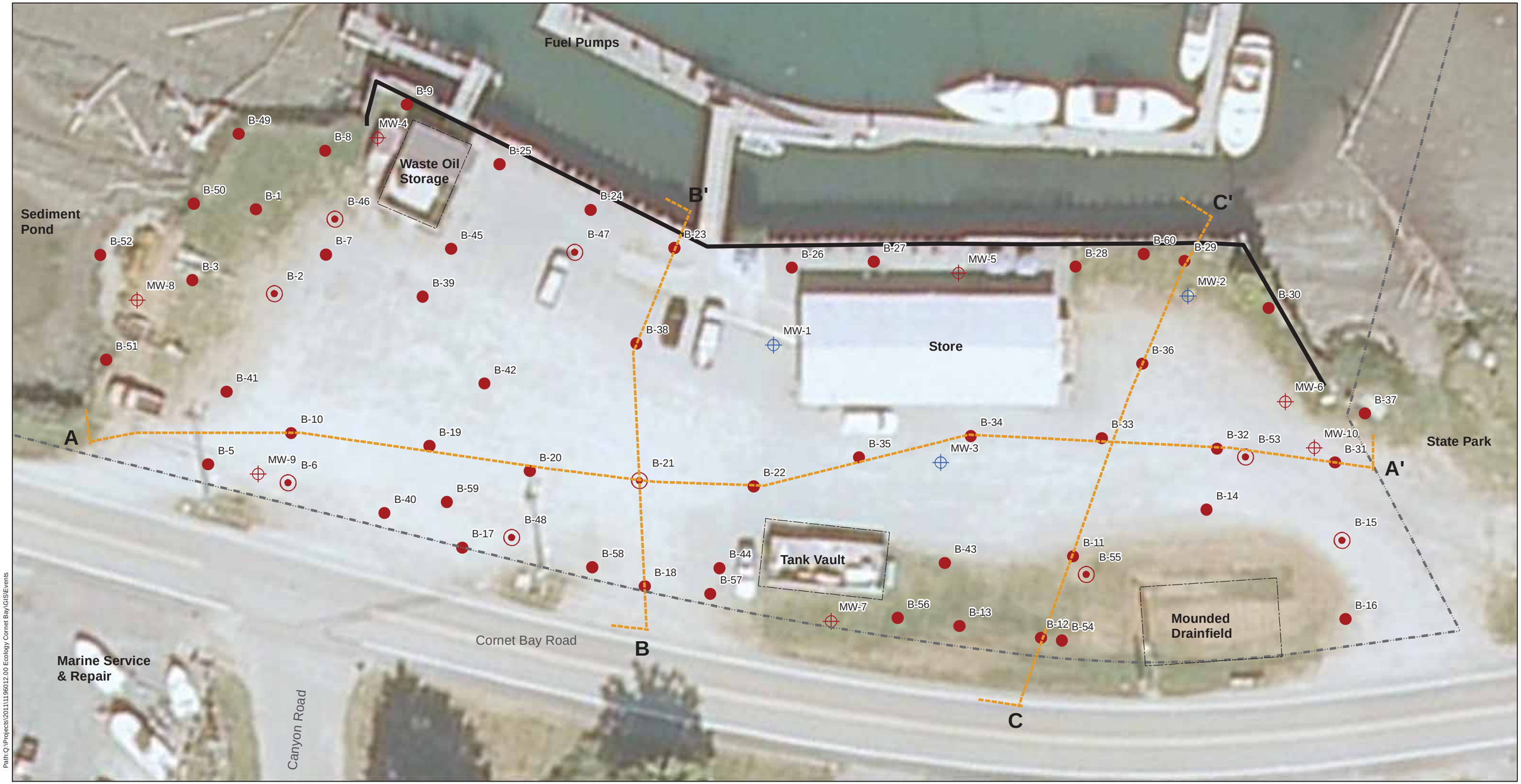
Figure 3



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Legend

- 2011 Soil Boring
- 2011 Soil boring and GW
- 2011 Monitoring Well
- Prior Monitoring Well
- Geologic Cross Section
- 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.
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 = 30 feet

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Remedial Investigation/Feasability Study
Cornet Bay, Washington

Generalized Geologic Cross Section Locations

1396010*00
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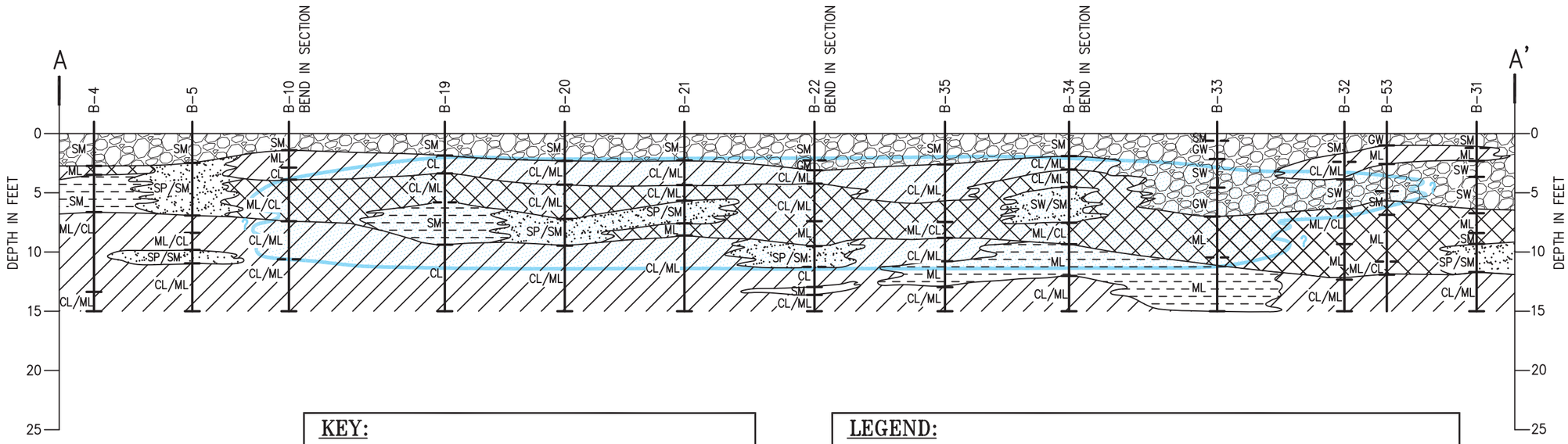
Figure 4



KEY:

SM = SILTY SAND; MAY INCLUDE GRAVEL
ML = SILT OR SANDY SILT; MAY INCLUDE GRAVEL
CL = CLAY; MAY INCLUDE SAND AND/OR GRAVEL
CL/ML = SILTY CLAY; MAY INCLUDE SAND AND/OR GRAVEL
MC/CL = CLAYEY SILT; MAY INCLUDE SAND AND/OR GRAVEL
SP = POORLY GRADED SAND
SP/SM = POORLY GRADED SAND WITH SILT
SW/SM = WELL GRADED SAND WITH SILT; MAY INCLUDE GRAVEL
GM = SILTY GRAVEL; MAY INCLUDE SAND
SW = WELL GRADED SAND; MAY INCLUDE GRAVEL

SOIL BORINGS

– SHARP OR GRADED CONTACT

– APPROXIMATE CONTACT (DEPTH UNCERTAIN)

NOTE:
REFER TO BORING LOGS FOR ADDITIONAL INFORMATION REGARDING LITHOLOGY

LEGEND:

PREDOMINANTLY SAND/GRAVEL/SILT FILL MATERIALS.

PREDOMINANTLY STIFF SILT AND CLAY MATERIALS; SOME SAND/GRAVEL LOCALLY.

PREDOMINANTLY SOFT SILT AND CLAY MATERIALS INCLUDING SILTY CLAY, CLAYEY SILT, AND SANDY SILT/CLAY; SOME GRAVEL LOCAL.

PREDOMINANTLY STIFF SILT/SANDY SILT.

PREDOMINANTLY POORLY GRADED SAND; SOME SILT LOCALLY.

APPROXIMATE IMPACTED SOIL REMOVAL AREA BASED ON ANALYTICAL RESULTS AND FIELD OBSERVATIONS.

0 5 10
SCALE: 1=10 VERTICAL

0 15 30
SCALE: APPROXIMATE 1=30 HORIZONTAL

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REMEDIAL INVESTIGATION/FEASIBILITY STUDY
CORNET BAY, WASHINGTON

GENERALIZED GEOLOGIC CROSS SECTION A-A'

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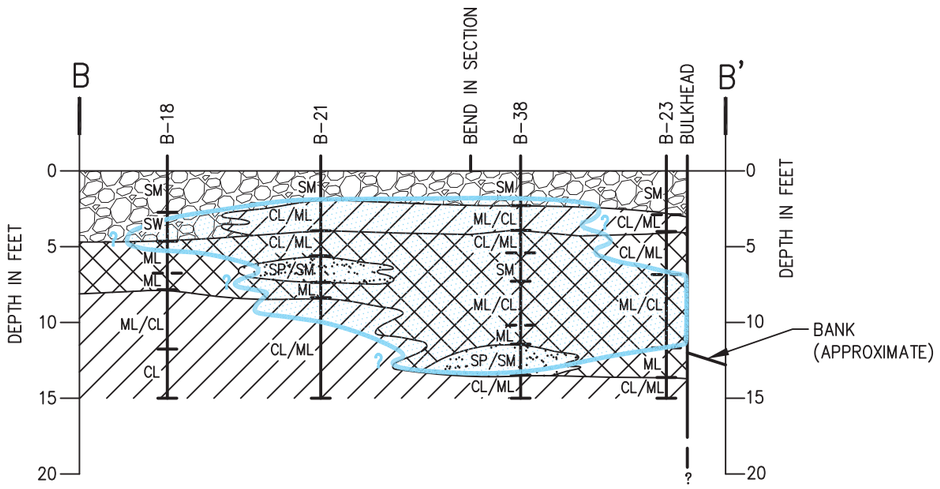
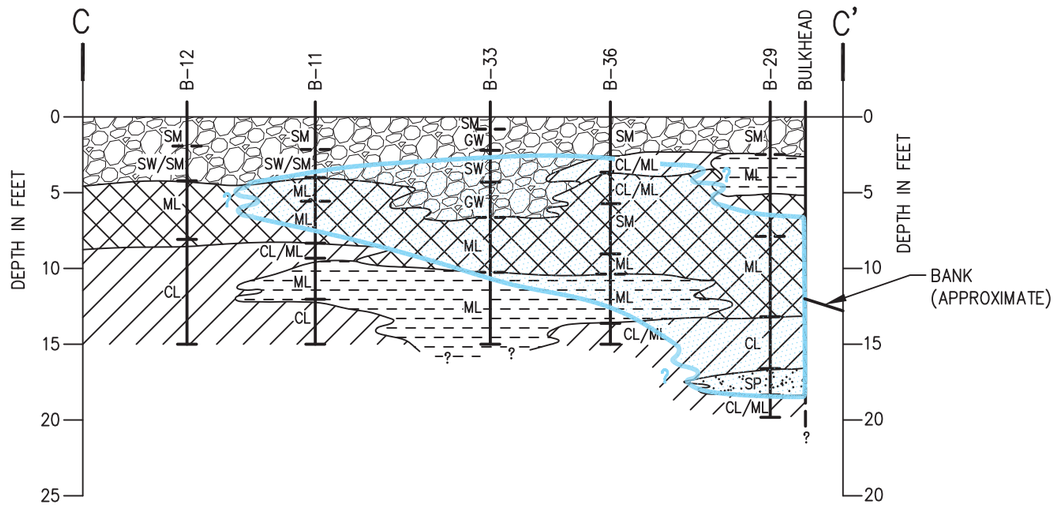
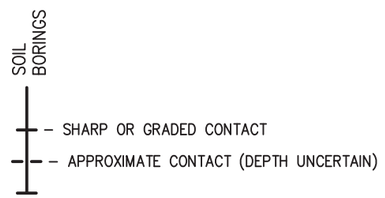
FIGURE 5





KEY:

SM = SILTY SAND; MAY INCLUDE GRAVEL
ML = SILT OR SANDY SILT; MAY INCLUDE GRAVEL
CL = CLAY; MAY INCLUDE SAND AND/OR GRAVEL
CL/ML = SILTY CLAY; MAY INCLUDE SAND AND/OR GRAVEL
MC/CL = CLAYEY SILT; MAY INCLUDE SAND AND/OR GRAVEL
SP = POORLY GRADED SAND
SP/SM = POORLY GRADED SAND WITH SILT
SW/SM = WELL GRADED SAND WITH SILT; MAY INCLUDE GRAVEL
GM = SILTY GRAVEL; MAY INCLUDE SAND
SW = WELL GRADED SAND; MAY INCLUDE GRAVEL



NOTE:
REFER TO BORING LOGS FOR ADDITIONAL INFORMATION REGARDING LITHOLOGY

LEGEND:

PREDOMINANTLY SAND/GRAVEL/SILT FILL MATERIALS.

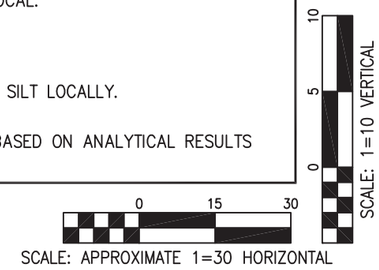
PREDOMINANTLY STIFF SILT AND CLAY MATERIALS; SOME SAND/GRAVEL LOCALLY.

PREDOMINANTLY SOFT SILT AND CLAY MATERIALS INCLUDING SILTY CLAY, CLAYEY SILT, AND SANDY SILT/CLAY; SOME GRAVEL LOCAL.

PREDOMINANTLY STIFF SILT/SANDY SILT.

PREDOMINANTLY POORLY GRADED SAND; SOME SILT LOCALLY.

APPROXIMATE IMPACTED SOIL REMOVAL AREA BASED ON ANALYTICAL RESULTS AND FIELD OBSERVATIONS.



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REMEDIAL INVESTIGATION/FEASIBILITY STUDY
CORNET BAY, WASHINGTON

GENERALIZED GEOLOGIC CROSS SECTION B-B' AND CROSS SECTION C-C'

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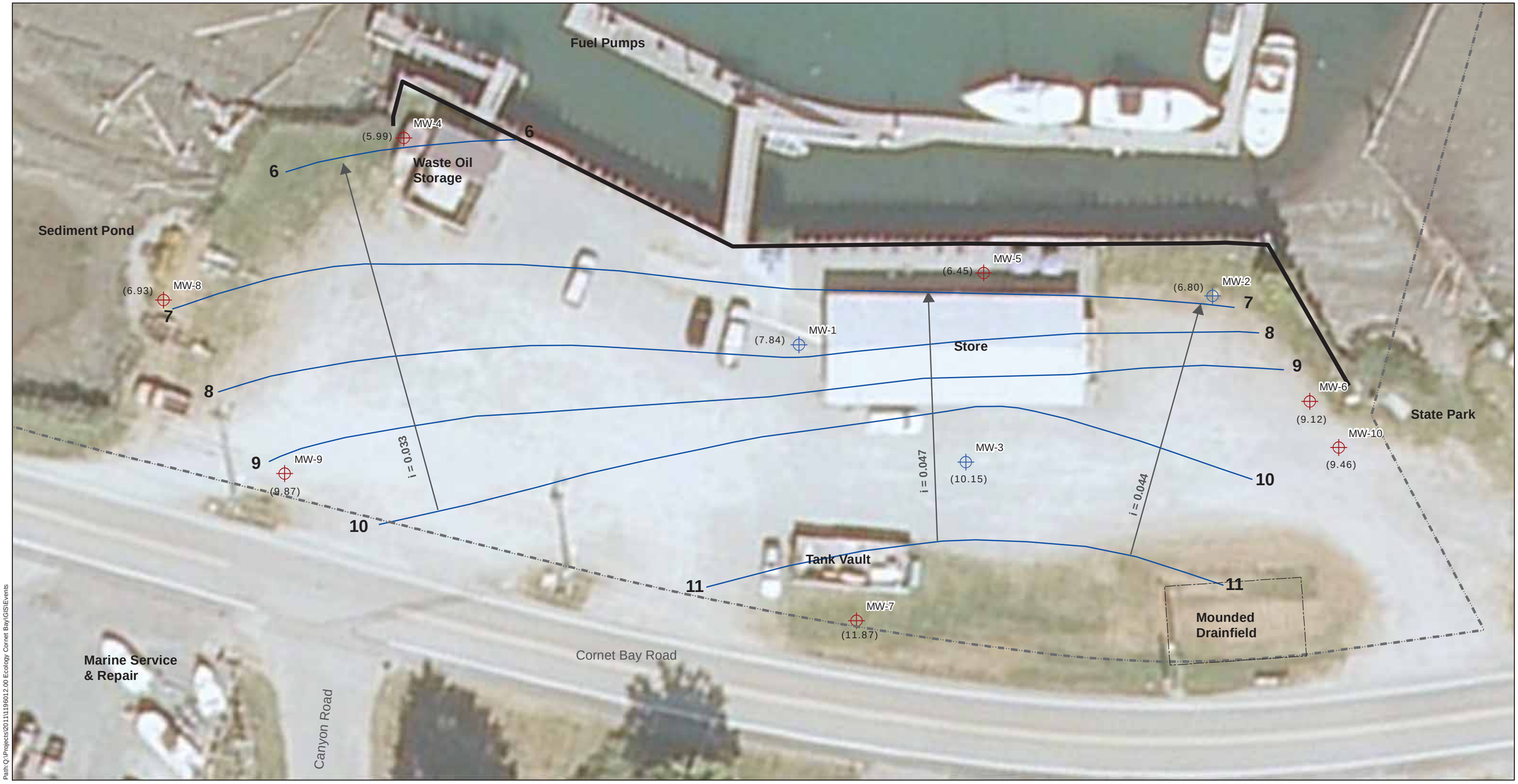
FIGURE 6



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Legend

- 2011 Monitoring Well
- Prior Monitoring Well
- Potentiometric Surface Contour (Contour Interval = 1 Foot)
- Timber Bulkhead
- Approximate Property Boundary

(10.01) Groundwater Elevation Measured on 10 November 2011

i = 0.043 Approximate Hydraulic Gradient Direction and Magnitude (feet/foot)

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.
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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0 30 60

Scale: Feet
1 inch = 30 feet

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Remedial Investigation/Feasability Study
Cornet Bay, Washington

Potentiometric Surface Map Low Tide
10 November 2011

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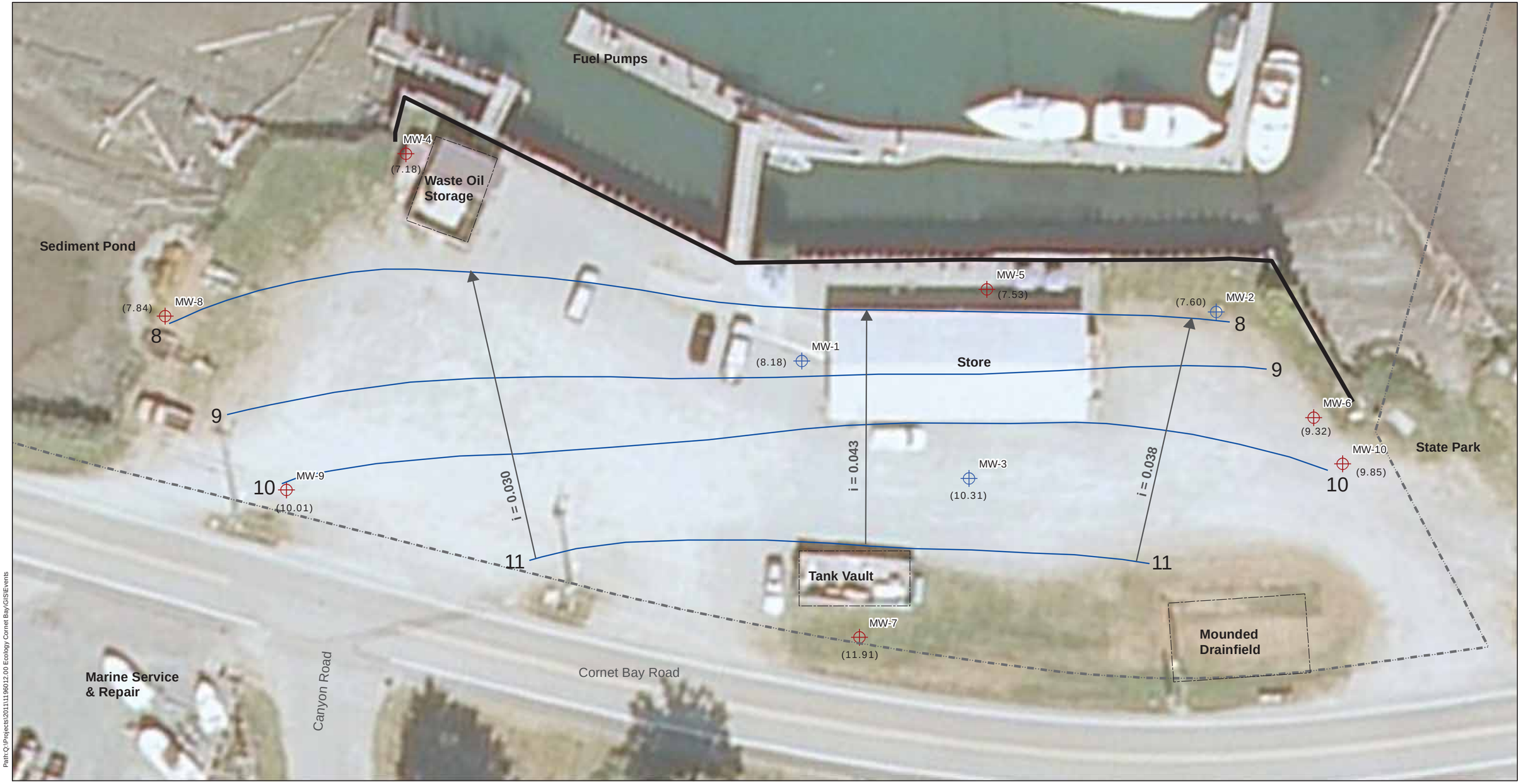
July 2013

Figure 7



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Legend

- 2011 Monitoring Well
- Prior Monitoring Well
- Potentiometric Surface Contour (Contour Interval = 1 Foot)
- Timber Bulkhead
- Approximate Property Boundary

(10.01) Groundwater Elevation Measured on 11 November 2011

i = 0.043 Approximate Hydraulic Gradient Direction and Magnitude (feet/foot)

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.
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 = 30 feet

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Remedial Investigation/Feasability Study
Cornet Bay, Washington

Potentiometric Surface Map High Tide 11 November 2011

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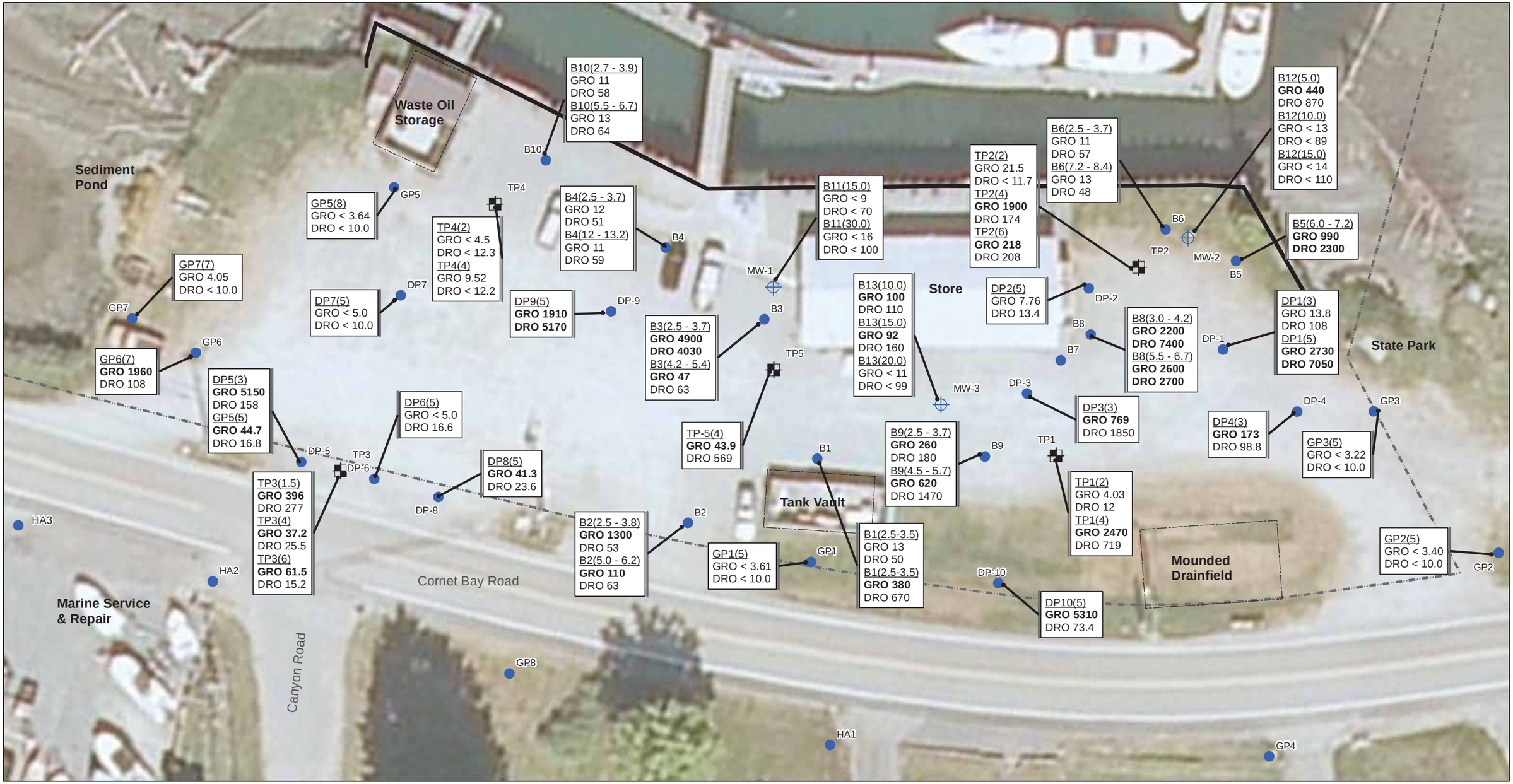
Figure 8



Legend

- Prior Monitoring Well
- Prior Soil Boring
- Test Pit
- Timber Bulkhead
- Approximate Property Boundary

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

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.
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 = 30 feet

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Remedial Investigation/Feasability Study
Cornet Bay, Washington

Previous Investigations Petroleum Hydrocarbon Concentrations in Soil

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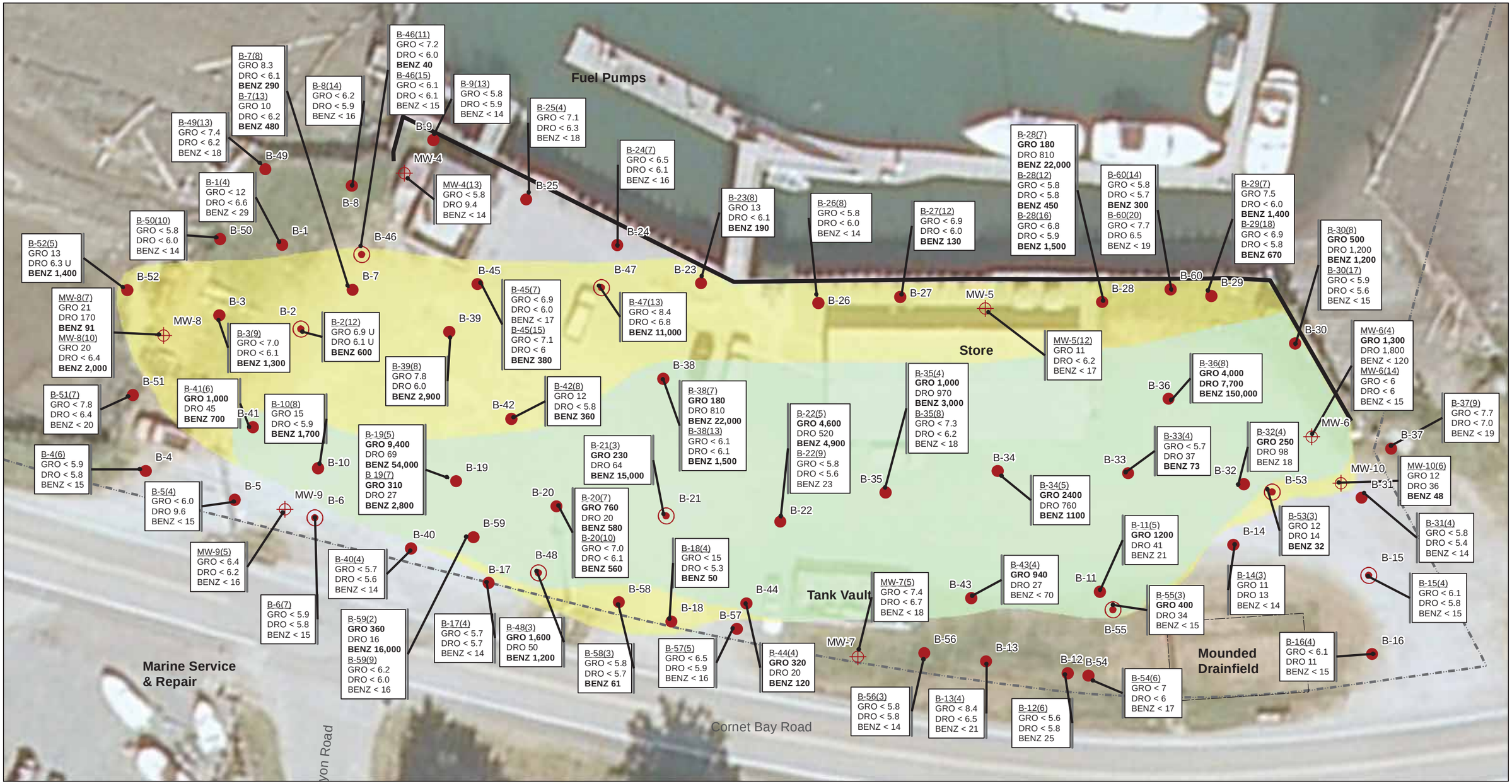
July 2013

Figure 9



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 Bulkhead
- 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:
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.
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 = 30 feet

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Remedial Investigation/Feasability Study
Cornet Bay, Washington

2011 Soil Investigation Results
Petroleum Hydrocarbon and Benzene Affected Area

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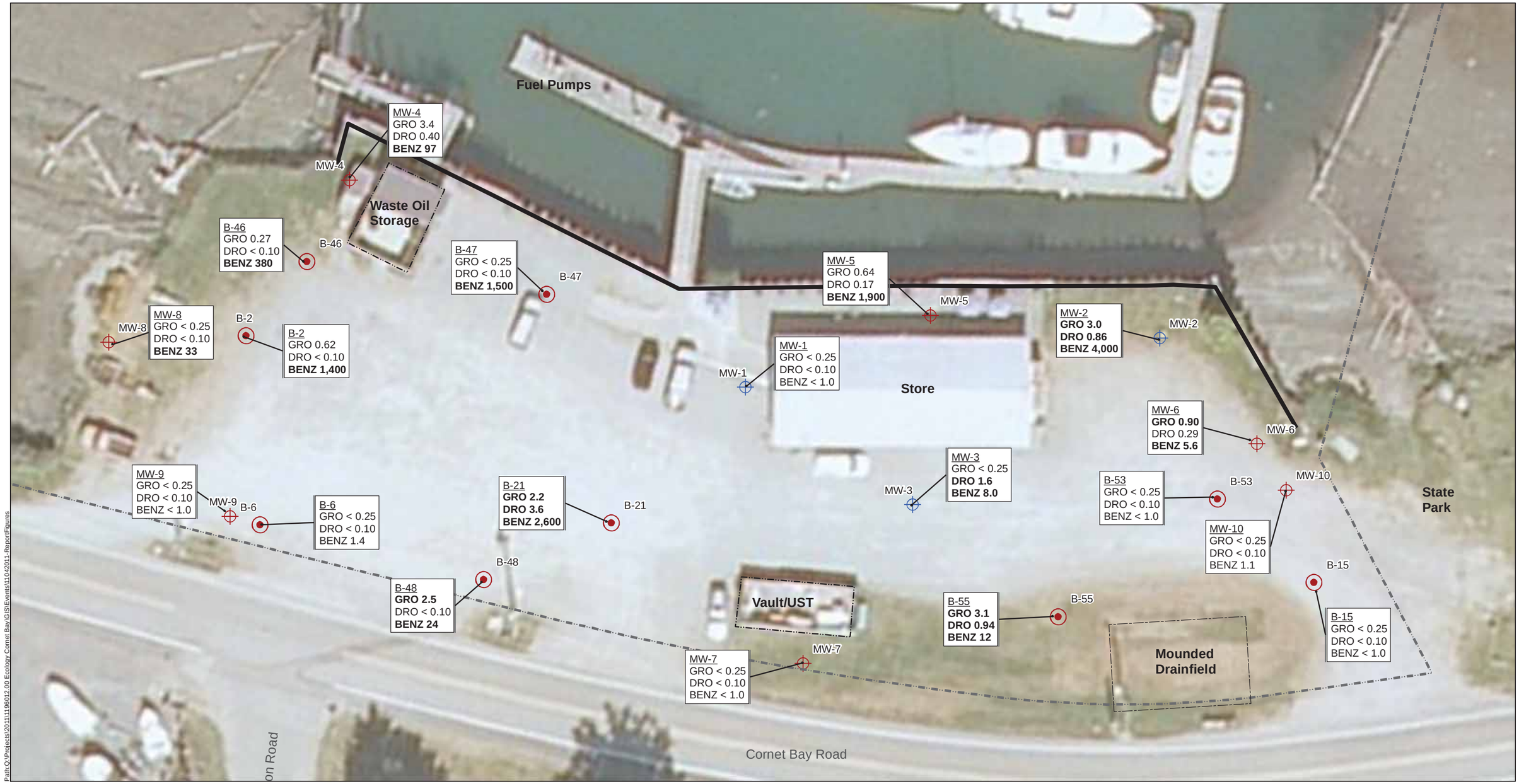
Figure 10



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Legend

- 2011 Monitoring Well
- Prior Monitoring Well
- 2011 Soil Boring with Reconnaissance Groundwater Sample
- Property Boundary
- Timber Bulkhead

GRO - Gasoline Range Organics (mg/L)
DRO - Diesel Range Organics (mg/L)
BENZ - Benzene (µg/L)
< - Indicates a nondetect at the laboratory reporting limit
BOLD - Indicates the value may exceed current MTCA Method A Groundwater Cleanup Levels
GRO - 0.8 mg/L
DRO - 0.5 mg/L
BENZ - 5 µg/L

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
1 inch = 30 feet

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Remedial Investigation/Feasability Study
Cornet Bay, Washington

2011 Groundwater Investigation Results

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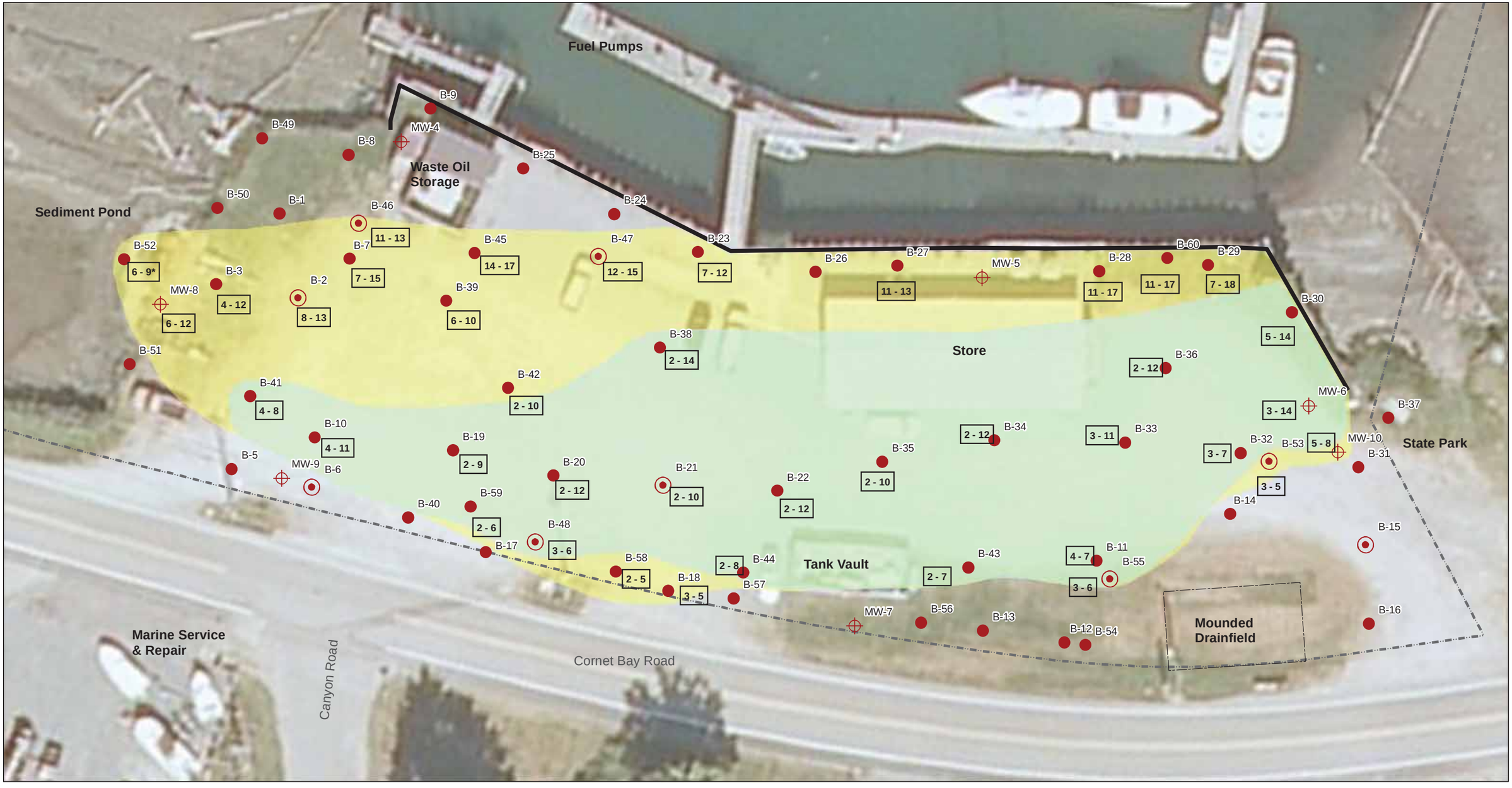
July 2013

Figure 11



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 Bulkhead
- Approximate Property Boundary

2 - 12 Impacted Soil Depth (below site grade surface)

* Boring location on bank area approximately 3 feet below average site grade. Impacated soil at 6 - 9 feet below grade corresponds to approximately 3 - 6 feet below ground surface at boring location.

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
1 inch = 30 feet

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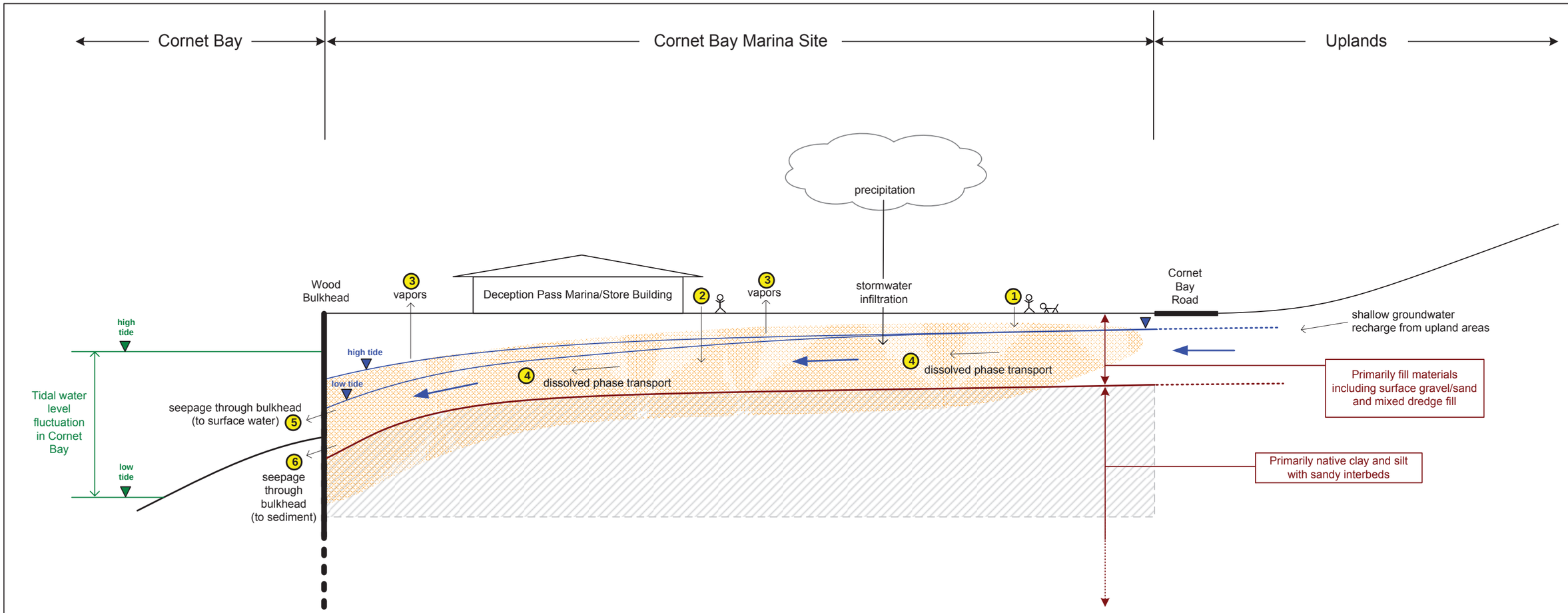
Remedial Investigation/Feasability Study
Cornet Bay, Washington

Approximate Depth of Hydrocarbon Affected Soils

1396010*00
July 2013

Figure 12



Summary of Potential Exposure Pathways

	Potential Pathway	Potential Receptors	Exposure Scenarios
1	Direct Contact Soil	Workers, Ecological Receptors	Possible direct contact/ingestion by workers doing invasive work; direct contact/ ingestion by wildlife.
2	Direct Contact Groundwater	Workers	Possible direct contact by workers doing invasive work; ingestion pathway incomplete because shallow groundwater is not a potable water source.
3	Vapor Inhalation	Workers	Possible inhalation by workers; vapor migration upward through unpaved surfaces and possibly through building foudations/slab..
4	Soil to Groundwater Leaching	Aquatic Organisms in Cornet Bay	Infiltration of stormwater through unpaved site surfaces and shallow groundwater recharge from uplands to east of site; transport toward Cornet Bay.
5	Groundwater to Surface Water	Aquatic Organisms in Cornet Bay	Groundwater discharge through and around bulkhead to surface water in Cornet Bay; possible ingestion by aquatic organisms; possible ingestion or aquatic organisms by recreational users.
6	Groundwater to Sediment	Aquatic Organisms in Cornet Bay	Groundwater discharge through and around bulkhead to sediment in Cornet Bay; possible ingestion by aquatic organisms; possible ingestion by aquatic organisms; possible ingestion or aquatic organisms by recreational users.

Legend:

- Shallow groundwater gradient
- Shallow groundwater potentiometric surface
- Tidal water levels for Cornet Bay
- 1 Potential exposure pathways (summarized in table)
- Affected soil area

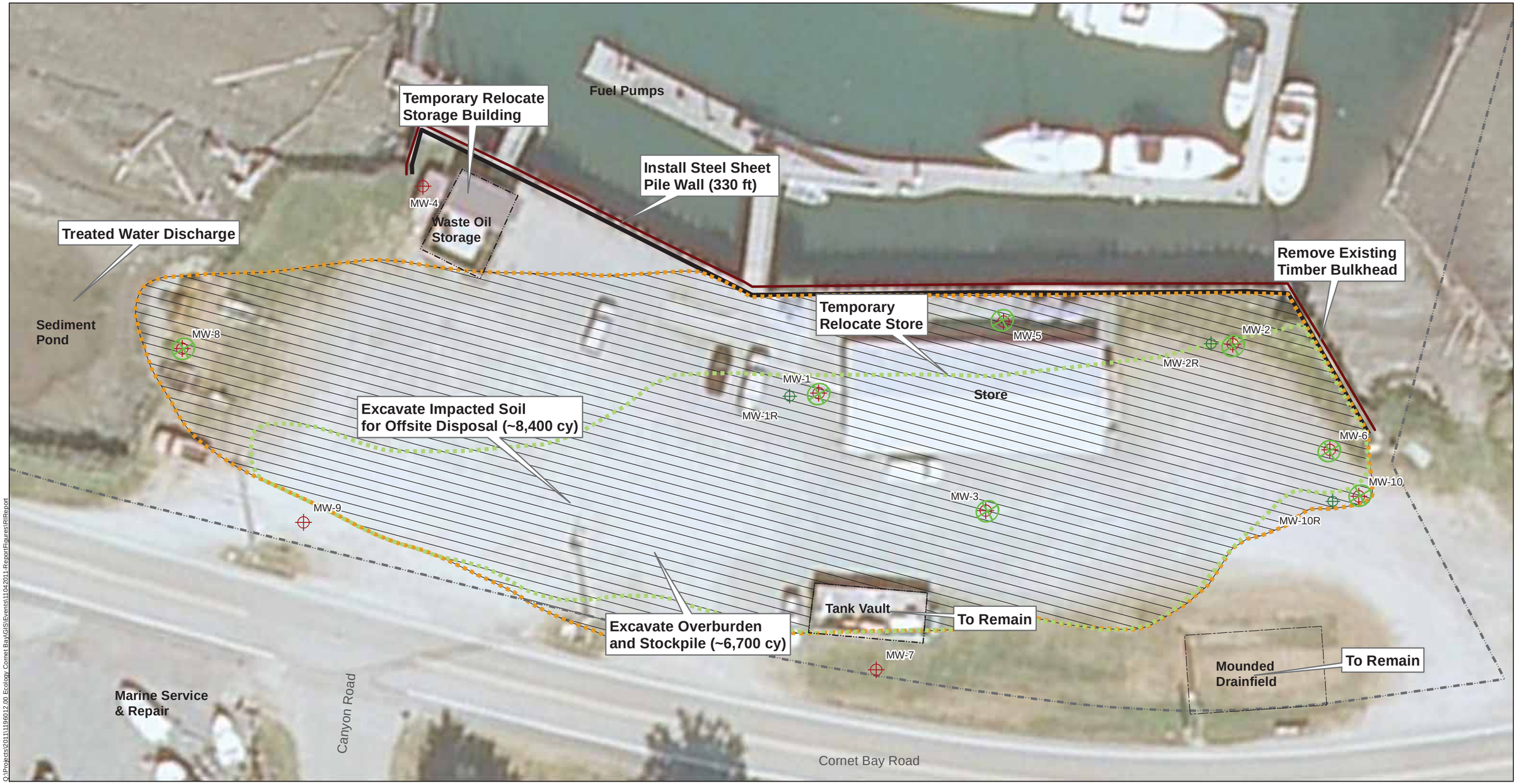
Kennedy/Jenks Consultants

WASHINGTON STATE DEPARTMENT OF ECOLOGY
CORNET BAY, WA

GENERALIZED CONCEPTUAL SITE MODEL

1396010*00 /SiteModel.VSD

FIGURE 13



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Legend

- Existing Monitoring Wells (Total of 10)
- Abandon Monitoring Wells (Total of 6)
- Proposed New Monitoring Well (Total of 3)
- Gas and Benzene Area Exceeding MTCA Method A Soil Cleanup Levels
- Benzene Area Exceeding MTCA Method A Soil Cleanup Levels
- Excavation Area
- New Steel Sheet Pile Wall
- Approximate Property Boundary
- Existing 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
1 inch = 30 feet

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Remedial Investigation/Feasability Study
Cornet Bay, Washington

Alternative 1: Excavation and Offsite Disposal

1396010*00
July 2013

Figure 14

Fuel Pumps

Install Treatment System Building

Install Steel Sheet Pile Wall (330 ft)

Waste Oil Storage

Treated Water Discharge

Sediment Pond

Store

Ashpalt Cover

Ashpalt Cover

Tank Vault

Mounded Drainfield

Marine Service & Repair

Canyon Road

Cornet Bay Road

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Legend

- Proposed Extraction Wells (Total of 9)
- Proposed Soil Vapor Extraction Wells (Total of 3)
- Existing Monitoring Wells
- New Steel Sheet Pile Wall
- Approximate Property Boundary
- Timber Bulkhead
- Asphalt Cover
- Gas and Benzene Area Exceeding MTCA Method A Soil Cleanup Levels
- Benzene Area Exceeding MTCA Method A Soil Cleanup Levels

NOTE:
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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
1 inch = 30 feet

Kennedy/Jenks Consultants

Remedial Investigation/Feasability Study
Cornet Bay, Washington

Alternative 2: Containment with Groundwater and Soil Vapor Extraction

1396010*00
July 2013

Figure 15

Fuel Pumps

Treated Water Discharge

Sediment Pond

MW-4

Waste Oil Storage

Install Treatment System Building

Existing Timber Bulkhead to Remain

MW-8

MW-5

MW-2

MW-2R

MW-1

SVE-1

MW-1R

Store

SVE-3

SVE-2

MW-6

MW-10

MW-10R

MW-9

MW-3

To Remain

Excavate Overburden and Stockpile (~3,200 cy)
Excavate Impacted Soil for Offsite Disposal (~4,700 cy)

Tank Vault

MW-7

To Remain

Mounded Drainfield

Marine Service & Repair

Canyon Road

Cornet Bay Road

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Legend

- Existing Monitoring Wells (Total of 10)
- Abandon Monitoring Wells (Total of 5)
- Proposed New Monitoring Well (Total of 3)
- Proposed Soil Vapor Extraction Wells (Total of 3)
- Biological Injection Point (Total of 135)
- Gas and Benzene Area Exceeding MTCA Method A Soil Cleanup Levels
- Benzene Area Exceeding MTCA Method A Soil Cleanup Levels
- Excavation Area
- Approximate Property Boundary
- Existing 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.
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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0 30 60

Scale: Feet
1 inch = 30 feet

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Remedial Investigation/Feasability Study
Cornet Bay, Washington

Alternative 3: Limited Excavation and Off Site Diposal with Soil Vapor Extraction and Bioremediation

1396010*00
July 2013

Figure 16

Appendix A

Deed and Title Information

Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

Inquiry Number: 3175182.12
October 10, 2011

The EDR Chain of Title Report

EDR Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Chain of Title

The EDR Chain of Title Report tracks a line from the present to the 1940 of successive owners of a particular parcel of property that are linked together by recorded transactions which pass title. Available nationwide, this report provides a summary of a property's ownership history and is a valuable source for determining the prior uses of a property.

A network of professional abstractor following established procedures, uses client supplied address information to locate:

Historical Chain of Title research

Leases and Miscellaneous Abstracts

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EDR Chain of Title

TARGET PROPERTY INFORMATION

ADDRESS

Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

Research Source

Source 1:	Island County Recorders Office
Source 2:	N/A
Examiner's Note:	Property recorders were searched in Island County, WA from January 1, 1940 through September 26, 2011.

PROPERTY DESCRIPTION

Current Owner:	Deception Pass Marina, Inc.
Legal Description:	See attached deed
Property Identifiers:	APN: R13436-506-2420
General Comments:	N/A

HISTORICAL CHAIN OF TITLE

See Exhibit "A"

LEASES AND MISCELLANEOUS

No leases or liens were found of record searching back during the time period of the attached chain. See attached deed for any restrictions, amendments, leases or agreements.

Chain of Title

Exhibit “A”

EDR Chain of Title

Chain 1

Type of Deed:	Deed
Title is vested in:	Deception Pass Marina, Inc.
Title received from:	Milton A. Woods and P. Tuulikki Woods, Charles H. Morse, Robert R. Masters and Carol A. Masters, Walter Paul Kistler and Olga Kistler, Ronald K. Bustad and Shirley L. Bustad, Michael R. Sanders and Leida K. Sanders, Mary Ann Nelson, Dundee A. Woods and Darlene L. Woods, William J. Kraing and Kathleen Kranig
Date Executed:	March 27, 2000
Date Recorded:	April 6, 2000
Book:	811
Page:	2437
Volume:	
Instrument #:	
Docket:	
Land Records:	N/A

Chain 2

Type of Deed:	Deed
Title is vested in:	Milton A. Woods and P. Tuulikki Woods, Charles H. Morse, Robert R.Masters and Carol A. Masters, Walter Paul Kistler and Olga Kistler, Ronald K. Bustad and Shirley L. Bustad, Michael R. Sanders and Leida K. Sanders, Mary Ann Nelson, Dundee A. Woods and Darlene L. Woods, William J. Kranig and Kathleen Kranig
Title received from:	Bay on Cornet
Date Executed:	September 1, 1980
Date Recorded:	September 1, 1980
Book:	
Page:	
Volume:	
Instrument #:	198011538
Docket:	
Land Records:	N/A

Chain 3

Type of Deed:	Deed
Title is vested in:	Bay on Cornet
Title received from:	Lomax and Lurie LLC
Date Executed:	August 26, 1972
Date Recorded:	August 30, 1972
Book:	4215
Page:	199
Volume:	
Instrument #:	
Docket:	
Land Records:	N/A

EDR Chain of Title

Chain 4

Type of Deed:	Deed
Title is vested in:	Lomax and Lurie LLC
Title received from:	Premcor Production Company
Date Executed:	November 9, 1963
Date Recorded:	November 11, 1963
Book:	3130
Page:	457
Volume:	
Instrument #:	
Docket:	
Land Records:	N/A

Chain 5

Type of Deed:	Deed
Title is vested in:	Premcor Production Company
Title received from:	Lorenzo Richards and Paula Richards
Date Executed:	May 16, 1954
Date Recorded:	May 20, 1954
Book:	2203
Page:	46
Volume:	
Instrument #:	
Docket:	
Land Records:	N/A

Chain 6

Type of Deed:	Deed
Title is vested in:	Lorenzo Richards and Paula Richards
Title received from:	Roy Davis and Vickey Davis
Date Executed:	December 7, 1948
Date Recorded:	December 8, 1948
Book:	1692
Page:	511
Volume:	
Instrument #:	
Docket:	
Land Records:	N/A

EDR Chain of Title

Chain 7

Type of Deed:	Deed
Title is vested in:	Roy Davis and Vickey Davis
Title received from:	Gene M. Holmes and Greta R. Holmes
Date Executed:	June 1, 1944
Date Recorded:	June 3, 1944
Book:	1114
Page:	394
Volume:	
Instrument #:	
Docket:	
Land Records:	N/A

Chain 8

Type of Deed:	Deed
Title is vested in:	Gene M. Holmes and Greta R. Holmes
Title received from:	Phillip E. O'Donnell and Peggy M. O'Donnell
Date Executed:	February 11, 1932
Date Recorded:	February 15, 1932
Book:	162
Page:	53
Volume:	
Instrument #:	
Docket:	
Land Records:	N/A

EDR Chain of Title

DEED EXHIBIT

#20 006078 TYPE: QCD $19.00
BK 811 PG 2437 4/6/2000 2:44:43 PM
ISLAND COUNTY AUDITOR
DEPUTY: CS REQUESTED BY:
FIRST AMERICAN TITLE INSURANCE CO

AFTER RECORDING RETURN TO:

JACOB COHEN
Post Office Box 889
Oak Harbor, WA 98277

EXCISE TAX EXEMPT
APR - 6 2000
MAXINE R. SUTTON
ISLAND COUNTY TREASURER

A-6-00

140926 **QUIT CLAIM DEED** A-

Grantors: WOODS, Milton A. and P. Tuulikki
MORSE, Charles H.
MASTERS, Robert R and Carol A.
KISTLER, Walter Paul and Olga
BUSTAD, Ronald K. and Shirley L.
SANDERS, Michael R. and Leida K.
NELSON, Mary Ann
WOODS, Dundee A. and Darlene L.
KRANIG, William J. and Kathleen
Grantee: DECEPTION PASS MARINA, INC.
Legal Descriptions: All portions of Government Lot 1, Section 36, Township 34, Range 1, E.W.M.
(Full legal descriptions attached as Exhibit A)
Assessor's Tax Parcel ID#s:
R13436-478-1490; R13436-476-1610; R13436-460-1780;
R13436-488-2260; R13436-506-2420; R13436-517-2500;
R13436-519-2700; R13436-314-0330

The Grantors, **MILTON A. WOODS** and **P. TUULIKKI WOODS**, husband and wife, **CHARLES H. MORSE**, as his separate property, **ROBERT R. MASTERS** and **CAROL A. MASTERS**, husband and wife, **CAROL A. MASTERS** as her separate property, **WALTER PAUL KISTLER** and **OLGA KISTLER**, husband and wife, **RONALD K. BUSTAD** and **SHIRLEY L. BUSTAD**, husband and wife, **MICHAEL R. SANDERS** and **LEIDA K. SANDERS**, husband and wife, **LEIDA K. SANDERS**, as her separate property, **MARY ANN NELSON**, a single woman, formerly the wife of Earl V. Nelson, deceased, and the successor to all of the interests of Earl V. Nelson, **DUNDEE A. WOODS** and **DARLENE L. WOODS**, husband and wife, and **WILLIAM J. KRANIG** and **KATHLEEN KRANIG**, husband and wife, either in their capacity as (a) all of the shareholders in that certain dissolved Washington corporation known as "Cornet Bay Marine Company, Inc.", also known of record as "Cornet Bay Marine Co., Inc.", and/or (b) that certain dissolved Washington general

partnership known as "Cornet Bay Marina Company", also appearing of record as "Cornet Bay Marina Co.", and/or (c) as all of the shareholders in that certain existing corporation known as "Deception Pass Marina, Inc.", a Washington corporation, for and in consideration of clearing title from dissolved Washington corporation and dissolved Washington general partnership into a new Washington corporation, and no monetary consideration, conveys and quit claims to **DECEPTION PASS MARINA, INC.**, a Washington corporation, the following described real estate, situated in the County of Island, State of Washington, including any interest therein which grantors may hereafter acquire:

See Exhibit A attached hereto for legal descriptions and assessor's tax parcel numbers.

4-6-05

DATED this 27th day of March, 2000 ~~1999~~

MILTON A. WOODS	P. TUULIKKI WOODS
CHARLES H. MORSE	ROBERT R. MASTERS
CAROL A. MASTERS	WALTER PAUL KISTLER
OLGA KISTLER	RONALD K. BUSTAD
SHIRLEY L. BUSTAD	MICHAEL R. SANDERS
LEIDA K. SANDERS	MARY ANN NELSON
DUNDEE A. WOODS	DARLENE L. WOODS
WILLIAM J. KRANIG	KATHLEEN KRANIG

STATE OF WASHINGTON)
) ss
COUNTY OF Island)

On this day personally appeared before me **MILTON A. WOODS** and **P. TUULIKKI WOODS**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 24th day of November, 1999.

KATHLEEN MARIE KRANIG NOTARY PUBLIC STATE OF WASHINGTON Commission Expires April 7, 2002

[signature]
NOTARY PUBLIC in and for the state of Washington, residing at Oak Harbor
My commission expires: April 7, 2002

STATE OF WASHINGTON)
) ss
COUNTY OF King)

On this day personally appeared before me **CHARLES H. MORSE**, to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that he signed the same as his free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 22nd day of February, ~~1999~~ 2000

NANCY E. BODDY NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES APRIL 2, 2002

Nancy E. Boddy
NOTARY PUBLIC in and for the state of Washington, residing at Seattle
My commission expires: 2/10/02

4-6-00

STATE OF WASHINGTON)
) ss
COUNTY OF King)

On this day personally appeared before me **ROBERT R. MASTERS** and **CAROL A. MASTERS**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 12 day of JAN, ~~1999~~ 2000.

NOTARY PUBLIC in and for the State of Washington, residing at King Co.
My commission expires: 7-2-2002

STATE OF WASHINGTON)
) ss
COUNTY OF King)

On this day personally appeared before me **WALTER PAUL KISTLER** and **OLGA KISTLER**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 1st day of December, 1999.

NOTARY PUBLIC in and for the state of Washington, residing at Redmond
My commission expires: 7-30-2001

LORALIE FULLER NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES JULY 30, 2001

STATE OF WASHINGTON)
) ss
COUNTY OF Pierce)

On this day personally appeared before me **RONALD K. BUSTAD** and **SHIRLEY L. BUSTAD**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 27th day of March, ~~1999~~ 2000

Sherri D. Cordeiro
NOTARY PUBLIC in and for the state of Washington, residing at Lakebay
My commission expires: 5-9-02

STATE OF WASHINGTON)
) ss
COUNTY OF King)

On this day personally appeared before me **MICHAEL R. SANDERS** and **LEIDA K. SANDERS**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 6 day of Dec, 1999.

NOTARY PUBLIC in and for the state of Washington, residing at King County
My commission expires: 7-2-02

A-6-03

STATE OF WASHINGTON)
) ss
COUNTY OF Island)

On this day personally appeared before me **MARY ANN NELSON**, to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that she signed the same as her free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 23rd day of November, 1999.

KAREN A. HUFF
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES
8-19-03

Karen A. Huff
NOTARY PUBLIC in and for the state of Washington, residing at Coupeville
My commission expires: 8-19-2003

4-6-00

STATE OF WASHINGTON)
) ss
COUNTY OF Island)

On this day personally appeared before me **DUNDEE A. WOODS** and **DARLENE L. WOODS**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 24th day of November, 1999.

KATHLEEN MARIE KRAMIG
NOTARY PUBLIC
STATE OF WASHINGTON
Commission Expires
2002

Kathleen Kramig
NOTARY PUBLIC in and for the state of Washington, residing at Oak Harbor
My commission expires: April 7, 2002

STATE OF WASHINGTON)
)
COUNTY OF King)

On this day personally appeared before me **WILLIAM J. KRANIG,** to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that he signed the same as his free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 14th day of December, 1999.

GUINASSO, PAMELA A. RICHARDS NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 07-15-01

Pamela A. Richards Guinasso

NOTARY PUBLIC in and for the state of Washington, residing at Seattle
My Commission expires: 7-15-01
Pamela A. Richards Guinasso

4-6-02

STATE OF WASHINGTON)
)
COUNTY OF Island)

On this day personally appeared before me **KATHLEEN M. KRANIG**, to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that he signed the same as his free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 13 day of Dec., 1999.

Barbara Wollroth
NOTARY PUBLIC in and for the state of Washington, residing at Oak Harbor
My Commission expires: 5/1/02

A-6-00

EXHIBIT A

LEGAL DESCRIPTION

SITUATE IN THE COUNTY OF ISLAND, STATE OF WASHINGTON:

PARCEL A:

COMMENCING AT THE SOUTHWEST CORNER OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M.;
THENCE NORTH 0°4' EAST TO THE CENTER LINE OF THE COUNTY ROAD WHICH IS APPROXIMATELY 731 FEET;
THENCE EASTERLY ON THE CENTER LINE OF THE COUNTY ROAD A DISTANCE OF 101 FEET BEING THE TRUE POINT OF BEGINNING OF THIS TRACT DESCRIPTION;
THENCE CONTINUING EASTERLY ON THE CENTER LINE OF THE COUNTY ROAD 128.12 FEET;
THENCE NORTH 0°04' EAST TO THE MEANDER LINE ON CORNET BAY;
THENCE NORTHWESTERLY ON SAID MEANDER LINE TO A POINT LOCATED NORTH 0°4' EAST FROM THE POINT OF BEGINNING;
THENCE SOUTH 0°4' WEST TO THE POINT OF BEGINNING,

EXCEPT THE SOUTH 40 FEET THEREOF FOR COUNTY ROAD.

TOGETHER WITH TIDELANDS OF THE SECOND CLASS AS CONVEYED BY THE STATE OF WASHINGTON, SITUATE IN FRONT OF, ADJACENT TO AND ABUTTING THEREON;

EXCEPT THAT PORTION OF SAID TIDELANDS, LYING WEST OF THE FOLLOWING DESCRIBED LINE:
COMMENCING AT THE SOUTHWEST CORNER OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M.;
THENCE NORTH 0°4' EAST 731 FEET MORE OR LESS TO THE CENTER LINE OF THE COUNTY ROAD;
THENCE EASTERLY ON THE CENTER LINE OF THE COUNTY ROAD A DISTANCE OF 101 FEET TO THE TRUE POINT OF BEGINNING;
THENCE NORTH 0°4' EAST 197.60 FEET TO THE ADJUSTED MEANDER LINE OF CORNET BAY;
THENCE NORTH 19° EAST TO THE LINE OF EXTREME LOW TIDE AND THE NORTHERLY TERMINUS OF SAID LINE.

PARCEL B:

THAT PORTION OF GOVERNMENT LOT 1, IN SECTION THIRTY-SIX (36), TOWNSHIP THIRTY-FOUR (34) NORTH, RANGE ONE (1), E.W.M., DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHWEST CORNER OF SAID GOVERNMENT LOT 1;
THENCE NORTH 0°4' EAST 731 FEET, MORE OR LESS, TO THE CENTER LINE OF THE COUNTY ROAD; THENCE EAST ON THE CENTER LINE OF THE COUNTY ROAD 229.12 FEET TO THE POINT OF BEGINNING;
THENCE CONTINUE EASTERLY ON THE CENTER LINE OF THE COUNTY ROAD 100 FEET;
THENCE NORTH 0°4' EAST TO THE MEANDER LINE ON CORNET BAY;
THENCE NORTHWESTERLY ON THE MEANDER LINE TO A POINT NORTH 0°4' EAST FROM THE TRUE

4-6-05

POINT OF BEGINNING;
THENCE SOUTH 0°4' WEST TO POINT OF BEGINNING,

EXCEPT THE SOUTH 40 FEET THEREOF FOR COUNTY ROAD.

TOGETHER WITH TIDELANDS OF THE SECOND CLASS AS CONVEYED BY THE STATE OF WASHINGTON, SITUATE IN FRONT OF, ADJACENT TO AND ABUTTING THEREON;

EXCEPT ALL SECOND CLASS TIDELANDS LYING EAST OF THE FOLLOWING DESCRIBED LINE:
COMMENCING AT THE SOUTHWEST CORNER OF GOVERNMENT LOT 1;
THENCE NORTH 0°4' EAST 731 FEET, MORE OR LESS, TO THE CENTERLINE OF THE COUNTY ROAD;
THENCE EAST ON THE CENTERLINE OF THE COUNTY ROAD 229.12 FEET;
THENCE CONTINUE EASTERLY ON THE CENTERLINE OF THE COUNTY ROAD 100 FEET;
THENCE NORTH 0°4' EAST TO THE MEANDER LINE ON CORNET BAY, SAID POINT BEING THE SOUTHERLY TERMINUS OF SAID LINE;
THENCE NORTH 19°00'00" EAST TO THE LINE OF EXTREME LOW TIDE, SAID POINT BEING THE NORTHERLY TERMINUS OF SAID LINE.

4-6-03

PARCEL C:

THAT PORTION OF GOVERNMENT LOT 1, IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1, E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF GOVERNMENT LOT 1, IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., MEASURING SOUTH 40 RODS;
THENCE WEST 780 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;
THENCE SOUTH 150 FEET;
THENCE WEST 140 FEET;
THENCE NORTH 150 FEET;
THENCE EAST 140 FEET TO THE TRUE POINT OF BEGINNING;

EXCEPT THAT PORTION, IF ANY, LYING WITHIN CORNET BAY ROAD.

PARCEL D:

THAT PORTION OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF THAT CERTAIN TRACT OF LAND CONVEYED TO ROLAND P. LONG, ET UX, BY V.W. THUESEN, BY REAL ESTATE CONTRACT RECORDED MARCH 2, 1960, UNDER AUDITOR'S FILE NO. 127676;
THENCE NORTH 0°04' EAST ALONG THE EAST LINE OF SAID LONG TRACT APPROXIMATELY 131 FEET, TO THE ADJUSTED MEANDER LINE;
THENCE EASTERLY ALONG SAID MEANDER LINE AS FOLLOWS:
SOUTH 78°34'20 EAST 247.25 FEET;
THENCE NORTH 65°43'30" EAST 428.24 FEET;
THENCE NORTH 33°17'40" EAST 135.38 TO THE SOUTHWEST LINE OF THAT CERTAIN TRACT OF LAND CONVEYED TO CORNET BAY MARINE COMPANY BY V.W. THUESEN BY REAL ESTATE

CONTRACT RECORDED JANUARY 4, 1961, UNDER AUDITOR'S FILE NO. 133796;
THENCE SOUTH 52°06'30" EAST 86.98 FEET TO THE CENTERLINE OF THE COUNTY ROAD;
THENCE SOUTHWESTERLY ALONG SAID CENTERLINE TO THE POINT OF BEGINNING;

TOGETHER WITH TIDELANDS OF THE SECOND CLASS AS CONVEYED BY THE STATE OF WASHINGTON SITUATE IN FRONT OF, ADJACENT TO AND ABUTTING UPON THE ABOVE DESCRIBED TRACT;

EXCEPT THAT PORTION OF THE ABOVE DESCRIBED TRACT LYING WITHIN THE COUNTY ROAD.

PARCEL E:

THAT PORTION OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE MEANDER CORNER ON THE NORTH LINE OF SAID GOVERNMENT LOT WHICH IS APPROXIMATELY 98.94 FEET WEST OF THE NORTH QUARTER CORNER OF SAID SECTION 36;
THENCE SOUTHWESTERLY ON THE MEANDER LINE A DISTANCE OF 200 FEET TO THE TRUE POINT OF BEGINNING;
THENCE SOUTHEASTERLY AT RIGHT ANGLES TO THE MEANDER LINE APPROXIMATELY 77 FEET TO THE WESTERLY BOUNDARY OF THE COUNTY ROAD;
THENCE SOUTH 41°28'00" WEST 136.22 FEET ALONG SAID WESTERLY BOUNDARY;
THENCE NORTH 52°06'30 WEST TO THE MEANDER LINE;
THENCE NORTHEASTERLY ALONG SAID MEANDER LINE TO THE TRUE POINT OF BEGINNING;

TOGETHER WITH TIDELANDS OF THE SECOND CLASS AS CONVEYED BY THE STATE OF WASHINGTON, SITUATE IN FRONT OF, ADJACENT TO AND ABUTTING THEREON.

PARCEL F:

THAT PORTION OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE MEANDER CORNER ON THE NORTH LINE OF SAID GOVERNMENT LOT WHICH IS APPROXIMATELY 98.94 FEET WEST OF THE NORTH QUARTER CORNER OF SAID SECTION 36;
THENCE SOUTHWESTERLY ON SAID MEANDER LINE A DISTANCE OF 200.00 FEET;
THENCE SOUTHEASTERLY AT RIGHT ANGLES TO SAID MEANDER LINE APPROXIMATELY 77 FEET TO THE WESTERLY BOUNDARY OF THE COUNTY ROAD;
THENCE NORTHEASTERLY ON THE WESTERLY BOUNDARY OF SAID COUNTY ROAD APPROXIMATELY 244 FEET TO A POINT DUE EAST OF THE POINT OF BEGINNING;
THENCE WEST APPROXIMATELY 85 FEET TO THE POINT OF BEGINNING.

TOGETHER WITH SECOND CLASS TIDELANDS SITUATE IN FRONT OF ADJACENT TO AND ABUTTING THEREON.

PARCEL G:

AN EASEMENT IN THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 36,

A-6-03

TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTH QUARTER CORNER OF SAID SECTION 36, WHICH IS 98.94 FEET DUE EAST OF THE MEANDER CORNER ON THE NORTH LINE OF SAID SECTION, THENCE SOUTH 44°11'00" EAST 174.29 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;
THENCE SOUTH 27°33'00" WEST 15.00 FEET;
THENCE NORTH 62°26'30" WEST TO THE SOUTHEASTERLY LINE OF THE COUNTY ROAD KNOWN AS CORNET BAY ROAD;
THENCE NORTHEASTERLY ALONG SAID LINE TO A POINT WHICH IS NORTH 62°26'30" WEST OF THE TRUE POINT OF BEGINNING;
THENCE SOUTH 62°26'30" EAST TO THE TRUE POINT OF BEGINNING.

SAID EASEMENT IS SITUATE OVER, UNDER AND ACROSS THE FOLLOWING DESCRIBED PROPERTY:

THAT PORTION OF SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:
BEGINNING AT THE NORTHERNMOST CORNER OF LOT 6, CORNET BAY HEIGHTS, DIVISION NO. 1, ACCORDING TO THE RECORDED PLAT THEREOF IN THE OFFICE OF THE AUDITOR OF ISLAND COUNTY, WASHINGTON IN VOLUME 6 OF PLATS, PAGE 87;
THENCE NORTH 25°21'15" EAST 194.00 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;
THENCE NORTH 64°38'45" WEST 239.03 FEET TO A POINT ON THE SOUTHEAST LINE OF CORNET BAY ROAD;
THENCE SOUTHWESTERLY ALONG SAID SOUTHEAST LINE ALONG A CURVE TO THE RIGHT WITH A RADIUS OF 555.81 FEET THROUGH AN ARC OF 8°46'15" A DISTANCE OF 85.08 FEET;
THENCE SOUTH 64°38'45" EAST 238.91 FEET TO A POINT WHICH IS NORTH 25°21'15" EAST 109 FEET FROM THE NORTHERNMOST CORNER OF SAID LOT 6;
THENCE NORTH 25°21'15" EAST 85.00 FEET TO THE TRUE POINT OF BEGINNING.
(BEING KNOWN AS TRACT 1 AND THE NORTHERLY 41.00 FEET OF TRACT E OF MAP OF THUESENS PARK, ACCORDING TO THE UNRECORDED PLAT THEREOF, AS RECORDED JANUARY 25, 1963, UNDER AUDITOR'S FILE NO. 150179, RECORDS OF ISLAND COUNTY, WASHINGTON.)

PARCEL H:

THE NORTH HALF OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER, AND THE WEST 330 FEET OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER, IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1, E.W.M.

EXCEPT THE NORTH 660 FEET OF SAID WEST 330 FEET OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER.

TOGETHER WITH AND SUBJECT TO AN EASEMENT FOR INGRESS, EGRESS AND FOR THE PLACEMENT, REPAIR AND MAINTENANCE OF UTILITIES, INCLUDING WATER, TELEPHONE, ELECTRICITY, DRAINAGE, UNDERGROUND OR OTHERWISE, AS DESCRIBED IN INSTRUMENT RECORDED UNDER AUDITOR'S FILE NO. 262954, RECORDS OF ISLAND COUNTY, WASHINGTON.

ABBREVIATED LEGAL: SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., GOVERNMENT LOT 1, SOUTHWEST QUARTER, NORTHWEST QUARTER

END OF EXHIBIT A

DEED—SECOND CLASS TIDE OR SHORE LANDS sold subsequent to June 7, 1911.

State of Washington

IN CONSIDERATION of Two hundred seventy-nine and 75/100 ($279.75) *Dollars,*

the receipt of which is hereby acknowledged, the STATE OF WASHINGTON does hereby grant, bargain, sell and convey unto

Nellie B. Blout, her

heirs and assigns, the following described tide and shore lands of the second class, as defined by Section 1 of Chapter 36 of the Session Laws of 1911, situate in Island *County, Washington, to-wit:*

All tide lands of the second class, situate in front of, adjacent to or abutting upon the following described uplands:

In front of the east 600 feet of lot 1, section 36, township 34 north, range 1 east, W.M., with a frontage of 10.91 lineal chains, more or less; also

In front of that part of lot 1, section 36, township 34 north, range 1 east, W.M., measured along the meander line as follows:

Beginning at a point on said meander line which is S 78° E2.00 chains distant from the point of intersection of same with a line parallel to and 100 feet east of the west line of said lot; thence running S 78°E along said meander line 5.65 chains, more or less, to an angle point therein; thence N 66½° E 2.09 chains, more or less, to the point of intersection with the west boundary line of the east 600 feet of said lot, with a frontage of 7.74 lineal chains, more or less.

The two descriptions together have a total frontage of 18.65 lineal chains, more or less, measured along the government meander line.

The above described lands are sold subject to all the provisions of Chapter 109 of the Session Laws of 1911, to which reference is hereby made, and which shall be as binding upon the grantee and any successor in interest of said grantee as though set out at length herein.

"The grantor hereby expressly saves, excepts and reserves out of the grant hereby made, unto itself, its successors, and assigns forever, all oils, gases, coal, ores, minerals and fossils of every name, kind or description, and which may be in or upon said lands above described, or any part thereof, and the right to explore the same for such oil, gases, coal, ores, minerals and fossils; and it also hereby expressly saves and reserves out of the grant hereby made, unto itself, its successors and assigns forever, the right to enter by itself, its agents, attorneys and servants upon said lands or any part or parts thereof, at any and all times, for the purpose of opening, developing and working mines thereon, and taking out and removing therefrom all such oils, gases, coal, ores, minerals and fossils, and to that end it further expressly reserves out of the grant hereby made, unto itself, its successors and assigns forever, the right by its or their agents, servants and attorneys at any and all times to erect, construct, maintain and use all such buildings, machinery, roads and railroads, sink such shafts, remove such soil, and to remain on said lands or any part thereof for the business of mining and to occupy as much of said land as may be necessary or convenient for the successful prosecution of such mining business hereby expressly reserving to itself, its successors and assigns, as aforesaid, generally, all rights and powers in, to, and over said lands, whether herein expressed or not, reasonably necessary or convenient to render beneficial and efficient the complete enjoyment of the property and rights hereby expressly reserved": Provided, That no rights shall be exercised under this reservation by the state, its successors, or assigns, until provision has been made by the state, its successors or assigns to pay to the owner of the land upon which the rights herein reserved to the state, its successors or assigns or sought to be exercised, full payment for all damages sustained by said owner, by reason of entering upon said land.

TO HAVE AND TO HOLD the said premises, with their appurtenances, unto the said

Nellie B. Blout, her *heirs and assigns, forever.*

WITNESS, The Seal of the State, affixed this 29th

day of January, A.D., *1929*

[SEAL]

Roland H. Hartley

Governor.

Attest:

J. Grant Hinkle

Secretary of State.

Deed No. 15506
Cont. No. 5705
App. No. 8566

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
BERT L. COLE, Commissioner of Public Lands

TIDELAND BOUNDARY LINE AGREEMENT

Coronet Bay Marine Company, Inc. is the present record owner of tidelands of the second class situate in front of that portion of Government Lot 1, Section 36, Township 34 North, Range 1 East W.M. which were conveyed by the State of Washington to Nellie B. Blout through deed issued January 29, 1929, under Application No. 8566.

The State of Washington acting by and through its Department of Natural Resources is the owner of the tidelands of the second class in front of Government Lot 3, Section 25, Township 34 North, Range 1 East, W.M.

Said tideland parcels are adjoining, and there is a need to agree to a boundary line between said parcels.

Sideline boundaries of tidelands are not determined by a projection of the sideline boundaries of the upland property.

In the case of Spath vs Larsen, 20 Washington 2nd Series, P. 500, the Supreme Court laid down certain rules and principles for determining the direction of sideline boundaries of tidelands. In bays, coves and along other concave shores, the direction of the sideline boundaries would be determined by the application of the rule of proportionate measure.

It is hereby mutually agreed to between the State of Washington acting by and through its Department of Natural Resources, and Coronet Bay Marine Company, Inc., that the parties hereto are owners of adjoining parcels of tideland, and that a line has been established by application of the rule of proportionate measure extending N47° 15'W from the meander corner common to Sections 25 and 36, Township 34 North, Range 1 East, W.M. to the line of extreme low tide.

Agreed and entered into this 27th day of May A.D. 1977, at [illegible], Washington.

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES

By Bert L. Cole by [signature]
BERT L. COLE
Commissioner of Public Lands

Approved as to Form Only
24th day of May 1977
[illegible]
By J. Lawrence Coniff Jr.

CORONET BAY MARINE COMPANY, INC.

By [signature] President
HERBERT C. PICKARD Title
President

By Lew L. Naddy
LEW L. NADDY Title
Secretary

App. No. 8566
Park Site No. 13

11/27

Appendix B

Environmental Data Resources, Inc. (EDR™) Reports

Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

Inquiry Number: 3175182.8
October 5, 2011

The EDR Environmental LienSearch™ Report

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Environmental LienSearch™ Report

The EDR Environmental Lien Search Report provides results from a search of available current land title records for environmental cleanup liens and other activity and use limitations, such as engineering controls and institutional controls.

A network of professional, trained researchers, following established procedures, uses client supplied address information to:

- search for parcel information and/or legal description;
- search for ownership information;
- research official land title documents recorded at jurisdictional agencies such as recorders' offices, registries of deeds, county clerks' offices, etc.;
- access a copy of the deed;
- search for environmental encumbering instrument(s) associated with the deed;
- provide a copy of any environmental encumbrance(s) based upon a review of key words in the instrument(s) (title, parties involved, and description); and
- provide a copy of the deed or cite documents reviewed.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EDR Environmental LienSearch™ Report

TARGET PROPERTY INFORMATION

ADDRESS

CORNET BAY MARINA
200 CORNET BAY ROAD
Oak Harbor, WA 98277

RESEARCH SOURCE

Source 1:	Island County Recorder Office
Source 2:	N/A
Examiner's Note:	Public records of Island County, WA were searched from January 1, 1980 to September 21, 2011

PROPERTY DESCRIPTION

Current Owner:	Deception Pass Marina, Inc.
Legal Description:	see attached deed
Property Identifiers:	APN: R13436-506-2420
General Comments:	N/A

PROPERTY INFORMATION

Deed 1:

Type of Deed:	Deed
Title is vested in:	Deception Pass Marina, Inc.
Title received from:	Milton A .and P. Tuulikki Woods; Charles H. Morse ; Robert R. and Carol A. Masters; Walter Paul and Olga Kistler; Ronald K. and Shirley L. Bustad; Michael R. and Leida K. Sanders; Mary Ann Nelson; Dundee A. And Darlene L. Woods; William J. and Kathleen Kranig
Date Executed:	March 27, 2000
Date Recorded:	April 6, 2000
Book:	811
Page:	2437
Volume:	
Instrument #:	
Docket:	

Land Record Comments: N/A

EDR Environmental LienSearch™ Report

ENVIRONMENTAL LIEN

Environmental Lien:	Found	Not Found	X

If found:

1st Party:

2nd Party:

Dated:
Recorded:
Book:
Page:
Docket:
Volume:
Instrument:
Comments:
Miscellaneous:

OTHER ACTIVITY AND USE LIMITATIONS (AULs)

Other AUL's:	Found	Not Found	X

If found:

1st Party:

2nd Party:

Dated:
Recorded:
Book:
Page:
Docket:
Volume:
Instrument:
Comments:

EDR Environmental LienSearch™ Report

DEED EXHIBIT

#20 006078 TYPE: QCD $19.00
BK 811 PG 2437 4/6/2000 2:44:43 PM
ISLAND COUNTY AUDITOR
DEPUTY: CS REQUESTED BY:
FIRST AMERICAN TITLE INSURANCE CO

AFTER RECORDING RETURN TO:

JACOB COHEN
Post Office Box 889
Oak Harbor, WA 98277

EXCISE TAX EXEMPT
APR - 6 2000
MAXINE R. SUTTON
ISLAND COUNTY TREASURER

A-6-00

140926 **QUIT CLAIM DEED** A-

Grantors: WOODS, Milton A. and P. Tuulikki
MORSE, Charles H.
MASTERS, Robert R and Carol A.
KISTLER, Walter Paul and Olga
BUSTAD, Ronald K. and Shirley L.
SANDERS, Michael R. and Leida K.
NELSON, Mary Ann
WOODS, Dundee A. and Darlene L.
KRANIG, William J. and Kathleen
Grantee: DECEPTION PASS MARINA, INC.
Legal Descriptions: All portions of Government Lot 1, Section 36, Township 34, Range 1, E.W.M.
(Full legal descriptions attached as Exhibit A)
Assessor's Tax Parcel ID#s:
R13436-478-1490; R13436-476-1610; R13436-460-1780;
R13436-488-2260; R13436-506-2420; R13436-517-2500;
R13436-519-2700; R13436-314-0330

The Grantors, **MILTON A. WOODS** and **P. TUULIKKI WOODS**, husband and wife, **CHARLES H. MORSE**, as his separate property, **ROBERT R. MASTERS** and **CAROL A. MASTERS**, husband and wife, **CAROL A. MASTERS** as her separate property, **WALTER PAUL KISTLER** and **OLGA KISTLER**, husband and wife, **RONALD K. BUSTAD** and **SHIRLEY L. BUSTAD**, husband and wife, **MICHAEL R. SANDERS** and **LEIDA K. SANDERS**, husband and wife, **LEIDA K. SANDERS**, as her separate property, **MARY ANN NELSON**, a single woman, formerly the wife of Earl V. Nelson, deceased, and the successor to all of the interests of Earl V. Nelson, **DUNDEE A. WOODS** and **DARLENE L. WOODS**, husband and wife, and **WILLIAM J. KRANIG** and **KATHLEEN KRANIG**, husband and wife, either in their capacity as (a) all of the shareholders in that certain dissolved Washington corporation known as "Cornet Bay Marine Company, Inc.", also known of record as "Cornet Bay Marine Co., Inc.", and/or (b) that certain dissolved Washington general

partnership known as "Cornet Bay Marina Company", also appearing of record as "Cornet Bay Marina Co.", and/or (c) as all of the shareholders in that certain existing corporation known as "Deception Pass Marina, Inc.", a Washington corporation, for and in consideration of clearing title from dissolved Washington corporation and dissolved Washington general partnership into a new Washington corporation, and no monetary consideration, conveys and quit claims to **DECEPTION PASS MARINA, INC.**, a Washington corporation, the following described real estate, situated in the County of Island, State of Washington, including any interest therein which grantors may hereafter acquire:

See Exhibit A attached hereto for legal descriptions and assessor's tax parcel numbers.

4-6-05

DATED this 27th day of March, 2000 ~~1999~~

MILTON A. WOODS	P. TUULIKKI WOODS
CHARLES H. MORSE	ROBERT R. MASTERS
CAROL A. MASTERS	WALTER PAUL KISTLER
OLGA KISTLER	RONALD K. BUSTAD
SHIRLEY L. BUSTAD	MICHAEL R. SANDERS
LEIDA K. SANDERS	MARY ANN NELSON
DUNDEE A. WOODS	DARLENE L. WOODS
WILLIAM J. KRANIG	KATHLEEN KRANIG

STATE OF WASHINGTON)
) ss
COUNTY OF Island)

On this day personally appeared before me **MILTON A. WOODS** and **P. TUULIKKI WOODS**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 24th day of November, 1999.

KATHLEEN MARIE KRANIG NOTARY PUBLIC STATE OF WASHINGTON Commission Expires April 7, 2002

[signature]
NOTARY PUBLIC in and for the state of Washington, residing at Oak Harbor
My commission expires: April 7, 2002

STATE OF WASHINGTON)
) ss
COUNTY OF King)

On this day personally appeared before me **CHARLES H. MORSE**, to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that he signed the same as his free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 22nd day of February, ~~1999~~ 2000

NANCY E. BODDY NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES APRIL 2, 2002

Nancy E. Boddy
NOTARY PUBLIC in and for the state of Washington, residing at Seattle
My commission expires: 2/10/02

4-6-00

STATE OF WASHINGTON)
) ss
COUNTY OF King)

On this day personally appeared before me **ROBERT R. MASTERS** and **CAROL A. MASTERS**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 12 day of JAN, ~~1999~~ 2000.

NOTARY PUBLIC in and for the State of Washington, residing at King Co.
My commission expires: 7-2-2002

STATE OF WASHINGTON)
) ss
COUNTY OF King)

On this day personally appeared before me **WALTER PAUL KISTLER** and **OLGA KISTLER**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 1st day of December, 1999.

NOTARY PUBLIC in and for the state of Washington, residing at Redmond
My commission expires: 7-30-2001

LORALIE FULLER NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES JULY 30, 2001

STATE OF WASHINGTON)
) ss
COUNTY OF Pierce)

On this day personally appeared before me **RONALD K. BUSTAD** and **SHIRLEY L. BUSTAD**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 27th day of March, ~~1999~~ 2000

Sherri D. Cordeiro
NOTARY PUBLIC in and for the state of Washington, residing at Lakebay
My commission expires: 5-9-02

STATE OF WASHINGTON)
) ss
COUNTY OF King)

On this day personally appeared before me **MICHAEL R. SANDERS** and **LEIDA K. SANDERS**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 6 day of Dec, 1999.

NOTARY PUBLIC in and for the state of Washington, residing at King County
My commission expires: 7-2-02

A-6-03

STATE OF WASHINGTON)
) ss
COUNTY OF Island)

On this day personally appeared before me **MARY ANN NELSON**, to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that she signed the same as her free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 23rd day of November, 1999.

KAREN A. HUFF
NOTARY PUBLIC
STATE OF WASHINGTON
COMMISSION EXPIRES
8-19-03

Karen A. Huff
NOTARY PUBLIC in and for the state of Washington, residing at Coupeville
My commission expires: 8-19-2003

4-6-00

STATE OF WASHINGTON)
) ss
COUNTY OF Island)

On this day personally appeared before me **DUNDEE A. WOODS** and **DARLENE L. WOODS**, to me known to be the individuals described in and who executed the within and foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 24th day of November, 1999.

KATHLEEN MARIE KRAMIG
NOTARY PUBLIC
STATE OF WASHINGTON
Commission Expires
2002

Kathleen Kramig
NOTARY PUBLIC in and for the state of Washington, residing at Oak Harbor
My commission expires: April 7, 2002

STATE OF WASHINGTON)
)
COUNTY OF King)

On this day personally appeared before me **WILLIAM J. KRANIG,** to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that he signed the same as his free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 14th day of December, 1999.

GUINASSO, PAMELA A. RICHARDS NOTARY PUBLIC STATE OF WASHINGTON COMMISSION EXPIRES 07-15-01

Pamela A. Richards Guinasso

NOTARY PUBLIC in and for the state of Washington, residing at Seattle
My Commission expires: 7-15-01
Pamela A. Richards Guinasso

4-6-02

STATE OF WASHINGTON)
)
COUNTY OF Island)

On this day personally appeared before me **KATHLEEN M. KRANIG**, to me known to be the individual described in and who executed the within and foregoing instrument, and acknowledged that he signed the same as his free and voluntary act and deed for the uses and purposes therein mentioned.

GIVEN under my hand and official seal this 13 day of Dec., 1999.

Barbara Wollroth
NOTARY PUBLIC in and for the state of Washington, residing at Oak Harbor
My Commission expires: 5/1/02

A-6-00

EXHIBIT A

LEGAL DESCRIPTION

SITUATE IN THE COUNTY OF ISLAND, STATE OF WASHINGTON:

PARCEL A:

COMMENCING AT THE SOUTHWEST CORNER OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M.;
THENCE NORTH 0°4' EAST TO THE CENTER LINE OF THE COUNTY ROAD WHICH IS APPROXIMATELY 731 FEET;
THENCE EASTERLY ON THE CENTER LINE OF THE COUNTY ROAD A DISTANCE OF 101 FEET BEING THE TRUE POINT OF BEGINNING OF THIS TRACT DESCRIPTION;
THENCE CONTINUING EASTERLY ON THE CENTER LINE OF THE COUNTY ROAD 128.12 FEET;
THENCE NORTH 0°04' EAST TO THE MEANDER LINE ON CORNET BAY;
THENCE NORTHWESTERLY ON SAID MEANDER LINE TO A POINT LOCATED NORTH 0°4' EAST FROM THE POINT OF BEGINNING;
THENCE SOUTH 0°4' WEST TO THE POINT OF BEGINNING,

EXCEPT THE SOUTH 40 FEET THEREOF FOR COUNTY ROAD.

TOGETHER WITH TIDELANDS OF THE SECOND CLASS AS CONVEYED BY THE STATE OF WASHINGTON, SITUATE IN FRONT OF, ADJACENT TO AND ABUTTING THEREON;

EXCEPT THAT PORTION OF SAID TIDELANDS, LYING WEST OF THE FOLLOWING DESCRIBED LINE:
COMMENCING AT THE SOUTHWEST CORNER OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M.;
THENCE NORTH 0°4' EAST 731 FEET MORE OR LESS TO THE CENTER LINE OF THE COUNTY ROAD;
THENCE EASTERLY ON THE CENTER LINE OF THE COUNTY ROAD A DISTANCE OF 101 FEET TO THE TRUE POINT OF BEGINNING;
THENCE NORTH 0°4' EAST 197.60 FEET TO THE ADJUSTED MEANDER LINE OF CORNET BAY;
THENCE NORTH 19° EAST TO THE LINE OF EXTREME LOW TIDE AND THE NORTHERLY TERMINUS OF SAID LINE.

PARCEL B:

THAT PORTION OF GOVERNMENT LOT 1, IN SECTION THIRTY-SIX (36), TOWNSHIP THIRTY-FOUR (34) NORTH, RANGE ONE (1), E.W.M., DESCRIBED AS FOLLOWS:
COMMENCING AT THE SOUTHWEST CORNER OF SAID GOVERNMENT LOT 1;
THENCE NORTH 0°4' EAST 731 FEET, MORE OR LESS, TO THE CENTER LINE OF THE COUNTY ROAD; THENCE EAST ON THE CENTER LINE OF THE COUNTY ROAD 229.12 FEET TO THE POINT OF BEGINNING;
THENCE CONTINUE EASTERLY ON THE CENTER LINE OF THE COUNTY ROAD 100 FEET;
THENCE NORTH 0°4' EAST TO THE MEANDER LINE ON CORNET BAY;
THENCE NORTHWESTERLY ON THE MEANDER LINE TO A POINT NORTH 0°4' EAST FROM THE TRUE

4-6-05

POINT OF BEGINNING;
THENCE SOUTH 0°4' WEST TO POINT OF BEGINNING,

EXCEPT THE SOUTH 40 FEET THEREOF FOR COUNTY ROAD.

TOGETHER WITH TIDELANDS OF THE SECOND CLASS AS CONVEYED BY THE STATE OF WASHINGTON, SITUATE IN FRONT OF, ADJACENT TO AND ABUTTING THEREON;

EXCEPT ALL SECOND CLASS TIDELANDS LYING EAST OF THE FOLLOWING DESCRIBED LINE:
COMMENCING AT THE SOUTHWEST CORNER OF GOVERNMENT LOT 1;
THENCE NORTH 0°4' EAST 731 FEET, MORE OR LESS, TO THE CENTERLINE OF THE COUNTY ROAD;
THENCE EAST ON THE CENTERLINE OF THE COUNTY ROAD 229.12 FEET;
THENCE CONTINUE EASTERLY ON THE CENTERLINE OF THE COUNTY ROAD 100 FEET;
THENCE NORTH 0°4' EAST TO THE MEANDER LINE ON CORNET BAY, SAID POINT BEING THE SOUTHERLY TERMINUS OF SAID LINE;
THENCE NORTH 19°00'00" EAST TO THE LINE OF EXTREME LOW TIDE, SAID POINT BEING THE NORTHERLY TERMINUS OF SAID LINE.

4-6-03

PARCEL C:

THAT PORTION OF GOVERNMENT LOT 1, IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1, E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTHEAST CORNER OF GOVERNMENT LOT 1, IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., MEASURING SOUTH 40 RODS;
THENCE WEST 780 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;
THENCE SOUTH 150 FEET;
THENCE WEST 140 FEET;
THENCE NORTH 150 FEET;
THENCE EAST 140 FEET TO THE TRUE POINT OF BEGINNING;

EXCEPT THAT PORTION, IF ANY, LYING WITHIN CORNET BAY ROAD.

PARCEL D:

THAT PORTION OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF THAT CERTAIN TRACT OF LAND CONVEYED TO ROLAND P. LONG, ET UX, BY V.W. THUESEN, BY REAL ESTATE CONTRACT RECORDED MARCH 2, 1960, UNDER AUDITOR'S FILE NO. 127676;
THENCE NORTH 0°04' EAST ALONG THE EAST LINE OF SAID LONG TRACT APPROXIMATELY 131 FEET, TO THE ADJUSTED MEANDER LINE;
THENCE EASTERLY ALONG SAID MEANDER LINE AS FOLLOWS:
SOUTH 78°34'20 EAST 247.25 FEET;
THENCE NORTH 65°43'30" EAST 428.24 FEET;
THENCE NORTH 33°17'40" EAST 135.38 TO THE SOUTHWEST LINE OF THAT CERTAIN TRACT OF LAND CONVEYED TO CORNET BAY MARINE COMPANY BY V.W. THUESEN BY REAL ESTATE

CONTRACT RECORDED JANUARY 4, 1961, UNDER AUDITOR'S FILE NO. 133796;
THENCE SOUTH 52°06'30" EAST 86.98 FEET TO THE CENTERLINE OF THE COUNTY ROAD;
THENCE SOUTHWESTERLY ALONG SAID CENTERLINE TO THE POINT OF BEGINNING;

TOGETHER WITH TIDELANDS OF THE SECOND CLASS AS CONVEYED BY THE STATE OF WASHINGTON SITUATE IN FRONT OF, ADJACENT TO AND ABUTTING UPON THE ABOVE DESCRIBED TRACT;

EXCEPT THAT PORTION OF THE ABOVE DESCRIBED TRACT LYING WITHIN THE COUNTY ROAD.

PARCEL E:

THAT PORTION OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE MEANDER CORNER ON THE NORTH LINE OF SAID GOVERNMENT LOT WHICH IS APPROXIMATELY 98.94 FEET WEST OF THE NORTH QUARTER CORNER OF SAID SECTION 36;
THENCE SOUTHWESTERLY ON THE MEANDER LINE A DISTANCE OF 200 FEET TO THE TRUE POINT OF BEGINNING;
THENCE SOUTHEASTERLY AT RIGHT ANGLES TO THE MEANDER LINE APPROXIMATELY 77 FEET TO THE WESTERLY BOUNDARY OF THE COUNTY ROAD;
THENCE SOUTH 41°28'00" WEST 136.22 FEET ALONG SAID WESTERLY BOUNDARY;
THENCE NORTH 52°06'30 WEST TO THE MEANDER LINE;
THENCE NORTHEASTERLY ALONG SAID MEANDER LINE TO THE TRUE POINT OF BEGINNING;

TOGETHER WITH TIDELANDS OF THE SECOND CLASS AS CONVEYED BY THE STATE OF WASHINGTON, SITUATE IN FRONT OF, ADJACENT TO AND ABUTTING THEREON.

PARCEL F:

THAT PORTION OF GOVERNMENT LOT 1 IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE MEANDER CORNER ON THE NORTH LINE OF SAID GOVERNMENT LOT WHICH IS APPROXIMATELY 98.94 FEET WEST OF THE NORTH QUARTER CORNER OF SAID SECTION 36;
THENCE SOUTHWESTERLY ON SAID MEANDER LINE A DISTANCE OF 200.00 FEET;
THENCE SOUTHEASTERLY AT RIGHT ANGLES TO SAID MEANDER LINE APPROXIMATELY 77 FEET TO THE WESTERLY BOUNDARY OF THE COUNTY ROAD;
THENCE NORTHEASTERLY ON THE WESTERLY BOUNDARY OF SAID COUNTY ROAD APPROXIMATELY 244 FEET TO A POINT DUE EAST OF THE POINT OF BEGINNING;
THENCE WEST APPROXIMATELY 85 FEET TO THE POINT OF BEGINNING.

TOGETHER WITH SECOND CLASS TIDELANDS SITUATE IN FRONT OF ADJACENT TO AND ABUTTING THEREON.

PARCEL G:

AN EASEMENT IN THE NORTHWEST QUARTER OF THE NORTHEAST QUARTER OF SECTION 36,

A-6-03

TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:

BEGINNING AT THE NORTH QUARTER CORNER OF SAID SECTION 36, WHICH IS 98.94 FEET DUE EAST OF THE MEANDER CORNER ON THE NORTH LINE OF SAID SECTION, THENCE SOUTH 44°11'00" EAST 174.29 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;
THENCE SOUTH 27°33'00" WEST 15.00 FEET;
THENCE NORTH 62°26'30" WEST TO THE SOUTHEASTERLY LINE OF THE COUNTY ROAD KNOWN AS CORNET BAY ROAD;
THENCE NORTHEASTERLY ALONG SAID LINE TO A POINT WHICH IS NORTH 62°26'30" WEST OF THE TRUE POINT OF BEGINNING;
THENCE SOUTH 62°26'30" EAST TO THE TRUE POINT OF BEGINNING.

SAID EASEMENT IS SITUATE OVER, UNDER AND ACROSS THE FOLLOWING DESCRIBED PROPERTY:

THAT PORTION OF SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., DESCRIBED AS FOLLOWS:
BEGINNING AT THE NORTHERNMOST CORNER OF LOT 6, CORNET BAY HEIGHTS, DIVISION NO. 1, ACCORDING TO THE RECORDED PLAT THEREOF IN THE OFFICE OF THE AUDITOR OF ISLAND COUNTY, WASHINGTON IN VOLUME 6 OF PLATS, PAGE 87;
THENCE NORTH 25°21'15" EAST 194.00 FEET TO THE TRUE POINT OF BEGINNING OF THIS DESCRIPTION;
THENCE NORTH 64°38'45" WEST 239.03 FEET TO A POINT ON THE SOUTHEAST LINE OF CORNET BAY ROAD;
THENCE SOUTHWESTERLY ALONG SAID SOUTHEAST LINE ALONG A CURVE TO THE RIGHT WITH A RADIUS OF 555.81 FEET THROUGH AN ARC OF 8°46'15" A DISTANCE OF 85.08 FEET;
THENCE SOUTH 64°38'45" EAST 238.91 FEET TO A POINT WHICH IS NORTH 25°21'15" EAST 109 FEET FROM THE NORTHERNMOST CORNER OF SAID LOT 6;
THENCE NORTH 25°21'15" EAST 85.00 FEET TO THE TRUE POINT OF BEGINNING.
(BEING KNOWN AS TRACT 1 AND THE NORTHERLY 41.00 FEET OF TRACT E OF MAP OF THUESENS PARK, ACCORDING TO THE UNRECORDED PLAT THEREOF, AS RECORDED JANUARY 25, 1963, UNDER AUDITOR'S FILE NO. 150179, RECORDS OF ISLAND COUNTY, WASHINGTON.)

PARCEL H:

THE NORTH HALF OF THE SOUTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER, AND THE WEST 330 FEET OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER, IN SECTION 36, TOWNSHIP 34 NORTH, RANGE 1, E.W.M.

EXCEPT THE NORTH 660 FEET OF SAID WEST 330 FEET OF THE NORTHWEST QUARTER OF THE SOUTHWEST QUARTER OF THE NORTHWEST QUARTER.

TOGETHER WITH AND SUBJECT TO AN EASEMENT FOR INGRESS, EGRESS AND FOR THE PLACEMENT, REPAIR AND MAINTENANCE OF UTILITIES, INCLUDING WATER, TELEPHONE, ELECTRICITY, DRAINAGE, UNDERGROUND OR OTHERWISE, AS DESCRIBED IN INSTRUMENT RECORDED UNDER AUDITOR'S FILE NO. 262954, RECORDS OF ISLAND COUNTY, WASHINGTON.

ABBREVIATED LEGAL: SECTION 36, TOWNSHIP 34 NORTH, RANGE 1 E.W.M., GOVERNMENT LOT 1, SOUTHWEST QUARTER, NORTHWEST QUARTER

END OF EXHIBIT A

Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

Inquiry Number: 3175182.2s
September 28, 2011

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

200 CORNET BAY ROAD
OAK HARBOR, WA 98277

COORDINATES

Latitude (North):	48.397400 - 48° 23' 50.6''
Longitude (West):	122.626700 - 122° 37' 36.1''
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	527632.8
UTM Y (Meters):	5360319.5
Elevation:	11 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	48122-D6 DECEPTION PASS, WA
Most Recent Revision:	1980
East Map:	48122-D5 ANACORTES SOUTH, WA
Most Recent Revision:	1980

AERIAL PHOTOGRAPHY IN THIS REPORT

Portions of Photo from:	2005, 2006
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 7 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
DECEPTION BAY MARINA 200 CORNET BAY RD OAK HARBOR, WA 98277	FINDS	N/A
DECEPTION PASS MARINA 200 WEST CO DECEPTION PASS MARINA 200 WEST CORNET BAY ROAD OAK HARBOR, WA	ERNS	N/A
200 CORONET BAY RD 200 CORONET BAY RD OAK HARBOR, WA	SPILLS	N/A
DECEPTION BAY MARINA 200 CORNET BAY RD OAK HARBOR, WA 98277	UST	N/A

EXECUTIVE SUMMARY

DECEPTION PASS MARINA 200 CORNET BAY RD OAK HARBOR, WA 98277	FINDS	N/A
UNKNOWN 200 W CORNET BAY RD OAK HARBOR, WA	SPILLS	N/A

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

CERCLIS ---------- Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY ---------- Federal Facility Site Information listing

Federal CERCLIS NFRAP site List

CERC-NFRAP ---------- CERCLIS No Further Remedial Action Planned

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal RCRA generators list

RCRA-LQG ---------- RCRA - Large Quantity Generators
RCRA-SQG ---------- RCRA - Small Quantity Generators
RCRA-CESQG ---------- RCRA - Conditionally Exempt Small Quantity Generator

Federal institutional controls / engineering controls registries

US ENG CONTROLS ..... Engineering Controls Sites List
US INST CONTROL ..... Sites with Institutional Controls

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ..... Solid Waste Facility Database

State and tribal leaking storage tank lists

INDIAN LUST ..... Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

AST ..... Aboveground Storage Tank Locations
INDIAN UST ..... Underground Storage Tanks on Indian Land
FEMA UST ..... Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

INST CONTROL ..... Institutional Control Site List

State and tribal voluntary cleanup sites

INDIAN VCP ..... Voluntary Cleanup Priority Listing
VCP ..... Voluntary Cleanup Program Sites
ICR ..... Independent Cleanup Reports

State and tribal Brownfields sites

BROWNFIELDS ..... Brownfields Sites Listing

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS ..... A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9 ..... Torres Martinez Reservation Illegal Dump Site Locations
ODI ..... Open Dump Inventory
SWTIRE ..... Solid Waste Tire Facilities
INDIAN ODI ..... Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL ..... Clandestine Drug Labs
CSCSL NFA ..... Confirmed & Contaminated Sites - No Further Action
CDL ..... Clandestine Drug Lab Contaminated Site List
HIST CDL ..... List of Sites Contaminated by Clandestine Drug Labs
US HIST CDL ..... National Clandestine Laboratory Register

EXECUTIVE SUMMARY

Local Land Records

LIENS 2 ---------- CERCLA Lien Information
LUCIS ---------- Land Use Control Information System

Records of Emergency Release Reports

HMIRS ---------- Hazardous Materials Information Reporting System

Other Ascertainable Records

RCRA-NonGen ---------- RCRA - Non Generators
DOT OPS ---------- Incident and Accident Data
DOD ---------- Department of Defense Sites
FUDS ---------- Formerly Used Defense Sites
CONSENT ---------- Superfund (CERCLA) Consent Decrees
ROD ---------- Records Of Decision
UMTRA ---------- Uranium Mill Tailings Sites
MINES ---------- Mines Master Index File
TRIS ---------- Toxic Chemical Release Inventory System
TSCA ---------- Toxic Substances Control Act
FTTS ---------- FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
HIST FTTS ---------- FIFRA/TSCA Tracking System Administrative Case Listing
SSTS ---------- Section 7 Tracking Systems
ICIS ---------- Integrated Compliance Information System
PADS ---------- PCB Activity Database System
MLTS ---------- Material Licensing Tracking System
RADINFO ---------- Radiation Information Database
RAATS ---------- RCRA Administrative Action Tracking System
UIC ---------- Underground Injection Wells Listing
MANIFEST ---------- Hazardous Waste Manifest Data
DRYCLEANERS ---------- Drycleaner List
NPDES ---------- Water Quality Permit System Data
AIRS ---------- Washington Emissions Data System
Inactive Drycleaners ---------- Inactive Drycleaners
INDIAN RESERV ---------- Indian Reservations
SCRD DRYCLEANERS ---------- State Coalition for Remediation of Drycleaners Listing
FINANCIAL ASSURANCE ---------- Financial Assurance Information Listing
COAL ASH ---------- Coal Ash Disposal Site Listing
COAL ASH DOE ---------- Sleam-Electric Plan Operation Data
COAL ASH EPA ---------- Coal Combustion Residues Surface Impoundments List
PCB TRANSFORMER ---------- PCB Transformer Registration Database

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants ---------- EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

EXECUTIVE SUMMARY

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

State- and tribal - equivalent NPL

HSL: The Hazardous Sites List is a subset of the CSCSL Report. It includes sites which have been assessed and ranked using the Washington Ranking Method (WARM).

A review of the HSL list, as provided by EDR, and dated 03/01/2011 has revealed that there is 1 HSL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DECEPTION BAY MARINA		***NE 1/2 - 1 (0.760 mi.)***	***9***	***13***
Facility Type: Hazardous Sites List				

State- and tribal - equivalent CERCLIS

CSCSL: The State Hazardous Waste Sites records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. The data come from the Department of Ecology's Confirmed & Suspected Contaminated Sites List.

A review of the CSCSL list, as provided by EDR, and dated 07/28/2011 has revealed that there is 1 CSCSL site within approximately 1 mile of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DECEPTION BAY MARINA		***NE 1/2 - 1 (0.760 mi.)***	***9***	***13***

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Department of Ecology's Leaking Underground Storage Tanks Site List.

A review of the LUST list, as provided by EDR, and dated 08/23/2011 has revealed that there is 1 LUST

site within approximately 0.5 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WA PARKS MARINE CREW YARD	*5256 N CORNET BAY RD*	*SW 0 - 1/8 (0.050 mi.)*	*7*	*10*

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Department of Ecology's Statewide UST Site/Tank Report.

A review of the UST list, as provided by EDR, and dated 08/24/2011 has revealed that there is 1 UST site within approximately 0.25 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WA PARKS MARINE CREW YARD	*5256 N CORNET BAY RD*	*SW 0 - 1/8 (0.050 mi.)*	*7*	*10*

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Hazardous waste / Contaminated Sites

ALLSITES: Information on facilities and sites of interest to the Department of Ecology.

A review of the ALLSITES list, as provided by EDR, and dated 08/09/2011 has revealed that there are 2 ALLSITES sites within approximately 0.5 miles of the target property.

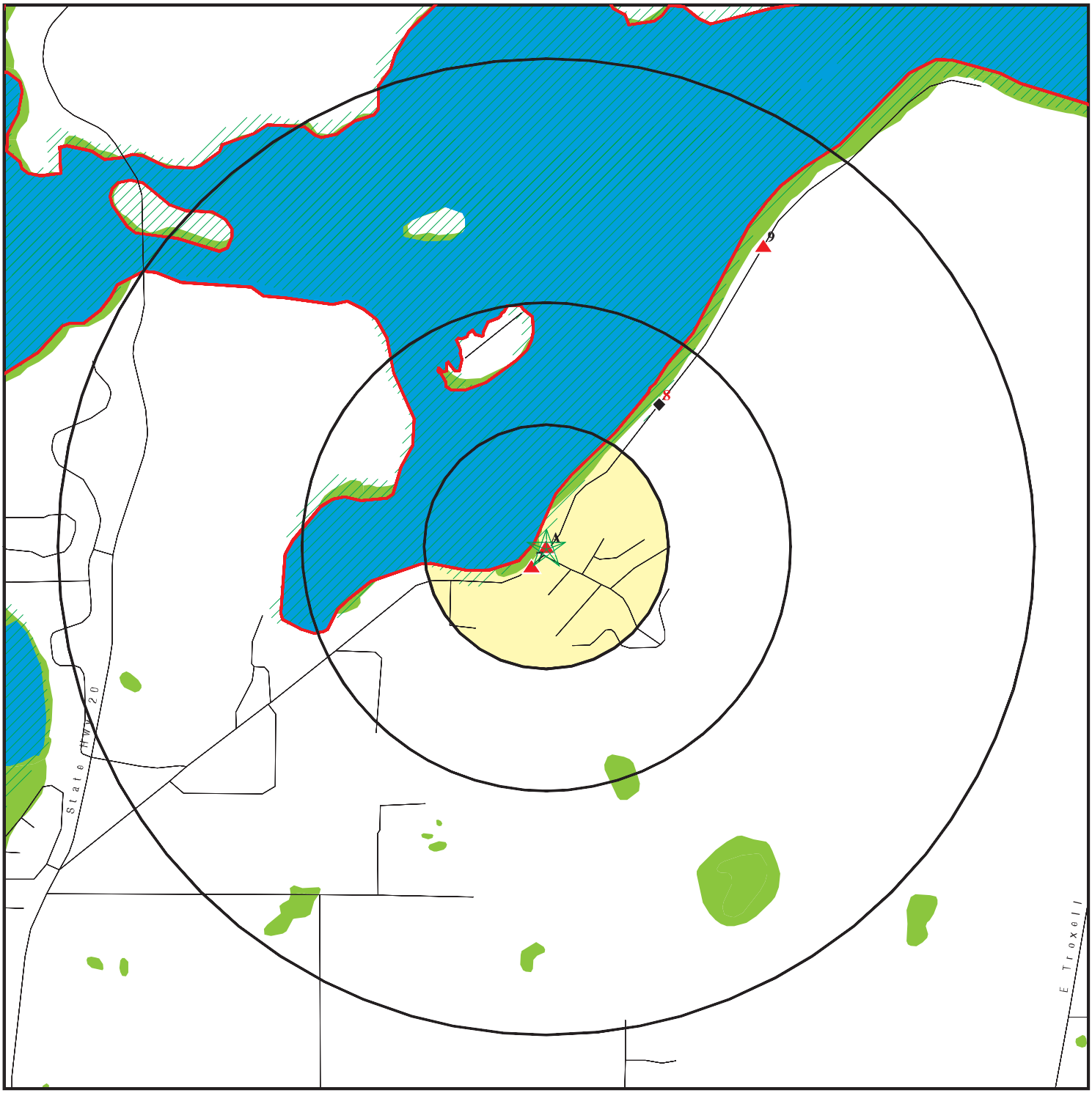
Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
WA PARKS MARINE CREW YARD	*5256 N CORNET BAY RD*	*SW 0 - 1/8 (0.050 mi.)*	*7*	*10*
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
EQ HARBOR SVC INC	265 CORNET BAY RD	NE 1/4 - 1/2 (0.372 mi.)	8	12

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 22 records.

Site Name	Database(s)
SHARPS CORNER	FINDS, CSCSL, ALLSITES, LUST, UST
NAVY FEDERAL CREDIT UNION	ALLSITES
WA DOT OAK HARBOR	ALLSITES, UST
WHIDBEY MARKET & DELI	FINDS, CSCSL, ALLSITES, LUST
ISLAND CO - COUPEVILLE LDFL	CERC-NFRAP
ISLAND CO - FREELAND LDFL	CERC-NFRAP
OAK HARBOR SEAPLANE LAGOON WWT (OU	SWF/LF
WALLGREN TIRE CENTER	UST
DECEPTION PASS SITE	RCRA-SQG, FINDS
B & L SELECTIVE LOGGING	RCRA-NonGen, FINDS
USELESS BAY	ERNS
BETWEEN COUNTY DOCK AND BAY 318 CO	ERNS
OAK HARBOR MARINA	ERNS
OAK HARBOR MARINA SLIP: UNKNOWN	ERNS
OAK HARBOR CITY MARINA 1401 SE CAT	ERNS
OAK HARBOR MARINA 1401 SE CATALINA	ERNS
OAK HARBOR MARINA 1401 CATALINA DR	ERNS
CORNET BAY PARTNERSHIP	FINDS
QUINN'S MARKET	ICR
CHEVRON #100 1319	ICR
SOUTHLAND #18255	ICR
SOUTHLAND #18255	ICR

OVERVIEW MAP - 3175182.2s



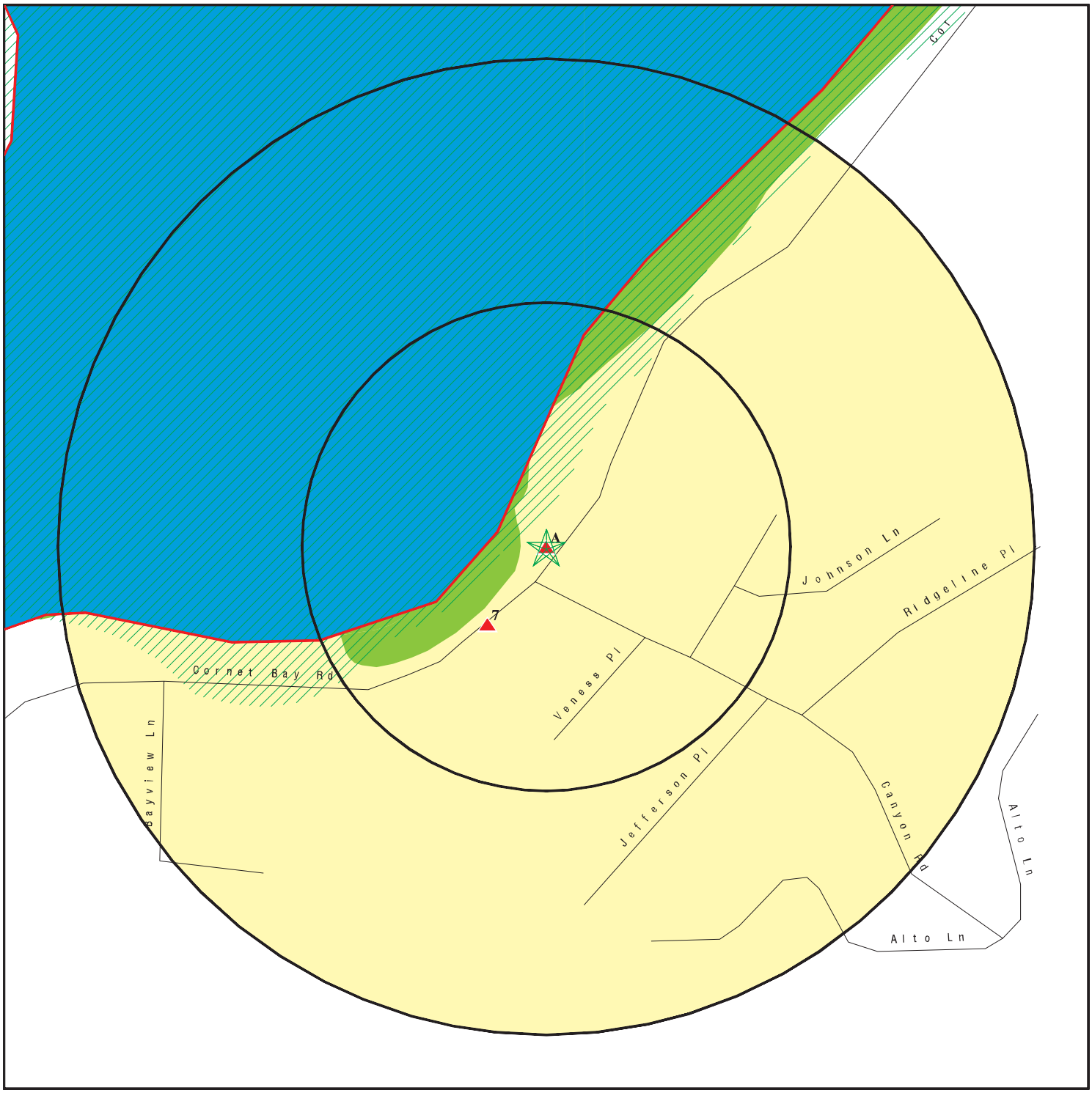
0 1/4 1/2 1 Miles

- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Cornet Bay Marina	CLIENT:	Kennedy/Jenks Consultants
ADDRESS:	200 Cornet Bay Road Oak Harbor WA 98277	CONTACT:	Gregg Bryden
LAT/LONG:	48.3974 / 122.6267	INQUIRY #:	3175182.2s
		DATE:	September 28, 2011 5:41 pm

DETAIL MAP - 3175182.2s



- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- Sensitive Receptors
- National Priority List Sites
- Dept. Defense Sites

0 1/16 1/8 1/4 Miles

- Indian Reservations BIA
- County Boundary
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	Cornet Bay Marina	CLIENT:	Kennedy/Jenks Consultants
ADDRESS:	200 Cornet Bay Road Oak Harbor WA 98277	CONTACT:	Gregg Bryden
LAT/LONG:	48.3974 / 122.6267	INQUIRY #:	3175182.2s
		DATE:	September 28, 2011 5:42 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
STANDARD ENVIRONMENTAL RECORDS								
Federal NPL site list								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
NPL LIENS		TP	NR	NR	NR	NR	NR	0
Federal Delisted NPL site list								
Delisted NPL		1.000	0	0	0	0	NR	0
Federal CERCLIS list								
CERCLIS		0.500	0	0	0	NR	NR	0
FEDERAL FACILITY		1.000	0	0	0	0	NR	0
Federal CERCLIS NFRAP site List								
CERC-NFRAP		0.500	0	0	0	NR	NR	0
Federal RCRA CORRACTS facilities list								
CORRACTS		1.000	0	0	0	0	NR	0
Federal RCRA non-CORRACTS TSD facilities list								
RCRA-TSDF		0.500	0	0	0	NR	NR	0
Federal RCRA generators list								
RCRA-LQG		0.250	0	0	NR	NR	NR	0
RCRA-SQG		0.250	0	0	NR	NR	NR	0
RCRA-CESQG		0.250	0	0	NR	NR	NR	0
Federal institutional controls / engineering controls registries								
US ENG CONTROLS		0.500	0	0	0	NR	NR	0
US INST CONTROL		0.500	0	0	0	NR	NR	0
Federal ERNS list								
ERNS	X	TP	NR	NR	NR	NR	NR	0
State- and tribal - equivalent NPL								
HSL		1.000	0	0	0	1	NR	1
State- and tribal - equivalent CERCLIS								
CSCSL		1.000	0	0	0	1	NR	1
State and tribal landfill and/or solid waste disposal site lists								
SWF/LF		0.500	0	0	0	NR	NR	0
State and tribal leaking storage tank lists								
LUST		0.500	1	0	0	NR	NR	1
INDIAN LUST		0.500	0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
State and tribal registered storage tank lists								
UST	X	0.250	1	0	NR	NR	NR	1
AST		0.250	0	0	NR	NR	NR	0
INDIAN UST		0.250	0	0	NR	NR	NR	0
FEMA UST		0.250	0	0	NR	NR	NR	0
State and tribal institutional control / engineering control registries								
INST CONTROL		0.500	0	0	0	NR	NR	0
State and tribal voluntary cleanup sites								
INDIAN VCP		0.500	0	0	0	NR	NR	0
VCP		0.500	0	0	0	NR	NR	0
ICR		0.500	0	0	0	NR	NR	0
State and tribal Brownfields sites								
BROWNFIELDS		0.500	0	0	0	NR	NR	0
ADDITIONAL ENVIRONMENTAL RECORDS								
Local Brownfield lists								
US BROWNFIELDS		0.500	0	0	0	NR	NR	0
Local Lists of Landfill / Solid Waste Disposal Sites								
DEBRIS REGION 9		0.500	0	0	0	NR	NR	0
ODI		0.500	0	0	0	NR	NR	0
SWTIRE		0.500	0	0	0	NR	NR	0
INDIAN ODI		0.500	0	0	0	NR	NR	0
Local Lists of Hazardous waste / Contaminated Sites								
US CDL		TP	NR	NR	NR	NR	NR	0
ALLSITES		0.500	1	0	1	NR	NR	2
CSCSL NFA		0.500	0	0	0	NR	NR	0
CDL		TP	NR	NR	NR	NR	NR	0
HIST CDL		TP	NR	NR	NR	NR	NR	0
US HIST CDL		TP	NR	NR	NR	NR	NR	0
Local Land Records								
LIENS 2		TP	NR	NR	NR	NR	NR	0
LUCIS		0.500	0	0	0	NR	NR	0
Records of Emergency Release Reports								
HMIRS		TP	NR	NR	NR	NR	NR	0
SPILLS	X	TP	NR	NR	NR	NR	NR	0
Other Ascertainable Records								
RCRA-NonGen		0.250	0	0	NR	NR	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
DOT OPS		TP	NR	NR	NR	NR	NR	0
DOD		1.000	0	0	0	0	NR	0
FUDS		1.000	0	0	0	0	NR	0
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
UMTRA		0.500	0	0	0	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
HIST FTTS		TP	NR	NR	NR	NR	NR	0
SSTS		TP	NR	NR	NR	NR	NR	0
ICIS		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
RADINFO		TP	NR	NR	NR	NR	NR	0
FINDS	X	TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
UIC		TP	NR	NR	NR	NR	NR	0
MANIFEST		0.250	0	0	NR	NR	NR	0
DRYCLEANERS		0.250	0	0	NR	NR	NR	0
NPDES		TP	NR	NR	NR	NR	NR	0
AIRS		TP	NR	NR	NR	NR	NR	0
Inactive Drycleaners		0.250	0	0	NR	NR	NR	0
INDIAN RESERV		1.000	0	0	0	0	NR	0
SCRD DRYCLEANERS		0.500	0	0	0	NR	NR	0
FINANCIAL ASSURANCE		TP	NR	NR	NR	NR	NR	0
COAL ASH		0.500	0	0	0	NR	NR	0
COAL ASH DOE		TP	NR	NR	NR	NR	NR	0
COAL ASH EPA		0.500	0	0	0	NR	NR	0
PCB TRANSFORMER		TP	NR	NR	NR	NR	NR	0
EDR PROPRIETARY RECORDS								
EDR Proprietary Records								
Manufactured Gas Plants		1.000	0	0	0	0	NR	0

NOTES:

TP = Target Property

NR = Not Requested at this Search Distance

Sites may be listed in more than one database

A1
Target Property
DECEPTION BAY MARINA
200 CORNET BAY RD
OAK HARBOR, WA 98277

FINDS **1007080726**
N/A

Site 1 of 6 in cluster A

Actual: 11 ft.

FINDS:

Registry ID: 110015574485

Environmental Interest/Information System
Washington Facility / Site Identification System (WA-FSIS) provides a means to query and display data maintained by the Washington Department of Ecology. This system contains key information for each facility/site that is currently, or has been, of interest to the Air Quality, Dam Safety, Hazardous Waste, Toxics Cleanup, and Water Quality Programs.

A2
Target Property
DECEPTION PASS MARINA 200 WEST CORNET BAY ROAD
DECEPTION PASS MARINA 200 WEST CORNET BAY ROAD
OAK HARBOR, WA

ERNS **99607347**
N/A

Site 2 of 6 in cluster A

Actual: 11 ft.

Click this hyperlink while viewing on your computer to access additional ERNS detail in the EDR Site Report.

A3
Target Property
200 CORONET BAY RD
OAK HARBOR, WA

SPILLS **S108544754**
N/A

Site 3 of 6 in cluster A

Actual: 11 ft.

SPILLS:

Facility ID:	563569
Medium:	Not reported
Material Desc:	PETROLEUM - DIESEL FUEL
Material Qty:	1
Material Units:	SHEEN
Date Received:	7/2/2007
Contact Name:	UNK

A4
Target Property
DECEPTION BAY MARINA
200 CORNET BAY RD
OAK HARBOR, WA 98277

UST **U003025769**
N/A

Site 4 of 6 in cluster A

Actual: 11 ft.

UST:

Facility ID:	2011
Site ID:	12070
Lat Deg:	48
Lat Min:	23
Lat Sec:	53.916000000007784
Long Deg:	-122
Long Min:	37

DECEPTION BAY MARINA (Continued) **U003025769**

Long Sec:	34.283999999978505
UBI:	Not reported
Phone Number:	3606755411

Tank ID:	8630
Tank Name:	#3
Install Date:	12/31/1964
Capacity:	Not reported
Tank Upgrade Date:	01/01/2001
TankSystem Status:	Not reported
TankSystem Status Change Date:	08/26/1996
Tank Status:	Removed
Tank Permit Expiration Date:	01/01/2001
Tank Closure Date:	01/01/2001
Tank Pumping System:	Not reported
Tank Spill Prevention:	Not reported
Tank Overfill Prevention:	Not reported
Tank Material:	Not reported
Tank Construction:	Not reported
Tank Tightness Test:	Not reported
Tank Corrosion Protection:	Not reported
Pipe Material:	Not reported
Pipe Construction:	Not reported
Pipe Primary Release Detection:	Not reported
Pipe Second Release Detection:	Not reported
Pipe Corrosion Protection:	Not reported
Tank Primary Release Detection:	Not reported
Tank Second Release Detection:	Not reported
Pipe Tightness Test:	Not reported
Tank Actual Status Date:	08/06/1996
Tag Number:	Not reported

Tank ID:	8696
Tank Name:	#1
Install Date:	12/31/1964
Capacity:	Not reported
Tank Upgrade Date:	01/01/2001
TankSystem Status:	Not reported
TankSystem Status Change Date:	08/26/1996
Tank Status:	Removed
Tank Permit Expiration Date:	01/01/2001
Tank Closure Date:	01/01/2001
Tank Pumping System:	Not reported
Tank Spill Prevention:	Not reported
Tank Overfill Prevention:	Not reported
Tank Material:	Not reported
Tank Construction:	Not reported
Tank Tightness Test:	Not reported
Tank Corrosion Protection:	Not reported
Pipe Material:	Not reported
Pipe Construction:	Not reported
Pipe Primary Release Detection:	Not reported
Pipe Second Release Detection:	Not reported
Pipe Corrosion Protection:	Not reported
Tank Primary Release Detection:	Not reported
Tank Second Release Detection:	Not reported

DECEPTION BAY MARINA (Continued) **U003025769**

Pipe Tightness Test:	Not reported
Tank Actual Status Date:	08/06/1996
Tag Number:	Not reported

Tank ID:	8737
Tank Name:	#4
Install Date:	12/31/1964
Capacity:	Not reported
Tank Upgrade Date:	01/01/2001
TankSystem Status:	Not reported
TankSystem Status Change Date:	08/26/1996
Tank Status:	Removed
Tank Permit Expiration Date:	01/01/2001
Tank Closure Date:	01/01/2001
Tank Pumping System:	Not reported
Tank Spill Prevention:	Not reported
Tank Overfill Prevention:	Not reported
Tank Material:	Not reported
Tank Construction:	Not reported
Tank Tightness Test:	Not reported
Tank Corrosion Protection:	Not reported
Pipe Material:	Not reported
Pipe Construction:	Not reported
Pipe Primary Release Detection:	Not reported
Pipe Second Release Detection:	Not reported
Pipe Corrosion Protection:	Not reported
Tank Primary Release Detection:	Not reported
Tank Second Release Detection:	Not reported
Pipe Tightness Test:	Not reported
Tank Actual Status Date:	08/06/1996
Tag Number:	Not reported

Tank ID:	8771
Tank Name:	#2
Install Date:	12/31/1964
Capacity:	Not reported
Tank Upgrade Date:	01/01/2001
TankSystem Status:	Not reported
TankSystem Status Change Date:	08/26/1996
Tank Status:	Removed
Tank Permit Expiration Date:	01/01/2001
Tank Closure Date:	01/01/2001
Tank Pumping System:	Not reported
Tank Spill Prevention:	Not reported
Tank Overfill Prevention:	Not reported
Tank Material:	Not reported
Tank Construction:	Not reported
Tank Tightness Test:	Not reported
Tank Corrosion Protection:	Not reported
Pipe Material:	Not reported
Pipe Construction:	Not reported
Pipe Primary Release Detection:	Not reported
Pipe Second Release Detection:	Not reported
Pipe Corrosion Protection:	Not reported
Tank Primary Release Detection:	Not reported

DECEPTION BAY MARINA (Continued) **U003025769**

Tank Second Release Detection: Not reported
Pipe Tightness Test: Not reported
Tank Actual Status Date: 08/06/1996
Tag Number: Not reported

A5 **DECEPTION PASS MARINA** **FINDS** **1007067393**
Target **200 CORNET BAY RD** **N/A**
Property **OAK HARBOR, WA 98277**

Site 5 of 6 in cluster A

Actual:
11 ft.

FINDS:

Registry ID: 110015439845

Environmental Interest/Information System
Washington Facility / Site Identification System (WA-FSIS) provides a means to query and display data maintained by the Washington Department of Ecology. This system contains key information for each facility/site that is currently, or has been, of interest to the Air Quality, Dam Safety, Hazardous Waste, Toxics Cleanup, and Water Quality Programs.

A6 **UNKNOWN** **SPILLS** **S108277930**
Target **200 W CORNET BAY RD** **N/A**
Property **OAK HARBOR, WA**

Site 6 of 6 in cluster A

Actual:
11 ft.

SPILLS:
Facility ID: 502021
Medium: Not reported
Material Desc: PETROLEUM - DIESEL FUEL
Material Qty: Not reported
Material Units: Not reported
Date Received: 1/14/1999
Contact Name: Not reported

---

7 **WA PARKS MARINE CREW YARD** **ALLSITES** **U001777696**
SW **5256 N CORNET BAY RD** **LUST** **N/A**
< 1/8 **OAK HARBOR, WA 98277** **UST**
0.050 mi.
263 ft.

Relative:
Higher

Actual:
12 ft.

ALLSITES:
Facility Id: 25187227
Latitude: 48.4001501
Longitude: -122.62375
Geographic location identifier (alias facid): 25187227
Facility Name: WA PARKS MARINE CREW YARD
Latitude Decimal Degrees: 48.400150144400001
Longitude Decimal Degrees: -122.62375195
Coordinate Point Areal Extent Code: 4
Horizontal Accuracy Code: 6

WA PARKS MARINE CREW YARD (Continued) **U001777696**

Coordinate Point Geographic Position Code: 8
Location Verified Code: Not reported

LUST:
FS ID: 25187227
Cleanup Site ID: 8459
Cleanup Unit Type: Upland
Process Type: Independent Action
Facility Status: Cleanup Started
Alternate Name: WA STATE PARKS MARINE CREW FACILITY
Release Notification Date: Not reported
Release Status Date: 06/01/1995
Site Response Unit Code: Northwest
Lat/Long: 48.4001501 / -122.62375

UST:
Facility ID: 25187227
Site ID: 2041
Lat Deg: Not reported
Lat Min: Not reported
Lat Sec: Not reported
Long Deg: Not reported
Long Min: Not reported
Long Sec: Not reported
UBI: Not reported
Phone Number: 2066754242

Tank ID: 25559
Tank Name: 1-
Install Date: 12/31/1964
Capacity: Not reported
Tank Upgrade Date: 01/01/2001
TankSystem Status: Not reported
TankSystem Status Change Date: 08/26/1996
Tank Status: Removed
Tank Permit Expiration Date: 01/01/2001
Tank Closure Date: 01/01/2001
Tank Pumping System: Not reported
Tank Spill Prevention: Not reported
Tank Overfill Prevention: Not reported
Tank Material: Steel
Tank Construction: Single Wall Tank
Tank Tightness Test: Not reported
Tank Corrosion Protection: Not reported
Pipe Material: Steel
Pipe Construction: Not reported
Pipe Primary Release Detection: Not reported
Pipe Second Release Detection: Not reported
Pipe Corrosion Protection: Not reported
Tank Primary Release Detection: Not reported
Tank Second Release Detection: Not reported
Pipe Tightness Test: Not reported
Tank Actual Status Date: 08/06/1996
Tag Number: Not reported

WA PARKS MARINE CREW YARD (Continued) **U001777696**

Tank ID:	30983
Tank Name:	2-
Install Date:	12/31/1964
Capacity:	Not reported
Tank Upgrade Date:	01/01/2001
TankSystem Status:	Not reported
TankSystem Status Change Date:	08/26/1996
Tank Status:	Removed
Tank Permit Expiration Date:	01/01/2001
Tank Closure Date:	01/01/2001
Tank Pumping System:	Not reported
Tank Spill Prevention:	Not reported
Tank Overfill Prevention:	Not reported
Tank Material:	Steel
Tank Construction:	Single Wall Tank
Tank Tightness Test:	Not reported
Tank Corrosion Protection:	Not reported
Pipe Material:	Steel
Pipe Construction:	Not reported
Pipe Primary Release Detection:	Not reported
Pipe Second Release Detection:	Not reported
Pipe Corrosion Protection:	Not reported
Tank Primary Release Detection:	Not reported
Tank Second Release Detection:	Not reported
Pipe Tightness Test:	Not reported
Tank Actual Status Date:	08/06/1996
Tag Number:	Not reported

8
NE
1/4-1/2
0.372 mi.
1963 ft.

EQ HARBOR SVC INC **ALLSITES** **S110038808**
265 CORNET BAY RD **N/A**
OAK HARBOR, WA

Relative:
Lower

Actual:
9 ft.

ALLSITES:

Facility Id:	19678
Latitude:	48.3976889
Longitude:	-122.62667
Geographic location identifier (alias facid):	19678
Facility Name:	EQ HARBOR SVC INC
Latitude Decimal Degrees:	48.399999999999999
Longitude Decimal Degrees:	-122.617
Coordinate Point Areal Extent Code:	0
Horizontal Accuracy Code:	99
Coordinate Point Geographic Position Code:	0
Location Verified Code:	Not reported
Geographic Location Identifier (Alias Facid):	19678
Interaction (Aka Env Int) Type Code:	BOATGP
Interaction (Aka Env Int) Description:	Boatyard GP
Interaction Status:	I
Federal Program Indentifier:	WAG030019
Interaction Start Date:	1993-02-05 00:00:00
Interaction End Date:	1993-03-30 00:00:00
prgm_facil:	EQ HARBOR SVC INC
cur_sys_pr:	WATQUAL
cur_sys_nm:	PARIS

EQ HARBOR SVC INC (Continued) **S110038808**

Geographic Location Identifier (Alias Facid):	19678
Interaction (Aka Env Int) Type Code:	BOATGP
Interaction (Aka Env Int) Description:	Boatyard GP
Interaction Status:	A
Federal Program Indentifier:	WAG030093
Interaction Start Date:	1994-02-11 00:00:00
Interaction End Date:	Not reported
prgm_facil:	EQ HARBOR SVC INC
cur_sys_pr:	WATQUAL
cur_sys_nm:	PARIS

---

9 **DECEPTION BAY MARINA** **CSCSL** **S101856282**
NE **HSL** **N/A**
1/2-1 **OAK HARBOR, WA** **ALLSITES**
0.760 mi. **LUST**
4013 ft.

Relative:
Higher

Actual:
34 ft.

CSCSL:

Facility ID:	2011
Region:	Northwest
Lat/Long:	48.398310000000 / -122.6261899999
Brownfield Status:	Not reported
Rank Status:	5
Clean Up Siteid:	5048
Site Status:	Cleanup Started
PSI?:	Yes
Contaminant Name:	Petroleum Products - unspecified
Ground Water:	Not reported
Surface Water:	S
Soil:	Not reported
Sediment:	Not reported
Air:	Not reported
Bedrock:	Not reported
Responsible Unit:	Northwest

Facility ID:	2011
Region:	Northwest
Lat/Long:	48.398310000000 / -122.6261899999
Brownfield Status:	Not reported
Rank Status:	5
Clean Up Siteid:	5048
Site Status:	Cleanup Started
PSI?:	Yes
Contaminant Name:	Petroleum-Other
Ground Water:	C
Surface Water:	Not reported
Soil:	C
Sediment:	Not reported
Air:	Not reported
Bedrock:	Not reported
Responsible Unit:	Northwest

HSL:

edr_fstat:	WA
edr_fzip:	Not reported
edr_fcnty:	ISLAND

DECEPTION BAY MARINA (Continued) **S101856282**

edr_zip: Not reported
Facility Type: Hazardous Sites List
Facility Status: Cleanup Started
FSID Number: 2011
Rank: 5
Region: NW

ALLSITES:

Facility Id: 64262686
Latitude: 48.4082597
Longitude: -122.61589
Geographic location identifier (alias facid): 64262686
Facility Name: DECEPTION PASS MARINA
Latitude Decimal Degrees: 48.408259796800003
Longitude Decimal Degrees: -122.615897011
Coordinate Point Areal Extent Code: 99
Horizontal Accuracy Code: 99
Coordinate Point Geographic Position Code: 99
Location Verified Code: N

Facility Id: 2011
Latitude: 48.3983100
Longitude: -122.62618
Geographic location identifier (alias facid): 2011
Facility Name: DECEPTION BAY MARINA
Latitude Decimal Degrees: 48.398310000000002
Longitude Decimal Degrees: -122.62618999999999
Coordinate Point Areal Extent Code: 99
Horizontal Accuracy Code: 4
Coordinate Point Geographic Position Code: 99
Location Verified Code: Y

Geographic Location Identifier (Alias Facid): 2011
Interaction (Aka Env Int) Type Code: SCS
Interaction (Aka Env Int) Description: State Cleanup Site
Interaction Status: A
Federal Program Indentifier: Not reported
Interaction Start Date: 1900-01-01 00:00:00
Interaction End Date: Not reported
prgm_facil: DECEPTION BAY MARINA
cur_sys_pr: TOXICS
cur_sys_nm: ISIS

Geographic Location Identifier (Alias Facid): 2011
Interaction (Aka Env Int) Type Code: LUST
Interaction (Aka Env Int) Description: LUST Facility
Interaction Status: A
Federal Program Indentifier: 12070
Interaction Start Date: 1989-04-12 00:00:00
Interaction End Date: Not reported
prgm_facil: Not reported
cur_sys_pr: TOXICS
cur_sys_nm: ISIS

Geographic Location Identifier (Alias Facid): 2011
Interaction (Aka Env Int) Type Code: UST

DECEPTION BAY MARINA (Continued) **S101856282**

Interaction (Aka Env Int) Description:	Underground Storage Tank
Interaction Status:	I
Federal Program Indentifier:	12070
Interaction Start Date:	2000-03-20 00:00:00
Interaction End Date:	2000-03-20 00:00:00
prgm_facil:	Not reported
cur_sys_pr:	TOXICS
cur_sys_nm:	ISIS

LUST:

FS ID:	2011
Cleanup Site ID:	5048
Cleanup Unit Type:	Upland
Process Type:	Ecology-supervised or conducted
Facility Status:	Cleanup Started
Alternate Name:	CORNET BAY MARINA
Release Notification Date:	Not reported
Release Status Date:	06/01/1995
Site Response Unit Code:	Northwest
Lat/Long:	48.3983100 / -122.62618

Count: 22 records. ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)
COUPEVILLE (WHIDBEY	1003880418	ISLAND CO - COUPEVILLE LDFL	HWY 20	98277	CERC-NFRAP
FREELAND	1003880413	ISLAND CO - FREELAND LDFL	HWY 20	98277	CERC-NFRAP
ISLAND COUNTY	2006799452	USELESS BAY	USELESS BAY		ERNS
OAK HARBOR	S104484675	QUINN'S MARKET	5050 HWY 20 N	98277	ICR
OAK HARBOR	S105454237	CHEVRON #100 1319	HWY 20 & POWER ST	98277	ICR
OAK HARBOR	1007070403	SHARPS CORNER	HWY 20 & SHARPS COR	98277	FINDS, CSCSL, ALLSITES, LUST, UST
OAK HARBOR	1001491375	B & L SELECTIVE LOGGING	SR 20 & TROXELL RD INTERSECTIO	98277	RCRA-NonGen, FINDS
OAK HARBOR	99648137	BETWEEN COUNTY DOCK AND BAY 318 CO	BETWEEN COUNTY DOCK AND BAY 31		ERNS
OAK HARBOR	1000982930	DECEPTION PASS SITE	4900 BLK OF N SR 20 DECEPTION	98277	RCRA-SQG, FINDS
OAK HARBOR	1007071241	CORNET BAY PARTNERSHIP	5191 N CORNET BAY RD	98277	FINDS
OAK HARBOR	2008885050	OAK HARBOR MARINA	OAK HARBOR MARINA		ERNS
OAK HARBOR	99649600	OAK HARBOR MARINA SLIP: UNKNOWN	OAK HARBOR MARINA SLIP: UNKNOW		ERNS
OAK HARBOR	2010929498	OAK HARBOR CITY MARINA 1401 SE CAT	1401 SE OAK HBR		ERNS
OAK HARBOR	2011966826	OAK HARBOR MARINA 1401 SE CATALINA	1401 SE OAK HBR		ERNS
OAK HARBOR	2011963663	OAK HARBOR MARINA 1401 CATALINA DR	1401 OAK HBR		ERNS
OAK HARBOR	S110336096	OAK HARBOR SEAPLANE LAGOON WWT (OU	60 E PIONEER AVE	98277	SWF/LF
OAK HARBOR	S110993521	NAVY FEDERAL CREDIT UNION	32885 STATE 20	98277	ALLSITES
OAK HARBOR	U004041086	WA DOT OAK HARBOR	40652 N STATE ROUTE 20	98277	ALLSITES, UST
OAK HARBOR	S103502903	SOUTHLAND #18255	5520 N STATE HWY	98277	ICR
OAK HARBOR	S103850742	SOUTHLAND #18255	5220 N STATE HWY	98277	ICR
OAK HARBOR	U004139740	WALLGREN TIRE CENTER	31750 W STATE ROUTE 20	98277	UST
OAK HARBOR	1007062392	WHIDBEY MARKET & DELI	40928 STHY 20 N	98277	FINDS, CSCSL, ALLSITES, LUST

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Number of Days to Update: Provides confirmation that EDR is reporting records that have been updated within 90 days from the date the government agency made the information available to the public.

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL: National Priority List

National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC) and regional EPA offices.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 07/12/2011
Next Scheduled EDR Contact: 10/24/2011
Data Release Frequency: Quarterly

NPL Site Boundaries

Sources:

EPA's Environmental Photographic Interpretation Center (EPIC)
Telephone: 202-564-7333

EPA Region 1
Telephone 617-918-1143

EPA Region 6
Telephone: 214-655-6659

EPA Region 3
Telephone 215-814-5418

EPA Region 7
Telephone: 913-551-7247

EPA Region 4
Telephone 404-562-8033

EPA Region 8
Telephone: 303-312-6774

EPA Region 5
Telephone 312-886-6686

EPA Region 9
Telephone: 415-947-4246

EPA Region 10
Telephone 206-553-8665

Proposed NPL: Proposed National Priority List Sites

A site that has been proposed for listing on the National Priorities List through the issuance of a proposed rule in the Federal Register. EPA then accepts public comments on the site, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 07/12/2011
Next Scheduled EDR Contact: 10/24/2011
Data Release Frequency: Quarterly

NPL LIENS: Federal Superfund Liens

Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/1991
Date Data Arrived at EDR: 02/02/1994
Date Made Active in Reports: 03/30/1994
Number of Days to Update: 56

Source: EPA
Telephone: 202-564-4267
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: No Update Planned

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Federal Delisted NPL site list

DELISTED NPL: National Priority List Deletions

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 03/31/2011
Date Data Arrived at EDR: 04/13/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 62

Source: EPA
Telephone: N/A
Last EDR Contact: 07/12/2011
Next Scheduled EDR Contact: 10/24/2011
Data Release Frequency: Quarterly

Federal CERCLIS list

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 09/01/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

FEDERAL FACILITY: Federal Facility Site Information listing

A listing of National Priority List (NPL) and Base Realignment and Closure (BRAC) sites found in the Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Database where EPAa??s Federal Facilities Restoration and Reuse Office is involved in cleanup activities.

Date of Government Version: 12/10/2010
Date Data Arrived at EDR: 01/11/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 36

Source: Environmental Protection Agency
Telephone: 703-603-8704
Last EDR Contact: 07/15/2011
Next Scheduled EDR Contact: 10/24/2011
Data Release Frequency: Varies

Federal CERCLIS NFRAP site List

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned

Archived sites are sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

Date of Government Version: 02/25/2011
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA
Telephone: 703-412-9810
Last EDR Contact: 09/01/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

Federal RCRA CORRACTS facilities list

CORRACTS: Corrective Action Report

CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 03/09/2011
Date Data Arrived at EDR: 03/15/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 91

Source: EPA
Telephone: 800-424-9346
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Quarterly

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF: RCRA - Treatment, Storage and Disposal

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Transporters are individuals or entities that move hazardous waste from the generator offsite to a facility that can recycle, treat, store, or dispose of the waste. TSDFs treat, store, or dispose of the waste.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

Federal RCRA generators list

RCRA-LQG: RCRA - Large Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

RCRA-SQG: RCRA - Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Quarterly

RCRA-CESQG: RCRA - Conditionally Exempt Small Quantity Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

Federal institutional controls / engineering controls registries

US ENG CONTROLS: Engineering Controls Sites List

A listing of sites with engineering controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health.

Date of Government Version: 03/16/2011
Date Data Arrived at EDR: 03/25/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 81

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

US INST CONTROL: Sites with Institutional Controls

A listing of sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are generally required as part of the institutional controls.

Date of Government Version: 03/16/2011
Date Data Arrived at EDR: 03/25/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 81

Source: Environmental Protection Agency
Telephone: 703-603-0695
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

Federal ERNS list

ERNS: Emergency Response Notification System

Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 04/05/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 70

Source: National Response Center, United States Coast Guard
Telephone: 202-267-2180
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Annually

State- and tribal - equivalent NPL

HSL: Hazardous Sites List

The Hazardous Sites List is a subset of the CSCSL Report. It includes sites which have been assessed and ranked using the Washington Ranking Method (WARM).

Date of Government Version: 03/01/2011
Date Data Arrived at EDR: 03/18/2011
Date Made Active in Reports: 03/30/2011
Number of Days to Update: 12

Source: Department of Ecology
Telephone: 360-407-7200
Last EDR Contact: 09/13/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

State- and tribal - equivalent CERCLIS

CSCSL: Confirmed and Suspected Contaminated Sites List

State Hazardous Waste Sites. State hazardous waste site records are the states' equivalent to CERCLIS. These sites may or may not already be listed on the federal CERCLIS list. Priority sites planned for cleanup using state funds (state equivalent of Superfund) are identified along with sites where cleanup will be paid for by potentially responsible parties. Available information varies by state.

Date of Government Version: 07/28/2011
Date Data Arrived at EDR: 07/29/2011
Date Made Active in Reports: 09/08/2011
Number of Days to Update: 41

Source: Department of Ecology
Telephone: 360-407-7200
Last EDR Contact: 07/29/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Semi-Annually

State and tribal landfill and/or solid waste disposal site lists

SWF/LF: Solid Waste Facility Database

Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state. Depending on the state, these may be active or inactive facilities or open dumps that failed to meet RCRA Subtitle D Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 06/22/2011
Date Data Arrived at EDR: 06/24/2011
Date Made Active in Reports: 07/27/2011
Number of Days to Update: 33

Source: Department of Ecology
Telephone: 360-407-6132
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Annually

State and tribal leaking storage tank lists

LUST: Leaking Underground Storage Tanks Site List

Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 08/23/2011
Date Data Arrived at EDR: 08/25/2011
Date Made Active in Reports: 09/21/2011
Number of Days to Update: 27

Source: Department of Ecology
Telephone: 360-407-7183
Last EDR Contact: 08/25/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Quarterly

INDIAN LUST R9: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Arizona, California, New Mexico and Nevada

Date of Government Version: 01/31/2011
Date Data Arrived at EDR: 02/01/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 48

Source: Environmental Protection Agency
Telephone: 415-972-3372
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN LUST R4: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Florida, Mississippi and North Carolina.

Date of Government Version: 08/11/2011
Date Data Arrived at EDR: 08/12/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 32

Source: EPA Region 4
Telephone: 404-562-8677
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Semi-Annually

INDIAN LUST R10: Leaking Underground Storage Tanks on Indian Land

LUSTs on Indian land in Alaska, Idaho, Oregon and Washington.

Date of Government Version: 08/04/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 39

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN LUST R1: Leaking Underground Storage Tanks on Indian Land

A listing of leaking underground storage tank locations on Indian Land.

Date of Government Version: 05/05/2011
Date Data Arrived at EDR: 08/02/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 42

Source: EPA Region 1
Telephone: 617-918-1313
Last EDR Contact: 08/02/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN LUST R6: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in New Mexico and Oklahoma.

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-6597
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN LUST R7: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Iowa, Kansas, and Nebraska

Date of Government Version: 02/16/2011
Date Data Arrived at EDR: 06/02/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 103

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 08/02/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN LUST R8: Leaking Underground Storage Tanks on Indian Land
LUSTs on Indian land in Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming.

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 25

Source: EPA Region 8
Telephone: 303-312-6271
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

State and tribal registered storage tank lists

UST: Underground Storage Tank Database
Registered Underground Storage Tanks. UST's are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program. Available information varies by state program.

Date of Government Version: 08/24/2011
Date Data Arrived at EDR: 08/26/2011
Date Made Active in Reports: 09/14/2011
Number of Days to Update: 19

Source: Department of Ecology
Telephone: 360-407-7183
Last EDR Contact: 08/26/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Quarterly

AST: Aboveground Storage Tank Locations
A listing of aboveground storage tank locations regulated by the Department of Ecology's Spill Prevention, Preparedness and Response Program.

Date of Government Version: 05/27/2009
Date Data Arrived at EDR: 05/28/2009
Date Made Active in Reports: 06/19/2009
Number of Days to Update: 22

Source: Department of Ecology
Telephone: 360-407-7562
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Varies

INDIAN UST R4: Underground Storage Tanks on Indian Land
The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 4 (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee and Tribal Nations)

Date of Government Version: 08/11/2011
Date Data Arrived at EDR: 08/12/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 32

Source: EPA Region 4
Telephone: 404-562-9424
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Semi-Annually

INDIAN UST R9: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 9 (Arizona, California, Hawaii, Nevada, the Pacific Islands, and Tribal Nations).

Date of Government Version: 08/04/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 39

Source: EPA Region 9
Telephone: 415-972-3368
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN UST R8: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 8 (Colorado, Montana, North Dakota, South Dakota, Utah, Wyoming and 27 Tribal Nations).

Date of Government Version: 08/18/2011
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 25

Source: EPA Region 8
Telephone: 303-312-6137
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN UST R10: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 10 (Alaska, Idaho, Oregon, Washington, and Tribal Nations).

Date of Government Version: 08/04/2011
Date Data Arrived at EDR: 08/05/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 39

Source: EPA Region 10
Telephone: 206-553-2857
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Quarterly

INDIAN UST R1: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 1 (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont and ten Tribal Nations).

Date of Government Version: 05/05/2011
Date Data Arrived at EDR: 08/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 36

Source: EPA, Region 1
Telephone: 617-918-1313
Last EDR Contact: 08/02/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN UST R5: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 5 (Michigan, Minnesota and Wisconsin and Tribal Nations).

Date of Government Version: 07/01/2011
Date Data Arrived at EDR: 08/26/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 18

Source: EPA Region 5
Telephone: 312-886-6136
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

INDIAN UST R6: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 6 (Louisiana, Arkansas, Oklahoma, New Mexico, Texas and 65 Tribes).

Date of Government Version: 05/10/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 34

Source: EPA Region 6
Telephone: 214-665-7591
Last EDR Contact: 08/01/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Semi-Annually

INDIAN UST R7: Underground Storage Tanks on Indian Land

The Indian Underground Storage Tank (UST) database provides information about underground storage tanks on Indian land in EPA Region 7 (Iowa, Kansas, Missouri, Nebraska, and 9 Tribal Nations).

Date of Government Version: 04/01/2011
Date Data Arrived at EDR: 06/01/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 13

Source: EPA Region 7
Telephone: 913-551-7003
Last EDR Contact: 08/02/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

FEMA UST: Underground Storage Tank Listing

A listing of all FEMA owned underground storage tanks.

Date of Government Version: 01/01/2010
Date Data Arrived at EDR: 02/16/2010
Date Made Active in Reports: 04/12/2010
Number of Days to Update: 55

Source: FEMA
Telephone: 202-646-5797
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Varies

State and tribal institutional control / engineering control registries

INST CONTROL: Institutional Control Site List

Sites that have institutional controls.

Date of Government Version: 08/17/2011
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/14/2011
Number of Days to Update: 26

Source: Department of Ecology
Telephone: 360-407-7170
Last EDR Contact: 08/19/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Varies

State and tribal voluntary cleanup sites

INDIAN VCP R1: Voluntary Cleanup Priority Listing

A listing of voluntary cleanup priority sites located on Indian Land located in Region 1.

Date of Government Version: 05/05/2011
Date Data Arrived at EDR: 07/05/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 70

Source: EPA, Region 1
Telephone: 617-918-1102
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

VCP: Voluntary Cleanup Program Sites

Sites that have entered either the Voluntary Cleanup Program or its predecessor Independent Remedial Action Program.

Date of Government Version: 07/22/2011
Date Data Arrived at EDR: 08/02/2011
Date Made Active in Reports: 08/18/2011
Number of Days to Update: 16

Source: Department of Ecology
Telephone: 360-407-7200
Last EDR Contact: 07/22/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Varies

INDIAN VCP R7: Voluntary Cleanup Priority Lisitng

A listing of voluntary cleanup priority sites located on Indian Land located in Region 7.

Date of Government Version: 03/20/2008
Date Data Arrived at EDR: 04/22/2008
Date Made Active in Reports: 05/19/2008
Number of Days to Update: 27

Source: EPA, Region 7
Telephone: 913-551-7365
Last EDR Contact: 04/20/2009
Next Scheduled EDR Contact: 07/20/2009
Data Release Frequency: Varies

ICR: Independent Cleanup Reports
These are remedial action reports Ecology has received from either the owner or operator of the sites. These actions have been conducted without department oversight or approval and are not under an order or decree. This database is no longer updated by the Department of Ecology.

Date of Government Version: 12/01/2002
Date Data Arrived at EDR: 01/03/2003
Date Made Active in Reports: 01/22/2003
Number of Days to Update: 19
Source: Department of Ecology
Telephone: 360-407-7200
Last EDR Contact: 08/10/2009
Next Scheduled EDR Contact: 11/09/2009
Data Release Frequency: No Update Planned

State and tribal Brownfields sites

BROWNFIELDS: Brownfields Sites Listing
A listing of brownfields sites included in the Confirmed & Suspected Sites Listing. Brownfields are abandoned, idle or underused commercial or industrial properties, where the expansion or redevelopment is hindered by real or perceived contamination. Brownfields vary in size, location, age, and past use -- they can be anything from a five-hundred acre automobile assembly plant to a small, abandoned corner gas station.

Date of Government Version: 07/28/2011
Date Data Arrived at EDR: 07/29/2011
Date Made Active in Reports: 08/18/2011
Number of Days to Update: 20
Source: Department of Ecology
Telephone: 360-725-4030
Last EDR Contact: 07/29/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Varies

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS: A Listing of Brownfields Sites
Included in the listing are brownfields properties addresses by Cooperative Agreement Recipients and brownfields properties addressed by Targeted Brownfields Assessments. Targeted Brownfields Assessments-EPA's Targeted Brownfields Assessments (TBA) program is designed to help states, tribes, and municipalities--especially those without EPA Brownfields Assessment Demonstration Pilots--minimize the uncertainties of contamination often associated with brownfields. Under the TBA program, EPA provides funding and/or technical assistance for environmental assessments at brownfields sites throughout the country. Targeted Brownfields Assessments supplement and work with other efforts under EPA's Brownfields Initiative to promote cleanup and redevelopment of brownfields. Cooperative Agreement Recipients-States, political subdivisions, territories, and Indian tribes become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the U.S. EPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities.

Date of Government Version: 06/27/2011
Date Data Arrived at EDR: 06/27/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 78
Source: Environmental Protection Agency
Telephone: 202-566-2777
Last EDR Contact: 09/28/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Semi-Annually

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9: Torres Martinez Reservation Illegal Dump Site Locations
A listing of illegal dump sites location on the Torres Martinez Indian Reservation located in eastern Riverside County and northern Imperial County, California.

Date of Government Version: 01/12/2009
Date Data Arrived at EDR: 05/07/2009
Date Made Active in Reports: 09/21/2009
Number of Days to Update: 137
Source: EPA, Region 9
Telephone: 415-947-4219
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: No Update Planned

ODI: Open Dump Inventory
An open dump is defined as a disposal facility that does not comply with one or more of the Part 257 or Part 258 Subtitle D Criteria.

Date of Government Version: 06/30/1985
Date Data Arrived at EDR: 08/09/2004
Date Made Active in Reports: 09/17/2004
Number of Days to Update: 39
Source: Environmental Protection Agency
Telephone: 800-424-9346
Last EDR Contact: 06/09/2004
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SWTIRE: Solid Waste Tire Facilities
This study identified sites statewide with unauthorized accumulations of scrap tires.

Date of Government Version: 11/01/2005
Date Data Arrived at EDR: 03/16/2006
Date Made Active in Reports: 04/13/2006
Number of Days to Update: 28
Source: Department of Ecology
Telephone: N/A
Last EDR Contact: 09/15/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

INDIAN ODI: Report on the Status of Open Dumps on Indian Lands
Location of open dumps on Indian land.

Date of Government Version: 12/31/1998
Date Data Arrived at EDR: 12/03/2007
Date Made Active in Reports: 01/24/2008
Number of Days to Update: 52
Source: Environmental Protection Agency
Telephone: 703-308-8245
Last EDR Contact: 08/08/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Varies

Local Lists of Hazardous waste / Contaminated Sites

US CDL: Clandestine Drug Labs
A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 04/08/2011
Date Data Arrived at EDR: 06/16/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 89
Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 09/07/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: Quarterly

ALLSITES: Facility/Site Identification System Listing
Information on facilities and sites of interest to the Department of Ecology.

Date of Government Version: 08/09/2011
Date Data Arrived at EDR: 08/09/2011
Date Made Active in Reports: 09/14/2011
Number of Days to Update: 36
Source: Department of Ecology
Telephone: 360-407-6423
Last EDR Contact: 08/09/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Quarterly

CSCSL NFA: Confirmed and Contaminated Sites - No Further Action
The data set contains information about sites previously on the Confirmed and Suspected Contaminated Sites list that have received a No Further Action (NFA) determination. Because it is necessary to maintain historical records of sites that have been investigated and cleaned up, sites are not deleted from the database when cleanup activities are completed. Instead, a No Further Action code is entered based upon the type of NFA determination the site received.

Date of Government Version: 07/28/2011
Date Data Arrived at EDR: 07/29/2011
Date Made Active in Reports: 08/18/2011
Number of Days to Update: 20

Source: Department of Ecology
Telephone: 360-407-7170
Last EDR Contact: 07/29/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Semi-Annually

CDL: Clandestine Drug Lab Contaminated Site List

Illegal methamphetamine labs use hazardous chemicals that create public health hazards. Chemicals and residues can cause burns, respiratory and neurological damage, and death. Biological hazards associated with intravenous needles, feces, and blood also pose health risks.

Date of Government Version: 02/09/2009
Date Data Arrived at EDR: 03/18/2009
Date Made Active in Reports: 03/24/2009
Number of Days to Update: 6

Source: Department of Health
Telephone: 360-236-3380
Last EDR Contact: 08/15/2011
Next Scheduled EDR Contact: 11/28/2011
Data Release Frequency: Varies

HIST CDL: List of Sites Contaminated by Clandestine Drug Labs

This listing of contaminated sites by Clandestine Drug Labs includes non-remediated properties. The current CDL listing does not. This listing is no longer updated by the state agency.

Date of Government Version: 02/08/2007
Date Data Arrived at EDR: 06/26/2007
Date Made Active in Reports: 07/19/2007
Number of Days to Update: 23

Source: Department of Health
Telephone: 360-236-3381
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

US HIST CDL: National Clandestine Laboratory Register

A listing of clandestine drug lab locations. The U.S. Department of Justice ("the Department") provides this web site as a public service. It contains addresses of some locations where law enforcement agencies reported they found chemicals or other items that indicated the presence of either clandestine drug laboratories or dumpsites. In most cases, the source of the entries is not the Department, and the Department has not verified the entry and does not guarantee its accuracy. Members of the public must verify the accuracy of all entries by, for example, contacting local law enforcement and local health departments.

Date of Government Version: 09/01/2007
Date Data Arrived at EDR: 11/19/2008
Date Made Active in Reports: 03/30/2009
Number of Days to Update: 131

Source: Drug Enforcement Administration
Telephone: 202-307-1000
Last EDR Contact: 03/23/2009
Next Scheduled EDR Contact: 06/22/2009
Data Release Frequency: No Update Planned

Local Land Records

LIENS 2: CERCLA Lien Information

A Federal CERCLA ('Superfund') lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties.

Date of Government Version: 05/05/2011
Date Data Arrived at EDR: 05/11/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 125

Source: Environmental Protection Agency
Telephone: 202-564-6023
Last EDR Contact: 08/12/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

LUCIS: Land Use Control Information System

LUCIS contains records of land use control information pertaining to the former Navy Base Realignment and Closure properties.

Date of Government Version: 12/09/2005
Date Data Arrived at EDR: 12/11/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 31

Source: Department of the Navy
Telephone: 843-820-7326
Last EDR Contact: 07/11/2011
Next Scheduled EDR Contact: 09/05/2011
Data Release Frequency: Varies

Records of Emergency Release Reports

HMIRS: Hazardous Materials Information Reporting System

Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 04/05/2011
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 161

Source: U.S. Department of Transportation
Telephone: 202-366-4555
Last EDR Contact: 07/05/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Annually

SPILLS: Reported Spills

Spills reported to the Spill Prevention, Preparedness and Response Division.

Date of Government Version: 06/16/2011
Date Data Arrived at EDR: 06/17/2011
Date Made Active in Reports: 07/27/2011
Number of Days to Update: 40

Source: Department of Ecology
Telephone: 360-407-6950
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Semi-Annually

Other Ascertainable Records

RCRA-NonGen: RCRA - Non Generators

RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

Date of Government Version: 06/15/2011
Date Data Arrived at EDR: 07/07/2011
Date Made Active in Reports: 08/08/2011
Number of Days to Update: 32

Source: Environmental Protection Agency
Telephone: (206) 553-1200
Last EDR Contact: 07/07/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

DOT OPS: Incident and Accident Data

Department of Transporation, Office of Pipeline Safety Incident and Accident data.

Date of Government Version: 01/12/2011
Date Data Arrived at EDR: 02/11/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 80

Source: Department of Transporation, Office of Pipeline Safety
Telephone: 202-366-4595
Last EDR Contact: 08/09/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Varies

DOD: Department of Defense Sites

This data set consists of federally owned or administered lands, administered by the Department of Defense, that have any area equal to or greater than 640 acres of the United States, Puerto Rico, and the U.S. Virgin Islands.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 11/10/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 62

Source: USGS
Telephone: 888-275-8747
Last EDR Contact: 07/22/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Semi-Annually

FUDS: Formerly Used Defense Sites

The listing includes locations of Formerly Used Defense Sites properties where the US Army Corps of Engineers is actively working or will take necessary cleanup actions.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 08/12/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 112

Source: U.S. Army Corps of Engineers
Telephone: 202-528-4285
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

CONSENT: Superfund (CERCLA) Consent Decrees

Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 04/05/2011
Date Made Active in Reports: 06/14/2011
Number of Days to Update: 70

Source: Department of Justice, Consent Decree Library
Telephone: Varies
Last EDR Contact: 07/01/2011
Next Scheduled EDR Contact: 10/17/2011
Data Release Frequency: Varies

ROD: Records Of Decision

Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 05/31/2011
Date Data Arrived at EDR: 06/15/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 90

Source: EPA
Telephone: 703-416-0223
Last EDR Contact: 09/14/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Annually

UMTRA: Uranium Mill Tailings Sites

Uranium ore was mined by private companies for federal government use in national defense programs. When the mills shut down, large piles of the sand-like material (mill tailings) remain after uranium has been extracted from the ore. Levels of human exposure to radioactive materials from the piles are low; however, in some cases tailings were used as construction materials before the potential health hazards of the tailings were recognized.

Date of Government Version: 09/14/2010
Date Data Arrived at EDR: 10/21/2010
Date Made Active in Reports: 01/28/2011
Number of Days to Update: 99

Source: Department of Energy
Telephone: 505-845-0011
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Varies

MINES: Mines Master Index File

Contains all mine identification numbers issued for mines active or opened since 1971. The data also includes violation information.

Date of Government Version: 05/06/2011
Date Data Arrived at EDR: 06/08/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 97

Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959
Last EDR Contact: 09/08/2011
Next Scheduled EDR Contact: 12/19/2011
Data Release Frequency: Semi-Annually

TRIS: Toxic Chemical Release Inventory System

Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/17/2010
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 94

Source: EPA
Telephone: 202-566-0250
Last EDR Contact: 09/01/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Annually

TSCA: Toxic Substances Control Act

Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/2006
Date Data Arrived at EDR: 09/29/2010
Date Made Active in Reports: 12/02/2010
Number of Days to Update: 64

Source: EPA
Telephone: 202-260-5521
Last EDR Contact: 09/27/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Every 4 Years

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-566-1667
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
A listing of FIFRA/TSCA Tracking System (FTTS) inspections and enforcements.

Date of Government Version: 04/09/2009
Date Data Arrived at EDR: 04/16/2009
Date Made Active in Reports: 05/11/2009
Number of Days to Update: 25
Source: EPA
Telephone: 202-566-1667
Last EDR Contact: 08/31/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Quarterly

HIST FTTS: FIFRA/TSCA Tracking System Administrative Case Listing
A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2007
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

HIST FTTS INSP: FIFRA/TSCA Tracking System Inspection & Enforcement Case Listing
A complete inspection and enforcement case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

Date of Government Version: 10/19/2006
Date Data Arrived at EDR: 03/01/2007
Date Made Active in Reports: 04/10/2007
Number of Days to Update: 40
Source: Environmental Protection Agency
Telephone: 202-564-2501
Last EDR Contact: 12/17/2008
Next Scheduled EDR Contact: 03/17/2008
Data Release Frequency: No Update Planned

SSTS: Section 7 Tracking Systems
Section 7 of the Federal Insecticide, Fungicide and Rodenticide Act, as amended (92 Stat. 829) requires all registered pesticide-producing establishments to submit a report to the Environmental Protection Agency by March 1st each year. Each establishment must report the types and amounts of pesticides, active ingredients and devices being produced, and those having been produced and sold or distributed in the past year.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 12/10/2010
Date Made Active in Reports: 02/25/2011
Number of Days to Update: 77
Source: EPA
Telephone: 202-564-4203
Last EDR Contact: 08/18/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Annually

ICIS: Integrated Compliance Information System

The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

Date of Government Version: 01/07/2011
Date Data Arrived at EDR: 01/21/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 59

Source: Environmental Protection Agency
Telephone: 202-564-5088
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Quarterly

PADS: PCB Activity Database System

PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 11/01/2010
Date Data Arrived at EDR: 11/10/2010
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 98

Source: EPA
Telephone: 202-566-0500
Last EDR Contact: 07/22/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Annually

MLTS: Material Licensing Tracking System

MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 06/21/2011
Date Data Arrived at EDR: 07/15/2011
Date Made Active in Reports: 09/13/2011
Number of Days to Update: 60

Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Quarterly

RADINFO: Radiation Information Database

The Radiation Information Database (RADINFO) contains information about facilities that are regulated by U.S. Environmental Protection Agency (EPA) regulations for radiation and radioactivity.

Date of Government Version: 01/11/2011
Date Data Arrived at EDR: 01/13/2011
Date Made Active in Reports: 02/16/2011
Number of Days to Update: 34

Source: Environmental Protection Agency
Telephone: 202-343-9775
Last EDR Contact: 07/12/2011
Next Scheduled EDR Contact: 10/24/2011
Data Release Frequency: Quarterly

FINDS: Facility Index System/Facility Registry System

Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 04/14/2010
Date Data Arrived at EDR: 04/16/2010
Date Made Active in Reports: 05/27/2010
Number of Days to Update: 41

Source: EPA
Telephone: (206) 553-1200
Last EDR Contact: 09/13/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Quarterly

RAATS: RCRA Administrative Action Tracking System

RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/1995
Date Data Arrived at EDR: 07/03/1995
Date Made Active in Reports: 08/07/1995
Number of Days to Update: 35

Source: EPA
Telephone: 202-564-4104
Last EDR Contact: 06/02/2008
Next Scheduled EDR Contact: 09/01/2008
Data Release Frequency: No Update Planned

BRS: Biennial Reporting System

The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 03/01/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 62

Source: EPA/NTIS
Telephone: 800-424-9346
Last EDR Contact: 09/01/2011
Next Scheduled EDR Contact: 12/12/2011
Data Release Frequency: Biennially

UIC: Underground Injection Wells Listing

A listing of underground injection wells.

Date of Government Version: 08/23/2011
Date Data Arrived at EDR: 08/25/2011
Date Made Active in Reports: 09/14/2011
Number of Days to Update: 20

Source: Department of Ecology
Telephone: 360-407-6143
Last EDR Contact: 08/25/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Varies

WA MANIFEST: Hazardous Waste Manifest Data

Hazardous waste manifest information.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 06/30/2011
Date Made Active in Reports: 07/27/2011
Number of Days to Update: 27

Source: Department of Ecology
Telephone: N/A
Last EDR Contact: 07/22/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Annually

DRYCLEANERS: Drycleaner List

A listing of registered drycleaners who registered with the Department of Ecology (using the SIC code of 7215 and 7216) as hazardous waste generators.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 06/30/2011
Date Made Active in Reports: 07/27/2011
Number of Days to Update: 27

Source: Department of Ecology
Telephone: 360-407-6732
Last EDR Contact: 07/22/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Varies

NPDES: Water Quality Permit System Data

A listing of permitted wastewater facilities.

Date of Government Version: 08/01/2011
Date Data Arrived at EDR: 08/03/2011
Date Made Active in Reports: 08/31/2011
Number of Days to Update: 28

Source: Department of Ecology
Telephone: 360-407-6073
Last EDR Contact: 07/25/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Quarterly

AIRS (EMI): Washington Emissions Data System

Emissions inventory data.

Date of Government Version: 12/31/2009
Date Data Arrived at EDR: 01/11/2011
Date Made Active in Reports: 02/23/2011
Number of Days to Update: 43

Source: Department of Ecology
Telephone: 360-407-6040
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Annually

INACTIVE DRYCLEANERS: Inactive Drycleaners
A listing of inactive drycleaner facility locations.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 06/30/2011
Date Made Active in Reports: 07/27/2011
Number of Days to Update: 27
Source: Department of Ecology
Telephone: 360-407-6732
Last EDR Contact: 07/22/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Annually

INDIAN RESERV: Indian Reservations
This map layer portrays Indian administered lands of the United States that have any area equal to or greater than 640 acres.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 12/08/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 34
Source: USGS
Telephone: 202-208-3710
Last EDR Contact: 07/22/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Semi-Annually

SCRD DRYCLEANERS: State Coalition for Remediation of Drycleaners Listing
The State Coalition for Remediation of Drycleaners was established in 1998, with support from the U.S. EPA Office of Superfund Remediation and Technology Innovation. It is comprised of representatives of states with established drycleaner remediation programs. Currently the member states are Alabama, Connecticut, Florida, Illinois, Kansas, Minnesota, Missouri, North Carolina, Oregon, South Carolina, Tennessee, Texas, and Wisconsin.

Date of Government Version: 03/07/2011
Date Data Arrived at EDR: 03/09/2011
Date Made Active in Reports: 05/02/2011
Number of Days to Update: 54
Source: Environmental Protection Agency
Telephone: 615-532-8599
Last EDR Contact: 07/15/2011
Next Scheduled EDR Contact: 11/07/2011
Data Release Frequency: Varies

FINANCIAL ASSURANCE 3: Financial Assurance Information Listing
A listing of financial assurance information for solid waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 02/01/2001
Date Data Arrived at EDR: 03/06/2007
Date Made Active in Reports: 04/19/2007
Number of Days to Update: 44
Source: Department of Ecology
Telephone: 360-407-6136
Last EDR Contact: 08/23/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Varies

FINANCIAL ASSURANCE 1: Financial Assurance Information Listing
A listing of financial assurance information for underground storage tank facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 08/24/2011
Date Data Arrived at EDR: 08/26/2011
Date Made Active in Reports: 09/21/2011
Number of Days to Update: 26
Source: Department of Ecology
Telephone: 360-586-1060
Last EDR Contact: 08/22/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Varies

FINANCIAL ASSURANCE 2: Financial Assurance Information Listing
A listing of financial assurance information for hazardous waste facilities. Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

Date of Government Version: 05/23/2011
Date Data Arrived at EDR: 05/26/2011
Date Made Active in Reports: 06/27/2011
Number of Days to Update: 32
Source: Department of Ecology
Telephone: 360-407-6754
Last EDR Contact: 08/22/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Varies

COAL ASH: Coal Ash Disposal Site Listing
A listing of coal ash disposal site locations.

Date of Government Version: 06/29/2009
Date Data Arrived at EDR: 07/02/2009
Date Made Active in Reports: 07/08/2009
Number of Days to Update: 6
Source: Department of Ecology
Telephone: 360-407-6933
Last EDR Contact: 09/12/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

COAL ASH DOE: Sleam-Electric Plan Operation Data
A listing of power plants that store ash in surface ponds.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 08/07/2009
Date Made Active in Reports: 10/22/2009
Number of Days to Update: 76
Source: Department of Energy
Telephone: 202-586-8719
Last EDR Contact: 07/18/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: Varies

COAL ASH EPA: Coal Combustion Residues Surface Impoundments List
A listing of coal combustion residues surface impoundments with high hazard potential ratings.

Date of Government Version: 08/17/2010
Date Data Arrived at EDR: 01/03/2011
Date Made Active in Reports: 03/21/2011
Number of Days to Update: 77
Source: Environmental Protection Agency
Telephone: N/A
Last EDR Contact: 09/16/2011
Next Scheduled EDR Contact: 12/26/2011
Data Release Frequency: Varies

PCB TRANSFORMER: PCB Transformer Registration Database
The database of PCB transformer registrations that includes all PCB registration submittals.

Date of Government Version: 01/01/2008
Date Data Arrived at EDR: 02/18/2009
Date Made Active in Reports: 05/29/2009
Number of Days to Update: 100
Source: Environmental Protection Agency
Telephone: 202-566-0517
Last EDR Contact: 08/05/2011
Next Scheduled EDR Contact: 11/14/2011
Data Release Frequency: Varies

FEDLAND: Federal and Indian Lands
Federally and Indian administrated lands of the United States. Lands included are administrated by: Army Corps of Engineers, Bureau of Reclamation, National Wild and Scenic River, National Wildlife Refuge, Public Domain Land, Wilderness, Wilderness Study Area, Wildlife Management Area, Bureau of Indian Affairs, Bureau of Land Management, Department of Justice, Forest Service, Fish and Wildlife Service, National Park Service.

Date of Government Version: 12/31/2005
Date Data Arrived at EDR: 02/06/2006
Date Made Active in Reports: 01/11/2007
Number of Days to Update: 339
Source: U.S. Geological Survey
Telephone: 888-275-8747
Last EDR Contact: 07/22/2011
Next Scheduled EDR Contact: 10/31/2011
Data Release Frequency: N/A

EDR PROPRIETARY RECORDS

EDR Proprietary Records

Manufactured Gas Plants: EDR Proprietary Manufactured Gas Plants
The EDR Proprietary Manufactured Gas Plant Database includes records of coal gas plants (manufactured gas plants) compiled by EDR's researchers. Manufactured gas sites were used in the United States from the 1800's to 1950's to produce a gas that could be distributed and used as fuel. These plants used whale oil, rosin, coal, or a mixture of coal, oil, and water that also produced a significant amount of waste. Many of the byproducts of the gas production, such as coal tar (oily waste containing volatile and non-volatile chemicals), sludges, oils and other compounds are potentially hazardous to human health and the environment. The byproduct from this process was frequently disposed of directly at the plant site and can remain or spread slowly, serving as a continuous source of soil and groundwater contamination.

Date of Government Version: N/A
Date Data Arrived at EDR: N/A
Date Made Active in Reports: N/A
Number of Days to Update: N/A

Source: EDR, Inc.
Telephone: N/A
Last EDR Contact: N/A
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

COUNTY RECORDS

KING COUNTY:

Abandoned Landfill Study in King County
The King County Abandoned Landfill Survey was conducted from October through December 1984 by the Health Department's Environmental Health Division at the request of the King County Council. The primary objective of the survey was to determine if any public health problems existed at the predetermined 24 sites.

Date of Government Version: 04/30/1985
Date Data Arrived at EDR: 11/07/1994
Date Made Active in Reports: N/A
Number of Days to Update: 0

Source: Seattle-King County Department of Public Health
Telephone: 206-296-4785
Last EDR Contact: 10/21/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SEATTLE COUNTY:

Abandoned Landfill Study in the City of Seattle
The Seattle Abandoned Landfill Survey was conducted in June and July of 1984 by the Health Department's Environmental Health Division at the request of the Mayor's Office. The primary objective of the survey was to determine if any public health problems existed at the predetermined 12 sites.

Date of Government Version: 07/30/1984
Date Data Arrived at EDR: 11/07/1994
Date Made Active in Reports: N/A
Number of Days to Update: 0

Source: Seattle - King County Department of Public Health
Telephone: 206-296-4785
Last EDR Contact: 10/21/1994
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SEATTLE/KING COUNTY:

Seattle - King County Abandoned Landfill Toxicity / Hazard Assessment Project
This report presents the Seattle-King County Health Department's follow-up investigation of two city owned and four county owned abandoned landfills which was conducted from February to December 1986.

Date of Government Version: 12/31/1986
Date Data Arrived at EDR: 08/18/1995
Date Made Active in Reports: 09/20/1995
Number of Days to Update: 33

Source: Department of Public Health
Telephone: 206-296-4785
Last EDR Contact: 08/14/1995
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

SNOHOMISH COUNTY:

Solid Waste Sites of Record at Snohomish Health District
Solid waste disposal and/or utilization sites in Snohomish County.

Date of Government Version: 03/08/2011
Date Data Arrived at EDR: 03/31/2011
Date Made Active in Reports: 05/06/2011
Number of Days to Update: 36

Source: Snohomish Health District
Telephone: 206-339-5250
Last EDR Contact: 06/30/2011
Next Scheduled EDR Contact: 10/10/2011
Data Release Frequency: Semi-Annually

TACOMA/PIERCE COUNTY:

Closed Landfill Survey

Following numerous requests for information about closed dumpsites and landfills in Pierce County, the Tacoma-Pierce County Health Department decided to conduct a study on the matter. The aim of the study was to evaluate public health risks associated with the closed dumpsites and landfills, and to determine the need, if any, for further investigations of a more detailed nature. The sites represent all of the known dumpsites and landfills closed after 1950.

Date of Government Version: 09/01/2002
Date Data Arrived at EDR: 03/24/2003
Date Made Active in Reports: 05/14/2003
Number of Days to Update: 51

Source: Tacoma-Pierce County Health Department
Telephone: 206-591-6500
Last EDR Contact: 03/19/2003
Next Scheduled EDR Contact: N/A
Data Release Frequency: No Update Planned

OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

CT MANIFEST: Hazardous Waste Manifest Data

Facility and manifest data. Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a tsd facility.

Date of Government Version: 12/31/2007
Date Data Arrived at EDR: 08/26/2009
Date Made Active in Reports: 09/11/2009
Number of Days to Update: 16

Source: Department of Environmental Protection
Telephone: 860-424-3375
Last EDR Contact: 08/26/2011
Next Scheduled EDR Contact: 12/05/2011
Data Release Frequency: Annually

NY MANIFEST: Facility and Manifest Data

Manifest is a document that lists and tracks hazardous waste from the generator through transporters to a TSD facility.

Date of Government Version: 08/01/2011
Date Data Arrived at EDR: 08/09/2011
Date Made Active in Reports: 09/16/2011
Number of Days to Update: 38

Source: Department of Environmental Conservation
Telephone: 518-402-8651
Last EDR Contact: 08/09/2011
Next Scheduled EDR Contact: 11/21/2011
Data Release Frequency: Annually

PA MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2008
Date Data Arrived at EDR: 12/01/2009
Date Made Active in Reports: 12/14/2009
Number of Days to Update: 13

Source: Department of Environmental Protection
Telephone: 717-783-8990
Last EDR Contact: 09/26/2011
Next Scheduled EDR Contact: 01/09/2012
Data Release Frequency: Annually

WI MANIFEST: Manifest Information

Hazardous waste manifest information.

Date of Government Version: 12/31/2010
Date Data Arrived at EDR: 08/19/2011
Date Made Active in Reports: 09/15/2011
Number of Days to Update: 27

Source: Department of Natural Resources
Telephone: N/A
Last EDR Contact: 09/19/2011
Next Scheduled EDR Contact: 01/02/2012
Data Release Frequency: Annually

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

Oil/Gas Pipelines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines.

Electric Power Transmission Line Data
Source: Rextag Strategies Corp.
Telephone: (281) 769-2247
U.S. Electric Transmission and Power Plants Systems Digital GIS Data

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

AHA Hospitals:
Source: American Hospital Association, Inc.
Telephone: 312-280-5991
The database includes a listing of hospitals based on the American Hospital Association's annual survey of hospitals.

Medical Centers: Provider of Services Listing
Source: Centers for Medicare & Medicaid Services
Telephone: 410-786-3000
A listing of hospitals with Medicare provider number, produced by Centers of Medicare & Medicaid Services, a federal agency within the U.S. Department of Health and Human Services.

Nursing Homes
Source: National Institutes of Health
Telephone: 301-594-6248
Information on Medicare and Medicaid certified nursing homes in the United States.

Public Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on elementary and secondary public education in the United States. It is a comprehensive, annual, national statistical database of all public elementary and secondary schools and school districts, which contains data that are comparable across all states.

Private Schools
Source: National Center for Education Statistics
Telephone: 202-502-7300
The National Center for Education Statistics' primary database on private school locations in the United States.

Daycare Centers: Daycare Center Listing
Source: Department of Social & Health Services
Telephone: 253-383-1735

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

GOVERNMENT RECORDS SEARCHED / DATA CURRENCY TRACKING

STREET AND ADDRESS INFORMATION

GEOCHECK ®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

CORNET BAY MARINA
200 CORNET BAY ROAD
OAK HARBOR, WA 98277

TARGET PROPERTY COORDINATES

Latitude (North):	48.39740 - 48° 23' 50.6''
Longitude (West):	122.6267 - 122° 37' 36.1''
Universal Tranverse Mercator:	Zone 10
UTM X (Meters):	527632.8
UTM Y (Meters):	5360319.5
Elevation:	11 ft. above sea level

USGS TOPOGRAPHIC MAP

Target Property Map:	48122-D6 DECEPTION PASS, WA
Most Recent Revision:	1980
East Map:	48122-D5 ANACORTES SOUTH, WA
Most Recent Revision:	1980

EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

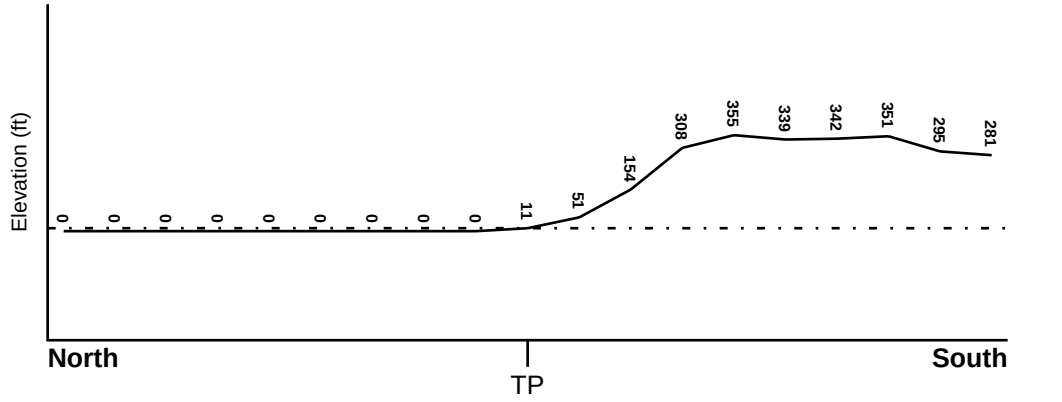
TOPOGRAPHIC INFORMATION

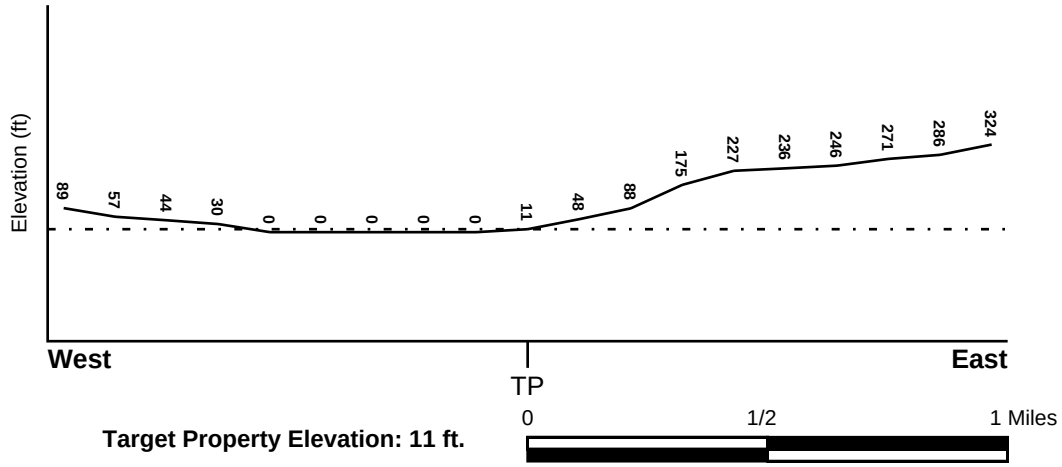
Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

TARGET PROPERTY TOPOGRAPHY

General Topographic Gradient: General NNW

SURROUNDING TOPOGRAPHY: ELEVATION PROFILES





Target Property Elevation: 11 ft.

Source: Topography has been determined from the USGS 7.5' Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Flood Electronic Data
ISLAND, WA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property: 53029C - FEMA DFIRM Flood data

Additional Panels in search area: 5301510225C - FEMA Q3 Flood data

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Data Coverage
DECEPTION PASS	YES - refer to the Overview Map and Detail Map

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:

Search Radius:	1.25 miles
Status:	Not found

AQUIFLOW®

Search Radius: 1.000 Mile.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
Not Reported		

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

ROCK STRATIGRAPHIC UNIT

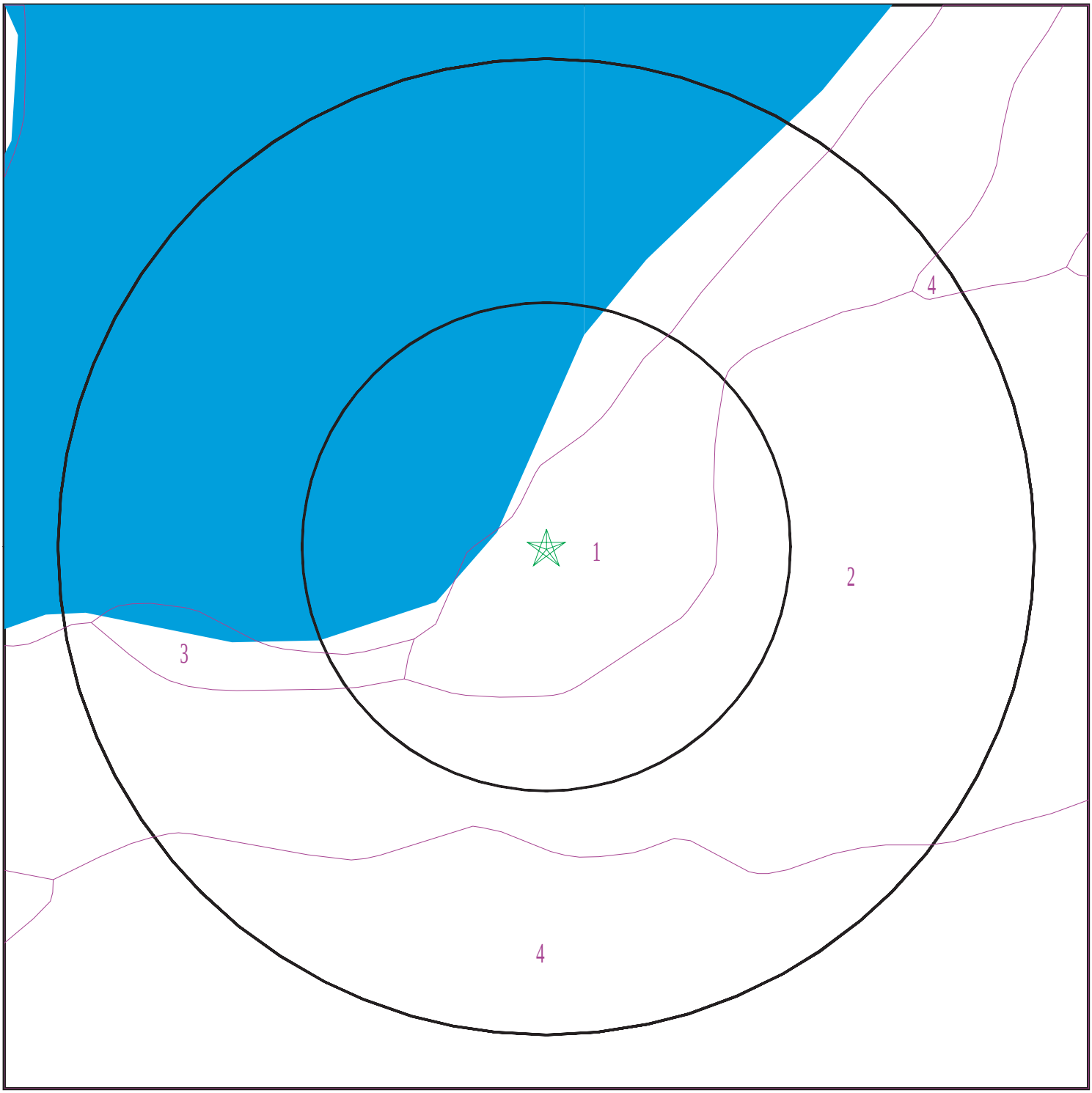
Era:	Mesozoic
System:	Cretaceous
Series:	Upper Mesozoic
Code:	uMze*(decoded above as Era, System & Series)*

GEOLOGIC AGE IDENTIFICATION

Category: Eugeosynclinal Deposits

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

SSURGO SOIL MAP - 3175182.2s



Target Property
SSURGO Soil
Water

0 1/16 1/8 1/4 Miles

N

SITE NAME:	Cornet Bay Marina	CLIENT:	Kennedy/Jenks Consultants
ADDRESS:	200 Cornet Bay Road Oak Harbor WA 98277	CONTACT:	Gregg Bryden
LAT/LONG:	48.3974 / 122.6267	INQUIRY #:	3175182.2s
		DATE:	September 28, 2011 5:42 pm

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. The following information is based on Soil Conservation Service SSURGO data.

Soil Map ID: 1

Soil Component Name: Norma

Soil Surface Texture: silt loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	silt loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.1
2	7 inches	20 inches	loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.1
3	20 inches	40 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.1
4	40 inches	59 inches	very gravelly sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.1

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Soil Map ID: 2

Soil Component Name: Whidbey

Soil Surface Texture: gravelly sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Moderately well drained

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 69 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILIS, Gravels, Clean Gravels, Well-graded gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.6
2	7 inches	29 inches	very gravelly sandy loam	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILIS, Gravels, Clean Gravels, Well-graded gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.6
3	29 inches	59 inches	very gravelly loamy sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILIS, Gravels, Clean Gravels, Well-graded gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 0.42 Min: 0.01	Max: 6.5 Min: 5.6

Soil Map ID: 3

Soil Component Name: Tidal marsh

Soil Surface Texture: fine sandy loam

Hydrologic Group: Class D - Very slow infiltration rates. Soils are clayey, have a high water table, or are shallow to an impervious layer.

Soil Drainage Class: Very poorly drained

Hydric Status: All hydric

Corrosion Potential - Uncoated Steel: High

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information

	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	5 inches	fine sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 5 Min: 3.6
2	5 inches	59 inches	stratified fine sandy loam to silty clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	FINE-GRAINED SOILS, Silts and Clays (liquid limit less than 50%), Lean Clay	Max: 14 Min: 4	Max: 5 Min: 3.6

Soil Map ID: 4

Soil Component Name: Hoypus

Soil Surface Texture: gravelly loamy sand

Hydrologic Group: Class A - High infiltration rates. Soils are deep, well drained to excessively drained sands and gravels.

Soil Drainage Class: Somewhat excessively drained

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

Hydric Status: Not hydric

Corrosion Potential - Uncoated Steel: Moderate

Depth to Bedrock Min: > 0 inches

Depth to Watertable Min: > 0 inches

Soil Layer Information							
	Boundary			Classification		Saturated hydraulic conductivity micro m/sec	Soil Reaction (pH)
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil		
1	0 inches	7 inches	gravelly loamy sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 7.3 Min: 6.1
2	7 inches	18 inches	gravelly loamy sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 7.3 Min: 6.1
3	18 inches	59 inches	very gravelly coarse sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COARSE-GRAINED SOILS, Gravels, Clean gravels, Poorly Graded Gravel. COARSE-GRAINED SOILS, Gravels, Gravels with fines, Silty Gravel.	Max: 705 Min: 141	Max: 7.3 Min: 6.1

LOCAL / REGIONAL WATER AGENCY RECORDS

EDR Local/Regional Water Agency records provide water well information to assist the environmental professional in assessing sources that may impact ground water flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

GEOCHECK® - PHYSICAL SETTING SOURCE SUMMARY

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
4	USGS3260028	1/8 - 1/4 Mile ESE
6	USGS3260040	1/4 - 1/2 Mile NE
7	USGS3260011	1/4 - 1/2 Mile SSE
8	USGS3260000	1/4 - 1/2 Mile SW
9	USGS3260003	1/2 - 1 Mile SW
10	USGS3259995	1/2 - 1 Mile SW
11	USGS3260041	1/2 - 1 Mile SSE

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

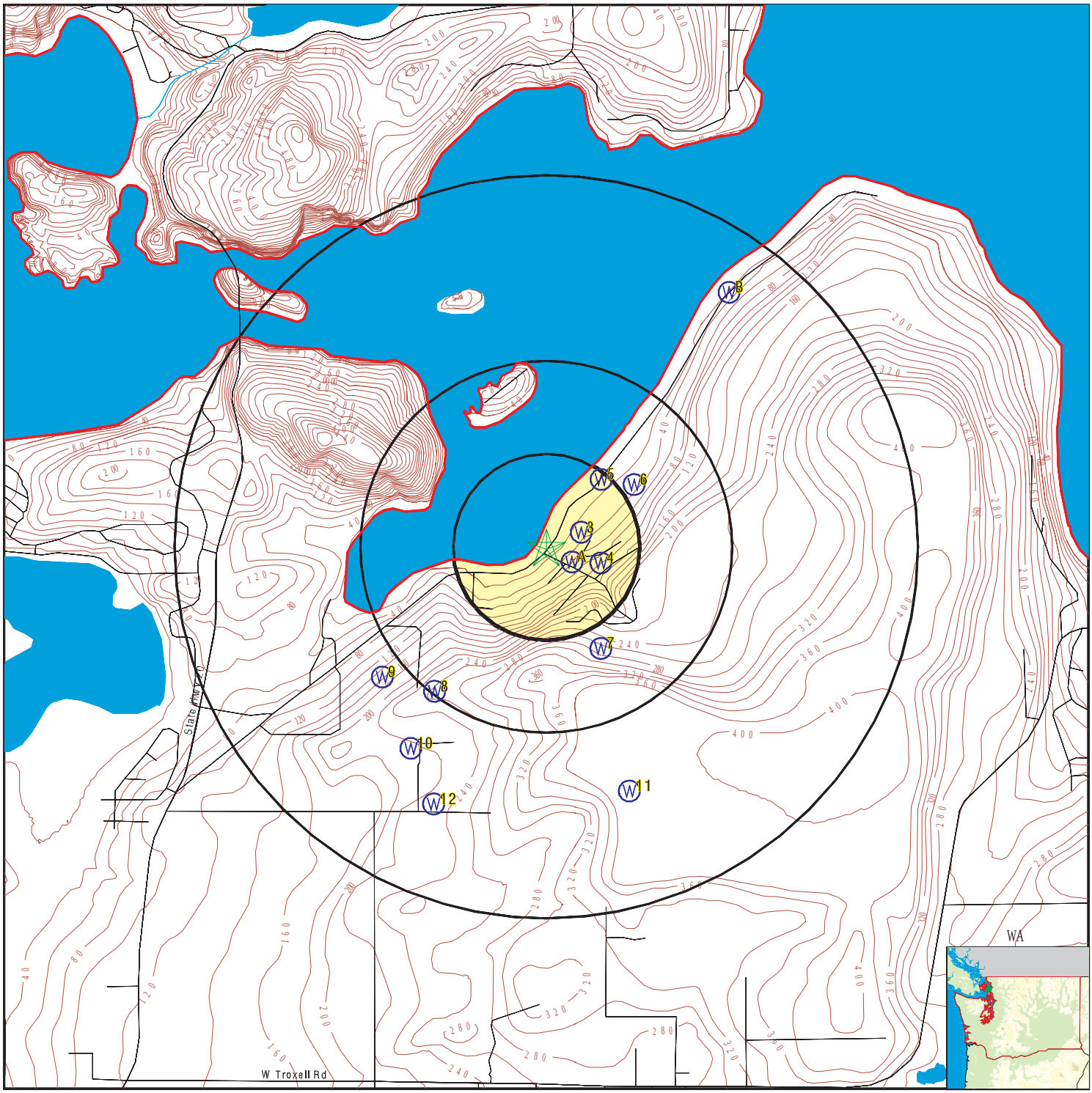
MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
A1	WA7000000018219	0 - 1/8 Mile ESE
A2	WA7000000018218	0 - 1/8 Mile ESE
3	WA7000000018225	0 - 1/8 Mile ENE
5	WA7000000018230	1/8 - 1/4 Mile NE
12	WA7000000018203	1/2 - 1 Mile SSW
B13	WA7000000018268	1/2 - 1 Mile NE
B14	WA7000000018269	1/2 - 1 Mile NE

PHYSICAL SETTING SOURCE MAP - 3175182.2s



- County Boundary
- Major Roads
- Contour Lines
- Earthquake epicenter, Richter 5 or greater
- Water Wells
- Public Water Supply Wells
- Cluster of Multiple Icons

- Groundwater Flow Direction
- GI Indeterminate Groundwater Flow at Location
- GV Groundwater Flow Varies at Location
- HD Closest Hydrogeological Data

SITE NAME:	Cornet Bay Marina	CLIENT:	Kennedy/Jenks Consultants
ADDRESS:	200 Cornet Bay Road Oak Harbor WA 98277	CONTACT:	Gregg Bryden
		INQUIRY #:	3175182.2s
LAT/LONG:	48.3974 / 122.6267	DATE:	September 28, 2011 5:42 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation

	Database	EDR ID Number
A1 **ESE** **0 - 1/8 Mile** **Higher**	**WA WELLS**	**WA7000000018219**

Objectid:	6440	Pwsid:	15020
Srcnum:	03	Pwssrcid:	1502003
Systemname:	CORNET BAY HEIGHTS WATER ASSN INC		
Systemgrou:	A		
Systemtype:	Comm	Region:	NW
County:	ISLAND	Smaid:	Not Reported
Ftrespopul:	99	Resconnect:	47
Totalconne:	47	Srcname:	WELL #3 (AGA552)
Srctype:	W	Srcusecode:	P
Srcwelldep:	137	Township:	34
Range:	01E	Section:	36
Qtrqtrsect:	NWNE		
Longitude:	-122.625268		
Latitude:	48.396852		
Latlongmet:	GPS	Srcsuscept:	H
Srcvulnioc:	M	Srcvulnvoc:	M
Srcvulnsoc:	L	Doewelltag:	AGA552
Srctot6mo:	220	Srctot1yr:	310
Srctot5yr:	700	Srctot10yr:	980
Protection:	CFR	Pricontact:	3606752419
Priconta 1:	Not Reported	Priconta 2:	5055 ALTO LN
Priconta 3:	OAK HARBOR	Priconta 4:	WA
Priconta 5:	98277		
Priconta 6:	Not Reported		
Pwseffecti:	01/01/1970	Srceffecti:	04/15/1994
Internalon:	N	Site id:	WA7000000018219

	Database	EDR ID Number
A2 **ESE** **0 - 1/8 Mile** **Higher**	**WA WELLS**	**WA7000000018218**

Objectid:	6439	Pwsid:	15020
Srcnum:	01	Pwssrcid:	1502001
Systemname:	CORNET BAY HEIGHTS WATER ASSN INC		
Systemgrou:	A		
Systemtype:	Comm	Region:	NW
County:	ISLAND	Smaid:	Not Reported
Ftrespopul:	99	Resconnect:	47
Totalconne:	47	Srcname:	WELL #1 (AGA553)
Srctype:	W	Srcusecode:	P
Srcwelldep:	173	Township:	34
Range:	01E	Section:	36
Qtrqtrsect:	NWNE		
Longitude:	-122.625115		
Latitude:	48.396763		
Latlongmet:	GPS	Srcsuscept:	M
Srcvulnioc:	L	Srcvulnvoc:	M
Srcvulnsoc:	L	Doewelltag:	AAG553
Srctot6mo:	220	Srctot1yr:	310

Srctot5yr:	700	Srctot10yr:	980
Protection:	CFR	Pricontact:	3606752419
Priconta 1:	Not Reported	Priconta 2:	5055 ALTO LN
Priconta 3:	OAK HARBOR	Priconta 4:	WA
Priconta 5:	98277		
Priconta 6:	Not Reported		
Pwseffecti:	01/01/1970	Srceffecti:	01/01/1970
Internalon:	N	Site id:	WA7000000018218

3
ENE **WA WELLS** **WA7000000018225**
0 - 1/8 Mile
Higher

Objectid:	6441	Pwsid:	15025
Srcnum:	01	Pwssrcid:	1502501
Systemname:	DECEPTION PASS MARINA INC		
Systemgrou:	A		
Systemtype:	TNC	Region:	NW
County:	ISLAND	Smaid:	Not Reported
Ftrespopul:	6	Resconnect:	8
Totalconne:	9	Srcname:	AGA528 CORNET BAY
Srctype:	W	Srcusecode:	P
Srcwelldep:	56	Township:	34
Range:	01E	Section:	36
Qtrqtrsect:	Not Reported		
Longitude:	-122.62465		
Latitude:	48.397966		
Latlongmet:	GPS	Srcsuscept:	H
Srcvulnioc:	H	Srcvulnvoc:	H
Srcvulnsoc:	U	Doewelltag:	AGA528
Srctot6mo:	0	Srctot1yr:	0
Srctot5yr:	0	Srctot10yr:	0
Protection:	Assigned	Pricontact:	3606755411
Priconta 1:	Not Reported	Priconta 2:	200 W CORNET BAY RD
Priconta 3:	OAK HARBOR	Priconta 4:	WA
Priconta 5:	98277		
Priconta 6:	Not Reported		
Pwseffecti:	01/01/1970	Srceffecti:	01/01/1970
Internalon:	N	Site id:	WA7000000018225

4
ESE **FED USGS** **USGS3260028**
1/8 - 1/4 Mile
Higher

Agency cd:	USGS	Site no:	482349122372001
Site name:	34N/01E-36B03		
Latitude:	482349	EDR Site id:	USGS3260028
Longitude:	1223720	Dec lat:	48.39676896
Dec lon:	-122.62350335	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	53
State:	53	County:	029
Country:	US	Land net:	NW NE S36 T34N R01E W
Location map:	DECEPTION PASS	Map scale:	62500

Altitude:	65		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Puget Sound. Washington. Area = 2550 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19610510
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	138	Hole depth:	Not Reported
Source of depth data:	other		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1964-09-24
Water quality data end date:	1978-05-11	Water quality data count:	3
Ground water data begin date:	1965-01-08	Ground water data end date:	1965-01-08
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1965-01-08	37.6	

5
NE
1/8 - 1/4 Mile
Higher

WA WELLS **WA7000000018230**

Objectid:	16643	Pwsid:	SP212
Srcnum:	02	Pwssrcid:	SP21202
Systemname:	DECEPTION PASS SP - CORNET BAY		
Systemgrou:	A		
Systemtype:	TNC	Region:	NW
County:	ISLAND	Smaid:	Not Reported
Ftrespopul:	0	Resconnect:	0
Totalconne:	2	Srcname:	AGA529 CORNET BAY WELL 2
Srctype:	W	Srcusecode:	P
Srcwelldep:	225	Township:	34
Range:	01E	Section:	25
Qtrqtrsect:	SWSE		
Longitude:	-122.623481		
Latitude:	48.400024		
Latlongmet:	GPS	Srcsuscept:	H
Srcvulnioc:	H	Srcvulnvoc:	H
Srcvulnsoc:	U	Doewelltag:	AGA529
Srctot6mo:	0	Srctot1yr:	0
Srctot5yr:	0	Srctot10yr:	0
Protection:	Assigned	Pricontact:	3607559231
Priconta 1:	WA STATE PARKS NW REGION HQ	Priconta 2:	220 N WALNUT
Priconta 3:	BURLINGTON	Priconta 4:	WA
Priconta 5:	98233		
Priconta 6:	dave.johnson@parks.wa.gov		
Pwseffecti:	04/01/1990	Srceffecti:	09/09/1997
Internalon:	N	Site id:	WA7000000018230

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID
Direction
Distance
Elevation | Database | EDR ID Number

6
NE
1/4 - 1/2 Mile
Higher

FED USGS **USGS3260040**

Agency cd:	USGS	Site no:	482400122371301
Site name:	34N/01E-25Q01		
Latitude:	482400	EDR Site id:	USGS3260040
Longitude:	1223713	Dec lat:	48.39982459
Dec lon:	-122.62155888	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	53
State:	53	County:	029
Country:	US	Land net:	SW SE S25 T34N R01E W
Location map:	DECEPTION PASS	Map scale:	62500
Altitude:	425		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Puget Sound. Washington. Area = 2550 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19010101
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	185	Hole depth:	Not Reported
Source of depth data:	driller		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1972-09-01	Ground water data end date:	1972-09-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1972-09-01	75	

7
SSE
1/4 - 1/2 Mile
Higher

FED USGS **USGS3260011**

Agency cd:	USGS	Site no:	482337122372001
Site name:	34N/01E-36B01		
Latitude:	482337	EDR Site id:	USGS3260011
Longitude:	1223720	Dec lat:	48.39343556
Dec lon:	-122.62350329	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	53
State:	53	County:	029
Country:	US	Land net:	NW NE S36 T34N R01E W
Location map:	DECEPTION PASS	Map scale:	62500
Altitude:	65		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Puget Sound. Washington. Area = 2550 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19610529
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	174	Hole depth:	Not Reported
Source of depth data:	driller		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1965-01-08	Ground water data end date:	1965-01-08
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1965-01-08	38.6	

8
SW
1/4 - 1/2 Mile
Higher

FED USGS USGS3260000

Agency cd:	USGS	Site no:	482331122375501
Site name:	34N/01E-36E01		
Latitude:	482331	EDR Site id:	USGS3260000
Longitude:	1223755	Dec lat:	48.39176879
Dec lon:	-122.63322592	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	53
State:	53	County:	029
Country:	US	Land net:	SW NW S36 T34N R01E W
Location map:	DECEPTION PASS	Map scale:	62500
Altitude:	50		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Puget Sound. Washington. Area = 2550 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19750820
Date inventoried:	Not Reported	Mean greenwich time offset:	PST

Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	196	Hole depth:	Not Reported
Source of depth data:	other		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1978-05-11
Water quality data end date:	1978-05-11	Water quality data count:	1
Ground water data begin date:	1975-08-20	Ground water data end date:	1975-08-20
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1975-08-20	129	

9
SW
1/2 - 1 Mile
Higher

FED USGS **USGS3260003**

Agency cd:	USGS	Site no:	482333122380601
Site name:	34N/01E-36E02		
Latitude:	482333	EDR Site id:	USGS3260003
Longitude:	1223806	Dec lat:	48.39232433
Dec lon:	-122.63628163	Coor meth:	M
Coor accr:	F	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	53
State:	53	County:	029
Country:	US	Land net:	SW NW S36 T34N R01E W
Location map:	DECEPTION PASS	Map scale:	62500
Altitude:	225		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	10		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Puget Sound. Washington. Area = 2550 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19780401
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	142	Hole depth:	142
Source of depth data:	other		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	1980-04-09
Water quality data end date:	1980-08-06	Water quality data count:	2
Ground water data begin date:	1978-04-01	Ground water data end date:	1978-04-01
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1978-04-01	133	

10
SW
1/2 - 1 Mile
Higher

FED USGS **USGS3259995**

Agency cd:	USGS	Site no:	482323122380001
Site name:	34N/01E-36M02		
Latitude:	482323	EDR Site id:	USGS3259995
Longitude:	1223800	Dec lat:	48.38954651
Dec lon:	-122.63461483	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	53
State:	53	County:	029
Country:	US	Land net:	NW SW S36 T34N R01E W
Location map:	DECEPTION PASS	Map scale:	62500
Altitude:	420		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Puget Sound. Washington. Area = 2550 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19741015
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	134	Hole depth:	Not Reported
Source of depth data:	driller		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1974-10-15	Ground water data end date:	1974-10-15
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1974-10-15	121	

11
SSE
1/2 - 1 Mile
Higher

FED USGS **USGS3260041**

Agency cd:	USGS	Site no:	482400122371401
Site name:	34N/01E-35K02		
Latitude:	482317	EDR Site id:	USGS3260041
Longitude:	1223714	Dec lat:	48.38787992
Dec lon:	-122.62183644	Coor meth:	M
Coor accr:	S	Latlong datum:	NAD27
Dec latlong datum:	NAD83	District:	53
State:	53	County:	029
Country:	US	Land net:	NW SE S35 T34N R01E W
Location map:	DECEPTION PASS	Map scale:	62500
Altitude:	425		
Altitude method:	Interpolated from topographic map		
Altitude accuracy:	2		
Altitude datum:	National Geodetic Vertical Datum of 1929		
Hydrologic:	Puget Sound. Washington. Area = 2550 sq.mi.		
Topographic:	Not Reported		
Site type:	Ground-water other than Spring	Date construction:	19681217
Date inventoried:	Not Reported	Mean greenwich time offset:	PST
Local standard time flag:	Y		
Type of ground water site:	Single well, other than collector or Ranney type		
Aquifer Type:	Not Reported		
Aquifer:	Not Reported		
Well depth:	178	Hole depth:	Not Reported
Source of depth data:	driller		
Project number:	Not Reported		
Real time data flag:	0	Daily flow data begin date:	0000-00-00
Daily flow data end date:	0000-00-00	Daily flow data count:	0
Peak flow data begin date:	0000-00-00	Peak flow data end date:	0000-00-00
Peak flow data count:	0	Water quality data begin date:	0000-00-00
Water quality data end date:	0000-00-00	Water quality data count:	0
Ground water data begin date:	1968-12-17	Ground water data end date:	1968-12-17
Ground water data count:	1		

Ground-water levels, Number of Measurements: 1

Date	Feet below Surface	Feet to Sealevel
1968-12-17	90	

12
SSW
1/2 - 1 Mile
Higher

WA WELLS **WA7000000018203**

Objectid:	7529	Pwsid:	24088
Srcnum:	01	Pwssrcid:	2408801
Systemname:	DUCKEN RD WATER COMMUNITY		
Systemgrou:	B		
Systemtype:	GRPB	Region:	NW
County:	ISLAND	Smaid:	Not Reported
Ftrespopul:	7	Resconnect:	4
Totalconne:	4	Srcname:	WELL 01 APH142
Srctype:	W	Srcusecode:	P
Srcwelldep:	0	Township:	34
Range:	01E	Section:	36
Qtrqtrsect:	NWSW		
Longitude:	-122.633283		
Latitude:	48.387377		
Latlongmet:	GPS	Srcsuscept:	H
Srcvulnioc:	H	Srcvulnvoc:	H
Srcvulnsoc:	U	Doewelltag:	APH142
Srctot6mo:	0	Srctot1yr:	0

Srctot5yr:	0	Srctot10yr:	0
Protection:	Assigned	Pricontact:	3606753432
Priconta 1:	Not Reported	Priconta 2:	318 DUCKEN RD
Priconta 3:	OAK HARBOR	Priconta 4:	WA
Priconta 5:	98277		
Priconta 6:	Not Reported		
Pwseffecti:	01/01/1970	Srceffecti:	01/01/1970
Internalon:	N	Site id:	WA7000000018203

B13
NE
1/2 - 1 Mile
Higher

WA WELLS **WA7000000018268**

Objectid:	17162	Pwsid:	02433
Srcnum:	01	Pwssrcid:	0243301
Systemname:	BEN URE ISLAND COMMUNITY		
Systemgrou:	B		
Systemtype:	GRPB	Region:	NW
County:	ISLAND	Smaid:	Not Reported
Ftrespopul:	12	Resconnect:	4
Totalconne:	4	Srcname:	WELL #1
Srctype:	W	Srcusecode:	E
Srcwelldep:	185	Township:	34
Range:	01	Section:	25
Qtrqtrsect:	NESW		
Longitude:	-122.616		
Latitude:	48.40731		
Latlongmet:	QtrQtrSection	Srcsuscept:	U
Srcvulnioc:	Not Reported	Srcvulnvoc:	Not Reported
Srcvulnsoc:	Not Reported	Doewelltag:	Not Reported
Srctot6mo:	0	Srctot1yr:	0
Srctot5yr:	0	Srctot10yr:	0
Protection:	Assigned	Pricontact:	3602402000
Priconta 1:	Not Reported	Priconta 2:	PO BOX 2782
Priconta 3:	OAK HARBOR	Priconta 4:	WA
Priconta 5:	98277		
Priconta 6:	Not Reported		
Pwseffecti:	06/02/1993	Srceffecti:	06/02/1993
Internalon:	N	Site id:	WA7000000018268

B14
NE
1/2 - 1 Mile
Higher

WA WELLS **WA7000000018269**

Objectid:	17163	Pwsid:	02433
Srcnum:	02	Pwssrcid:	0243302
Systemname:	BEN URE ISLAND COMMUNITY		
Systemgrou:	B		
Systemtype:	GRPB	Region:	NW
County:	ISLAND	Smaid:	Not Reported
Ftrespopul:	12	Resconnect:	4
Totalconne:	4	Srcname:	WELL #2 AKY790

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Srctype:	W	Srcusecode:	P
Srcwelldep:	286	Township:	34
Range:	01	Section:	25
Qtrqtrsect:	NESW		
Longitude:	-122.616		
Latitude:	48.40731		
Latlongmet:	QtrQtrSection	Srcsuscept:	N
Srcvulnioc:	U	Srcvulnvoc:	H
Srcvulnsoc:	X	Doewelltag:	AKY790
Srctot6mo:	0	Srctot1yr:	0
Srctot5yr:	0	Srctot10yr:	0
Protection:	Assigned	Pricontact:	3602402000
Priconta 1:	Not Reported	Priconta 2:	PO BOX 2782
Priconta 3:	OAK HARBOR	Priconta 4:	WA
Priconta 5:	98277		
Priconta 6:	Not Reported		
Pwseffecti:	06/02/1993	Srceffecti:	06/02/1993
Internalon:	N	Site id:	WA7000000018269

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for ISLAND County: 3

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

Federal Area Radon Information for Zip Code: 98277

Number of sites tested: 4

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.075 pCi/L	100%	0%	0%
Living Area - 2nd Floor	Not Reported	Not Reported	Not Reported	Not Reported
Basement	0.100 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

TOPOGRAPHIC INFORMATION

USGS 7.5' Digital Elevation Model (DEM)
Source: United States Geologic Survey
EDR acquired the USGS 7.5' Digital Elevation Model in 2002 and updated it in 2006. The 7.5 minute DEM corresponds to the USGS 1:24,000- and 1:25,000-scale topographic quadrangle maps. The DEM provides elevation data with consistent elevation units and projection.

Scanned Digital USGS 7.5' Topographic Map (DRG)
Source: United States Geologic Survey
A digital raster graphic (DRG) is a scanned image of a U.S. Geological Survey topographic map. The map images are made by scanning published paper maps on high-resolution scanners. The raster image is georeferenced and fit to the Universal Transverse Mercator (UTM) projection.

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 2003 & 2011 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 2002 and 2005 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW^{R} Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services
The U.S. Department of Agriculture's (USDA) Natural Resources Conservation Service (NRCS) leads the national Conservation Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

SSURGO: Soil Survey Geographic Database
Source: Department of Agriculture, Natural Resources Conservation Services (NRCS)
Telephone: 800-672-5559
SSURGO is the most detailed level of mapping done by the Natural Resources Conservation Services, mapping scales generally range from 1:12,000 to 1:63,360. Field mapping methods using national standards are used to construct the soil maps in the Soil Survey Geographic (SSURGO) database. SSURGO digitizing duplicates the original soil survey maps. This level of mapping is designed for use by landowners, townships and county natural resource planning and management.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

LOCAL / REGIONAL WATER AGENCY RECORDS

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-564-3750
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: USGS National Water Inventory System (NWIS)
This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on wells, springs, and other sources of groundwater.

STATE RECORDS

Water Wells
Source: Department of Health
Telephone: 360-236-3148
Group A and B well locations.

Water Well Listing
Source: Public Utility District
Telephone: 206-779-7656
A listing of water well locations in Kitsap County.

OTHER STATE DATABASE INFORMATION

Oil and Gas Well Listing
Source: Department of Natural Resources
Telephone: 360-902-1445
Locations that represent oil and gas test well sites in Washington State from 1890 to present.

RADON

Area Radon Information
Source: USGS
Telephone: 703-356-4020
The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones
Source: EPA
Telephone: 703-356-4020
Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Airport Landing Facilities: Private and public use landing facilities
Source: Federal Aviation Administration, 800-457-6656

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STREET AND ADDRESS INFORMATION

Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

Inquiry Number: 3175182.3
September 28, 2011

Certified Sanborn® Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

Certified Sanborn® Map Report

9/28/11

Site Name:
Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

EDR Inquiry # 3175182.3

Client Name:
Kennedy/Jenks Consultants
200 SW Market Street
Portland, OR 97201

Contact: Gregg Bryden

EDR® Environmental Data Resources Inc

The complete Sanborn Library collection has been searched by EDR, and fire insurance maps covering the target property location provided by Kennedy/Jenks Consultants were identified for the years listed below. The certified Sanborn Library search results in this report can be authenticated by visiting www.edrnet.com/sanborn and entering the certification number. Only Environmental Data Resources Inc. (EDR) is authorized to grant rights for commercial reproduction of maps by Sanborn Library LLC, the copyright holder for the collection.

Certified Sanborn Results:

Site Name: Cornet Bay Marina
Address: 200 Cornet Bay Road
City, State, Zip: Oak Harbor, WA 98277
Cross Street:
P.O. # NA
Project: Ecology - Cornet Bay
Certification # 9797-4F56-8CBF

Sanborn® Library search results
Certification # 9797-4F56-8CBF

UNMAPPED PROPERTY

This report certifies that the complete holdings of the Sanborn Library, LLC collection have been searched based on client supplied target property information, and fire insurance maps covering the target property were not found.

The Sanborn Library includes more than 1.2 million Sanborn fire insurance maps, which track historical property usage in approximately 12,000 American cities and towns. Collections searched:

- ✓ Library of Congress
- ✓ University Publications of America
- ✓ EDR Private Collection

The Sanborn Library LLC Since 1866™

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Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

Inquiry Number: 3175182.4
September 28, 2011

EDR Historical Topographic Map Report

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Historical Topographic Map Report

Environmental Data Resources, Inc.s (EDR) Historical Topographic Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topographic Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the early 1900s.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

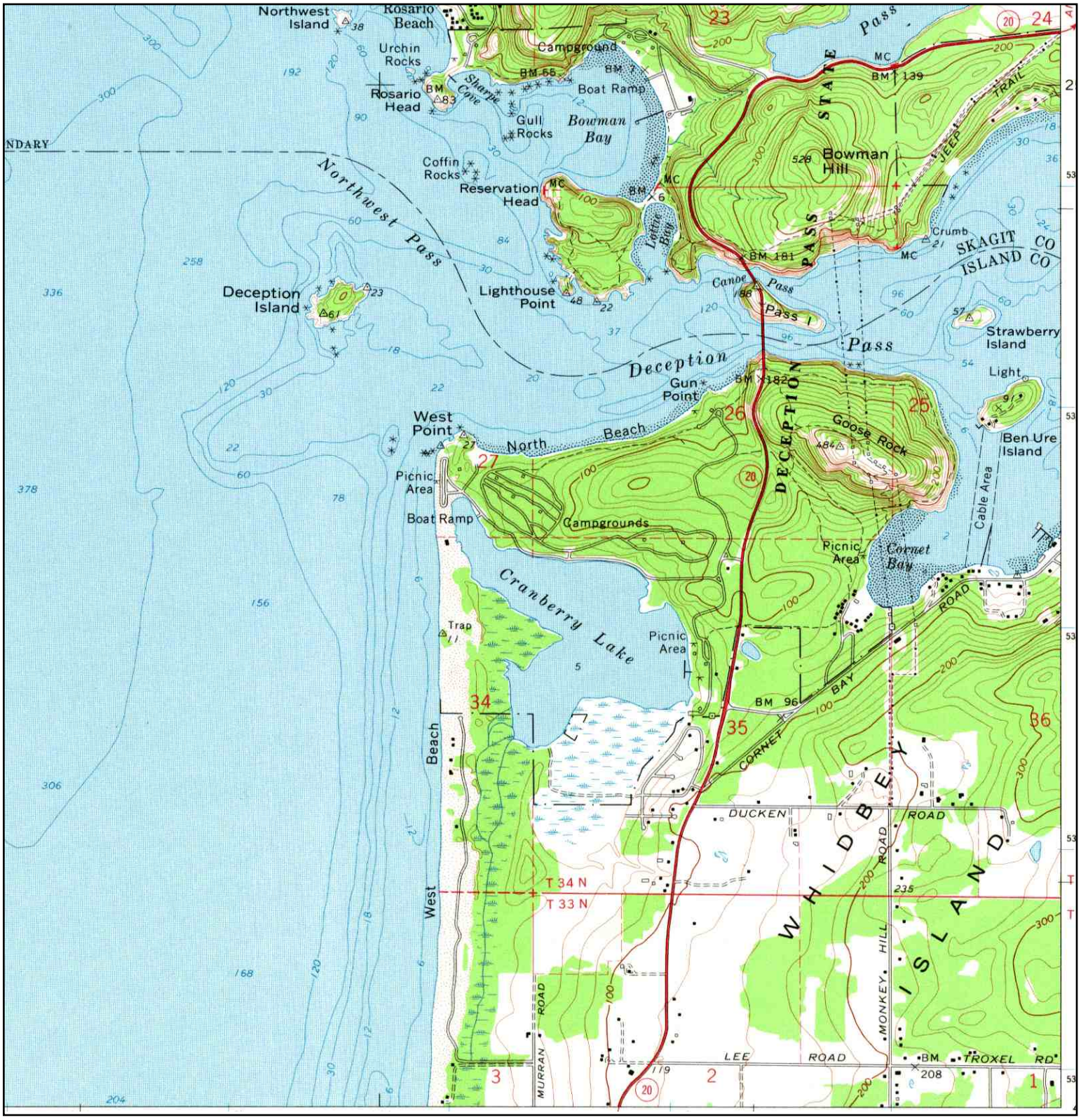
Historical Topographic Map

N	TARGET QUAD NAME: DECEPTION PASS MAP YEAR: 1943 SERIES: 15 SCALE: 1:50000	SITE NAME: Cornet Bay Marina ADDRESS: 200 Cornet Bay Road Oak Harbor, WA 98277 LAT/LONG: 48.3974 / -122.6267	CLIENT: Kennedy/Jenks Consultants CONTACT: Gregg Bryden INQUIRY#: 3175182.4 RESEARCH DATE: 09/28/2011

Historical Topographic Map

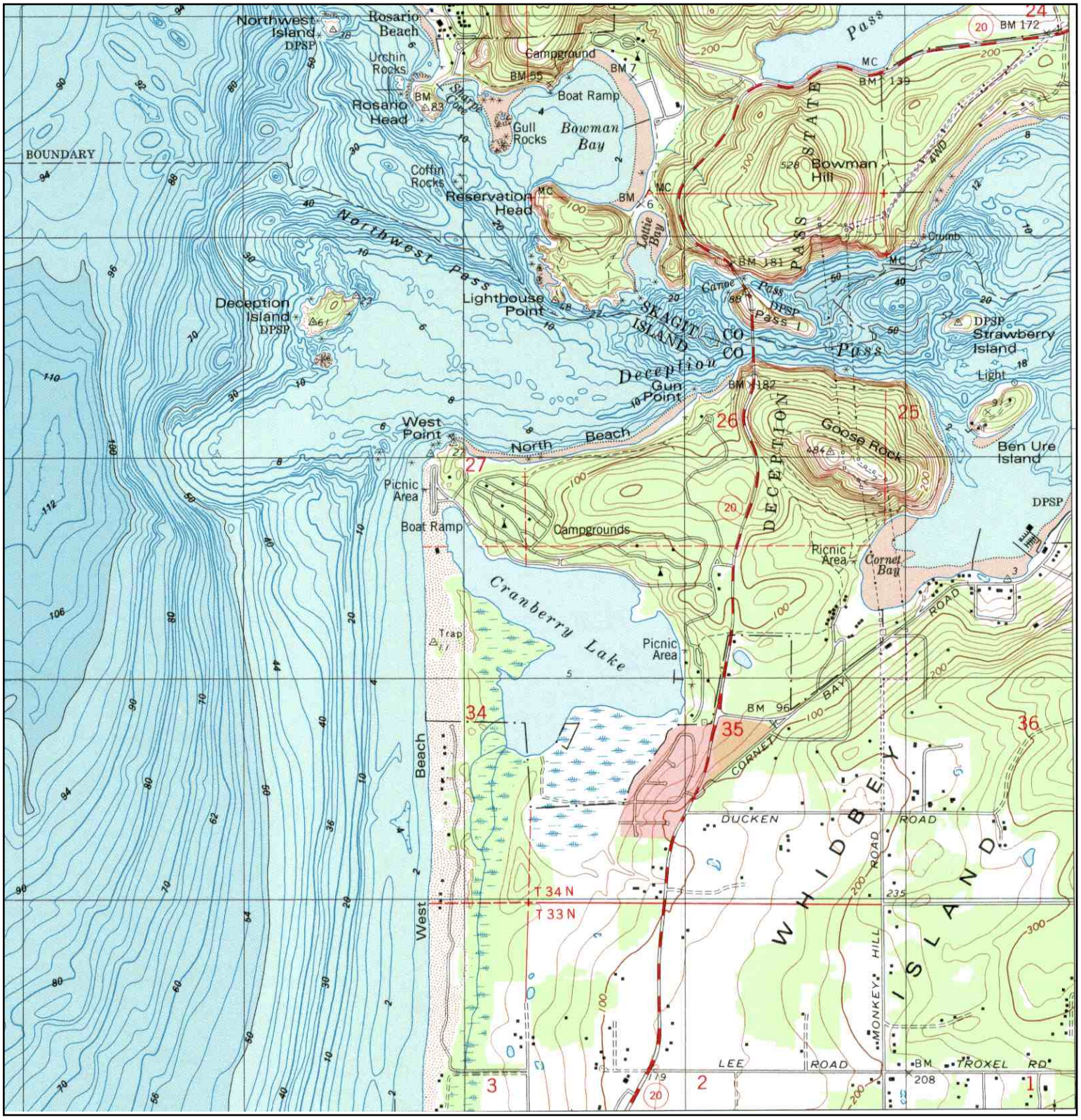
N	TARGET QUAD NAME: DECEPTION PASS MAP YEAR: 1951 SERIES: 15 SCALE: 1:62500	SITE NAME: Cornet Bay Marina ADDRESS: 200 Cornet Bay Road Oak Harbor, WA 98277 LAT/LONG: 48.3974 / -122.6267	CLIENT: Kennedy/Jenks Consultants CONTACT: Gregg Bryden INQUIRY#: 3175182.4 RESEARCH DATE: 09/28/2011

Historical Topographic Map



N	TARGET QUAD NAME: DECEPTION PASS MAP YEAR: 1978 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Cornet Bay Marina ADDRESS: 200 Cornet Bay Road Oak Harbor, WA 98277 LAT/LONG: 48.3974 / -122.6267	CLIENT: Kennedy/Jenks Consultants CONTACT: Gregg Bryden INQUIRY#: 3175182.4 RESEARCH DATE: 09/28/2011

Historical Topographic Map

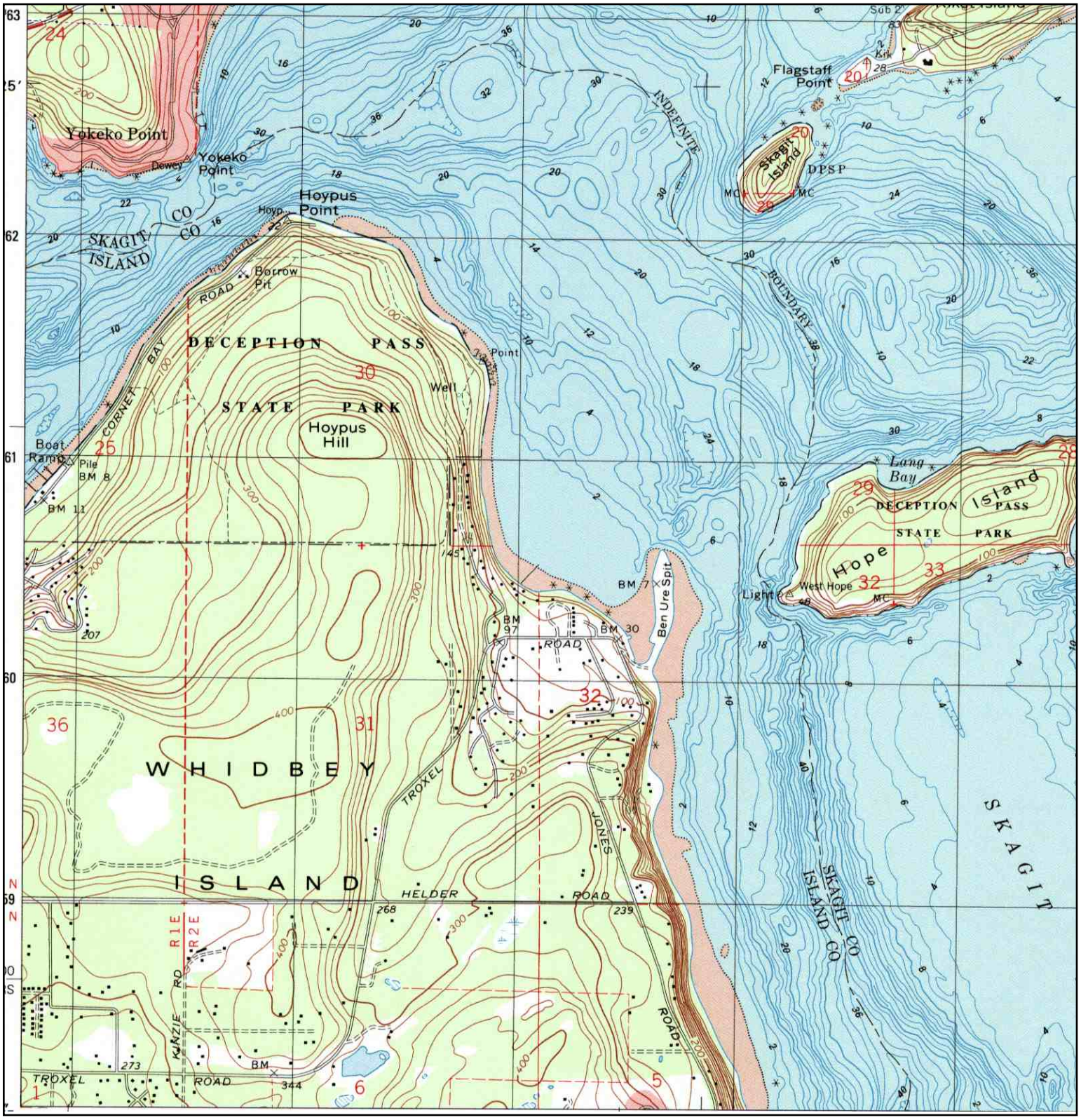


N	TARGET QUAD NAME: DECEPTION PASS MAP YEAR: 1998 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Cornet Bay Marina ADDRESS: 200 Cornet Bay Road Oak Harbor, WA 98277 LAT/LONG: 48.3974 / -122.6267	CLIENT: Kennedy/Jenks Consultants CONTACT: Gregg Bryden INQUIRY#: 3175182.4 RESEARCH DATE: 09/28/2011

Historical Topographic Map

N	ADJOINING QUAD NAME: ANACORTES SOUTH MAP YEAR: 1978 SERIES: 7.5 SCALE: 1:24000	SITE NAME: Cornet Bay Marina ADDRESS: 200 Cornet Bay Road Oak Harbor, WA 98277 LAT/LONG: 48.3974 / -122.6267	CLIENT: Kennedy/Jenks Consultants CONTACT: Gregg Bryden INQUIRY#: 3175182.4 RESEARCH DATE: 09/28/2011

Historical Topographic Map



N	ADJOINING QUAD		
	NAME: ANACORTES SOUTH	SITE NAME: Cornet Bay Marina	CLIENT: Kennedy/Jenks Consultants
	MAP YEAR: 1998	ADDRESS: 200 Cornet Bay Road	CONTACT: Gregg Bryden
		Oak Harbor, WA 98277	INQUIRY#: 3175182.4
	SERIES: 7.5	LAT/LONG: 48.3974 / -122.6267	RESEARCH DATE: 09/28/2011
	SCALE: 1:24000		

Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

Inquiry Number: 3175182.5
September 29, 2011

The EDR Aerial Photo Decade Package

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

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with any questions or comments.

Date EDR Searched Historical Sources:

Aerial Photography September 29, 2011

Target Property:

200 Cornet Bay Road

Oak Harbor, WA 98277

Year	***Scale***	***Details***	***Source***
1941	Aerial Photograph. Scale: 1"=750'	Panel #: 48122-D6, Deception Pass, WA;/Flight Date: June 27, 1941	EDR
1968	Aerial Photograph. Scale: 1"=1000'	Panel #: 48122-D6, Deception Pass, WA;/Flight Date: September 04, 1968	EDR
1972	Aerial Photograph. Scale: 1"=1000'	Panel #: 48122-D6, Deception Pass, WA;/Flight Date: May 04, 1972	EDR
1981	Aerial Photograph. Scale: 1"=1000'	Panel #: 48122-D6, Deception Pass, WA;/Flight Date: August 17, 1981	EDR
1998	Aerial Photograph. Scale: 1"=604'	Panel #: 48122-D6, Deception Pass, WA;/Composite DOQQ - acquisition dates: July 16, 1998,July 21, 1998	EDR
2005	Aerial Photograph. Scale: 1"=604'	Panel #: 48122-D6, Deception Pass, WA;/Flight Year: 2005	EDR
2006	Aerial Photograph. Scale: 1"=604'	Panel #: 48122-D6, Deception Pass, WA;/Flight Year: 2006	EDR

INQUIRY #: 3175182.5

YEAR: 1941

= 750'

N


INQUIRY #: 3175182.5
YEAR: 1968
= 1000'
N


INQUIRY #: 3175182.5
YEAR: 1972
= 1000'
N


INQUIRY #: 3175182.5
YEAR: 1981
= 1000'
N


INQUIRY #: 3175182.5
YEAR: 1998
= 604'
N


INQUIRY #: 3175182.5
YEAR: 2005
= 604'
N


INQUIRY #: 3175182.5
YEAR: 2006
= 604'
N

Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

Inquiry Number: 3175182.6
October 03, 2011

The EDR-City Directory Abstract

Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR CITY DIRECTORY ABSTRACT

Environmental Data Resources, Inc.'s (EDR) City Directory Abstract is a screening report designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's City Directory Abstract includes a search and abstract of available city directory data. For each address, the directory lists the name of the corresponding occupant at five year intervals.

NO COVERAGE

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Cornet Bay Marina
200 Cornet Bay Road
Oak Harbor, WA 98277

Inquiry Number: 3175182.7
September 28, 2011

EDR Building Permit Report

Target Property and Adjoining Properties

Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
800.352.0050
www.edrnet.com

EDR Building Permit Report: Search Documentation

9/28/11

Site Name:
Cornet Bay Marina
200 Cornet Bay
Oak Harbor, WA 98277

EDR Inquiry # 3175182.7

Client Name:
Kennedy/Jenks Consultants
200 SW Market Street
Portland, OR 97201

Contact: Gregg Bryden

Search Documentation

DATA GAP

The complete collection of Building Permit data available to EDR has been searched, and as of 9/28/11, EDR does not have access to building permits in the city where your target property is located (Oak Harbor, WA).

EDR BUILDING PERMIT REPORT

About This Report

The EDR Building Permit Report provides a practical and efficient method to search building department records for indications of environmental conditions. Generated via a search of municipal building permit records gathered from more than 1,600 cities nationwide, this report will assist you in meeting the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05), or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

Building permit data can be used to identify current and/or former operations and structures/features of environmental concern. The data can provide information on a target property and adjoining properties such as the presence of underground storage tanks, pump islands, sumps, drywells, etc., as well as information regarding water, sewer, natural gas, electrical connection dates, and current/former septic tanks.

ASTM and EPA Requirements

ASTM E 1527-05 lists building department records as a "standard historical source," as detailed in § 8.3.4.7: "Building Department Records – The term building department records means those records of the local government in which the property is located indicating permission of the local government to construct, alter, or demolish improvements on the property." ASTM also states that "Uses in the area surrounding the property shall be identified in the report, but this task is required only to the extent that this information is revealed in the course of researching the property itself."

EPA's Standards and Practices for All Appropriate Inquires (AAI) states: "§312.24: Reviews of historical sources of information. (a) Historical documents and records must be reviewed for the purposes of achieving the objectives and performance factors of §312.20(e) and (f). Historical documents and records may include, but are not limited to, aerial photographs, fire insurance maps, building department records, chain of title documents, and land use records."

Methodology

EDR has developed the EDR Building Permit Report through our partnership with BuildFax, the nation's largest repository of building department records. BuildFax collects, updates, and manages building department records from local municipal governments. The database now includes 30 million permits, on more than 10 million properties across 1,600 cities in the United States.

The EDR Building Permit Report comprises local municipal building permit records, gathered directly from local jurisdictions, including both target property and adjoining properties. Years of coverage vary by municipality. Data reported includes (where available): date of permit, permit type, permit number, status, valuation, contractor company, contractor name, and description.

Incoming permit data is checked at seven stages in a regimented quality control process, from initial data source interview, to data preparation, through final auditing. To ensure the building department is accurate, each of the seven quality control stages contains, on average, 15 additional quality checks, resulting in a process of approximately 105 quality control "touch points."

For more information about the EDR Building Permit Report, please contact your EDR Account Executive at (800) 352-0050.

EDR® Environmental Data Resources Inc

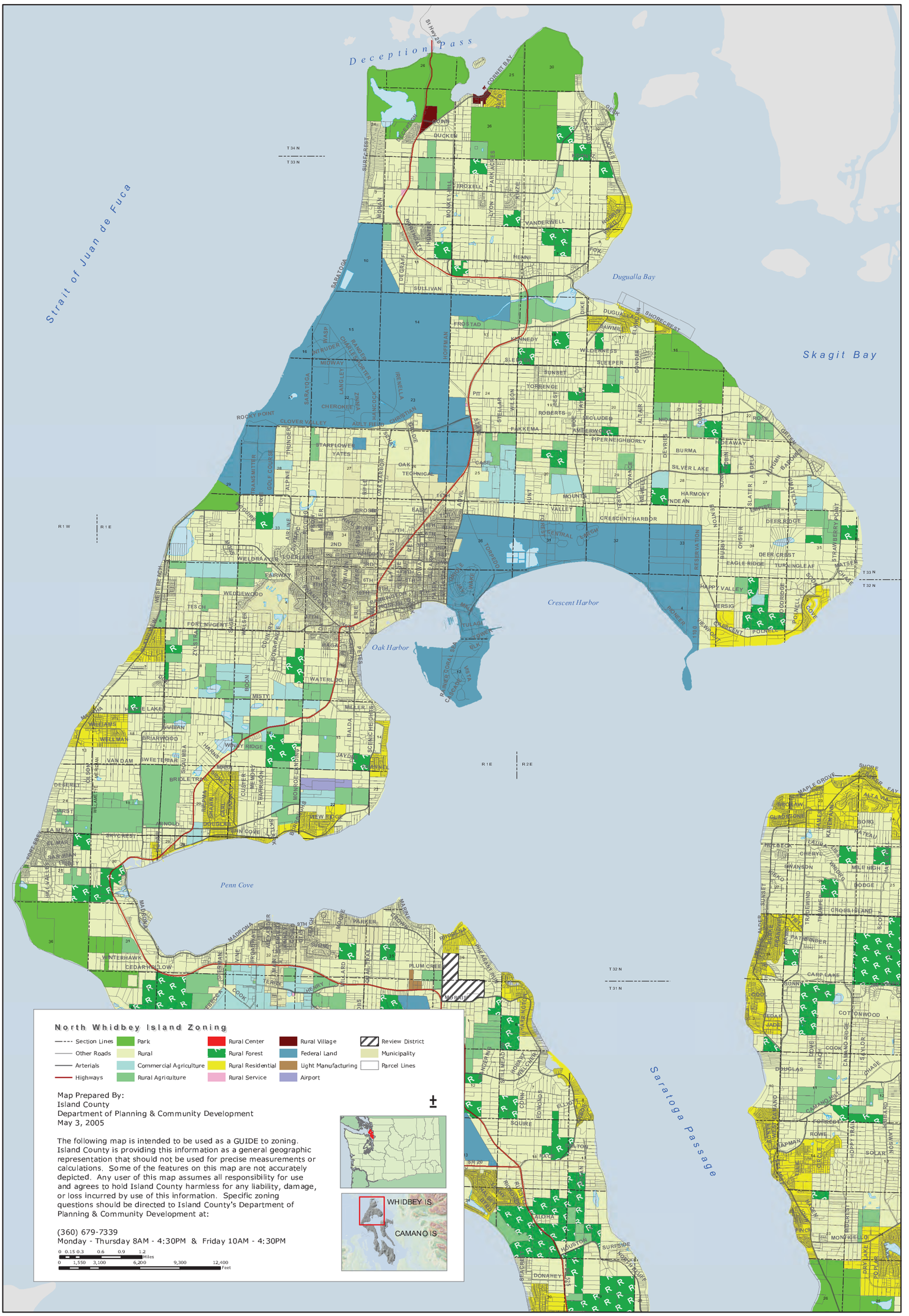
BUILD FAX PROPERTY HISTORY

Appendix C

Island County Zoning Map

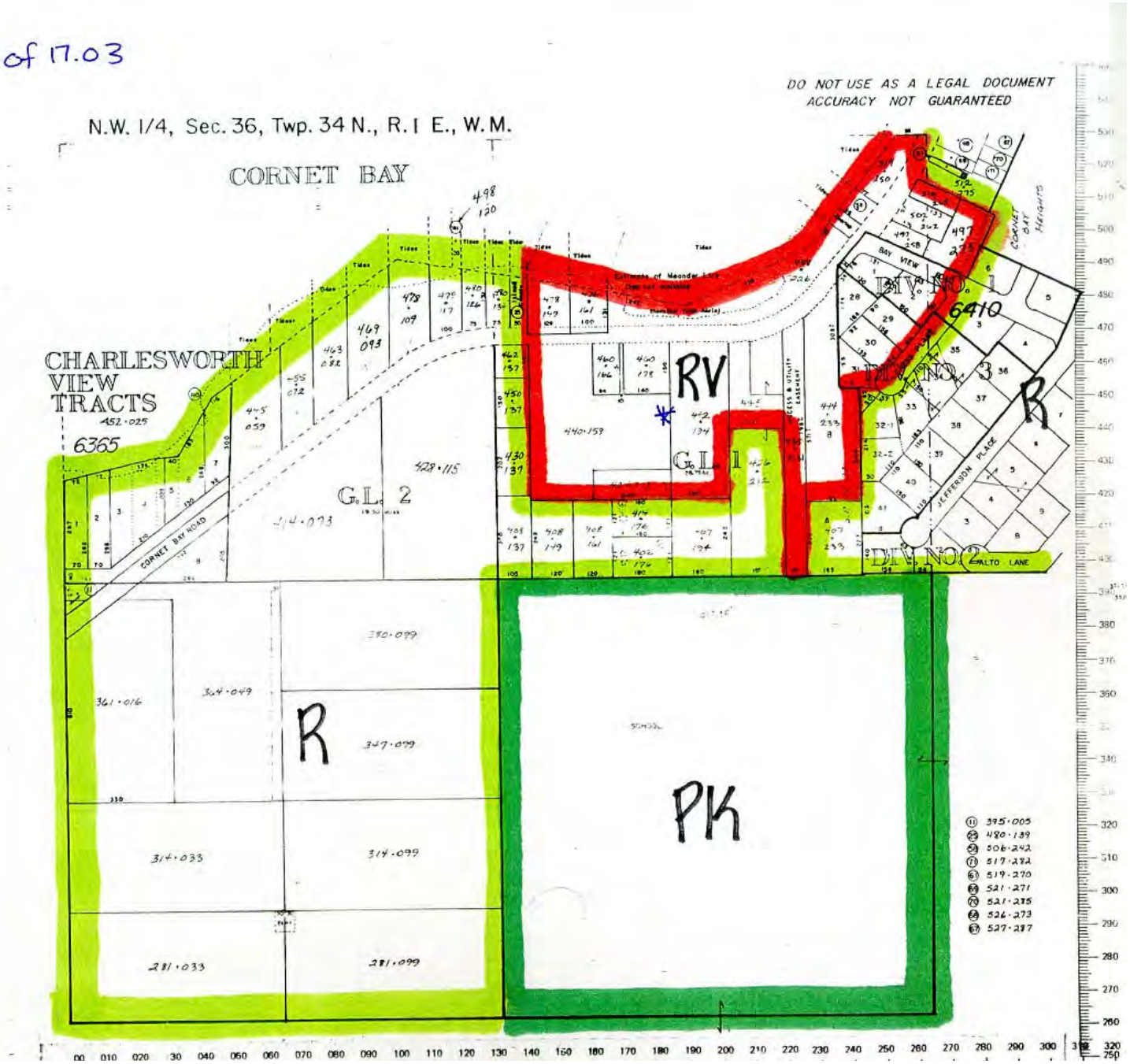
ISLAND COUNTY
Department of Planning & Community Development

NORTH WHIDBEY ZONING
Last Updated - March 2005



File Source: ICDPCD D:\Maps\11x17\nw_zoning11x17_2.mxd

* See appendix A of 17.03
Coronet Bay



Appendix D

Field Documentation

Boring and Well Logs

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B01
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 10.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5		0	KJ-B1-4	Granular Bentonite	0		SM	**Silty SAND with gravel** Tan / light brown, silty sand with ~20% subangular to rounded gravel, moderately soft, slightly moist, no odor, no sheen.
SS	1.5		5			0		CL/ ML	**Sandy silty CLAY with gravel** Dark brown, silty clay mixed with sand and gravel, moderately soft, moist, no odor, no sheen.
SS	3		10		▽	0.1		CL/ ML	**Silty CLAY** Gray, silty clay, moderately stiff but softer below ~9 feet, high plasticity, moist, no odor, no sheen.
			15					ML	**SILT** Gray, silt with ~5-10% clay, sand, and gravel, moderately soft, moderately high plasticity, wet, no odor, no sheen.
								CL/ ML	**Silty CLAY** Gray, silty clay, minor gravel, moderately stiff, moderately high plasticity, wet, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B02
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 9.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5							SM	**Silty SAND with gravel** Brown/tan, silty sand with gravel, moderately dense, slightly moist, no odor, no sheen.
						0.1		ML	**SILT with sand** Tan-gray, silt with 15-20% fine sand and minor gravel, moderately soft, medium plasticity, moist, no odor, no sheen.
SS	3		5			6.8		ML/ CL	**Clayey SILT with sand** Gray, clayey silt with 10-15% fine sand and minor gravel, moderately soft, moderately high plasticity, moist, no odor, no sheen.
								CL/ ML	**Silty CLAY** Gray, silty clay, moderately stiff, high plasticity, moist to wet, no odor, no sheen.
SS	4		10	KJ-B2-12		13.7		SP	**Poorly graded SAND** Gray, medium sand with 5-10% silt, moderately dense, wet, medium odor, no sheen.
			15			0.1		ML	**SILT with sand** Gray, silt with 5-10% fine sand, some clay, minor gravel, moderately soft, moderately high plasticity, wet, no odor, no sheen.

NOTES

1. Reconnaissance groundwater sample KJ-B2-RGW collected. Screen set approximately 10-15 feet bgs.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B03	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2					0.3		SM	**Silty SAND with gravel** Tan-gray, silty sand with gravel fill, loose, slightly moist, no odor, no sheen.
			5					SP/ SM	**Poorly graded SAND with silt and gravel** Brown to gray-brown, sand with ~20% silt and 10-20% rounded to subrounded gravel, some woody material in upper foot, moderately dense, moist to wet, medium odor, no sheen.
SS	3.5					0.4			
				KJ-B3-9		5.5		SP/ SM	**Poorly graded SAND with silt** Gray, fine to medium sand with up to ~15% silt, moderately dense, wet, medium odor, no sheen.
			10						
SS	4					0.5		SM	**Silty SAND with gravel** Gray, sand with up to 40% silt, 10-15% gravel, moderately dense, wet, no odor, no sheen.
						0.1		CL/ ML	**Silty CLAY** Gray, silty clay with 5-10% gravel, stiff, high plasticity, wet, no odor, no sheen.
			15						

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B04
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5					0		SM	**Silty SAND with gravel** Tan/gray, silty sand with gravel fill, no odor, no sheen.
								ML	**SILT** Brown, silt with fine woody material, moderately soft, moist, no odor, no sheen.
			5					SM	**Silty SAND with gravel** Greenish-gray to gray, silty medium to fine sand with 5-15% gravel, moderately dense, moist, no odor, no sheen.
SS	4.5			KJ-B4-6		0.6			
						0.4		ML/ CL	**Sandy clayey SILT with gravel** Gray, clayey silt with 5-15% gravel and 5-15% sand, some 1-2" thick sandy interbeds locally, stiff to very stiff, moist to wet, wet in sandy interbeds, no odor, no sheen.
SS	4.5		10			0			
			15					CL/ ML	**Silty CLAY** Gray, silty clay with minor gravel, very stiff, high plasticity, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B05	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.5	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3		0	KJ-B5-4		0		SM	**Silty SAND with gravel** Tan/brown, silty sand with gravel fill, no odor, no sheen.
			5					SP/ SM	**Poorly graded SAND with silt and gravel** Dark gray, sand with 10-20% silt and 10-20% gravel overall, texture varies locally, moderately dense, moist, no odor, no sheen.
SS	3.5					0		ML/ CL	**Clayey SILT with sand** Gray to brown, clayey silt with 10-15% sand and 5-10% gravel, 1-2" interbeds of fine sand below ~8 feet, moderately stiff, moist, no odor, no sheen.
						0		CL/ ML	**Silty CLAY** Gray, silty clay, minor gravel, very stiff, high plasticity, moist to wet, no odor, no sheen.
			10					SP/ SM	**Poorly graded SAND with silt** Gray, medium sand with 10-15% silt, moderately dense, wet, no odor, no sheen.
SS	5					0		CL/ ML	**Silty CLAY** Gray, silty clay, minor gravel, very stiff, high plasticity, moist to wet, no odor, no sheen.
			15						

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B06
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 6.5	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5		0			0		SM	**Silty SAND with gravel** Tan/brown, silty sand with gravel fill, no odor, no sheen.
			5			0		SP/ SM	**Poorly graded SAND with silt and gravel** Greenish-gray, sand with 10-20% silt and 10-20% gravel, texture varies locally, moderately dense to moderately loose, moist to wet, no odor, no sheen.
SS	4			KJ-B6-7		0			
			10			0		CL/ ML	**Silty CLAY with gravel** Gray, silty clay with 10-15% gravel, 5-10% fine sand, stiff, moderately high plasticity, moist, no odor, no sheen.
SS	4.5					0			
			15						

NOTES

1. Reconnaissance groundwater sample KJ-B6-RGW collected. Screen set approximately 10-15 feet bgs.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B07
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 10.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 20 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	1.5		0			0		SM	**Silty SAND with gravel** Tan/brown, silt, sand, and gravel fill, no odor, no sheen.
SS	3		5	KJ-B7-8		0.1		CL/ ML	**Silty CLAY** Brown, silty clay with 5-10% gravel, stiff, moist, no odor, no sheen.
SS	3		10	KJ-B7-13		3.7		ML/ CL	**Clayey SILT with sand** Gray, clayey silt with 10-15% fine sand and 5-10% gravel, moderately soft, moist to wet, slight odor ~7-9 feet, slight to medium odor ~12-15 feet, no odor otherwise, no sheen.
SS	2.5		15			3.6			
			20			0.8			

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B08
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2					0		SM	**Silty SAND with gravel** Tan/brown, silty sand with gravel fill, no odor, no sheen.
			5			0		ML/ CL	**Clayey SILT** Brown/gray, clayey silt, stiff, moderately low plasticity above ~4.5 feet, moderately high below ~4.5 feet, slightly moist to moist, no odor, no sheen.
SS	2					0		ML/ CL	**Clayey SILT with sand** Gray, clayey silt with 10-20% fine to medium sand and 5-10% gravel, texture varies locally, moderately soft overall, locally moderately stiff, moist to wet, no odor, no sheen.
			10						
SS	2.5			KJ-B8-14		0		ML	**Sandy SILT** Gray, silt with 20-30% sand, minor gravel, some clay, soft, wet, no odor, no sheen.
			15						

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B09
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3		0		Granular Bentonite	0		SM	**Silty SAND with gravel** Tan/brown, silt, sand, gravel fill, no odor, no sheen.
								ML	**SILT** Brown, silt, minor clay, stiff, dry, no odor, no sheen.
						0		CL/ ML	**Silty CLAY** Gray, silty clay with some sand, moderately stiff, moderately high plasticity, moist, no odor, no sheen.
			5						
SS	3.5					0			**Clayey SILT with sand** Gray, clayey silt with 10-20% fine to medium sand, 5-10% gravel, increased sand and less clayey below ~10 feet, soft, moist to wet, no odor, no sheen.
						0			
			10					ML/ CL	
SS	3.5			KJ-B9-13		0			
			15			0		CL/ ML	**Silty CLAY** Gray, silty clay with 5-10% sand, minor gravel, stiff, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B10	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/12/11	DATE COMPLETED: 9/12/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5					0		ML	**Sandy SILT** Brown, sandy silt, some gravel, moderately stiff, no odor, no sheen.
								CL	**Lean CLAY** Tan/gray, clay, minor silt, stiff, high plasticity, moist, no odor, no sheen.
			5			23.9		ML/ CL	**Clayey SILT with sand** Gray, clayey silt with 10-20% sand and fine gravel, soft, moist to wet, low to medium odor, no sheen.
SS	2.5			KJ-B10-8		13.7			
						68.7		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-20% sand and fine gravel, locally sandier in 1-2" thick layers or pods, blocky wood material in upper ~1 foot, stiff to very stiff, medium plasticity, moist to wet, medium odor, no sheen.
			10			0			
SS	4.5					0		CL/ ML	**Silty CLAY** Gray, silty clay with some sand and fine gravel, stiff, high plasticity, moist to wet, no odor, no sheen.
						0			
			15						

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B11	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5					0		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
								SW/ SM	**Well-graded SAND with silt and gravel** Tan/brown, medium to coarse sand with gravel and some silt, fill, no odor, no sheen.
			5	KJ-B11-5		70.1		ML	**Sandy SILT** Dark gray, sandy silt with some clay and gravel, texture varies locally, moderately soft, medium plasticity, moist, strong odor, heavy sheen.
SS	3.5					4.3		ML	**SILT with sand** Brown to dark brown, silt, minor clay, 10-20% fine to medium sand, some gravel locally, woody material in upper ~6 inches, moderately soft, moist to wet, no odor, no sheen.
								CL/ ML	**Silty CLAY** Gray/tan, silty clay, no odor, no sheen.
			10			0		ML	**Sandy SILT** Gray, silt with ~30% fine sand, some clay and fine gravel, increased sand locally, moderately stiff, wet, no odor, no sheen.
SS	4					0		CL	**Lean CLAY with sand** Gray, clay, minor silt, 5-10% sand and fine gravel, locally sandier in 1-2" layers or pods, stiff to very stiff, high plasticity, wet, no odor, no sheen.
			15			0			

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B12	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 6.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3		0			0		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
								SW/ SM	**Well-graded SAND with silt and gravel** Tan/brown, medium to coarse sand with gravel and some silt, fill, no odor, no sheen.
						0.2			
SS	4.5		5	KJ-B12-6		0		ML	**Sandy SILT** Dark brown, silt with 25-35% fine sand, minor clay, roots present in upper ~6 inches, texture varies locally (siltier vs. sandier), moderately soft, moist to wet, no odor, no sheen.
						0			
SS	4		10			0		CL	**Lean CLAY** Brown/gray, clay, minor silt, 5-10% sand and fine gravel, stiff to very stiff, high plasticity, moist, no odor, no sheen.
						0			
			15			0			

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B13
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	2.5					0		SW/ SM	**Well-graded SAND with silt and gravel** Tan/brown, medium to coarse sand with gravel and some silt, fill, no odor, no sheen.
			5	KJ-B13-4		0.1		ML	**Sandy SILT** Dark brown to gray/brown (below ~5 feet), sandy silt, minor gravel, soft, moist to wet, no odor, no sheen.
SS	3					0		SP/ SM	**Poorly graded SAND with silt** Brown/gray, medium sand with 10-20% silt, moderately dense, wet, no odor, no sheen.
						0		CL/ ML	**Silty CLAY with sand** Brown to gray/brown, silty clay with 10-15% sand and fine gravel, increased sand locally, stiff to very stiff, moist, no odor, no sheen.
			10						
SS	4.5					0		CL	**Lean CLAY with sand** Gray to tan/gray, clay, minor silt, 5-15% sand and fine gravel, stiff to very stiff, high plasticity, moist, no odor, no sheen.
			15						

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

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(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B14	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	4		0	KJ-B14-3		1.2		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						2.6		SW/SM	**Well-graded SAND with silt and gravel** Tan/brown, medium to coarse sand with gravel and some silt, fill, no odor, no sheen.
						0		SP	**Poorly graded SAND** Dark gray, sand with some silt and gravel, moderately dense, moist, medium odor and medium sheen.
SS	3		5			1.2		CL/ML	**Silty CLAY with sand** Gray, silty clay with 10-20% sand and fine gravel, moist, slight odor, no sheen.
						0		SP/SM	**Poorly graded SAND with silt** Gray, medium to fine sand with 10-15% silt, minor gravel locally, moderately dense, moist to wet, no odor, no sheen.
SS	2		10			0		ML	**Sandy SILT** Tan/green/brown, silt with ~30% medium to fine sand, minor clay, some gravel locally, moderately soft, moist to wet, no odor, no sheen.
						0		CL	**Lean CLAY with sand** Green/gray, clay, minor silt, 5-15% sand and fine gravel, moist, no odor, no sheen.
			15					CL	**Lean CLAY** Green-blue/gray, clay, stiff, high plasticity, moist, no odor, no sheen.

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F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B15	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	SAMPLES RECOV (FEET)	SAMPLES PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3		0			0		SM	**Silty SAND with gravel** Tan/brown, silt, sand, gravel fill, no odor, no sheen.
								SP	**Poorly graded SAND with gravel** Brown/orange, sand with ~30% gravel, some silt, fill, no odor, no sheen.
			5	KJ-B15-4		0			
SS	3					0		SP/ SM	**Poorly graded SAND with silt** Gray/brown, medium sand with 10-20% silt, minor gravel locally, moderately dense, moist to wet, no odor, no sheen.
						0			
			10						**Silty CLAY with sand** Gray, silty clay with <20% sand and fine gravel, stiff, medium to high (below ~13 feet) plasticity, moist, no odor, no sheen.
SS	4					0		CL/ ML	
			15						

NOTES

1. Reconnaissance groundwater sample KJ-B15-RGW collected. Screen set approximately 4-9 feet bgs.

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B16
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 10.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 10 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	SAMPLES RECOV. (FEET)	SAMPLES PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3		5	KJ-B16-4		0		SM	**Silty SAND with gravel** Tan/brown, silt, sand, gravel fill, no odor, no sheen.
								SP	**Poorly graded SAND with gravel** Dark brown, sand with ~30% gravel, some silt locally, fill, moist, no odor, no sheen.
SS	4		10			0		CL/ ML	**Silty CLAY with sand** Green/gray, silty clay with 10-20% sand and fine gravel, moderately stiff to stiff, moist to wet, no odor, no sheen.
						0		CL	**Lean CLAY** Gray, clay, minor sand and fine gravel, stiff to very stiff, moist to wet, no odor, no sheen.

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F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B17
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3					8.2		SP/ SM	**Poorly graded SAND with silt and gravel** Gray, medium sand with 10-15% silt and 25-35% gravel, moderately dense, moist, no odor, light sheen below ~3 feet.
			5	KJ-B17-4		0		ML	**SILT** Dark brown, silt with some sand and clay, roots present, soft, moist, no odor, no sheen.
SS	3.5					0		ML	**Sandy SILT** Gray, silt with 20-30% sand, ~10% gravel, some clay, locally >30% sand, moderately stiff, moist to wet, no odor, no sheen.
			10			0			
SS	4					0		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-20% sand and fine gravel (amount varies locally), moderately stiff to stiff, moderately high plasticity, moist, no odor, no sheen.
			15			0		CL	**Lean CLAY** Gray, clay with some silt and minor sand/gravel, stiff to very stiff, high plasticity, moist, no odor, no sheen.

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(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B18	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	SAMPLES RECOV (FEET)	SAMPLES PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3		0	KJ-B18-4		0.1		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						0.9		SW	**Well-graded SAND with gravel** Brown to greenish-brown (below ~4 feet), sand with ~40% gravel, some silt, moderately dense, moist, medium odor and light sheen below ~4 feet, no odor and no sheen otherwise.
			5			0		ML	**Sandy SILT** Brown, topsoil-like sandy silt, soft, moist, no odor, no sheen.
SS	3							ML	**Sandy SILT** Greenish-gray, sandy silt with some clay, moderately soft, moist to wet, no odor, no sheen.
						0		ML/ CL	**Clayey SILT with sand** Gray to greenish-gray, silt with clay and 10-15% sand and fine gravel, stiff to very stiff, medium plasticity, moist to wet, no odor, no sheen.
			10						
SS	4					0		CL	**Lean CLAY** Gray, clay, minor silt, ~10% sand and fine gravel, stiff, high plasticity, moist, no odor, no sheen.
			15						

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B19
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	SAMPLES RECOV. (FEET)	SAMPLES PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	4					29.1		CL	**Lean CLAY** Gray, clay, stiff, moderately high plasticitiy, moist, no odor, no sheen.
						20.7		CL/ ML	**Silty CLAY** Gray, silty clay, moderately soft, moderately high plasticity, moist, slight odor below ~3 feet, no sheen.
			5	KJ-B19-5		979			
SS	4			KJ-B19-7	▽	189		SM	**Silty SAND** Gray, medium sand with 25-30% silt (varies locally), some shell fragments, moderately dense, moist to wet, medium odor and medium to heavy sheen.
						115			
						21.2			
						0.6			
			10						**Lean CLAY** Gray, clay, some silt, ~10% sand and fine gravel, stiff, high plasticity, moist to wet, no odor, no sheen.
SS	4					12.7		CL	
						1.3			
			15						

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Boring Log

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BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B20
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5					82.3		CL/ ML	**Silty CLAY** Gray, silty clay, stiff, slightly moist, slight odor, no sheen.
			5			1166		CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-15% sand overall but locally sandier in 1-2" layers, moderately soft, moist, strong odor, heavy sheen.
SS	3.5			KJ-B20-7		1156 2019		SP/ SM	**Poorly graded SAND with silt** Gray, medium sand with 10-20% silt, moderately dense, wet, strong odor, heavy sheen.
			10	KJ-B20-10		704			**Silty CLAY with sand** Greenish-gray to gray (below ~11 feet), clay with some silt and 10-20% sand and fine gravel, stiff, moderately high plasticity, moist, slight odor above ~12 feet, no sheen.
SS	3.5					79.7		CL/ ML	
			15			5.9			

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B21	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 6.5	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	4			KJ-B21-3		1659		CL/ ML	**Silty CLAY** Gray, silty clay, up to 10% sand, minor gravel, stiff, moist, medium odor, no sheen.
			5			1740		CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-15% sand overall but locally up to ~30% sand, some gravel, moderately soft, moist to wet, strong odor, no sheen.
SS	4					2461		SP/ SM	**Poorly graded SAND with silt** Gray, medium sand with 10-20% silt (varies locally), moderately dense, wet, strong odor, heavy sheen.
						152		ML	**SILT** Dark brown, silt, some sand and gravel, woody debris, topsoil-like, soft, wet, medium odor, no sheen.
			10			36.2		CL/ ML	**Silty CLAY with sand** Greenish-gray, silty clay with 10-20% sand and fine gravel, moderately soft to moderately stiff (varies locally), moist to wet, slight odor above ~9.5 feet, no odor otherwise, no sheen.
SS	3.5					4.1			
						0.2			
			15						

NOTES

1. Reconnaissance groundwater sample KJ-B21-RGW collected. Screen set approximately 3.5-8.5 feet bgs.

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F-40.1
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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B22	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/13/11	DATE COMPLETED: 9/13/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 9.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5					887		GM	**Silty GRAVEL with sand** Medium brown/gray, gravel with sand and silt, moderately dense, slight odor, no sheen.
						1764		CL/ ML	**Silty CLAY** Gray to brown/gray, silty clay, up to 10% sand, minor gravel, stiff, slightly moist, medium to strong odor, heavy sheen.
			5	KJ-B22-5		2304		CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-15% sand overall but locally >30% sand typically in <1" thick layers or pods, some gravel locally, moderately soft, moist, strong odor, heavy sheen.
SS	4.5					398		ML	**SILT** Brown, silt, some clay, woody material, soft, moist, slight odor, medium sheen.
						309		SP/ SM	**Poorly graded SAND with silt** Gray, medium sand with 5-15% silt, moderately dense, moist to wet, slight odor, light sheen.
			10	KJ-B22-9		24.2			
						25.6		CL	**Lean CLAY** Gray, clay, stiff, moist to wet, slight odor, no sheen.
SS	3.5					1.8		SM	**Silty SAND** Gray, silty sand, moderately dense, wet, no odor, no sheen.
						2.5		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% sand (varies locally), stiff, high plasticity, moist to wet, no odor, no sheen.
			15						

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B23
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/14/11	DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5					0.6		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						0.4		CL/ ML	**Silty CLAY** Gray, silty clay, up to 10% sand, minor gravel, stiff, high plasticity, moist, no odor, no sheen.
			5					CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-15% sand, some gravel, moderately soft, high plasticity, moist to wet, no odor, no sheen.
SS	3.5			KJ-B23-8		12.7			**Clayey SILT with sand** Gray, clayey silt, some sand, soft, wet, slight odor, no sheen.
			10			9.2		ML/ CL	
SS	3					3.0		ML	**Sandy SILT** Gray, silt with 20-30% fine to medium sand, minor gravel, some clay, soft, high plasticity, wet, no odor, no sheen.
			15			0.8		CL/ ML	**Silty CLAY with sand** Greenish-gray, silty clay with 10-15% sand and fine gravel, stiff, moderately high plasticity, moist to wet, no odor, no sheen.

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA	**Boring Name** KJ-B24
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day — **Project Name** Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch — **Project Number** 1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT. — ELEVATION AND DATUM: bgs — TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT. — DATE STARTED: 9/14/11 — DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT. — INITIAL WATER DEPTH (FT): 7.0
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT. — LOGGED BY: DKM
SEAL: Granular Bentonite	FROM 0 TO 15 FT. — SAMPLING METHODS: MacroCore w/liner — WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2						SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						0.3	CL/ ML	**Silty CLAY** Brown/gray, silty clay, stiff, slightly moist, no odor, no sheen.
			5				CL/ ML	**Silty CLAY** Gray, silty clay, moderately soft, high plasticity, moist, no odor, no sheen.
SS	3			KJ-B24-7		1.1	ML	**Sandy SILT** Gray, sandy silt, some clay, moderately soft, medium plasticity, wet, slight odor, no sheen.
						0.6	CL/ ML	**Silty CLAY** Gray, silty clay, locally 10-15% sand in 1-2" layers or pods, ~5% sand overall, moderately stiff, high plasticity, moist to wet, no odor, no sheen.
			10					
SS	3					0.2	ML	**Sandy SILT** Gray, silt with ~30% sand and some clay, some woody material and shell fragments locally, some 1-2" sandy layers locally, soft, medium plasticity, wet, no odor, no sheen.
			15					

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(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B25	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/14/11	DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 9.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3.5		5	KJ-B25-4		0.4 / 1.6		SM / CL/ML	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen. **Silty CLAY with sand** Tan/gray to gray (below ~4.5 feet), silty clay with 10-15% sand (varies locally), some ~1" thick sandier layers or pods below ~4.5 feet, moderately soft, moderately high plasticity, moist, no odor, no sheen.
SS	1		10			1.8		ML	**Sandy SILT** Gray, silt with 25-35% sand (varies locally), some clay, locally silt/clay without sand in thin (typically <1") layers, soft, moist to wet, no odor, no sheen.
SS	3.5		15			0.2 / 0.3		CL/ML / ML/CL / ML	**Silty CLAY** Gray, silty clay, minor sand, soft, high plasticity, wet, no odor, no sheen. **Clayey SILT with sand** Gray, clayey silt with ~30% sand with some fine gravel, soft, medium plasticity, wet, no odor, no sheen. **Sandy SILT with gravel** Gray, sandy silt with ~30% gravel and 20-25% sand, moderately soft, wet, no odor, no sheen.

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(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B26	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/14/11	DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3.5		0			0.7		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						0.4		CL/ ML	**Silty CLAY** Tan/gray to gray (below ~4 feet), silty clay with 5-10% sand occurring in thin (typically <1" thick) interbeds of silty/clayey sand, moderately stiff to stiff overall, locally moderately soft, high plasticity, moist, no odor, no sheen.
SS	3		5	KJ-B26-8		07			**Sandy SILT with gravel** Gray, silt, some clay, 20-30% sand and 10-15% gravel overall, sand/gravel content varies locally, increased gravel in bottom ~6 inches, soft, wet, no odor, no sheen.
						1.1		ML	
SS	3		10			1.2		CL/ ML	**Silty CLAY with sand** Greenish-gray, silty clay with 5-15% sand and fine gravel, stiff to very stiff, moderately high plasticity, moist to wet, no odor, no sheen.
						0.8			
			15						

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F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B27
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/14/11	DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 20 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	1.5					0.6		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						1.0			**Silty CLAY with sand** Gray, silty clay with 10-15% sand and fine gravel, soft to moderately stiff (below ~5 feet), moderately high plasticity, moist, no odor, no sheen.
			5						
SS	2.5					1.2		CL/ ML	
						0.8			**Sandy SILT** Gray, silt with 25-30% sand, some clay, some gravel locally, soft, medium plasticity, wet, slight odor below ~11 feet, no sheen.
			10					ML	
SS	4			KJ-B27-12		4.7			
						0.9			**Silty CLAY with sand** Greenish-tan to greenish-gray (below ~16 feet), silty clay with 10-15% sand, minor gravel, stiff to very stiff, high plasticity, moist to wet, no odor, no sheen.
			15						
SS	3					0		CL/ ML	
			20						

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F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B28	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/14/11	DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 20 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5		0			0.5		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, mixure of several different fill materials, no odor, no sheen.
						1.0			
SS	2.5		5					CL/ ML	**Silty CLAY** Gray, silty clay, moderately soft, moderately high plasticity, moist, no odor, no sheen.
						1.3		CL/ ML	**Silty CLAY** Gray, silty clay, moderately stiff to stiff, moist to wet, no odor, no sheen.
SS	4		10	KJ-B28-12		8.2		ML	**Sandy SILT** Greenish-gray to gray, silt with ~30% sand, some clay and gravel, moderately soft, medium plasticity, wet, slight odor below ~11 feet, no sheen.
						1.4			
SS	4.5		15	KJ-B28-16		3.1		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% sand and fine gravel, stiff, high plasticity, moist to wet, no odor, no sheen.
						0.6			
			20						

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(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B29
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/14/11	DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 20 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3.5		0			0.8		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						1.2		ML	**Sandy SILT** Brown/gray, silt with 30-40% sand and ~10% gravel overall, texture varies locally with layered sand/gravel with silt and stiff silt with some clay, moderately stiff, moist, no odor, no sheen.
SS	1		5	KJ-B29-7		17.4		ML	**Sandy SILT** Gray to greenish-gray, silt with ~30% sand, 5-10% gravel, some clay, moderately soft to soft, wet, slight to medium odor, no sheen.
SS	3.5		10			10.9		ML	
						1.3		CL	**Lean CLAY** Tan, clay, some silt, minor gravel locally, stiff to very stiff, high plasticity, moist to wet, no odor, no sheen.
SS	4.5		15	KJ-B29-18		1.8		SP	**Poorly graded SAND** Gray, medium sand with 5-10% silt, moderately dense, wet, no odor, no sheen.
			20			11.7		CL/ ML	**Silty CLAY** Gray, silty clay, stiff, high plasticity, moist to wet, no odor, no sheen.
						1.2			

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Boring Log

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BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B30	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/14/11	DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 20 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5					2.1		ML	**Sandy SILT with gravel** Brown, silt with 30% fine to medium sand, 10-15% gravel, moderately stiff, moist, no odor, no sheen.
			5			2.0			
SS	3			KJ-B30-8		1097		ML	**Sandy SILT with gravel** Dark gray, silt with 30% sand, 10-20% gravel, some clay, moderately soft, moist to wet, medium to strong odor, heavy sheen.
			10						
SS	3					2.6		CL/ ML	**Silty CLAY** Greenish-gray, silty clay with 5-10% sand and fine gravel, stiff to very stiff, high plasticity, moist to wet, slight odor above ~14 feet, no sheen.
			15			1.8			
						1.9			
SS	4			KJ-B30-17				CL	**Lean CLAY** Gray, clay, some silt, moderately stiff, high plasticity, moist to wet, no odor, no sheen.
			20			2.1			

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(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B31
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/14/11	DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 9.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
								ML	**Sandy SILT with gravel** Brown, silt with sand and gravel, stiff, slightly moist, no odor, no sheen.
SS	3.5					0.3		SW	**Well-graded SAND with gravel** Brown/orange, medium to coarse sand with 10-20% gravel, moderately dense, moist, no odor, no sheen.
				KJ-B31-4		0.9		SW	**Well-graded SAND with gravel** Gray, medium sand, some coarse sand, ~40% gravel, some silt, some shell fragments, moderately dense, moist, no odor, no sheen.
			5			0.4			
SS	4					0.1		ML	**SILT** Brown, silt with woody material, some sand, soft, moist, no odor, no sheen.
						0.4		SM	**Silty SAND** Brown/gray, silty fine sand, some clay, moderately soft, moist, no odor, no sheen.
			10			0.4		SP/ SM	**Poorly graded SAND with silt and gravel** Gray to greenish-gray, fine sand with 10-20% silt, 10-15% gravel, moderately dense, wet, no odor, no sheen.
SS	4					0.5		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% sand and fine gravel, stiff to very stiff, moist to wet, no odor, no sheen.
			15			0.6			

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B32
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/14/11	DATE COMPLETED: 9/14/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 9.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3.5		5	KJ-B32-4		52.0 88.9		SM CL/ML SW	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen. **Silty CLAY with sand** Gray, silty clay with 10-15% sand and fine gravel, moderately stiff to stiff, slightly moist, no odor, no sheen. **Well-graded SAND with gravel** Gray, medium to coarse sand with 10-20% gravel, some shell fragments below ~4.5 feet, moderately dense, moist, slight to medium odor, no sheen.
SS	4.5		10			6.4 44.6 4.5 1.7		ML/CL ML	**Clayey SILT** Brown, clayey silt with woody material, moderately soft, moist, no odor, no sheen. **Sandy SILT with gravel** Greenish-gray, sandy silt with 10-15% gravel, some clay locally, moderately soft, wet, no odor, no sheen.
SS	4		15			0.8 0.4		CL/ML	**Silty CLAY** Tan/gray, silty clay, some sand and gravel locally, stiff, high plasticity, moist to wet, no odor, no sheen.

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B33
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/15/11	DATE COMPLETED: 9/15/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3.5		0					SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
								GW	**Well-graded GRAVEL with sand** Orange/brown, gravel and sand fill, no odor, no sheen.
						21.7		SW	**Well-graded SAND with gravel** Gray, medium to coarse sand with 30-35% gravel, moderately dense, moist, medium odor, light sheen.
				KJ-B33-4		18.6		GW	**Well-graded GRAVEL with sand** Brown, gravel with ~40% medium to fine sand, some silt, moderately dense, moist, medium odor, light sheen.
SS	1		5					ML	**Sandy SILT** Gray to brown, sandy silt, some gravel locally, some woody material locally, soft, moist to wet, slight to medium odor, no sheen.
			10			0.9			
SS	4.5					0.8		ML	**Sandy SILT** Greenish gray, silt with 30-35% medium to fine sand, some clay, minor gravel, some thin (<1" thick) sandy interbeds locally, moderately stiff to stiff, wet, no odor, no sheen.
			15						

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B34
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/15/11	DATE COMPLETED: 9/15/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5					7.1		CL/ ML	**Silty CLAY** Tan/gray, silty clay with some sand, stiff, moderately high plasticity, slightly moist, no odor, no sheen
						33.7		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% sand, sandy interbeds (<1" thick) present below ~3.5 feet, moderately soft, moderately high plasticity, moist, medium odor, medium sheen.
			5	KJ-B34-5		1220			
SS	3.5				▽	158		SW/ SM	**Well-graded SAND with silt and gravel** Gray, medium to coarse sand with ~30% gravel and 10-15% silt, increased silt below ~6.5 feet, moderately dense, moist to wet, medium odor, medium to heavy sheen.
						4		ML/ CL	**Clayey SILT** Brown to dark brown, clayey silt with woody material in upper ~6 inches, soft, moist, slight odor, no sheen.
			10			5		ML	**Sandy SILT with gravel** Greeninsh-gray, silt with ~30% sand, 10-15% gravel, some clay, moderately stiff, medium plasticity, wet, slight odor, light sheen.
SS	3					0.2		CL/ ML	**Silty CLAY** Gray/brown, silty clay, ~10% sand and fine gravel, stiff, high plasticity, moist to wet, no odor, no sheen.
			15			0.1			

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B35	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/15/11	DATE COMPLETED: 9/15/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 9.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	4					131			
				KJ-B35-4		1513		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% medium to fine sand with some gravel overall (variable), local thin (typically <1") interbeds of silty sand and poorly graded sand, some shell fragments in lower portion, moderately stiff to moderately soft (varies locally), moist, medium to strong odor, heavy sheen.
			5						
SS	3					11.9		ML/ CL	**Clayey SILT** Brown to dark brown, clayey silt with woody material, soft, moist, slight odor, no sheen.
				KJ-B35-8					
						6.8		CL/ ML	**Silty CLAY with sand** Greenish-gray, silty clay with 10-15% sand, some gravel, stiff, moist to wet, slight odor, light sheen.
			10						
						0.9		ML	**Sandy SILT** Gray/tan, sandy silt, some clay and gravel, moderately stiff, wet, slight odor, no sheen.
SS	4.5								
						1.5		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% sand and fine gravel, stiff, high plasticity, moist to wet, no odor, no sheen.
			15						

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B36
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/15/11	DATE COMPLETED: 9/15/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	4					0		SM	**Silty SAND with gravel** Gray, silty sand with 20-30% gravel, moderately loose, slightly moist, slight odor, no sheen.
						14.1		CL/ ML	**Silty CLAY** Gray, silty clay, ~10% sand, some gravel, stiff, moist, slight odor, no sheen.
			5			10.1		CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-15% sand, some gravel, locally sandier in thin (<1") layers or pods, moderately soft, moist, slight odor, no sheen.
SS	3			KJ-B36-8		295		SM	**Silty SAND with gravel** Gray, silty sand, ~30% gravel, moderately loose, wet, medium odor, medium to heavy sheen.
			10			30.1		ML	**Sandy SILT** Gray, silt with ~30% sand, 5-10% gravel, some clay, moderately soft, wet, medium odor, medium to heavy sheen.
SS	4					0.7		ML	**Sandy SILT** Greenish-gray, silt with 30% sand, some clay, 5-10% gravel, moderately stiff to stiff, moist to wet, slight odor, no sheen.
			15			0.8		CL/ ML	**Silty CLAY** Tan/gray, silty clay, some sand and fine gravel, very stiff, high plasticlty, moist to wet, no odor, no sheen.

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B37	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 8.5	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 20 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5		0			0.4		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						1.3		SP	**Poorly graded SAND with gravel** Brown/orange to gray/brown (below ~4.5 feet), sand with 5-10% silt and 10-20% gravel, moderately dense, moist to wet, no odor, no sheen.
SS	3		5			0.8		ML	**Sandy SILT** Gray, silt with ~30% sand, some clay and gravel, moderately soft, medium plasticity, moist, no odor, no sheen.
						2.1		ML	**SILT** Dark brown to orange-brown, silt with woody material, moderately soft, medium plasticity, moist, no odor, no sheen.
				KJ-B37-9		1.1		ML/ CL	**Clayey SILT with sand** Brown/gray, clayey silt with 20-30% sand, some gravel locally, moderately soft, medium to high plasticity, wet, no odor, no sheen.
SS	4.5		10			1.7			
						1.8		CL/ ML	**Silty CLAY** Tan/gray, silty clay, 5-10% sand and fine gravel, stiff, high plasticity, moist to wet, no odor, no sheen.
SS	0.5		15			1.2		SP	**Poorly graded SAND** Gray, medium sand, some coarse sand locally, 5-10% silt, moderately dense, wet, no odor, no sheen.
			20					CL/ ML	**Silty CLAY** Gray, silty clay, 5-10% fine sand, stiff, high plasticity, wet, no odor, no sheen.

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B38
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 6.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3.5		0					SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						3.9		ML/ CL	**Clayey SILT** Brown, clayey silt with 5-10% sand, some gravel, stiff, slightly moist, slight odor, light sheen.
			5			301		CL/ ML	**Silty CLAY with sand** Brown/gray, silty clay with 5-15% sand, some gravel, locally sandier in thin (<1") layers of sandy silt, moderately soft, moist, medium odor, light sheen.
SS	3.5			KJ-B38-7		315		SM	**Silty SAND with gravel** Gray, medium sand with ~30% silt, 10-15% gravel, moderately dense, wet, medium to strong odor, heavy sheen.
						21.2		ML/ CL	**Clayey SILT with sand** Gray, clayey silt with 10-20% medium to fine sand, some gravel, local sand and silt layers typically 1-2" thick, moderately soft, medium to high plasticity, wet, slight odor, no sheen.
			10			10.1			
						2.7		ML	**Sandy SILT** Brown to dark brown, sandy silt, topsoil-like, moderately soft, medium plasticity, wet, no odor, no sheen.
SS	3.5			KJ-B38-13		15.1		SP/ SM	**Poorly graded SAND with silt** Greenish-gray, sand with 10-20% silt, some gravel, moderately dense, wet, slight odor, light sheen.
			15			0.8		CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-15% sand, stiff to very stiff, moderately high plasticity, moist to wet, no odor, no sheen.

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Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B39
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 6.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5					1.1		ML	**SILT** Brown, silt, some sand and gravel, very stiff, slightly moist, no odor, no sheen.
						3.2		CL/ ML	**Silty CLAY** Gray, silty clay, 5-10% sand and fine gravel, moderately stiff to stiff, high plasticity, moist, no odor, no sheen.
			5						
					▽	6.5		ML	**Sandy SILT with gravel** Gray, sandy silt, some clay, 10-15% gravel, soft, wet, no odor, no sheen.
SS	4			KJ-B39-8		11.6		SM	**Silty SAND** Gray, fine sand with 20-30% silt, some shell fragments, moderately dense, wet, slight odor, no sheen.
						9.6		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% sand and fine gravel, moderately soft, moderately high plasticity, wet, no odor, no sheen.
			10						
SS	3.5					1.2			
						3.1		SM	**Silty SAND** Gray, silty sand, moderately dense, wet, no odor, no sheen.
						0.8		CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-20% sand and fine gravel, moderately stiff, wet, no odor, no sheen.
			15						

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B40
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3		5	KJ-B40-4		2.6		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						3.1		ML/CL	**Clayey SILT with sand** Gray, clayey silt, 10-20% sand, some gravel, stiff, slightly moist, no odor, no sheen.
						0.8		SW	**Well-graded SAND with gravel** Brown, medium to coarse sand, 20-30% gravel, some silt, moderately dense, moist, no odor, no sheen.
SS	3.5		10			1.7		CL/ML	**Silty CLAY with sand** Brown, silty clay with ~30% sand, soft, moist, no odor, no sheen.
						1.1		CL/ML	**Silty CLAY with sand** Greeninsh-gray, silty clay, 20-30% sand, moderately soft to moderately stiff (varies locally), medium to moderately high plasticity, wet, no odor, no sheen.
SS	4.5		15			1.2		CL/ML	**Silty CLAY** Gray, silty clay, ~10% sand and fine gravel, stiff to very stiff, high plasticity, moist to wet, no odor, no sheen.
						0.8			

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B41
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS* LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5					2.3		SM	**Silty SAND with gravel** Orange/brown, silty medium to fine sand with 5-15% gravel, moderately loose, moist, no odor, no sheen.
			5			16.8		CL/ ML	**Silty CLAY with sand** Gray/brown, locally greenish-gray, silty clay, 10-15% sand, moderately soft, medium plasticity, moist, slight odor, light to medium sheen.
SS	4			KJ-B41-6		61.6		SM	**Silty SAND with gravel** Gray, medium to fine sand with ~30% silt, 10-15% gravel, moderately dense, wet, slight odor in upper ~1 foot, no odor below ~8 feet, no sheen.
			10			1.2			
SS	4.5					0.8		CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-15% sand and fine gravel, stiff, high plasticity, moist to wet, no odor, no sheen.
			15			0.6			

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B42	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 6.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 15 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	2.5					1.9		ML	**SILT** Brown, silt, stiff, slightly moist, no odor, no sheen.
						5.9		CL/ ML	**Silty CLAY** Brown/gray to gray, silty clay, stiff to moderately soft (below ~4 feet), moist, no odor, no sheen.
			5			12.0			
SS	3			KJ-B42-8		18.1		SP/ SM	**Poorly graded SAND with silt** Gray, sand with 10-15% silt, some gravel, shell fragments, moderately dense, moist to wet, slight to medium odor, no sheen.
			10			1.5		CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-20% sand, moderately stiff to moderately soft (varies locally), wet, no odor, no sheen.
SS	2.5					0.9		CL/ ML	**Silty CLAY** Gray, silty clay, 5-10% sand and fine gravel, stiff, medium to high plasticity, moist to wet, no odor, no sheen.
			15						

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B43
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 10.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.5	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 10 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	SAMPLES RECOV. (FEET)	SAMPLES PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3					1.4		CL/ ML	**Silty CLAY** Tan/brown to gray (below ~3.5 feet), silty clay, some sand and fine gravel, stiff to moderately soft (below ~4 feet), slightly moist to moist, moderately strong odor and medium sheen below ~3 feet.
				KJ-B43-4		375			
			5			163		SP/ SM	**Poorly graded SAND with silt and gravel** Gray, sand with 10-15% silt and 10-20% gravel, moderately dense, moist, moderately strong to strong odor, medium sheen
SS	3.5					2.1		ML	**SILT** Brown, silt with woody material, moderately soft, moist, no odor, no sheen.
						1.4		ML	**Sandy SILT** Brown to greenish-gray (below ~8 feet), silt with ~30% fine sand, some gravel locally, moderately stiff, wet, no odor, no sheen.
			10			0.8		CL/ ML	**Silty CLAY** Greenish-gray, silty clay, some sand and fine gravel, stiff, high plasticity, moist to wet, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B44	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 10.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 10 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	2.5		5	KJ-B44-4		5.3 272		CL/ ML	**Silty CLAY** Brown to gray (below ~4 feet), silty clay, some sand and fine gravel, stiff to moderately soft (below ~4.5 feet), medium to moderately high plasticity, slightly moist to moist, moderately strong odor and medium sheen below ~3 feet.
SS	3.5		10			2.9		ML	**Sandy SILT with gravel** Greenish-gray, silt with ~30% and, some clay, 10-15% gravel, moderately soft to moderately stiff (varies locally), moist to wet, slight odor, no sheen.
						1.7		CL/ ML	**Silty CLAY with sand** Greenish-gray, silty clay, 10-20% sand, some gravel, stiff to very stiff, moderately high plasticity, moist to wet, no odor, no sheen.

KJ PNW_ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B45
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 20 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3					0			**Silty CLAY with sand** Gray, silty clay with 10-15% sand and fine gravel overall, sand/gravel content varies locally, some shell fragments at 11-12 feet, moderately soft overall but varies locally, moist to wet below ~7 feet, no odor, no sheen.
			5			0			
SS	3			KJ-B45-7		0		CL/ ML	
						0			
SS	4		10			0			
						0			
SS	2					0		ML/ CL	**Clayey SILT with sand** Gray, clayey silt with up to 20% sand and fine gravel, moerately soft, wet, no odor, no sheen.
			15	KJ-B45-15		3.3			**Poorly graded SAND** Gray, medium sand, moderately dense, wet, no odor, no sheen.
SS	1.5					0		SP	
			20			0		CL/ ML	**Silty CLAY** Gray, silty clay with up to 10% sand and fine gravel, stiff, moderately high plasticity, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B46	
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 16.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 16 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	4					0		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						0			**Clayey SILT** Gray to tan, clayey silt with up to 10% sand and fine gravel, moderately stiff above ~9 feet, moderatley soft below ~9 feet, moderate plasticity, moist to wet below ~7 feet, no odor, no sheen.
SS	0		5					ML/ CL	
SS	3		10	KJ-B46-11		0			
						0.1		ML	**Sandy SILT** Tan above ~10.5 feet changing abruptly to gray below ~10.5 feet, sandy silt, some clay, moderately soft to soft, wet, no odor, no sheen.
SS	3.5		15	KJ-B46-15		0.3		CL/ ML	**Silty CLAY** Gray, silty clay, some thin (<2 inches) sandy interbeds locally, stiff, moist, no odor, no sheen.
						0			

NOTES

1. Reconnaissance groundwater sample KJ-B46-RGW collected. Screen set approximately 5-10 feet bgs.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B47
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 30.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 30 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5					0		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% sand and fine gravel overall but silt, sand, and gravel content varies locally, moderately stiff overall by varies locally (moderatly soft to stiff), moist to wet below ~7 feet, no odor, no sheen.
SS	2		5			0			
SS	3.5		10			0 0			
SS	3.5			KJ-B47-13		65.2		ML	**Sandy SILT** Gray, sandy silt with orange-brown woody material, moderately soft, wet, no odor, no sheen.
								CL/ ML	**Silty CLAY with sand** Gray-green, silty clay with 10-15% sand and fine gravel, stiff to very stiff, medium plasticity, moist, no odor, no sheen.
			15					SP	**Poorly graded SAND** Gray, medium sand with minor silt, moderately dense to dense, wet, no odor, no sheen.
SS	1.5					0		CL/ ML	**Silty CLAY with sand** Gray-green, silty clay with 10-15% sand and fine gravel, stiff to very stiff, medium plasticity, moist, no odor, no sheen.
SS	3.5		20			0		SP	**Poorly graded SAND** Gray, medium sand, minor silt overall but 10-15% silt in upper ~1 foot, moderately dense to dense, wet, no odor, no sheen.
								CL/ ML	***(See next page for lithology description)***

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

Project Name Ecology Cornet Bay **Project Number** 1196012*00 **Boring Name** KJ-B47

SAMPLES TYPE	SAMPLES RECOV. (FEET)	SAMPLES PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	4		25			0 0		CL/ ML	**Silty CLAY** Gray, silty clay with up to 10% sand (varies locally), stiff overall, locally moderately stiff to moderately soft, moderately high plasticity, moist to wet, no odor, no sheen. ***(Continued)***
SS	4		30			0 0			

NOTES

1. Reconnaissance groundwater sample KJ-B47-RGW collected. Screen set approximately 5-10 feet bgs.

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B48
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 12.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 3.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 12 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5			KJ-B48-3		1.2		CL/ ML	**Silty CLAY with sand** Gray, silty clay with up to 15% sand and fine gravel, moderately stiff to stiff, moist, no odor, no sheen.
			5			282.7		SW	**Well-graded SAND with gravel** Gray, sand with up to 15% gravel mainly in upper ~1 foot, some silt, moderately dense, wet, moderate odor decreasing below ~5 feet, medium sheen above ~5 feet, no sheen below ~5 feet.
SS	3					88.0			
						1.2		ML	**SILT with sand** Brown, silt with fine sand and woody material, moderately soft, wet, no odor, no sheen.
						0.0		SP	**Poorly graded SAND with gravel** Gray, sand with up to 15% gravel and some silt, moderately dense, wet, no odor, no sheen.
SS	3		10			0.3		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% sand and fine gravel, stiff to very stiff, medium plasticity, moist, no odor, no sheen.
						0			

NOTES

1. Reconnaissance groundwater sample KJ-B48-RGW collected. Screen set approximately 5-10 feet bgs.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B49
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 16.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 16 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5					0		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						0		ML	**Sandy SILT** Tan, silt with fine sand, stiff, crumbly, dry to slightly moist, no odor, no sheen.
SS	2		5			0			**Clayey SILT with sand** Tan/gray In upper 2-3 feet grading to gray, clayey silt with up to 15% sand and fine gravel, increased sand in bottom ~1 foot, moderately soft, moist to wet below ~7 feet, no odor, no sheen.
SS	2.5		10			0		ML/ CL	
SS	3			KJ-B49-13		0			
			15			0		CL/ ML	**Silty CLAY** Gray, silty clay with up to 10% sand and fine gravel, stiff, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B50
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 12.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 12 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3					0		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	2		5			0		ML	**SILT with sand** Tan/brown, silt with up to 15% sand and fine gravel, stiff, slightly moist, no odor, no sheen.
SS	3.5		10	KJ-B50-10		0		ML/ CL	**Clayey SILT with sand** Tan/gray, clayey silt with 15-20% sand (varies locally), moderately soft, moist to wet, no odor, no sheen.
						0		CL/ ML	**Silty CLAY** Gray, silty clay with up to 10% sand and fine gravel, stiff, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B51	
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 12.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 6.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 12 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								ML	**Sandy SILT** Silty sandy topsoil with grass.
SS	2					0		SW	**Well-graded SAND with gravel** Tan, sand with 25-30% gravel, some silt, moderately dense, moist, no odor, no sheen.
SS	3		5	KJ-B51-7		0		SM	**Silty SAND** Gray, silty fine sand, moderately loose, wet, no odor, no sheen.
						0		CL/ ML	**Silty CLAY** Gray, silty clay with up to 10% sand and fine gravel, moderately soft, wet, no odor, no sheen.
SS	3.5		10			0		CL/ ML	**Silty CLAY** Gray, silty clay with 5-15% sand and fine gravel (varies locally), stiff, moderately high plasticity, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B52
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push (advanced by hand)	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 7.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 3.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 7 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2					0		SW	**Well-graded SAND with gravel** Tan/brown, sand with 25-30% gravel, some silt, moderately dense, moist to wet, no odor, no sheen.
SS	2		5	KJ-B52-5		6.6		SM	**Silty SAND** Gray, silty fine sand, moderately loose, wet, slight odor, no sheen.
						0		CL/ ML	**Silty CLAY** Gray, silty clay with up to 10% sand and fine gravel, stiff, moist, no odor, no sheen.

NOTES

1. Top of boring approximately 3-4 feet below site grade adjacent to pond area.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B53	
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 12.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 5.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 12 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								GW	**Well-graded GRAVEL** Brown/orange, gravel/sand fill.
								ML	**SILT** Brown, silt with up to 10% sand and fine gravel, stiff, slightly moist, no odor, no sheen.
SS	3.5			KJ-B53-3		0		SW	**Well-graded SAND with gravel** Brown/gray/orange-brown (layered) above ~3 feet, dark gray below ~3 feet, sand with 25-30% gravel, some silt, moderately dense, moist, slight odor and light sheen below ~3 feet.
			5			0.9			
SS	3.5					0		SM	**Silty SAND** Gray, silty fine to medium sand, abundant shell fragments, moderately dense, moist to wet, no odor, no sheen.
						0		ML	**SILT** Brown, silt with abundant woody material, moderately soft, wet, no odor, no sheen.
SS	2		10			0		ML/ CL	**Clayey SILT with sand** Gray/green, clayey silt with 15-20% sand, minor gravel, stiff, moist, no odor, no sheen.

NOTES

1. Reconnaissance groundwater sample KJ-B53-RGW collected. Screen set approximately 5-10 feet bgs.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(8-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B54
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 12.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 3.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 12 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								ML	**Sandy SILT** Silty sandy topsoil with grass.
SS	1.5					0		GW	**Well-graded GRAVEL with sand** Brown, gravel and sand fill, moderately dense, moist, no odor, no sheen.
						0		CL/ ML	**Silty CLAY** Brown, silty clay, stiff, moist, no odor, no sheen.
			5					SM	**Silty SAND with gravel** Dark brown, silty sand with gravel, loose, wet, no odor, no sheen.
SS	3.5			KJ-B54-6		0		SM	**Silty SAND** Gray/green, silty fine sand, some gravel, moderately loose, wet, no odor, no sheen.
						0		ML/ CL	**Sandy clayey SILT** Gray, silt with sand and clay, moderately soft, wet, no odor, no sheen.
SS	3		10						**Silty CLAY** Gray, silty clay with up to 10% sand and fine gravel, stiff to very stiff, moist, no odor, no sheen.
						0		CL/ ML	

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA	**Boring Name** KJ-B55
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos — **Project Name** Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch — **Project Number** 1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.
BLANK CASING: N/A	FROM N/A TO N/A FT.
SLOTTED CASING: N/A	FROM N/A TO N/A FT.
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.
SEAL: Granular Bentonite	FROM 0 TO 12 FT.
GROUT: N/A	FROM N/A TO N/A FT.

ELEVATION AND DATUM: bgs	TOTAL DEPTH: 12.0 ft. bgs
DATE STARTED: 11/10/11	DATE COMPLETED: 11/10/11
INITIAL WATER DEPTH (FT): 3.0	
LOGGED BY: DKM	
SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								ML	**Sandy SILT** Sandy silt topsoil with grass.
								SW	**Well-graded SAND with gravel** Brown, sand with up to 40% gravel fill, moderately dense, moist, no odor, no sheen.
SS	3			KJ-B55-3		367.2		CL/ML	**Silty CLAY** Brown, silty clay, some sand and gravel, moderately stiff to stiff, moist, no odor, no sheen.
			5			81.7		SW	**Well-graded SAND with gravel** Gray, sand with 25-30% gravel, some silt, shell fragments present locally, moderately dense, wet, moderate odor decreasing below ~5 feet, light sheen above ~5 feet.
SS	3					0.2		SM	**Silty SAND** Brown/gray, silty fine sand, ~3 inches woody material at top, moderately loose, wet, no odor, no sheen.
SS	1		10			0		CL/ML	**Silty CLAY** Gray, silty clay with up to 10% sand and fine gravel, stiff, moist, no odor, no sheen.

NOTES

1. Reconnaissance groundwater sample KJ-B55-RGW collected. Screen set approximately 5-10 feet bgs.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B56
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 8.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/11/11	DATE COMPLETED: 11/11/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 3.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 8 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								ML	**Sandy SILT** Sandy silt topsoil with grass.
SS	2			KJ-B56-3		0		SW	**Well-graded SAND with gravel** Brown/gray, sand with up to 40% gravel fill, some silt, moderately dense, moist, no odor, no sheen.
						0		ML/ CL	**Clayey SILT** Brown, clayey silt with up to 10% sand and fine gravel, moderately stiff, moist to wet, no odor, no sheen.
			5						
SS	3							ML/ CL	**Clayey SILT with sand** Gray/green, clayey silt with 15-20% sand and fine gravel, moderately stiff, wet, no odor, no sheen.
						0		CL/ ML	**Silty CLAY with sand** Gray/green, silty clay with up to 15% sand and fine gravel, stiff, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name**	KJ-B57
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 8.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/11/11	DATE COMPLETED: 11/11/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 3.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 8 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	1					0		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
								ML	**Sandy SILT with gravel** Gray, sand/silt mixture, some gravel, very soft, wet, no odor, no sheen
SS	3.5		5	KJ-B57-5		0		SM	**Silty SAND with gravel** Dark brown, sand with 30-40% silt and some gravel, moderately dense, wet, no odor, no sheen.
						0		CL/ ML	**Silty CLAY with sand** Gray/green, silty clay with up to 15% sand and fine gravel, stiff to very stiff, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA	**Boring Name** KJ-B58
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch
ISOLATION CASING: N/A	FROM N/A TO N/A FT.
BLANK CASING: N/A	FROM N/A TO N/A FT.
SLOTTED CASING: N/A	FROM N/A TO N/A FT.
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.
SEAL: Granular Bentonite	FROM 0 TO 12 FT.
GROUT: N/A	FROM N/A TO N/A FT.
Project Name Ecology Cornet Bay	
Project Number 1196012*00	
ELEVATION AND DATUM: bgs	TOTAL DEPTH: 12.0 ft. bgs
DATE STARTED: 11/11/11	DATE COMPLETED: 11/11/11
INITIAL WATER DEPTH (FT): 4.0	
LOGGED BY: DKM	
SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE_____ FT.

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3.5			KJ-B58-3		0		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
						0.5		CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-20% sand and gravel, moderately stiff to stiff, moist, no odor no sheen.
			5					SM	**Silty SAND with gravel** Brown/gray, silty sand with gravel, moderately dense, moist to wet, no odor, no sheen.
SS	3					0		CL/ ML	**Silty CLAY** Gray/green, silty clay with up to 10% sand and fine gravel, stiff, moist, no odor, no sheen.
						0		SP	**Poorly graded SAND** Gray, medium sand, minor silt, moderately dense, wet, no odor, no sheen.
SS	2		10			0		CL/ ML	**Silty CLAY** Gray/green, silty clay with up to 10% sand and fine gravel, stiff, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B59	
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 12.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/11/11	DATE COMPLETED: 11/11/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 4.0	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 12 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3.5			KJ-B59-2		14.1		CL/ ML	**Silty CLAY** Gray, silty clay, moderately stiff to stiff, moist, slight odor below ~2 feet, no sheen.
						1489			
						318.9		SW	**Well-graded SAND with gravel** Gray, gravely sand fill, some silt, moderately dense, moist to wet, slight to medium odor, no sheen.
			5						
SS	2					31.8		ML	**SILT** Brown, silt with woody material, moderately soft, wet, no odor, no sheen.
						1.7		SM	**Silty SAND** Gray, silty fine to medium sand, some gravel, moderately dense, wet, no odor, no sheen.
SS	2.5		10	KJ-B59-9					
						0.7		CL/ ML	**Silty CLAY** Gray, silty clay with up to 10% sand and fine gravel, stiff, moist, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Boring Name** KJ-B60	
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 30.0 ft. bgs
BLANK CASING: N/A	FROM N/A TO N/A FT.	DATE STARTED: 11/11/11	DATE COMPLETED: 11/11/11
SLOTTED CASING: N/A	FROM N/A TO N/A FT.	INITIAL WATER DEPTH (FT): 6.5	
SIZE AND TYPE OF FILTER PACK: N/A	FROM N/A TO N/A FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 0 TO 30 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								ML	**Sandy SILT** Grass and topsoil.
SS	3					0		ML/ CL	**Clayey SILT with sand** Brown, clayey silt with 10-15% sand and fine gravel overall, some sandier intervals, stiff at top, moderatley stiff below ~5.5 feet, moist to wet below ~7 feet, no odor, no sheen.
SS	3		5			0			
SS	3		10			0		ML	**Sandy SILT with gravel** Gray, sandy silt with 10-20% gravel, loose, wet, no odor, no sheen.
						9.5		CL/ ML	**Silty CLAY** Gray, silty clay, stiff, moist, no odor, no sheen.
SS	2		15	KJ-B60-14		3.1		SM	**Silty SAND** Brown to dark brown, silty fine to medium sand with minor gravel, brown silty material with roots in upper 1-2 inches, moderately dense, wet, slight odor, no sheen.
SS	1.5								**Silty CLAY** Gray, silty clay, minor sand and gravel, stiff at top, moderately stiff by ~25 feet, moderately high plasticitiy, moist, slight odor above ~16 feet, no odor otherwise, no sheen.
SS	3		20	KJ-B60-20		0		CL/ ML	
						0			

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Project Name Ecology Cornet Bay **Project Number** 1196012*00 **Boring Name** KJ-B60

SAMPLES TYPE	SAMPLES RECOV (FEET)	SAMPLES PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	BACKFILL DETAILS	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3.5		25			0			**Silty CLAY** Gray, silty clay, minor sand and gravel, stiff at top, moderately stiff by ~25 feet, moderately high plasticity, moist, slight odor above ~16 feet, no odor otherwise, no sheen. ***(Continued)***
SS	3.5		30			0		CL/ ML	

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Well Name** MW-04	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
BLANK CASING: 2" Schedule 40 PVC Pipe	FROM 0 TO 4.5 FT.	DATE STARTED: 9/15/11	DATE COMPLETED: 9/15/11
SLOTTED CASING: 2" Shedule 40 PVC Pre-Pack 0.010" Slots	FROM 4.5 TO 14.5 FT.	INITIAL WATER DEPTH (FT): 7.0	
SIZE AND TYPE OF FILTER PACK: 10/20 Sand (Pre-Pack); 2/12 Sand Above	FROM 4 TO 14.5 FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 1 TO 4 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ■ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: Concrete	FROM 0 TO 1 FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3		0			0		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
								CL/ ML	**Silty CLAY with sand** Gray, silty clay, 10-15% sand, moderately stiff to stiff, high plasticity, moist, no odor, no sheen.
SS	3.5		5			0			**Sandy SILT** Brown/gray, silt with ~30% medium to fine sand, some gravel and clay, silty interbeds (typically 1-2" thick) and sandy interbeds (typically <1" thick) present locally, moderately stiff, moist to wet, slight odor and light sheen below ~13 feet, no odor and no sheen otherwise.
						0			
			10			0		ML	
SS	4			KJ-MW4-13		0			
						1.8			
			15			0.1		CL/ ML	**Silty CLAY** Gray, silty clay, stiff, moderately high plasticity, wet, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Well Name**	MW-05
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: 2" Schedule 40 PVC Pipe	FROM 0 TO 5 FT.	DATE STARTED: 9/15/11	DATE COMPLETED: 9/15/11
SLOTTED CASING: 2" Shedule 40 PVC Pre-Pack 0.010" Slots	FROM 5 TO 15 FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: 10/20 Sand (Pre-Pack); 2/12 Sand Above	FROM 4 TO 15 FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 1 TO 4 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ■ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: Concrete	FROM 0 TO 1 FT.		

SAMPLES TYPE	SAMPLES RECOV. (FEET)	SAMPLES PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2		0			0		SW	**Well-graded SAND with gravel** Brown, medium to coarse sand, 20-30% gravel, fill, no odor, no sheen.
			5			0		CL/ ML	**Silty CLAY with sand** Brown-gray to gray (bottom ~6 inches), silty clay, 10-15% fine to medium sand, some gravel, moderately stiff, moderately high plasticity, moist, no odor, no sheen.
SS	3					0.3			
			10			0.1		ML	**Sandy SILT** Gray, silt with ~30% fine to medium sand, 5-10% gravel, some clay, texture varies locally with sandy and silty interbeds (typically ~1" thick), moderately soft to moderately stiff (varies locally), medium plasticity, wet, slight odor locally, no sheen.
SS	3			KJ-MW5-12		2.7			
			15			1.6		CL	**Lean CLAY** Gray, clay, moderately stiff to stiff, high plasticity, moist to wet, no odor, no sheen.
SS	4.5					0.7			
			20			0.4			
						0.5			

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Well Name**	MW-06
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 20.0 ft. bgs
BLANK CASING: 2" Schedule 40 PVC Pipe	FROM 0 TO 4.5 FT.	DATE STARTED: 9/15/11	DATE COMPLETED: 9/15/11
SLOTTED CASING: 2" Shedule 40 PVC Pre-Pack 0.010" Slots	FROM 4.5 TO 14.5 FT.	INITIAL WATER DEPTH (FT): 8.0	
SIZE AND TYPE OF FILTER PACK: 10/20 Sand (Pre-Pack); 2/12 Sand Above	FROM 4 TO 14.5 FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 1 TO 4 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ■ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: Concrete	FROM 0 TO 1 FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SW	**Well-graded SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	3					3.8		CL/ML	**Silty CLAY with sand** Tan/gray, silty clay, 5-15% sand, some gravel, moderately stiff, high plasticity, moist, slight odor below ~3.5 feet, no sheen.
						2.3			
			5	KJ-MW6-4		55.3		SP/SM	**Poorly graded SAND with silt and gravel** Gray, fine to medium sand with 10-15% silt and 5-15% gravel, moderately dense, moist to wet, medium to strong odor, medium to heavy sheen.
SS	1					20.1			
			10					ML	**Sandy SILT with gravel** Gray, sandy silt, 10-15% gravel, woody material present below ~13 feet, soft, wet, medium odor, medium sheen.
SS	3					303			
			15	KJ-MW6-14		3.0		ML	**Sandy SILT** Greenish-gray, silt with ~30% sand, some clay and gravel, moderately stiff, wet, slight to medium odor, light sheen.
SS	3					0		CL/ML	**Silty CLAY** Gray, silty clay, 5-10% sand and fine gravel, stiff, high plasticity, moist to wet, no odor, no sheen.
			20			0			

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

SHEET 1 OF 1

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA	
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch
ISOLATION CASING: N/A	FROM N/A TO N/A FT.
BLANK CASING: 2" Schedule 40 PVC Pipe	FROM 0 TO 3.5 FT.
SLOTTED CASING: 2" Shedule 40 PVC Pre-Pack 0.010" Slots	FROM 3.5 TO 13.5 FT.
SIZE AND TYPE OF FILTER PACK: 10/20 Sand (Pre-Pack); 2/12 Sand Above	FROM 3 TO 13.5 FT.
SEAL: Granular Bentonite	FROM 1 TO 3 FT.
GROUT: Concrete	FROM 0 TO 1 FT.

Well Name MW-07
Project Name Ecology Cornet Bay
Project Number 1196012*00

ELEVATION AND DATUM: bgs	TOTAL DEPTH: 15.0 ft. bgs
DATE STARTED: 9/15/11	DATE COMPLETED: 9/15/11
INITIAL WATER DEPTH (FT): 5.0	
LOGGED BY: DKM	
SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ■ SURFACE HOUSING ☐ STAND PIPE____ FT.

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	2.5		5	KJ-MW7-5		0 0		ML SM	**Sandy SILT with gravel** Brown/gray/tan, sandy silt with gravel overall, texture varies locally with sandy, silty, and gravely intervals, fill, no odor, no sheen. **Silty SAND** Gray, silty sand, some gravel, loose, moist to wet, no odor, no sheen.
SS	4.5		10			0 0		CL/ ML	**Silty CLAY with sand** Greenish-gray to tan gray (below ~7.5 feet), silty clay, 10-15% sand, some gravel, increased sand below ~9.5 feet, moderately stiff to stiff, medium plasticity, moist to wet, no odor, no sheen.
SS	4.5		15			0.1 0		SM CL	**Silty SAND with gravel** Gray, silty sand with 10-15% gravel, moderately dense, wet, no odor, no sheen. **Lean CLAY** Gray, clay, some silt, stiff, high plasticity, moist to wet, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Well Name** MW-08
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name** Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs; TOTAL DEPTH: 16.0 ft. bgs
BLANK CASING: 2" Schedule 40 PVC Pipe	FROM 0 TO 3.5 FT.	DATE STARTED: 11/9/11; DATE COMPLETED: 11/9/11
SLOTTED CASING: 2" Shedule 40 PVC Pre-Pack 0.010" Slots	FROM 3.5 TO 13.5 FT.	INITIAL WATER DEPTH (FT): 6.0
SIZE AND TYPE OF FILTER PACK: 10/20 Sand (Pre-Pack); 2/12 Sand Above	FROM 3 TO 13.5 FT.	LOGGED BY: DKM
SEAL: Granular Bentonite	FROM 1 TO 3 FT.	SAMPLING METHODS: MacroCore w/liner; WELL COMPLETION: ■ SURFACE HOUSING ☐ STAND PIPE ____ FT.
GROUT: Concrete	FROM 0 TO 1 FT.	

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								ML	**Sandy SILT** Grass and sandy silt topsoil.
SS	2					0		SP/SM	**Poorly graded SAND with silt** Tan/brown grading to medium/dark gray below ~6 feet, medium sand with up to 10% rounded gravel, coarser sand below ~5 feet, 5-10% silt overall but up to 15% silt below ~5 feet, moderately loose, moist to wet below ~6 feet, slight odor below ~6 feet, no odor otherwise, no sheen.
SS	2.5		5	KJ-MW8-7		0			
						2.5			**Silty SAND** Gray, fine sand with ~30% silt overall, locally >50% silt in 1-2 inch layers or pods, moderately dense, wet, medium odor dissipates below ~9 feet, no odor below ~11 feet, no sheen.
SS	3		10	KJ-MW8-10		6.1			
						5.9		SM	
SS	1		15			0		ML	**SILT** Gray/tan, silt, possibly some clay, moderately soft, wet, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

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(6-87) (3-88) (8-90)

SHEET 1 OF 1

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Well Name** MW-09	
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 13.0 ft. bgs
BLANK CASING: 2" Schedule 40 PVC Pipe	FROM 0 TO 3 FT.	DATE STARTED: 11/9/11	DATE COMPLETED: 11/9/11
SLOTTED CASING: 2" Shedule 40 PVC Pre-Pack 0.010" Slots	FROM 3 TO 13 FT.	INITIAL WATER DEPTH (FT): 4.0	
SIZE AND TYPE OF FILTER PACK: 10/20 Sand (Pre-Pack); 2/12 Sand Above	FROM 2.5 TO 13 FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 1 TO 2.5 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ■ SURFACE HOUSING ☐ STAND PIPE____ FT.
GROUT: Concrete	FROM 0 TO 1 FT.		

SAMPLES TYPE	RECOV (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
SS	3					0		SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
								SM	**Silty SAND** Gray, medium to fine sand with ~30% silt, minor clay and gravel, moderately dense, moist, no odor, no sheen.
								ML	**SILT** Brown, silt with woody material, soft, moist to wet, no odor, no sheen.
SS	3		5	KJ-MW9-5		0		SM	**Silty SAND** Brown to gray, silty fine sand, some gravel, soft, wet, no odor, no sheen.
						0			**Clayey SILT with sand** Gray/green, clayey silt with up to 15% sand and fine gravel, some thin (1-2 inch) sandy interbeds locally, stiff to very stiff, moist, no odor, no sheen.
SS	3.5		10			0		ML/ CL	
U									

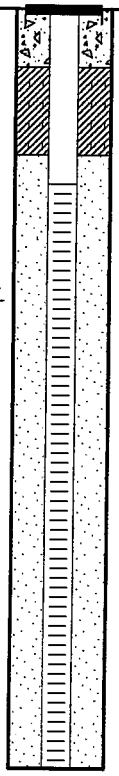
KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: Deception Pass Marina, Cornet Bay, WA		**Well Name** MW-10	
DRILLING COMPANY: ESN Northwest	DRILLER: Carlos	**Project Name** Ecology Cornet Bay	
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number** 1196012*00	
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 13.0 ft. bgs
BLANK CASING: 2" Schedule 40 PVC Pipe	FROM 0 TO 3 FT.	DATE STARTED: 11/9/11	DATE COMPLETED: 11/9/11
SLOTTED CASING: 2" Shedule 40 PVC Pre-Pack 0.010" Slots	FROM 3 TO 13 FT.	INITIAL WATER DEPTH (FT): 5.0	
SIZE AND TYPE OF FILTER PACK: 10/20 Sand (Pre-Pack); 2/12 Sand Above	FROM 2.5 TO 13 FT.	LOGGED BY: DKM	
SEAL: Granular Bentonite	FROM 1 TO 2.5 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ■ SURFACE HOUSING ☐ STAND PIPE_____ FT.
GROUT: Concrete	FROM 0 TO 1 FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
SS	2					0		GW	**Well-graded GRAVEL with sand** Gray, gravel and sand fill, minor silt, moderately dense, moist to wet below ~5 feet, no odor, no sheen.
			5						
SS	3			KJ-MW10-6		0			
						0		ML	**Sandy SILT** Reddish-brown (upper ~6 inches) to gray-brown, silt with up to 30% fine sand, minor gravel, woody material in upper ~6 inches, some shell fragments, moderately soft, wet, no odor, no sheen.
SS	0		10						
U								SW	**Well-graded SAND with gravel** Gray, sand and gravel, dense, wet, no odor, no sheen.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

F-40.1
(6-87) (3-88) (8-90)

Boring & Well Construction Log

Kennedy/Jenks Consultants

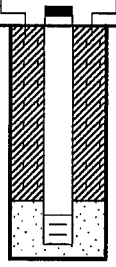
BORING LOCATION: Vapor Point Next to KJ-B36			
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day		
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch		
ISOLATION CASING: N/A	FROM: N/A	TO: N/A	FT.
BLANK CASING: 1/4" Teflon Tubing	FROM: 0	TO: 3.25	FT.
SLOTTED CASING: 6" Stainless Steel Vapor Implant Screen	FROM: 3.25	TO: 3.75	FT.
SIZE AND TYPE OF FILTER PACK: 10/20 Sand	FROM: 3	TO: 4	FT.
SEAL: Hydraded Granular Bentonite	FROM: 0	TO: 3	FT.
GROUT: N/A	FROM: N/A	TO: N/A	FT.

Well Name VP-1

Project Name Ecology Cornet Bay

Project Number 1196012*00

ELEVATION AND DATUM: bgs	TOTAL DEPTH: 4.0 ft. bgs
DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
INITIAL WATER DEPTH (FT): N/A	
LOGGED BY: DKM	
SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ■ STAND PIPE N/A FT.

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6"	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
								SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
	n/a							SM	**Silty SAND with gravel** Gray, silty sand with 20-30% gravel, moderately loose, slightly moist, slight odor, no sheen.
				VP-1 Cornet				CL/ ML	**Silty CLAY** Gray, silty clay, ~10 sand, some gravel, stiff, moist, slight odor, no sheen.

NOTES

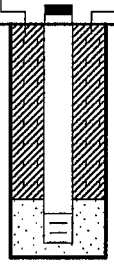
1. Lithology based on boring KJ-B36. Refer to the boring log for KJ-B36 for additional information.
2. Vapor sampling point was installed in the boring after advancing the boring to 4 feet bgs. Bentonite granules were installed in 1-foot lifts and hydrated after each lift. Installation was completed at 0800; sample collection was performed at 0925.
3. Sample VP-1 Cornet was collected as a grab sample using a 1/2 liter SUMMA canister prepared by the analytical laboratory.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

Boring & Well Construction Log

Kennedy/Jenks Consultants

BORING LOCATION: Vapor Point Next to KJ-B35		**Well Name**	VP-2
DRILLING COMPANY: Cascade Drilling	DRILLER: Tyler Day	**Project Name**	Ecology Cornet Bay
DRILLING METHOD(S): Direct-Push	DRILL BIT(S) SIZE: 2-Inch	**Project Number**	1196012*00
ISOLATION CASING: N/A	FROM N/A TO N/A FT.	ELEVATION AND DATUM: bgs	TOTAL DEPTH: 4.0 ft. bgs
BLANK CASING: 1/4" Teflon Tubing	FROM 0 TO 3.25 FT.	DATE STARTED: 9/16/11	DATE COMPLETED: 9/16/11
SLOTTED CASING: 6" Stainless Steel Vapor Implant Screen	FROM 3.25 TO 3.75 FT.	INITIAL WATER DEPTH (FT): N/A	
SIZE AND TYPE OF FILTER PACK: 10/20 Sand	FROM 3 TO 4 FT.	LOGGED BY: DKM	
SEAL: Hydraded Granular Bentonite	FROM 0 TO 3 FT.	SAMPLING METHODS: MacroCore w/liner	WELL COMPLETION: ☐ SURFACE HOUSING ■ STAND PIPE N/A FT.
GROUT: N/A	FROM N/A TO N/A FT.		

SAMPLES TYPE	RECOV. (FEET)	PENETR. RESIST. BLOWS/6	DEPTH (FEET)	SAMPLE NUMBER	WELL CONSTRUCTION	PID	LITHOLOGY	USCS LOG	SAMPLE DESCRIPTION AND DRILLING REMARKS
	n/a			VP-2 Cornet				SM	**Silty SAND with gravel** Tan/brown, sand, silt, gravel fill, no odor, no sheen.
								CL/ ML	**Silty CLAY with sand** Gray, silty clay with 10-15% medium to fine sand with some gravel overall (variable), local thin (typically <1") interbeds of silty sand and poorly graded sand, some shell fragments in lower portion, moderately stiff to moderately soft (varies locally), moist, medium to strong odor, heavy sheen.

NOTES

1. Lithology based on boring KJ-B35. Refer to the boring log for KJ-B35 for additional information.
2. Vapor sampling point was installed in the boring after advancing the boring to 4 feet bgs. Bentonite granules were installed in 1-foot lifts and hydrated after each lift. Installation was completed at 0820; sample collection was performed at 0935.
3. Sample VP-2 Cornet was collected as a grab sample using a 1/2 liter SUMMA canister prepared by the analytical laboratory.

KJ PNW ECOLOGY CORNET BAY BORING LOGS SEPT 2011.GPJ KJ PNW.GDT 12/13/11

Groundwater Purge and Sample Forms

Groundwater Purge and Sample Form Date: 9/19/11 **Kennedy/Jenks Consultants**

Project Name: Cornet Bay **Well Number:** MW-1

Project Number: **Personnel:** DKM

STATIC WATER LEVEL (FT.): 7.22

MEASURING POINT DESCRIPTION: TOC

WATER LEVEL MEASUREMENT METHOD: WL meter

PURGE METHOD: Peristaltic (micro)

TIME START PURGE: 1012

PURGE DEPTH (FT.): ≈15' (Screen = 10-25)

TIME END PURGE: 1059

TIME SAMPLED: 1100

COMMENTS:

Screen 10-25

WELL VOLUME CALCULATION Fill in before purging	TOTAL DEPTH (FT.)	-	DEPTH TO WATER (FT.)	=	WATER COLUMN (FT.)	X	MULTIPLIER FOR CASING DIAMETER (IN) 2	4	6	=	CASING VOLUME (GAL)
	25.3	-	7.22	=	18.08	X	0.16	0.64	1.44	=	2.89

TIME	1027	1040	1054	1059			
VOLUME PURGED (GAL)	1	2	3	3.5			
PURGE RATE (GPM)							
TEMPERATURE (°C)	13.67	13.85	13.97	13.94			
pH	7.53	7.56	7.49	7.46			
SPECIFIC CONDUCTIVITY (uncorrected) (micromhos)/cm	7857	7849	7848	7838			
DISSOLVED OXYGEN (mg/L)	2.76	0.96	2.15	2.07			
Eh(mv)Pt-AgCl ref.	-131.8	-141.4	-141.5	-142.0			
TURBIDITY / COLOR 4.43 NTU →	Clear	→	→	→			
ODOR	Mud 'tide flat' - SH_2S?	→	→	→			
DEPTH OF PURGE INTAKE (FT)							
DEPTH TO WATER DURING PURGE (FT)	7.82	8.21	8.62	8.81			
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	→	→	→			

F-43.1 (3-06)

Groundwater Purge and Sample Form

Date: 7/19/01

Kennedy/Jenks Consultants

Project Name: _____ **Well Number:** MW-1

Project Number: _____ **Personnel:** _____

TIME SAMPLED: 1120 COMMENTS:

DEPTH SAMPLED: =15

SAMPLING EQUIPMENT:

SAMPLE DATA

SAMPLE NO.	NO. OF CON-TAINERS	CONTAINER TYPE	PRESER-VATIVE	FIELD FILTRA-TION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUSTODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	2	A	~	N		clear		Y	Dx	
	5	VOA	HCl	↓		↓		↓	G/BTEX + VOCs	
	2	A	N						PAHs	
	1 1	P	HNO_3	Y					RCRA 8 Metals - TOTAL RCRA 8 Metals - Dissolved	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): <5 COMMENTS: _____

DISPOSAL METHOD: drummed

DRUM DESIGNATION(S) / VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO; IF NO, ADD COMMENTS):

YES NO • WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?

YES NO • INSIDE OF WELL HEAD AND OUTER CASING DRY?

YES NO • WELL CASING OK?

COMMENTS: _____

GENERAL:

WEATHER CONDITIONS: clear

TEMPERATURE (specify °C or °F): 65

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING: NO

CC:

Project Manager: _____

Job File: _____

Other: _____

Groundwater Purge and Sample Form Date: 9/19/11 **Kennedy/Jenks Consultants**

Project Name: Comet	**Well Number:** MW-2
Project Number:	**Personnel:**
STATIC WATER LEVEL (FT.): 7.18	MEASURING POINT DESCRIPTION: TOC
WATER LEVEL MEASUREMENT METHOD:	PURGE METHOD:
TIME START PURGE: 1315	PURGE DEPTH (FT.) (Scr 5-25') ≈15'
TIME END PURGE: 1351	
TIME SAMPLED: 1400	

COMMENTS: Dup. MW-100 collected 9/19/11 1700

Rinsate Blank RB-01 9/19/11 1800 Dx/Gx (5 cont)

WELL VOLUME CALCULATION (Fill in before purging)	TOTAL DEPTH (FT.)	-	DEPTH TO WATER (FT.)	=	WATER COLUMN (FT.)	X	MULTIPLIER FOR CASING DIAMETER (IN) 2	4	6	=	CASING VOLUME (GAL)
	24.7	-	7.18	=	17.52	X	0.16	0.64	1.44	=	2.80

TIME	1329	1339	1343	1351			
VOLUME PURGED (GAL)	1	2	3	3.5			
PURGE RATE (GPM)							
TEMPERATURE (°C)	14.92	14.93	14.66	14.66			
pH	6.30	5.99	6.45	6.43			
SPECIFIC CONDUCTIVITY (micromhos/cm) (uncorrected)	1250	1289	1251	1251			
DISSOLVED OXYGEN (mg/L)	1.53	1.09	0.83	0.82			
Eh(mv) Pt-AgCl ref.	-102.1	-99.3	-100.1	-99.9			
TURBIDITY / COLOR	clear 15.64	→	→	→			
ODOR	mild HC	→	→	→			
DEPTH OF PURGE INTAKE (FT)	-						
DEPTH TO WATER DURING PURGE (FT)	8.32	9.52	9.82	10.13			
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	→	→	→			

F-43.1 (3-06)

Groundwater Purge and Sample Form

Date: 9/19/11

Kennedy/Jenks Consultants

Project Name: _____ **Well Number:** MW-C

Project Number: _____ **Personnel:** _____

SAMPLE DATA

TIME SAMPLED: 1430 / 1700 (DUP) COMMENTS:

DEPTH SAMPLED: ~15

SAMPLING EQUIPMENT:

SAMPLE NO.	NO. OF CON-TAINERS	CONTAINER TYPE	PRESER-VATIVE	FIELD FILTRA-TION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUSTODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	2	A	N	N		clear		Y	DX	
	5	U*A	HCl	↓		↓		↓	G/8015 + VOC	
	2	A	N						PAH	
	1 1	P B	HNO_3	Y					RCRA 8- Total RCRA 8- Dissolved	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): <55 COMMENTS: _____

DISPOSAL METHOD: drum on A

DRUM DESIGNATION(S) / VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO; IF NO, ADD COMMENTS):

- (YES) NO • WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?
- YES (NO) • INSIDE OF WELL HEAD AND OUTER CASING DRY?
- (YES) NO • WELL CASING OK?

COMMENTS: water in drum

GENERAL:

WEATHER CONDITIONS: Clear

TEMPERATURE (specify °C or °F): 65

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING: NO

CC:

Project Manager: _____

Job File: _____

Other: _____

F-43.2 (3-06)

Groundwater Purge and Sample Form Date: 9/19/11 **Kennedy/Jenks Consultants**

Project Name: Cornet	**Well Number:** MW3
Project Number:	**Personnel:** DKM
STATIC WATER LEVEL (FT.): 4.79	MEASURING POINT DESCRIPTION: TOC
WATER LEVEL MEASUREMENT METHOD:	PURGE METHOD: Peristaltic
TIME START PURGE: 1146	PURGE DEPTH (FT.): Scn. 5-20 ≈ 18'
TIME END PURGE: 1222	
TIME SAMPLED: 1225	
COMMENTS:	

WELL VOLUME CALCULATION (Fill in before purging)	TOTAL DEPTH (FT.)	-	DEPTH TO WATER (FT.)	=	WATER COLUMN (FT.)	X	MULTIPLIER FOR CASING DIAMETER (IN) 2	4	6	=	CASING VOLUME (GAL)
	18.6	-	4.79	=	13.81	X	0.16	0.64	1.44	=	2.20

TIME	1158	1209	1215	1222			
VOLUME PURGED (GAL)	1	2	2.5	3			
PURGE RATE (GPM)							
TEMPERATURE (°C)	14.84	14.87	14.88	14.87			
pH	6.53	6.55	6.54	6.56			
SPECIFIC CONDUCTIVITY (micromhos/cm) (uncorrected)	4784	4785	4753	4752			
DISSOLVED OXYGEN (mg/L)	3.45	1.83	2.39	2.41			
Eh(mv)Pt-AgCl ref.	-80.8	-79.2	-71.8	-72.1			
TURBIDITY / COLOR	clear 16.83 NTU	→	→	→			
ODOR	mod sfc	→	→	→			
DEPTH OF PURGE INTAKE (FT)	~~7.23~~	~~7.59~~					
DEPTH TO WATER DURING PURGE (FT)	7.23	7.59	7.83	8.21			
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	→	→	→			

F-43.1 (3-06)

Groundwater Purge and Sample Form

Date: 9/19/11

Kennedy/Jenks Consultants

Project Name: _____ **Well Number:** MW-3

Project Number: _____ **Personnel:** _____

SAMPLE DATA

TIME SAMPLED: 1225 COMMENTS:

DEPTH SAMPLED: ~18

SAMPLING EQUIPMENT:

SAMPLE NO.	NO. OF CON-TAINERS	CONTAINER TYPE	PRESER-VATIVE	FIELD FILTRA-TION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUSTODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	2	A	N	N		Clear		Y	Dx	
	5	VOA	HCl	↓		↓		↓	GASTEX +VOC;	
	2	A	N						PAH;	
	1 1	P P	HNO_3	Y		V			RCRA 8 - Total RCRA 8 - Dissolved	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): <3 COMMENTS: _____

DISPOSAL METHOD: drummed

DRUM DESIGNATION(S) / VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO; IF NO, ADD COMMENTS):

(YES) NO • WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?

YES (NO) • INSIDE OF WELL HEAD AND OUTER CASING DRY?

(YES) NO • WELL CASING OK?

COMMENTS: water in monument

GENERAL:

WEATHER CONDITIONS: clear

TEMPERATURE (specify °C or °F): 65

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING: No

CC:

Project Manager: _____

Job File: _____

Other: _____

Groundwater Purge and Sample Form Date: 9/20/11 **Kennedy/Jenks Consultants**

Project Name: Cornet Bay **Well Number:** MW-4

Project Number: **Personnel:**

STATIC WATER LEVEL (FT.): 9.34	MEASURING POINT DESCRIPTION: TOC
WATER LEVEL MEASUREMENT METHOD:	PURGE METHOD: Peristaltic (micro)
TIME START PURGE: 815	PURGE DEPTH (FT.): ≈12.5
TIME END PURGE: 853	
TIME SAMPLED: 900	

COMMENTS:

WELL VOLUME CALCULATION Fill in before purging	TOTAL DEPTH (FT.)	-	DEPTH TO WATER (FT.)	=	WATER COLUMN (FT.)	X	MULTIPLIER FOR CASING DIAMETER (IN) 2	4	6	=	CASING VOLUME (GAL)
	14.5		9.34		5.16		0.16	0.64	1.44		0.83

TIME	827	836	845	853			
VOLUME PURGED (GAL)	0.5	0.75	1.00	1.25			
PURGE RATE (GPM)							
TEMPERATURE (°C)	12.18	12.18	12.14	12.14			
pH	7.23	7.27	7.26	7.26			
SPECIFIC CONDUCTIVITY (uncorrected) (micromhos/cm)	7871	8010	8088	8081			
DISSOLVED OXYGEN (mg/L)	~~8.9~~ [illegible]	0.94	0.89	0.88			
Eh(mv)Pt-AgCl ref.	-136.1	-143.2	-153.6	-153.7			
TURBIDITY / COLOR	clear pale yellow 13.55	→	→	→			
ODOR	H2S mod	→	→	→			
DEPTH OF PURGE INTAKE (FT)	≈12.5	→	→	→			
DEPTH TO WATER DURING PURGE (FT)	9.87	10.02	10.20	10.31			
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	→	→	→			

F-43.1 (3-06)

Groundwater Purge and Sample Form Date: 9/20/11 **Kennedy/Jenks Consultants**

Project Name: _____ **Well Number:** MW-4

Project Number: _____ **Personnel:** _____

SAMPLE DATA

TIME SAMPLED: 900 COMMENTS:

DEPTH SAMPLED: ~12-5

SAMPLING EQUIPMENT:

SAMPLE NO.	NO. OF CON-TAINERS	CONTAINER TYPE	PRESER-VATIVE	FIELD FILTRA-TION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUSTODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	7	A	N	N		clear		Y	BX	
	5	VOA	HCl	↓		↓		↓	G/BTEX +VOCs	
	2	A	N						PAHs	
	1	P	HNO3	Y					RCRA 8-Total	
	1	P	↓						RCRA 8-Dissolved	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): ~2 COMMENTS: _____

DISPOSAL METHOD: drummed

DRUM DESIGNATION(S) / VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO; IF NO, ADD COMMENTS):

(YES) NO • WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?

(YES) NO • INSIDE OF WELL HEAD AND OUTER CASING DRY?

(YES) NO • WELL CASING OK?

COMMENTS: _____

GENERAL:

WEATHER CONDITIONS: clear

TEMPERATURE (specify °C or °F): 65

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING: NO

CC:

Project Manager: _____

Job File: _____

Other: _____

Groundwater Purge and Sample Form Date: 9/20 **Kennedy/Jenks Consultants**

Project Name:	Carnel Bay	**Well Number:**	MW-5
Project Number:		**Personnel:**	DKM

STATIC WATER LEVEL (FT.):	8.92	MEASURING POINT DESCRIPTION:	TOC
WATER LEVEL MEASUREMENT METHOD:		PURGE METHOD:	Peristaltic (micro)
TIME START PURGE:	655	PURGE DEPTH (FT.):	≈12
TIME END PURGE:	727		
TIME SAMPLED:	730		

COMMENTS:

WELL VOLUME CALCULATION	TOTAL DEPTH (FT.)	-	DEPTH TO WATER (FT.)	=	WATER COLUMN (FT.)	X	MULTIPLIER FOR CASING DIAMETER (IN)			=	CASING VOLUME (GAL)
							2	4	6		
Fill in before purging	15		8.92		6.08		0.16	0.64	1.44		0.97

TIME	705	713	720	727			
VOLUME PURGED (GAL)	0.5	0.75	1.00	1.25			
PURGE RATE (GPM)							
TEMPERATURE (°C)	13.18	13.10	13.06	13.04			
pH	6.58	6.59	6.57	6.57			
SPECIFIC CONDUCTIVITY (uncorrected) (micromhos/cm)	2308	2268	2228	2229			
DISSOLVED OXYGEN (mg/L) Cal?	9.69?	9.68?	9.59?	9.58?	4.08 (circled)	- did @ 11:00 - purged [illegible]	
Eh(mv)Pt-AgCl ref.	53.6	1.4	-41.5	-46.7			
TURBIDITY / COLOR	Clear v. pale yellow 18.61	→	→	→			
ODOR	Sl+?	→	→	→			
DEPTH OF PURGE INTAKE (FT)							
DEPTH TO WATER DURING PURGE (FT)	≈10.2	≈10.8	≈11.1	≈11.3			
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	→	→	→			

Groundwater Purge and Sample Form

Date: 9/20/11

Kennedy/Jenks Consultants

Project Name: _____ **Well Number:** MW-5

Project Number: _____ **Personnel:** _____

SAMPLE DATA

TIME SAMPLED: 1550 COMMENTS:

DEPTH SAMPLED: ~12

SAMPLING EQUIPMENT:

SAMPLE NO.	NO. OF CON-TAINERS	CONTAINER TYPE	PRESER-VATIVE	FIELD FILTRA-TION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUSTODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	2	A	N	N		clear		Y	DX	
	5	VOA	HCl	↓		↓		↓	8/BTEX +VOCs	
	2	A	N						PAHs	
	1 1	P P	HNO_3	Y					RCRA 8+ Total RCRA 8+ Dissolved	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): <2 COMMENTS: _____

DISPOSAL METHOD: drummed

DRUM DESIGNATION(S) / VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO; IF NO, ADD COMMENTS):

(YES) NO • WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?

(YES) NO • INSIDE OF WELL HEAD AND OUTER CASING DRY?

(YES) NO • WELL CASING OK?

COMMENTS: _____

GENERAL:

WEATHER CONDITIONS: clear

TEMPERATURE (specify °C or °F): 65

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING: NO

CC:

Project Manager: _____

Job File: _____

Other: _____

Groundwater Purge and Sample Form Date: 9/20/11 **Kennedy/Jenks Consultants**

Project Name: Cromet	**Well Number:** MW-6
Project Number:	**Personnel:** DKem
STATIC WATER LEVEL (FT.): 4.75	MEASURING POINT DESCRIPTION: TOC
WATER LEVEL MEASUREMENT METHOD:	PURGE METHOD: Peristaltic
TIME START PURGE: 919	PURGE DEPTH (FT.): ~10'
TIME END PURGE: 950	
TIME SAMPLED: 1000	
COMMENTS:	

WELL VOLUME CALCULATION (Fill in before purging)	TOTAL DEPTH (FT.)	-	DEPTH TO WATER (FT.)	=	WATER COLUMN (FT.)	X	MULTIPLIER FOR CASING DIAMETER (IN) 2	4	6	=	CASING VOLUME (GAL)
	14.5		4.95		9.75		0.16	0.64	1.44		1.56

TIME	925	933	942	950			
VOLUME PURGED (GAL)	0.5	1.0	1.5	2			
PURGE RATE (GPM)							
TEMPERATURE (°C)	14.63	14.71	14.92	14.91			
pH	6.69	6.66	6.65	6.65			
SPECIFIC CONDUCTIVITY (micromhos/cm) (uncorrected)	2515	2510	2409	2401			
DISSOLVED OXYGEN (mg/L)	2.42	2.32	2.07	1.97			
Eh(mv)Pt-AgCl ref.	-60.6	-48.7	-54.6	-56.8			
TURBIDITY / COLOR	clear w. pale yel. 12-15	~	~	~			
ODOR	SH?	~	~	~			
DEPTH OF PURGE INTAKE (FT)							
DEPTH TO WATER DURING PURGE (FT)	5.31	5.91	6.13	6.29			
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	~	~	~			

Groundwater Purge and Sample Form Date: 9/20/11 **Kennedy/Jenks Consultants**

Project Name: _____ **Well Number:** MW-6

Project Number: _____ **Personnel:** _____

SAMPLE DATA

TIME SAMPLED: 1000 COMMENTS:

DEPTH SAMPLED: ~10'

SAMPLING EQUIPMENT:

SAMPLE NO.	NO. OF CON-TAINERS	CONTAINER TYPE	PRESER-VATIVE	FIELD FILTRA-TION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUSTODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	2	A	N	N		Clear		Y	DX	
	5	VOA	HCl	↓		↓		↓	G/BTEX +VOCs	
	2	A	N						PAHs	
	1 1	P	HNO3	Y					RCRA 8 - Total RCRA 8 - Dissolved	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): ~3 COMMENTS: _____

DISPOSAL METHOD: drummed

DRUM DESIGNATION(S) / VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO; IF NO, ADD COMMENTS):

(YES) NO • WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?

(YES) NO • INSIDE OF WELL HEAD AND OUTER CASING DRY?

(YES) NO • WELL CASING OK?

COMMENTS: _____

GENERAL:

WEATHER CONDITIONS: Clear

TEMPERATURE (specify °C or °F): 65

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING: No

CC:

Project Manager: _____

Job File: _____

Other: _____

Groundwater Purge and Sample Form Date: 9/20/11 **Kennedy/Jenks Consultants**

Project Name: Conoco	**Well Number:** MW-7
Project Number:	**Personnel:** DKM

STATIC WATER LEVEL (FT.): 2.49	MEASURING POINT DESCRIPTION:
WATER LEVEL MEASUREMENT METHOD:	PURGE METHOD: Peristaltic
TIME START PURGE: 1018	PURGE DEPTH (FT.): ~10
TIME END PURGE: 1044	
TIME SAMPLED: 1050	
COMMENTS:	

WELL VOLUME CALCULATION Fill in before purging	TOTAL DEPTH (FT.)	-	DEPTH TO WATER (FT.)	=	WATER COLUMN (FT.)	X	MULTIPLIER FOR CASING DIAMETER (IN) 2	4	6	=	CASING VOLUME (GAL)
	13.5	-	2.49	=	11.01	X	0.16	0.64	1.44	=	1.76

TIME	1024	1030	1037	1044			
VOLUME PURGED (GAL)	0.5	1	1.5	2			
PURGE RATE (GPM)							
TEMPERATURE (°C)	14.72	14.95	15.24	15.25			
pH	6.80	6.78	6.76	6.76			
SPECIFIC CONDUCTIVITY (micromhos/cm) (uncorrected)	626	623	569	566			
DISSOLVED OXYGEN (mg/L)	11.69	11.56	11.38	11.30			
Eh(mv)Pt-AgCl ref.	-4.1	4.1	-47.1	-49.3			
TURBIDITY / COLOR	clear 15.12	→	→	→			
ODOR	N	→	→	→			
DEPTH OF PURGE INTAKE (FT)							
DEPTH TO WATER DURING PURGE (FT)	3.52	3.71	3.82	3.90			
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	→	→	→			

Groundwater Purge and Sample Form

Date: 9/20/11

Kennedy/Jenks Consultants

Project Name: _____ **Well Number:** MW-7

Project Number: _____ **Personnel:** _____

TIME SAMPLED: 1050

DEPTH SAMPLED: ~10

SAMPLING EQUIPMENT:

COMMENTS:

SAMPLE DATA

SAMPLE NO.	NO. OF CONTAINERS	CONTAINER TYPE	PRESERVATIVE	FIELD FILTRATION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUSTODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	2	A	N	N		Clear		Y	DX	
	5	VOA	HCl	↓		↓		↓	GRO/BTEX +VOCs	
	2	A	N						PAHs	
	1	P	HNO_3	Y					dCrA8 - Total	
	1	P							RCrA8 - Dissolved	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): ~3

COMMENTS: _____

DISPOSAL METHOD: Drummed

DRUM DESIGNATION(S) / VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO; IF NO, ADD COMMENTS):

- (YES) NO • WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?
- (YES) NO • INSIDE OF WELL HEAD AND OUTER CASING DRY?
- (YES) NO • WELL CASING OK?

COMMENTS: _____

GENERAL:

WEATHER CONDITIONS: clear

TEMPERATURE (specify °C or °F): 65

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING: NO

CC:

Project Manager: _____

Job File: _____

Other: _____

F-43.2 (3-06)

Groundwater Purge and Sample Form Date: 11/11/11 **Kennedy/Jenks Consultants**

PROJECT NAME: Cornet Bay WELL NUMBER: MW-8

PROJECT NUMBER: 1196012*00/Task 1/1.2 PERSONNEL: LK

STATIC WATER LEVEL (FT): 4.89 MEASURING POINT DESCRIPTION:

WATER LEVEL MEASUREMENT METHOD: Beep Tape PURGE METHOD: Peristaltic

TIME START PURGE: 8 10 PURGE DEPTH (FT) ≈ 11.5

TIME END PURGE: 9 10

TIME SAMPLED: 9:00

COMMENTS:

WELL VOLUME CALCULATION (FILL IN BEFORE PURGING)	TOTAL DEPTH (FT)	-	DEPTH TO WATER (FT)	=	WATER COLUMN (FT)	X	MULTIPLIER FOR CASING DIAMETER (IN) 2	4	6	=	CASING VOLUME (GAL)
	13.41 PVC		4.89 PVC		8.52		0.16	0.64	1.44		

TIME	820	825	830	835	840	845	
VOLUME PURGED (GAL)							
PURGE RATE (GPM)	0.3	0.3	0.3	0.3	0.3	0.3	
TEMPERATURE (°C)	10.21	11.29	11.41	11.51	11.35	11.36	
pH	6.06	5.99	5.98	5.99	5.98	5.98	
SPECIFIC CONDUCTIVITY (micromhos/cm) (uncorrected)	2.234	2.276	2.175	1.919	1.769	1.713	
DISSOLVED OXYGEN (mg/L)	15.55	15.98	10.68	8.57	7.64	7.23	
eH(MV)Pt-AgCl ref.							
TURBIDITY/COLOR	clear	19.14	13.99	12.29	9.34	8.72	
ODOR	None	None	None	None	None	None	
DEPTH OF PURGE INTAKE (FT)	4.60	4.60	4.62	4.63	4.64	4.64	
DEPTH TO WATER DURING PURGE (FT)							
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	N	N	N	N	N	

Samp

Groundwater Purge and Sample Form Date: 11/11/11 **Kennedy/Jenks Consultants**

PROJECT NAME: _____ WELL NUMBER: MW-8

PROJECT NUMBER: _____ PERSONNEL: _____

SAMPLE DATA:

TIME SAMPLED: 1100 COMMENTS: _____

DEPTH SAMPLED (FT): 11.5 _____

SAMPLING EQUIPMENT: _____ _____

SAMPLE NO.	NO. OF CONTAIN-ERS	CON-TAINER TYPE	PRESER-VATIVE	FIELD FILTRA-TION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUS-TODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	2	A	N	N		clear		Y	D4	
	3	VOA	HCl	↓		↓		↓	G/BTEX	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): <5 COMMENTS: _____

DISPOSAL METHOD: drummed _____

DRUM DESIGNATION(S)/VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO - IF NO, ADD COMMENTS):

WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?: (YES) NO

INSIDE OF WELL HEAD AND OUTER CASING DRY?: (YES) NO

WELL CASING OK?: (YES) NO

COMMENTS: _____

GENERAL:

WEATHER CONDITIONS: Overcast

TEMPERATURE (SPECIFY °C OR °F): 50

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING? N

cc: Project Manager: _____
Job File: _____
Other: _____

F-43.2 (5-89)

Groundwater Purge and Sample Form Date: 11/11/11 **Kennedy/Jenks Consultants**

PROJECT NAME: Cornet Bay WELL NUMBER: MW-9

PROJECT NUMBER: 1196012*00/Task 1/1.2 PERSONNEL: CK

STATIC WATER LEVEL (FT): 1.82 MEASURING POINT DESCRIPTION:

WATER LEVEL MEASUREMENT METHOD: Beep type PURGE METHOD: Peristaltic

TIME START PURGE: 1020 PURGE DEPTH (FT) ≈ 11

TIME END PURGE: 1108

TIME SAMPLED: 1100

COMMENTS:

WELL VOLUME CALCULATION (FILL IN BEFORE PURGING)	TOTAL DEPTH (FT)	-	DEPTH TO WATER (FT)	=	WATER COLUMN (FT)	X	MULTIPLIER FOR CASING DIAMETER (IN) 2	4	6	=	CASING VOLUME (GAL)
	13.20		1.82		11.38		0.16	0.64	1.44		

TIME	1025	1030	1035	1040	1045		
VOLUME PURGED (GAL)							
PURGE RATE (GPM)	0.25	0.25	0.25	0.25	0.25		
TEMPERATURE (°C)	11.13	10.77	10.79	11.11	11.10		
pH	6.17	6.12	6.07	5.98	5.97		
SPECIFIC CONDUCTIVITY (micromhos/cm) (uncorrected)	1.059	1.054	1.054	1.054	1.055		
DISSOLVED OXYGEN (mg/L)	8.93	7.86	7.82	7.68	7.58		
eH(MV)Pt-AgCl ref.							
TURBIDITY/COLOR	Yellow	56.4	62.4	59.6	57.5		
ODOR	None	None	None	None	None		
DEPTH OF PURGE INTAKE (FT)	~~1.80~~						
DEPTH TO WATER DURING PURGE (FT)	1.80	1.83	1.84	1.84	1.85		
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	N	N	N	N		

Groundwater Purge and Sample Form Date: 6/11/11 **Kennedy/Jenks Consultants**

PROJECT NAME: _____ WELL NUMBER: MW-9

PROJECT NUMBER: _____ PERSONNEL: _____

SAMPLE DATA:

TIME SAMPLED: 900 COMMENTS: _____

DEPTH SAMPLED (FT): 11 _____

SAMPLING EQUIPMENT: _____ _____

SAMPLE NO.	NO. OF CONTAIN-ERS	CON-TAINER TYPE	PRESER-VATIVE	FIELD FILTRA-TION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUS-TODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	2	A	N	N		clear		Y	DX	
	3	V.A	HCl	↓		↓		↓	E/8260	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): 55 COMMENTS: _____

DISPOSAL METHOD: drummed _____

DRUM DESIGNATION(S)/VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO - IF NO, ADD COMMENTS):

WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?: (YES) NO

INSIDE OF WELL HEAD AND OUTER CASING DRY?: (YES) NO

WELL CASING OK?: (YES) NO

COMMENTS: _____

GENERAL:

WEATHER CONDITIONS: Overcast

TEMPERATURE (SPECIFY °C OR °F): 50

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING? N

cc: Project Manager: _____
Job File: _____
Other: _____

Groundwater Purge and Sample Form Date: 11/11/11 **Kennedy/Jenks Consultants**

PROJECT NAME: Carmel Bay WELL NUMBER: MW-10

PROJECT NUMBER: 1196012*00/Task 1/1.2 PERSONNEL: CK

STATIC WATER LEVEL (FT): 3.49 MEASURING POINT DESCRIPTION:

WATER LEVEL MEASUREMENT METHOD: Beep Tape PURGE METHOD: Peristaltic

TIME START PURGE: 915 PURGE DEPTH (FT) ~11.5

TIME END PURGE: 1012

TIME SAMPLED: 1005

COMMENTS:

WELL VOLUME CALCULATION (FILL IN BEFORE PURGING)	TOTAL DEPTH (FT)	-	DEPTH TO WATER (FT)	=	WATER COLUMN (FT)	X	MULTIPLIER FOR CASING DIAMETER (IN) 2	4	6	=	CASING VOLUME (GAL)
	13.42 NC		3.49		9.93		0.16	0.64	1.44		

TIME	920	925	930	935	940	945	
VOLUME PURGED (GAL)							
PURGE RATE (GPM)	0.3	0.3	0.3	0.3	0.3	0.3	
TEMPERATURE (°C)	8.31	8.56	8.79	8.78	9.01	9.15	
pH	5.90	5.81	5.84	5.86	5.86	5.86	
SPECIFIC CONDUCTIVITY (micromhos/cm) (uncorrected)	2.698	2.620	2.991	3.061	3.112	3.105	
DISSOLVED OXYGEN (mg/L)	17.15	17.44	17.69	17.96	17.93	17.98	
eH(MV)Pt-AgCl ref.							
TURBIDITY/COLOR	Slight Brown Clear	Slight Brown Clear	Slight Brown 27.77	25.42	24.03	24.55	
ODOR	none	none	none	none	none	none	
DEPTH OF PURGE INTAKE (FT)	3.45	3.47	3.47	3.48	3.48	3.49	
DEPTH TO WATER DURING PURGE (FT)							
NUMBER OF CASING VOLUMES REMOVED							
DEWATERED?	N	N	N	N	N	N	

Groundwater Purge and Sample Form Date: 11/11/15 **Kennedy/Jenks Consultants**

PROJECT NAME: _____ WELL NUMBER: MW-10

PROJECT NUMBER: _____ PERSONNEL: _____

SAMPLE DATA:

TIME SAMPLED: 1005 COMMENTS: _____

DEPTH SAMPLED (FT): 21.5 _____

SAMPLING EQUIPMENT: _____ _____

SAMPLE NO.	NO. OF CONTAIN-ERS	CON-TAINER TYPE	PRESER-VATIVE	FIELD FILTRA-TION	VOLUME FILLED (ml or L)	TURBIDITY	COLOR	SHIPPED UNDER CHAIN-OF-CUS-TODY AT 4°C?	ANALYSIS REQUEST (METHOD)	COMMENTS
	2	A	N	N		clear		Y	Dx	
	3	VOA	HCl	↓		↓		↓	G/BTEX	

PURGE WATER DISPOSAL NOTES:

TOTAL DISCHARGE (GAL): 25 COMMENTS: _____

DISPOSAL METHOD: Drummed _____

DRUM DESIGNATION(S)/VOLUME PER (GAL): _____

WELL HEAD CONDITIONS CHECKLIST (CIRCLE YES OR NO - IF NO, ADD COMMENTS):

WELL SECURITY DEVICES OK (BOLLARDS, CHRISTY LID, CASING LID AND LOCK)?: (YES) NO

INSIDE OF WELL HEAD AND OUTER CASING DRY?: (YES) NO

WELL CASING OK?: (YES) NO

COMMENTS: _____

GENERAL:

WEATHER CONDITIONS: Overcast

TEMPERATURE (SPECIFY °C OR °F): 50

PROBLEMS ENCOUNTERED DURING PURGING OR SAMPLING? N

cc: Project Manager: _____
Job File: _____
Other: _____

Appendix E

Hydrologic Data

Help Print

NOAA/NOS/CO-OPS
Monthly Tide Prediction for Yokeko Point, Deception Pass,WA
StationId: 9448601
From: 2011/10/01 - 20111031
Units: Feet Time Zone: LST/LDT Datum: MLLW

Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130)
Height offset in feet (low:-0.20 high: -1.00) Time offset in mins (low:38 high: 26)

October 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 10.33H 10.03H -2.2L 5.67L
2 10.0H 9.25H -1.87L 6.36L	3 9.7H 8.4H -1.19L 6.65L	4 9.59H 7.7H -0.34L 6.34L	5 9.65H 0.48L 5.49L	6 7.4H 9.76H 1.12L 4.46L	7 7.53H 9.83H 1.61L 3.45L	8 7.93H 9.82H 2.09L 2.53L
9 8.38H 9.78H 2.64L 1.72L	10 8.8H 9.72H 3.28L 1.0L	11 9.17H 9.65H 3.97L	12 9.47H 9.55H 0.35L 4.65L	13 9.71H 9.38H -0.19L 5.28L	14 9.86H 9.14H -0.59L 5.84L	15 9.9H 8.83H -0.81L 6.33L
16 9.83H 8.47H -0.83L 6.73L	17 9.67H 8.05H -0.68L 7.03L	18 9.51H 7.59H -0.36L 7.14L	19 9.44H 7.16H 0.08L 6.89L	20 9.52H 6.97H 0.59L 6.18L	21 9.74H 1.1L 5.04L	22 7.2H 10.05H 1.61L 3.58L
23 7.83H 10.4H 2.15L 1.93L	24 8.69H 10.75H 2.78L 0.24L	25 9.59H 11.02H 3.51L -1.29L	26 10.38H 11.15H 4.3L -2.47L	27 10.95H 11.1H 5.07L	28 11.25H 10.8H -3.17L 5.74L	29 11.29H 10.27H -3.35L 6.25L
30 11.12H 9.52H -3.02L 6.56L	31 10.84H 8.63H -2.26L 6.61L					

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Note: For predictions of Subordinate stations, the solid blue line depicts a curve fit between the high and low values and approximates the segments between.

High/Low Tide Predictions Prediction

Station Name: Yokeko Point, Deception Pass,WA
Parameter: Monthly
Product: Tide Prediction
Start Date & Time: 2011/10/01 12:00AM
End Date & Time: 2011/10/31 11:59PM

Source: NOAA/NOS/CO-OPS
Prediction Type: Subordinate
Datum: MLLW
Height Units: Feet
Time Zone: LST/LDT

Date	Day	Time	Hgt	Time	Hgt	Time	Hgt	Time	Hgt
2011/10/01	Sat	02:36 AM	-2.2 L	09:24 AM	10.33 H	03:07 PM	5.67 L	08:18 PM	10.03 H
2011/10/02	Sun	03:28 AM	-1.87 L	10:31 AM	10.0 H	04:13 PM	6.36 L	09:11 PM	9.25 H
2011/10/03	Mon	04:24 AM	-1.19 L	11:47 AM	9.7 H	05:36 PM	6.65 L	10:15 PM	8.4 H
2011/10/04	Tue	05:26 AM	-0.34 L	01:07 PM	9.59 H	07:17 PM	6.34 L	11:36 PM	7.7 H
2011/10/05	Wed	06:35 AM	0.48 L	02:16 PM	9.65 H	08:40 PM	5.49 L		
2011/10/06	Thu	01:06 AM	7.4 H	07:47 AM	1.12 L	03:09 PM	9.76 H	09:36 PM	4.46 L
2011/10/07	Fri	02:30 AM	7.53 H	08:52 AM	1.61 L	03:48 PM	9.83 H	10:18 PM	3.45 L
2011/10/08	Sat	03:39 AM	7.93 H	09:47 AM	2.09 L	04:17 PM	9.82 H	10:52 PM	2.53 L
2011/10/09	Sun	04:35 AM	8.38 H	10:34 AM	2.64 L	04:40 PM	9.78 H	11:20 PM	1.72 L
2011/10/10	Mon	05:22 AM	8.8 H	11:15 AM	3.28 L	05:00 PM	9.72 H	11:45 PM	1.0 L
2011/10/11	Tue	06:03 AM	9.17 H	11:52 AM	3.97 L	05:22 PM	9.65 H		
2011/10/12	Wed	12:10 AM	0.35 L	06:41 AM	9.47 H	12:28 PM	4.65 L	05:45 PM	9.55 H
2011/10/13	Thu	12:37 AM	-0.19 L	07:17 AM	9.71 H	01:04 PM	5.28 L	06:12 PM	9.38 H
2011/10/14	Fri	01:07 AM	-0.59 L	07:54 AM	9.86 H	01:41 PM	5.84 L	06:41 PM	9.14 H
2011/10/15	Sat	01:41 AM	-0.81 L	08:34 AM	9.9 H	02:21 PM	6.33 L	07:11 PM	8.83 H
2011/10/16	Sun	02:18 AM	-0.83 L	09:17 AM	9.83 H	03:05 PM	6.73 L	07:45 PM	8.47 H
2011/10/17	Mon	03:00 AM	-0.68 L	10:07 AM	9.67 H	03:56 PM	7.03 L	08:23 PM	8.05 H
2011/10/18	Tue	03:46 AM	-0.36 L	11:02 AM	9.51 H	05:00 PM	7.14 L	09:13 PM	7.59 H
2011/10/19	Wed	04:39 AM	0.08 L	12:03 PM	9.44 H	06:18 PM	6.89 L	10:26 PM	7.16 H
2011/10/20	Thu	05:37 AM	0.59 L	01:01 PM	9.52 H	07:34 PM	6.18 L	11:54 PM	6.97 H
2011/10/21	Fri	06:41 AM	1.1 L	01:50 PM	9.74 H	08:30 PM	5.04 L		
2011/10/22	Sat	01:19 AM	7.2 H	07:46 AM	1.61 L	02:31 PM	10.05 H	09:13 PM	3.58 L
2011/10/23	Sun	02:36 AM	7.83 H	08:47 AM	2.15 L	03:07 PM	10.4 H	09:53 PM	1.93 L
2011/10/24	Mon	03:44 AM	8.69 H	09:43 AM	2.78 L	03:41 PM	10.75 H	10:33 PM	0.24 L
2011/10/25	Tue	04:44 AM	9.59 H	10:36 AM	3.51 L	04:16 PM	11.02 H	11:13 PM	-1.29 L
2011/10/26	Wed	05:41 AM	10.38 H	11:27 AM	4.3 L	04:52 PM	11.15 H	11:55 PM	-2.47 L
2011/10/27	Thu	06:35 AM	10.95 H	12:18 PM	5.07 L	05:31 PM	11.1 H		
2011/10/28	Fri	12:38 AM	-3.17 L	07:29 AM	11.25 H	01:10 PM	5.74 L	06:12 PM	10.8 H
2011/10/29	Sat	01:23 AM	-3.35 L	08:24 AM	11.29 H	02:05 PM	6.25 L	06:57 PM	10.27 H
2011/10/30	Sun	02:11 AM	-3.02 L	09:20 AM	11.12 H	03:05 PM	6.56 L	07:48 PM	9.52 H
2011/10/31	Mon	03:01 AM	-2.26 L	10:18 AM	10.84 H	04:14 PM	6.61 L	08:46 PM	8.63 H

Help Print

NOAA/NOS/CO-OPS
Monthly Tide Prediction for Yokeko Point, Deception Pass,WA
StationId: 9448601
From: 2011/11/01 - 20111130
Units: Feet Time Zone: LST/LDT Datum: MLLW

Referenced to Station: SEATTLE (Madison St.), Elliott Bay (9447130)
Height offset in feet (low:-0.20 high: -1.00) Time offset in mins (low:38 high: 26)

November 2011

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1 10.54H 7.72H -1.19L 6.31L	**2** 10.31H 7.0H 0.05L 5.58L	**3** 10.16H 1.3L 4.54L	**4** 6.73H 10.06H 2.45L 3.41L	**5** 7.01H 9.99H 3.42L 2.34L
6 7.65H 9.9H 4.23L 1.37L	**7** 8.39H 9.81H 4.93L 0.54L	**8** 9.07H 9.72H 5.56L -0.17L	**9** 9.63H 9.6H 6.1L -0.76L	**10** 10.05H 9.46H 6.55L -1.22L	**11** 10.35H 9.28H 6.88L -1.52L	**12** 10.53H 9.07H 7.11L
13 10.62H 8.81H -1.66L 7.24L	**14** 10.64H 8.49H -1.61L 7.26L	**15** 10.6H 8.07H -1.37L 7.14L	**16** 10.56H 7.57H -0.89L 6.8L	**17** 10.55H 7.06H -0.16L 6.13L	**18** 10.59H 6.78H 0.81L 5.06L	**19** 10.69H 1.96L 3.63L
20 6.99H 10.85H 3.17L 1.96L	**21** 7.71H 11.03H 4.29L 0.24L	**22** 8.75H 11.2H 5.24L -1.34L	**23** 9.82H 11.29H 5.98L -2.61L	**24** 10.71H 11.26H 6.51L -3.44L	**25** 11.33H 11.05H 6.84L -3.77L	**26** 11.65H 10.64H 6.97L
27 11.73H 10.04H -3.61L 6.92L	**28** 11.64H 9.27H -3.01L 6.7L	**29** 11.44H 8.39H -2.06L 6.31L	**30** 11.19H 7.5H -0.82L 5.72L			

Disclaimer: These data are based upon the latest information available as of the date of your request, and may differ from the published tide tables.
Note: For predictions of Subordinate stations, the solid blue line depicts a curve fit between the high and low values and approximates the segments between.

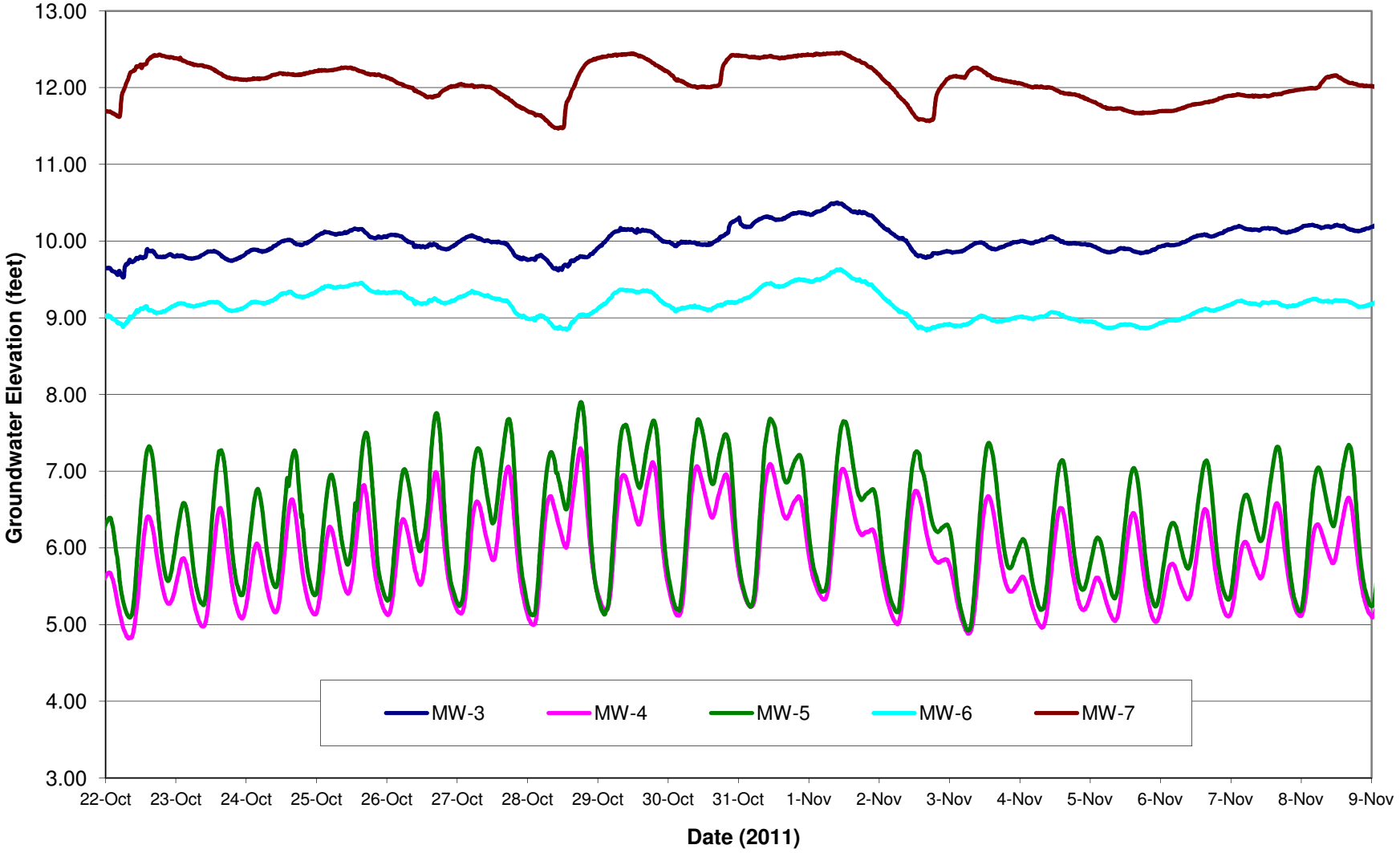
High/Low Tide Predictions Prediction

Station Name: Yokeko Point, Deception Pass,WA
Parameter: Monthly
Product: Tide Prediction
Start Date & Time: 2011/11/01 12:00AM
End Date & Time: 2011/11/30 11:59PM

Source: NOAA/NOS/CO-OPS
Prediction Type: Subordinate
Datum: MLLW
Height Units: Feet
Time Zone: LST/LDT

Date	Day	Time	Hgt	Time	Hgt	Time	Hgt	Time	Hgt
2011/11/01	Tue	03:54 AM	-1.19 L	11:19 AM	10.54 H	05:36 PM	6.31 L	09:55 PM	7.72 H
2011/11/02	Wed	04:51 AM	0.05 L	12:19 PM	10.31 H	07:03 PM	5.58 L	11:20 PM	7.0 H
2011/11/03	Thu	05:53 AM	1.3 L	01:15 PM	10.16 H	08:13 PM	4.54 L		
2011/11/04	Fri	12:55 AM	6.73 H	07:01 AM	2.45 L	02:01 PM	10.06 H	09:05 PM	3.41 L
2011/11/05	Sat	02:27 AM	7.01 H	08:09 AM	3.42 L	02:39 PM	9.99 H	09:46 PM	2.34 L
2011/11/06	Sun	02:43 AM	7.65 H	08:12 AM	4.23 L	02:10 PM	9.9 H	09:18 PM	1.37 L
2011/11/07	Mon	03:43 AM	8.39 H	09:06 AM	4.93 L	02:37 PM	9.81 H	09:46 PM	0.54 L
2011/11/08	Tue	04:31 AM	9.07 H	09:53 AM	5.56 L	03:04 PM	9.72 H	10:11 PM	-0.17 L
2011/11/09	Wed	05:12 AM	9.63 H	10:36 AM	6.1 L	03:31 PM	9.6 H	10:38 PM	-0.76 L
2011/11/10	Thu	05:47 AM	10.05 H	11:15 AM	6.55 L	03:59 PM	9.46 H	11:07 PM	-1.22 L
2011/11/11	Fri	06:20 AM	10.35 H	11:53 AM	6.88 L	04:29 PM	9.28 H	11:39 PM	-1.52 L
2011/11/12	Sat	06:53 AM	10.53 H	12:32 PM	7.11 L	05:00 PM	9.07 H		
2011/11/13	Sun	12:14 AM	-1.66 L	07:29 AM	10.62 H	01:13 PM	7.24 L	05:34 PM	8.81 H
2011/11/14	Mon	12:52 AM	-1.61 L	08:07 AM	10.64 H	01:57 PM	7.26 L	06:12 PM	8.49 H
2011/11/15	Tue	01:34 AM	-1.37 L	08:49 AM	10.6 H	02:47 PM	7.14 L	06:57 PM	8.07 H
2011/11/16	Wed	02:18 AM	-0.89 L	09:34 AM	10.56 H	03:45 PM	6.8 L	07:54 PM	7.57 H
2011/11/17	Thu	03:06 AM	-0.16 L	10:20 AM	10.55 H	04:50 PM	6.13 L	09:09 PM	7.06 H
2011/11/18	Fri	03:59 AM	0.81 L	11:05 AM	10.59 H	05:54 PM	5.06 L	10:38 PM	6.78 H
2011/11/19	Sat	04:57 AM	1.96 L	11:49 AM	10.69 H	06:50 PM	3.63 L		
2011/11/20	Sun	12:09 AM	6.99 H	06:02 AM	3.17 L	12:31 PM	10.85 H	07:39 PM	1.96 L
2011/11/21	Mon	01:36 AM	7.71 H	07:09 AM	4.29 L	01:11 PM	11.03 H	08:24 PM	0.24 L
2011/11/22	Tue	02:52 AM	8.75 H	08:15 AM	5.24 L	01:52 PM	11.2 H	09:07 PM	-1.34 L
2011/11/23	Wed	03:56 AM	9.82 H	09:16 AM	5.98 L	02:32 PM	11.29 H	09:51 PM	-2.61 L
2011/11/24	Thu	04:52 AM	10.71 H	10:14 AM	6.51 L	03:15 PM	11.26 H	10:34 PM	-3.44 L
2011/11/25	Fri	05:44 AM	11.33 H	11:10 AM	6.84 L	03:59 PM	11.05 H	11:19 PM	-3.77 L
2011/11/26	Sat	06:33 AM	11.65 H	12:05 PM	6.97 L	04:46 PM	10.64 H		
2011/11/27	Sun	12:04 AM	-3.61 L	07:21 AM	11.73 H	01:00 PM	6.92 L	05:36 PM	10.04 H
2011/11/28	Mon	12:50 AM	-3.01 L	08:08 AM	11.64 H	01:59 PM	6.7 L	06:29 PM	9.27 H
2011/11/29	Tue	01:37 AM	-2.06 L	08:54 AM	11.44 H	03:02 PM	6.31 L	07:28 PM	8.39 H
2011/11/30	Wed	02:25 AM	-0.82 L	09:39 AM	11.19 H	04:10 PM	5.72 L	08:36 PM	7.5 H

CHART 1
Summary of Continuous Groundwater Elevation Monitoring Results



Daily data obtained from http://www.nws.noaa.gov/

ARLINGTON (450257)
Observed Daily Data
Month: Oct 2011

Day	MaxT	MinT	AvgT	HDD	CDD	Pcpn	Snow	Snwg
1	57	46	51.5	13	0	0.02		
2	66	45	55.5	9	0	0.20		
3	61	48	54.5	10	0	0.02		
4	68	48	58.0	7	0	0.07		
5	55	47	51.0	14	0	0.52		
6	58	47	52.5	12	0	0.07		
7	62	37	49.5	15	0	0.06		
8	69	37	53.0	12	0	0.06		
9	66	48	57.0	8	0	0.02		
10	62	49	55.5	9	0	0.14		
11	60	50	55.0	10	0	0.00		
12	62	39	50.5	14	0	0.00		
13	62	39	50.5	14	0	0.00		
14	61	34	47.5	17	0	0.00		
15	64	34	49.0	16	0	0.00		
16	56	36	46.0	19	0	0.00		
17	65	34	49.5	15	0	0.00		
18	69	33	51.0	14	0	0.00		
19	65	41	53.0	12	0	0.11		
20	57	43	50.0	15	0	0.05		
21	58	45	51.5	13	0	0.88		
22	60	48	54.0	11	0	0.37		
23	60	38	49.0	16	0	0.09		
24	57	38	47.5	17	0	0.00		
25	58	36	47.0	18	0	0.00		
26	58	33	45.5	19	0	0.07		
27	58	33	45.5	19	0	0.00		
28	55	39	47.0	18	0	0.14		
29	61	40	50.5	14	0	0.07		
30	. 53	42	47.5	17	0	0.27		
31	52	32	42.0	23	0	0.04		
Smry	60.5	40.6	50.5	440	0	3.27		

Daily data obtained from http://www.nws.noaa.gov/

ARLINGTON (450257)
Observed Daily Data
Month: Nov 2011

Day	MaxT	MinT	AvgT	HDD	CDD	Pcpn	Snow	Snwg
1	55	29	42.0	23	0	0.00		
2	60	29	44.5	20	0	1.03		
3	56	30	43.0	22	0	0.63		
4	45	31	38.0	27	0	0.00		
5	54	20	37.0	28	0	0.00		
6	49	20	34.5	30	0	0.00		
7	48	33	40.5	24	0	0.07		
8	60	33	46.5	18	0	0.00		
9	64	34	49.0	16	0	0.00		
10	66	34	50.0	15	0	0.02		
11	52	33	42.5	22	0	0.67		
12	48	34	41.0	24	0	0.52		
13	45	34	39.5	25	0	0.45		
14	49	31	40.0	25	0	0.51		
15	51	28	39.5	25	0	0.00		
16	51	32	41.5	23	0	0.35		
17	54	33	43.5	21	0	0.34		
18	47	24	35.5	29	0	0.00		
19	46	22	34.0	31	0	0.00		
20	43	23	33.0	32	0	0.15		
21	50	37	43.5	21	0	0.93		
22	54	38	46.0	19	0	3.03		
23	54	36	45.0	20	0	0.56		
24	54	36	45.0	20	0	0.24		
25	52	34	43.0	22	0	0.00		
26	59	40	49.5	15	0	0.00		
27	56	36	46.0	19	0	0.86		
28	M	M	M	M	M	M		
29	M	M	M	M	M	M		
30	M	M	M	M	M	M		
Smry	52.7	31.3	42.0	616	0	10.36		

Daily data obtained from http://www.nws.noaa.gov/

BELLINGHAM INTL AP (450574)
Observed Daily Data
Month: Oct 2011

Day	MaxT	MinT	AvgT	HDD	CDD	Pcpn	Snow	Snwg
1	M	M	M	M	M	M		
2	63	46	54.5	10	0	0.05		
3	62	54	58.0	7	0	0.03		
4	66	51	58.5	6	0	0.01		
5	55	50	52.5	12	0	0.12		
6	58	50	54.0	11	0	0.00		
7	58	43	50.5	14	0	0.06		
8	65	39	52.0	13	0	0.02		
9	61	45	53.0	12	0	T		
10	58	48	53.0	12	0	0.20		
11	58	53	55.5	9	0	0.03		
12	57	42	49.5	15	0	0.00		
13	59	38	48.5	16	0	0.00		
14	58	38	48.0	17	0	0.00		
15	58	34	46.0	19	0	T		
16	54	31	42.5	22	0	0.00		
17	60	37	48.5	16	0	0.00		
18	67	38	52.5	12	0	0.00		
19	60	40	50.0	15	0	0.03		
20	56	46	51.0	14	0	0.09		
21	57	48	52.5	12	0	0.17		
22	57	51	54.0	11	0	0.53		
23	57	43	50.0	15	0	0.00		
24	56	38	47.0	18	0	T		
25	57	35	46.0	19	0	0.00		
26	50	34	42.0	23	0	0.05		
27	53	36	44.5	20	0	0.00		
28	58	38	48.0	17	0	0.23		
29	55	39	47.0	18	0	0.00		
30	56	41	48.5	16	0	0.21		
31	52	43	47.5	17	0	0.00		
Smry	58.0	42.3	50.2	438	0	1.83		

Daily data obtained from http://www.nws.noaa.gov/

BELLINGHAM INTL AP (450574)
Observed Daily Data
Month: Nov 2011

Day	MaxT	MinT	AvgT	HDD	CDD	Pcpn	Snow	Snwg
1	49	36	42.5	22	0	0.00		
2	54	30	42.0	23	0	0.18		
3	50	34	42.0	23	0	0.02		
4	48	31	39.5	25	0	0.00		
5	51	30	40.5	24	0	0.00		
6	47	27	37.0	28	0	0.00		
7	48	35	41.5	23	0	0.22		
8	52	44	48.0	17	0	0.01		
9	57	45	51.0	14	0	0.00		
10	58	38	48.0	17	0	0.00		
11	49	37	43.0	22	0	0.67		
12	49	34	41.5	23	0	0.23		
13	49	40	44.5	20	0	0.00		
14	M	M	M	M	M	M		
15	46	30	38.0	27	0	0.00		
16	52	31	41.5	23	0	0.29		
17	48	32	40.0	25	0	0.24		
18	42	27	34.5	30	0	0.10		
19	38	24	31.0	34	0	0.00		
20	37	21	29.0	36	0	0.00		
21	53	33	43.0	22	0	0.03		
22	54	41	47.5	17	0	0.92		
23	47	36	41.5	23	0	0.93		
24	48	37	42.5	22	0	0.10		
25	47	34	40.5	24	0	0.00		
26	61	40	50.5	14	0	0.03		
27	60	39	49.5	15	0	0.28		
28	48	34	41.0	24	0	0.00		
29	46	36	41.0	24	0	0.24		
30	M	M	M	M	M	M		
Smry	49.6	34.1	41.9	641	0	4.49		

Daily data obtained from http://www.nws.noaa.gov/

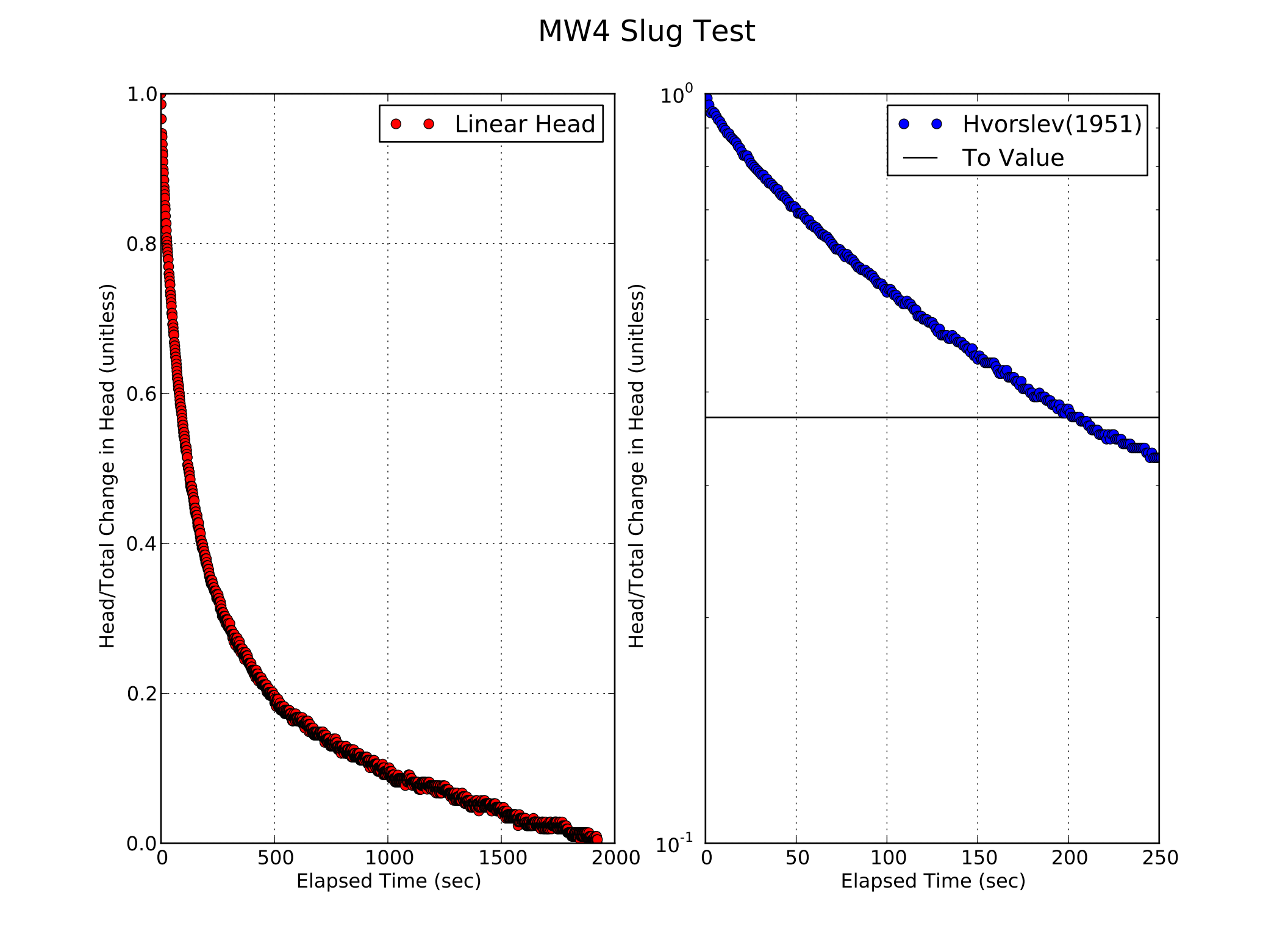
EVERETT (452675)
Observed Daily Data
Month: Oct 2011

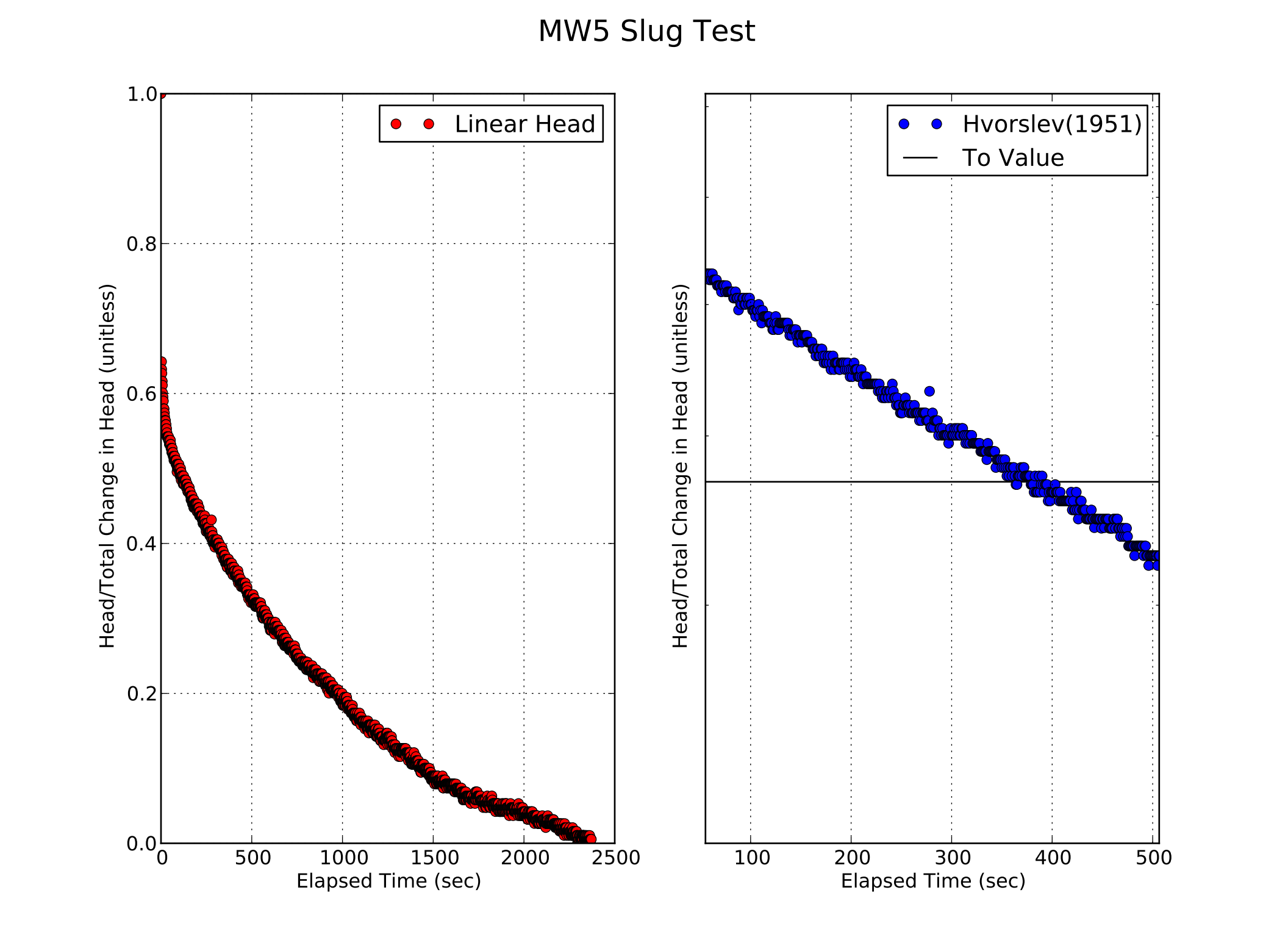
Day	MaxT	MinT	AvgT	HDD	CDD	Pcpn	Snow	Snwg
1	72	41	56.5	8	0	0.02		
2	57	49	53.0	12	0	0.06		
3	65	49	57.0	8	0	0.13		
4	62	50	56.0	9	0	0.01		
5	64	50	57.0	8	0	0.02		
6	55	50	52.5	12	0	0.26		
7	58	52	55.0	10	0	0.17		
8	58	40	49.0	16	0	0.00		
9	67	41	54.0	11	0	0.08		
10	60	51	55.5	9	0	0.03		
11	63	51	57.0	8	0	0.21		
12	61	51	56.0	9	0	0.01		
13	61	41	51.0	14	0	0.03		
14	57	42	49.5	15	0	T		
15	55	40	47.5	17	0	0.00		
16	54	41	47.5	17	0	0.00		
17	51	40	45.5	19	0	T		
18	59	M	M	M	M	0.00		
19	60	42	51.0	14	0	0.00		
20	59	43	51.0	14	0	0.01		
21	54	45	49.5	15	0	0.10		
22	58	45	51.5	13	0	0.59		
23	62	52	57.0	8	0	0.12		
24	57	45	51.0	14	0	0.03		
25	55	40	47.5	17	0	0.01		
26	53	34	43.5	21	0	0.01		
27	52	36	44.0	21	0	0.01		
28	52	36	44.0	21	0	T		
29	51	44	47.5	17	0	0.00		
30	56	42	49.0	16	0	0.22		
31	58	43	50.5	14	0	0.13		
Smry	58.3	44.2	51.2	407	0	2.26		

Daily data obtained from http://www.nws.noaa.gov/

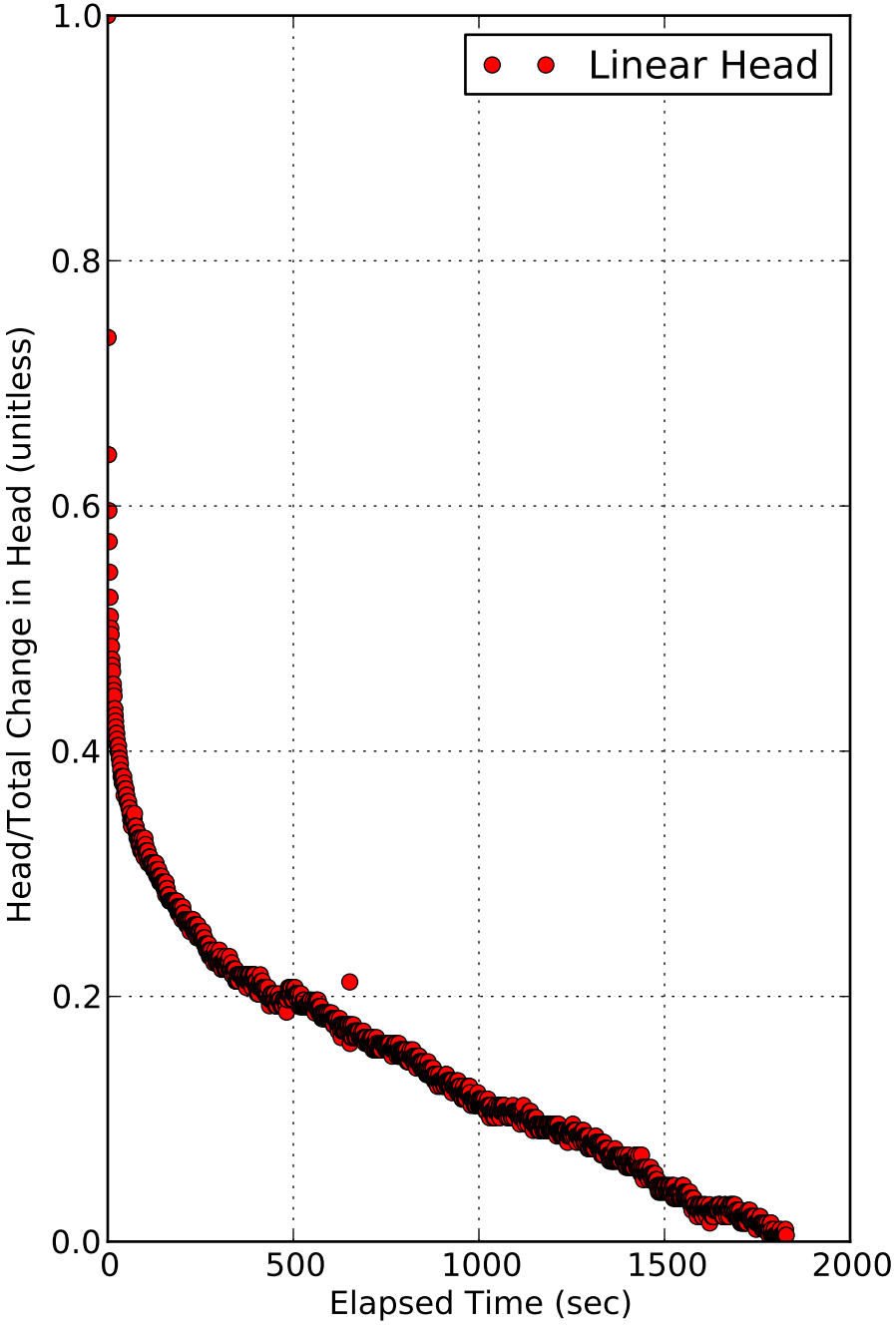
EVERETT (452675)
Observed Daily Data
Month: Nov 2011

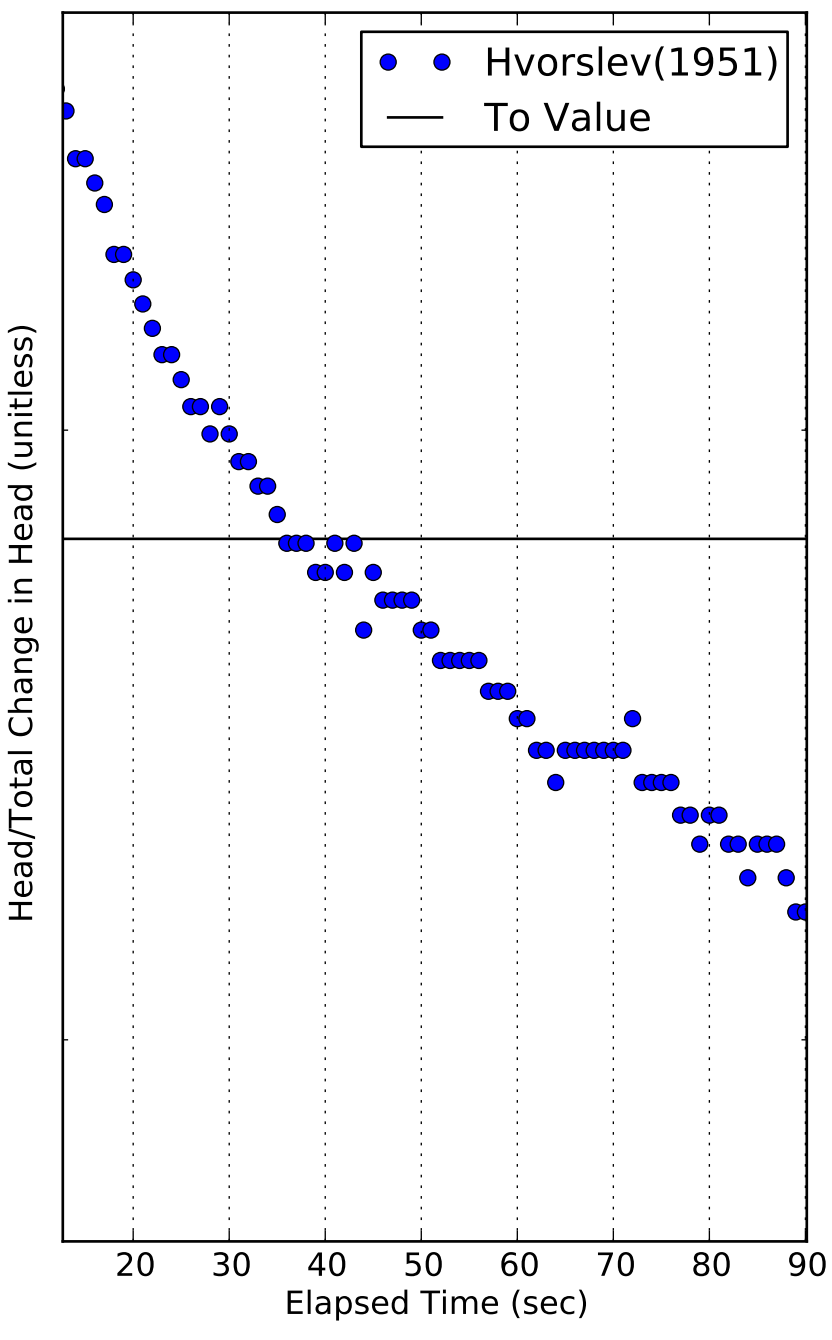
Day	MaxT	MinT	AvgT	HDD	CDD	Pcpn	Snow	Snwg
1	53	33	43.0	22	0	0.01		
2	53	33	43.0	22	0	T		
3	58	33	45.5	19	0	0.26		
4	51	32	41.5	23	0	0.01		
5	50	32	41.0	24	0	0.01		
6	51	26	38.5	26	0	0.01		
7	48	27	37.5	27	0	0.01		
8	48	37	42.5	22	0	0.02		
9	56	45	50.5	14	0	0.00		
10	M	M	M	M	M	M		
11	M	M	M	M	M	0.00		
12	60	36	48.0	17	0	0.51		
13	58	36	47.0	18	0	0.31		
14	49	41	45.0	20	0	0.02		
15	48	35	41.5	23	0	0.09		
16	48	31	39.5	25	0	T		
17	53	33	43.0	22	0	0.77		
18	53	33	43.0	22	0	0.13		
19	44	24	34.0	31	0	0.00		
20	42	22	32.0	33	0	0.00		
21	39	23	31.0	34	0	0.21		
22	51	23	37.0	28	0	1.00		
23	46	42	44.0	21	0	2.20		
24	M	M	M	M	M	0.00		
25	M	M	M	M	M	0.00		
26	48	35	41.5	23	0	0.70		
27	50	43	46.5	18	0	0.10		
28	52	41	46.5	18	0	0.32		
29	49	35	42.0	23	0	0.01		
30	44	35	39.5	25	0	0.08		
Smry	50.1	33.3	41.7	600	0	6.78		


MW4 Slug Test
Linear Head
Head/Total Change in Head (unitless)
Elapsed Time (sec)
1.0
0.8
0.6
0.4
0.2
0.0
0
500
1000
1500
2000
Hvorslev(1951)
To Value
10^0
10^{-1}
50
100
150
200
250

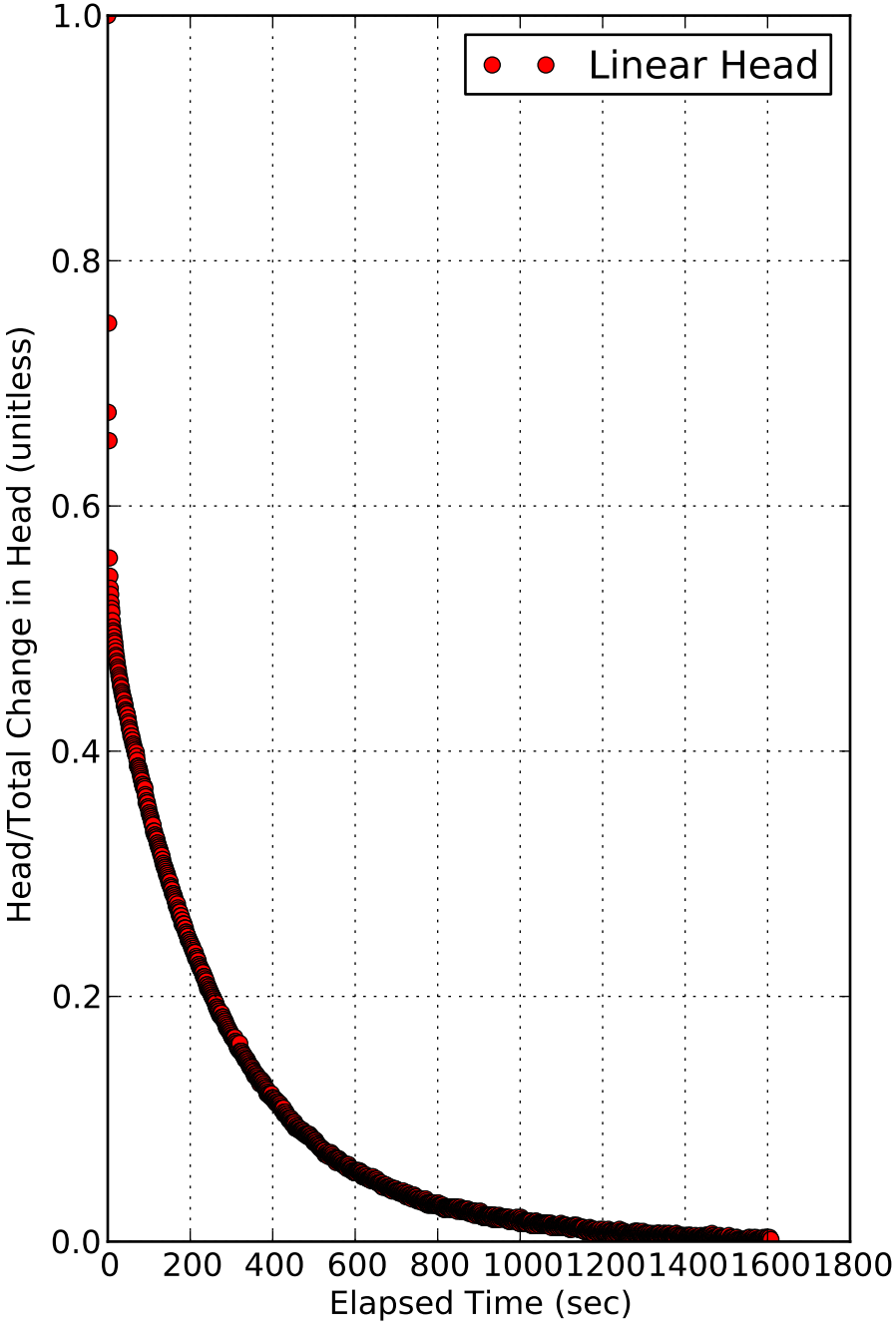

MW5 Slug Test
Linear Head
Head/Total Change in Head (unitless)
Elapsed Time (sec)
0.0
0.2
0.4
0.6
0.8
1.0
0
500
1000
1500
2000
2500
Hvorslev(1951)
To Value
Head/Total Change in Head (unitless)
Elapsed Time (sec)
100
200
300
400
500

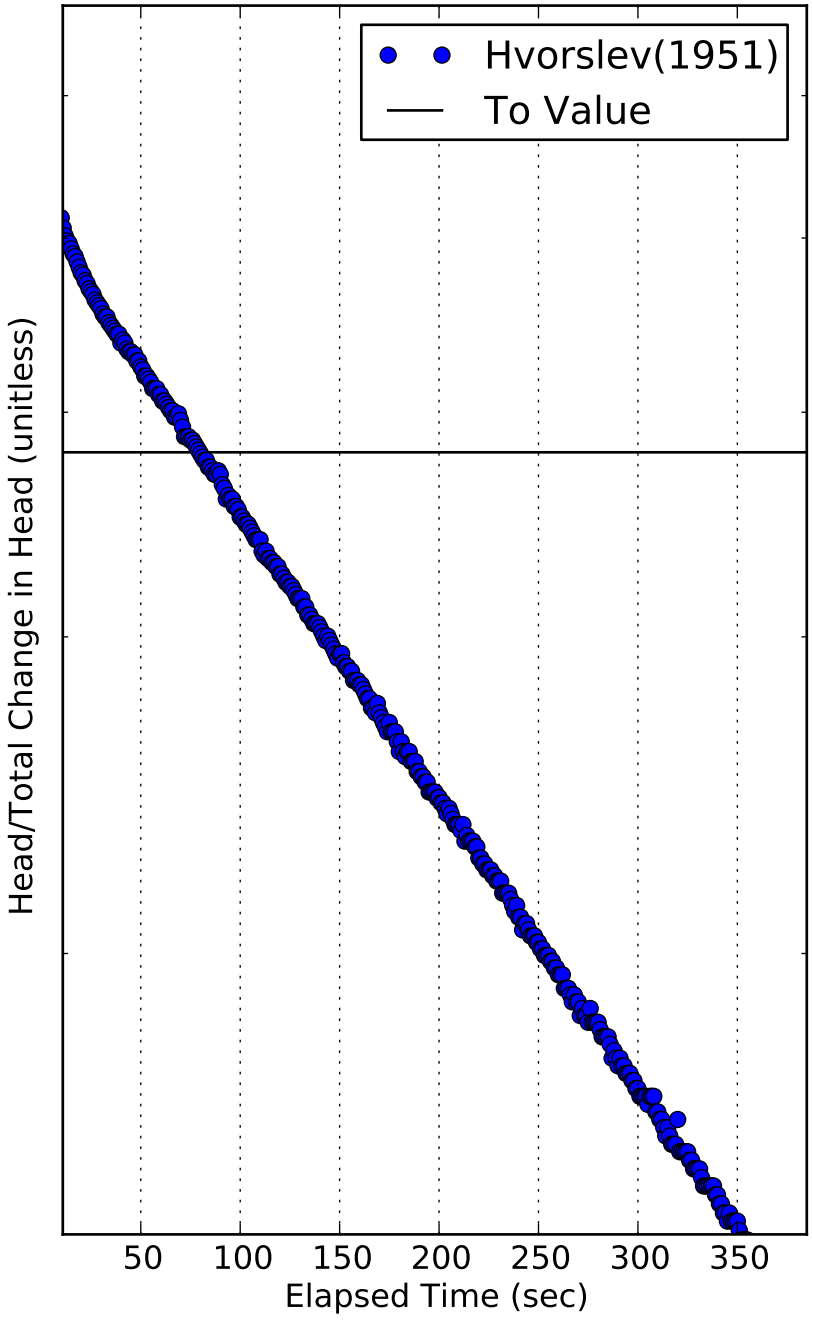
MW6 Slug Test





MW7 Slug Test





Appendix F

Data by Site Media

Table F1: Soil Gas Results from 2011 Investigation

Analyte	Units	Sample ID	
		VP-1 Cornet	VP-2 Cornet
1,1,1,2-Tetrachloroethane	µg/m^3	< 10,000	< 10,000
1,1,1-Trichloroethane	µg/m^3	< 10,000	< 10,000
1,1,2 Trichlorotrifluoroethane (F113)	µg/m^3	< 10,000	< 10,000
1,1,2,2-Tetrachloroethane	µg/m^3	< 10,000	< 10,000
1,1,2-Trichloroethane	µg/m^3	< 10,000	< 10,000
1,1-Dichloroethane	µg/m^3	< 10,000	< 10,000
1,1-Dichloroethene	µg/m^3	< 10,000	< 10,000
1,1-Dichloropropene	µg/m^3	< 10,000	< 10,000
1,2,3-Trichlorobenzene	µg/m^3	< 10,000	< 10,000
1,2,3-Trichloropropane	µg/m^3	< 10,000	< 10,000
1,2,4-Trichlorobenzene	µg/m^3	< 10,000	< 10,000
1,2,4-Trimethylbenzene	µg/m^3	< 10,000	< 10,000
1,2-Dibromo-3-chloropropane	µg/m^3	< 100,000	< 100,000
1,2-Dibromoethane (EDB)	µg/m^3	< 10,000	< 10,000
1,2-Dichlorobenzene	µg/m^3	< 10,000	< 10,000
1,2-Dichloroethane	µg/m^3	< 2,000	< 2,000
1,2-Dichloroethane-d4	µg/m^3	2,790	2,950
1,2-Dichloropropane	µg/m^3	< 10,000	< 10,000
1,3,5-Trimethylbenzene	µg/m^3	< 10,000	< 10,000
1,3-Dichlorobenzene	µg/m^3	< 10,000	< 10,000
1,3-Dichloropropane	µg/m^3	< 10,000	< 10,000
1,4-Dichlorobenzene	µg/m^3	< 10,000	< 10,000
2,2-Dichloropropane	µg/m^3	< 10,000	< 10,000
2-Chlorotoluene	µg/m^3	< 10,000	< 10,000
4-Bromofluorobenzene	µg/m^3	2,500	2,340
4-Chlorotoluene	µg/m^3	< 10,000	< 10,000
Benzene	µg/m^3	1,400,000	780,000
Bromobenzene	µg/m^3	< 10,000	< 10,000
Bromochloromethane	µg/m^3	< 10,000	< 10,000
Bromoform	µg/m^3	< 10,000	< 10,000
Bromomethane	µg/m^3	< 10,000	< 10,000
Carbon tetrachloride	µg/m^3	< 2,000	< 2,000
Chlorobenzene	µg/m^3	< 2,000	< 2,000
Chloroethane	µg/m^3	< 10,000	< 10,000
Chloroform	µg/m^3	< 2,000	< 2,000
Chloromethane	µg/m^3	< 10,000	< 10,000
cis-1,2-Dichloroethene	µg/m^3	< 10,000	< 10,000
cis-1,3-Dichloropropene	µg/m^3	< 10,000	< 10,000
Dibromochloromethane	µg/m^3	< 10,000	< 10,000
Dibromofluoromethane	µg/m^3	2,500	2,440
Dibromomethane	µg/m^3	< 10,000	< 10,000
Dichlorobromomethane	µg/m^3	< 10,000	< 10,000
Dichlorodifluoromethane (F12)	µg/m^3	< 10,000	< 10,000
Ethylbenzene	µg/m^3	120,000	130,000
Hexachlorobutadiene	µg/m^3	< 10,000	< 10,000
Isopropylbenzene (Cumene)	µg/m^3	< 10,000	< 10,000
m, p-Xylene	µg/m^3	14,000	16,000

Table F1: Soil Gas Results from 2011 Investigation

Analyte	Units	Sample ID	
		VP-1 Cornet	VP-2 Cornet
Methyl tertiary-butyl ether (MTBE)	µg/m^3	< 10,000	< 10,000
Methylene chloride (Dichloromethane)	µg/m^3	< 10,000	< 10,000
Naphthalene	µg/m^3	< 2,000	< 2,000
n-Butylbenzene	µg/m^3	< 10,000	< 10,000
n-Propylbenzene	µg/m^3	< 10,000	< 10,000
o-Xylene	µg/m^3	< 10,000	< 10,000
p-Isopropyltoluene	µg/m^3	< 10,000	< 10,000
sec-Butylbenzene	µg/m^3	< 10,000	< 10,000
Styrene	µg/m^3	< 10,000	< 10,000
tert-Butylbenzene	µg/m^3	< 10,000	< 10,000
Tetrachloroethene	µg/m^3	< 2,000	< 2,000
Toluene	µg/m^3	< 20,000	< 20,000
Toluene-d8	µg/m^3	2,910	2,940
TPHv (C5 - C8) aliphatic	µg/m^3	30,000,000	19,000,000
TPHv (C9 - C10) aromatic	µg/m^3	< 200,000	< 200,000
TPHv (C9 - C12) aliphatic	µg/m^3	690,000	680,000
trans-1,2-Dichloroethene	µg/m^3	< 10,000	< 10,000
trans-1,3-Dichloropropene	µg/m^3	< 10,000	< 10,000
Trichloroethene	µg/m^3	< 2,000	< 2,000
Trichlorofluoromethane (F11)	µg/m^3	< 10,000	< 10,000
Vinyl chloride	µg/m^3	< 1,000	< 1,000

Notes:

< = Indicates analyte not detected above method reporting limtis.

TPHv fractions analyzed by 8260 APH. All other analytes analyzed by 8260B VOCs.

µg/m^3 = micrograms per cubic meter

Table F2: Current Soil Investigation Data Summary - Metals, PAHs, and VOCs

Analyte	Analytical Method	Units	Location	B2	B10	B20	B27	B30	B35	B38	MW6
			Sample Depth (feet bgs)	12	8	7	12	8	4	7	14
			Sample Date	9/12/11	9/12/11	9/13/11	9/14/11	9/14/11	9/15/11	9/16/11	9/15/11
Metals											
Arsenic	1	mg/kg		6.0	20	6.0	9.0	9.0	11	7.0	8.0
Barium	1	mg/kg		26	74	27	46	65	63	37	43
Cadmium	1	mg/kg		< 0.20	< 0.6	< 0.20	0.20	< 0.20	< 0.20	< 0.30	< 0.20
Chromium	1	mg/kg		16	39	25	44	45	47	23	34
Lead	1	mg/kg		< 2.0	< 6.0	< 2.0	4.0	4.0	5.0	< 3.0	3.0
Selenium	1	mg/kg		< 6.0	< 10	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
Silver	1	mg/kg		< 0.30	< 0.80	< 0.30	< 0.40	< 0.40	< 0.30	< 0.40	< 0.30
Mercury	2	mg/kg		< 0.03	0.03	< 0.02	0.03	< 0.03	0.02	0.03	< 0.02
Polycyclic Aromatic Hydrocarbons											
1-Methylnaphthalene	3	µg/kg		64	72	1,800	12	6,200	13,000	8,300	64
2-Methylnaphthalene	3	µg/kg		77	61	3,500	15	9,300	21,000	13,000	120
Acenaphthene	3	µg/kg		110	61	28	56	2,100	2,600	2,600	12
Acenaphthylene	3	µg/kg		< 5	< 5	8	< 5	< 4	< 5	< 5	< 4
Anthracene	3	µg/kg		18	< 4.6	5.9	64	260	280	410	16
Benzo(a)anthracene	3	µg/kg		< 4.6	< 4.6	< 4.6	51	12	7.2	17	< 4.4
Benzo(a)pyrene	3	µg/kg		< 4.6	< 4.6	< 4.6	21	4.6	< 4.6	6.7	< 4.4
Benzo(g,h,i)perylene	3	µg/kg		< 5	< 5	< 4.6	11	< 4	< 5	< 5	< 4
Chrysene	3	µg/kg		< 4.6	< 4.6	< 4.6	63	17	20	27	< 4.4
Dibenzo(a,h)anthracene	3	µg/kg		< 4.6	< 4.6	< 4.6	< 4.8	< 4.4	< 4.6	< 4.9	< 4.4
Dibenzofuran	3	µg/kg		50	28	6.4	15	460	960	690	< 4.4
Fluoranthene	3	µg/kg		38	5.1	14	220	57	49	87	< 4.4
Fluorene	3	µg/kg		77	29	14	32	840	1,600	1,400	6
Indeno(1,2,3-cd)pyrene	3	µg/kg		< 4.6	< 4.6	< 4.6	8.1	< 4.4	< 4.6	< 4.9	< 4.4

Table F2: Current Soil Investigation Data Summary - Metals, PAHs, and VOCs

Analyte	Analytical Method	Units	Location	B2	B10	B20	B27	B30	B35	B38	MW6
			Sample Depth (feet bgs)	12	8	7	12	8	4	7	14
			Sample Date	9/12/11	9/12/11	9/13/11	9/14/11	9/14/11	9/15/11	9/16/11	9/15/11
Naphthalene	3	µg/kg		390	190	2,300	13	2,700	9,000	4,000	49
Phenanthrene	3	µg/kg		130	37	26	42	1,900	3,200	2,800	14
Pyrene	3	µg/kg		24	5.4	14	160	84	200	160	< 4.4
Total Benzofluoranthenes	3	µg/kg		< 4.6	< 4.6	< 4.6	48	10	5.6	14	< 4.4
Volatile Organic Compounds											
1,2-Dibromoethane (EDB)	4	µg/kg		< 1	< 1	< 300	< 1	< 130	< 62	< 82	< 54
1,2-Dichloroethane	4	µg/kg		< 1	< 1	< 300	< 1	< 130	< 62	< 82	< 54
Methyl tertiary-butyl ether (MTBE)	4	µg/kg		< 1	< 1	< 300	< 1	< 130	< 62	< 82	< 54

Notes:

< = Indicates analyte not detected above laboratory reporting limtis.
feet bgs = feet below ground surface
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
PAHs = polycyclic aromatic hydrocarbons
VOCs = volatile organic compounds

Analytical Method Codes:

1 Soil samples were analyzed for RCRA metals by EPA Method 6010B.
2 Soil samples were analyzed for mercury by EPA Method 7471A.
3 Soil samples were analyzed for PAHs by EPA Method 8270D with Selective Ion Monitoring (SIM).
4 Soil samples were analyzed for VOCs by EPA Method 8260C.

Table F3: Current Soil Investigation Data Summary - BTEX and Hydrocarbons

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethyl-benzene	m, p-Xylene	o-Xylene	Diesel Range Organics	Gasoline Range Organics	Lube Oil Range Hydrocarbons
B1	4	9/12/11	1,2	mg/kg	<0.029	<0.029	<0.029	<0.058	0.043	<6.6	<12	16
B2	12	9/12/11	1,2	mg/kg	0.60	<0.017	0.025	<0.034	0.046	<6.1	<6.9	<12
B3	9	9/12/11	1,2	mg/kg	1.3	<0.018	0.079	0.081	<0.018	<6.1	<7.0	<12
B4	6	9/12/11	1,2	mg/kg	<0.015	<0.015	<0.015	<0.029	0.018	<5.8	<5.9	<12
B5	5	9/12/11	1,2	mg/kg	<0.015	<0.015	<0.015	<0.03	0.16	9.6	<6.0	53
B6	7	9/12/11	1,2	mg/kg	<0.015	<0.015	<0.015	<0.03	<0.015	<5.8	<5.9	<12
B7	13	9/12/11	1,2	mg/kg	0.48	<0.016	0.025	<0.031	0.23	<6.2	10	<12
B7	8	9/12/11	1,2	mg/kg	0.29	<0.018	0.15	0.088	0.10	<6.1	8.3	<12
B8	14	9/12/11	1,2	mg/kg	<0.016	0.019	<0.016	<0.031	0.033	<5.9	<6.2	<12
B9	13	9/12/11	1,2	mg/kg	<0.014	<0.014	<0.014	<0.029	0.055	<5.9	<5.8	<12
B10	8	9/12/11	1,2	mg/kg	1.7	<0.014	0.46	0.43	0.073	<5.9	15	<12
B11	5	9/13/11	1,2	mg/kg	<0.021	1.6	0.14	0.61	0.47	41	1,200	<11
B12	6	9/13/11	1,2	mg/kg	0.025	0.024	<0.014	<0.028	0.75	<5.8	<5.6	<12
B13	4	9/13/11	1,2	mg/kg	<0.021	<0.021	<0.021	<0.042	0.059	<6.5	<8.4	<13
B14	3	9/13/11	1,2	mg/kg	<0.014	0.022	0.022	0.031	<0.014	13	11	<10
B15	4	9/13/11	1,2	mg/kg	<0.015	<0.015	<0.015	<0.03	0.043	<5.8	<6.1	<12
B16	4	9/13/11	1,2	mg/kg	<0.015	0.044	<0.015	<0.031	<0.015	11	<6.1	72
B17	4	9/13/11	1,2	mg/kg	<0.014	<0.014	<0.014	<0.028	<0.014	<5.7	<5.7	<11
B18	4	9/13/11	1,2	mg/kg	0.050	<0.014	<0.014	<0.028	0.033	<5.5	<5.6	<11
B18 (B100)[(a)]	4	9/13/11	1,2	mg/kg	<0.013	<0.013	<0.013	<0.027	0.029	<5.3	15	<11
B19	5	9/13/11	1,2	mg/kg	54	420	96	380	140	69	9,400	<12
B19	7	9/13/11	1,2	mg/kg	2.8	4.3	1.9	5.4	1.6	27	310	<11
B20	7	9/13/11	1,2	mg/kg	0.58	6.6	9.2	33	12	20	760	<12
B20	10	9/13/11	1,2	mg/kg	0.56	0.027	0.10	0.064	<0.018	<6.1	<7.0	<12
B21	3	9/13/11	1,2	mg/kg	15	14	3.0	12	4.4	64	230	<12
B22	5	9/13/11	1,2	mg/kg	4.9	89	50	200	72	520	4,600	<60
B22	9	9/13/11	1,2	mg/kg	0.023	<0.014	<0.014	<0.029	<0.014	<5.6	<5.8	<11
B23	8	9/14/11	1,2	mg/kg	0.19	0.026	0.72	0.97	0.04	<6.1	13	<12
B24	7	9/14/11	1,2	mg/kg	<0.016	<0.016	<0.016	<0.033	0.034	<6.1	<6.5	<12
B25	4	9/14/11	1,2	mg/kg	<0.018	<0.018	<0.018	<0.036	<0.018	<6.3	<7.1	<13
B26	8	9/14/11	1,2	mg/kg	<0.014	<0.014	<0.014	<0.029	0.078	< 6.0	<5.8	<12
B27	12	9/14/11	1,2	mg/kg	0.13	<0.017	<0.017	<0.034	0.061	< 6.0	<6.9	<12
B28	7	9/14/11	1,2	mg/kg	22	0.061	1.8	0.32	<0.018	810	180	<61
B28	12	9/14/11	1,2	mg/kg	0.45	<0.014	<0.014	<0.029	<0.014	<5.8	<5.8	<12
B28	16	9/14/11	1,2	mg/kg	1.5	<0.017	<0.017	<0.034	<0.017	<5.9	<6.8	<12
B29	18	9/14/11	1,2	mg/kg	0.67	<0.017	0.03	<0.034	<0.017	<5.8	<6.9	<12
B29	7	9/14/11	1,2	mg/kg	1.4	0.014	0.046	0.047	0.018	< 6.0	7.5	<12

Table F3: Current Soil Investigation Data Summary - BTEX and Hydrocarbons

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethyl-benzene	m, p-Xylene	o-Xylene	Diesel Range Organics	Gasoline Range Organics	Lube Oil Range Hydrocarbons
B30	8	9/14/11	1,2	mg/kg	1.2	0.23	4.4	1.4	0.19	1,200	500	<110
B30	17	9/14/11	1,2	mg/kg	<0.015	<0.015	<0.015	<0.029	<0.015	<5.6	<5.9	<11
B31	4	9/14/11	1,2	mg/kg	<0.014	<0.014	<0.014	<0.029	<0.014	<5.4	<5.8	<11
B32	4	9/14/11	1,2	mg/kg	0.018	0.093	0.60	0.12	0.057	98	250	<10
B33	4	9/15/11	1,2	mg/kg	0.073	<0.014	<0.014	<0.029	<0.014	37	<5.7	<11
B34	5	9/15/11	1,2	mg/kg	1.1	<0.18	15	1.5	<0.18	710	2,400	<63
B34 (B101)[(b)]	5	9/15/11	1,2	mg/kg	<0.180	<0.18	8.2	<0.36	<0.18	760	1,400	<57
B35	4	9/15/11	1,2	mg/kg	3.0	<0.14	13	2.4	<0.14	970	1,000	<120
B35	8	9/15/11	1,2	mg/kg	<0.018	<0.018	<0.018	<0.036	<0.018	<6.2	<7.3	<12
B36	8	9/15/11	1,2	mg/kg	150	7.2	72	33	2.5	7,700	4,000	<600
B37	9	9/16/11	1,2	mg/kg	<0.019	<0.019	<0.019	<0.039	<0.019	<7.0	<7.7	<14
B38	13	9/16/11	1,2	mg/kg	1.5	<0.015	<0.015	<0.031	<0.015	<6.1	<6.1	<12
B39	8	9/16/11	1,2	mg/kg	2.9	0.024	0.070	0.23	<0.015	6.0	7.8	<12
B40	4	9/16/11	1,2	mg/kg	<0.014	<0.014	<0.014	<0.029	<0.014	<5.6	<5.7	<11
B41	6	9/16/11	1,2	mg/kg	0.70	0.29	2.1	5.0	0.39	45	1,000	64
B42	8	9/16/11	1,2	mg/kg	0.36	<0.018	0.55	0.098	<0.018	<5.8	12	<12
B43	4	9/16/11	1,2	mg/kg	<0.07	<0.07	0.36	<0.14	0.49	27	940	<12
B44	4	9/17/11	1,2	mg/kg	0.12	0.098	<0.015	0.24	0.18	20	320	<11
B45	7	11/10/11	1,2	mg/kg	< 0.017	< 0.017	< 0.017	< 0.035	< 0.017	< 6.0	< 6.9	< 12
B45	15	11/10/11	1,2	mg/kg	0.38	< 0.018	< 0.018	< 0.035	< 0.018	< 6.0	< 7.1	< 12
B46	11	11/10/11	1,2	mg/kg	0.04	< 0.018	< 0.018	< 0.036	< 0.018	< 6.0	< 7.2	< 12
B46	15	11/10/11	1,2	mg/kg	< 0.015	< 0.015	< 0.015	< 0.031	< 0.015	< 6.1	< 6.1	< 12
B47	13	11/10/11	1,2	mg/kg	11	< 0.021	< 0.021	< 0.042	< 0.021	< 6.8	< 8.4	< 14
B48	3	11/10/11	1,2	mg/kg	1.2	2.2	13	50	9.3	50	1,600	18
B49	13	11/10/11	1,2	mg/kg	< 0.018	< 0.018	< 0.018	< 0.037	< 0.018	< 6.2	< 7.4	< 12
B50	10	11/10/11	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	< 6.0	< 5.8	< 12
B51	7	11/10/11	1,2	mg/kg	< 0.02	< 0.02	< 0.02	< 0.039	< 0.02	< 6.4	< 7.8	< 13
B52	5	11/10/11	1,2	mg/kg	1.4	< 0.018	0.56	0.14	< 0.018	< 6.3	13	< 13
B53	3	11/10/11	1,2	mg/kg	0.032	0.054	< 0.014	0.06	< 0.014	14	12	< 11
B54	6	11/10/11	1,2	mg/kg	< 0.017	< 0.017	< 0.017	< 0.035	< 0.017	< 6.0	< 7.0	< 12
B55	3	11/10/11	1,2	mg/kg	< 0.015	0.32	0.32	0.22	0.13	34	400	< 12
B56	3	11/11/11	1,2	mg/kg	< 0.014	< 0.014	< 0.014	< 0.029	< 0.014	< 5.8	< 5.8	< 12
B57	5	11/11/11	1,2	mg/kg	< 0.016	< 0.016	< 0.016	< 0.033	< 0.016	< 5.9	< 6.5	< 12
B58	3	11/11/11	1,2	mg/kg	0.061	0.015	< 0.015	0.047	< 0.015	< 5.7	< 5.8	< 11
B59	2	11/11/11	1,2	mg/kg	16	30	4.2	18	6.6	16	360	< 12
B59	9	11/11/11	1,2	mg/kg	< 0.016	0.016	< 0.016	< 0.031	< 0.016	< 6.0	< 6.2	< 12

Table F3: Current Soil Investigation Data Summary - BTEX and Hydrocarbons

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethyl-benzene	m, p-Xylene	o-Xylene	Diesel Range Organics	Gasoline Range Organics	Lube Oil Range Hydrocarbons
B60	14	11/11/11	1,2	mg/kg	0.3	< 0.014	< 0.014	< 0.029	< 0.014	< 5.7	< 5.8	< 12
B60	20	11/11/11	1,2	mg/kg	< 0.019	< 0.019	< 0.019	< 0.038	< 0.019	6.5	< 7.7	< 13
MW4	13	9/15/11	1,2	mg/kg	<0.014	<0.014	<0.014	<0.029	<0.014	9.4	<5.8	<12
MW5	12	9/15/11	1,2	mg/kg	<0.017	<0.017	<0.017	<0.034	<0.017	<6.2	11	<12
MW6	4	9/15/11	1,2	mg/kg	<0.12	<0.12	2.1	<0.25	<0.12	1,800	1,300	<210
MW6	14	9/15/11	1,2	mg/kg	<0.015	<0.015	<0.015	<0.03	<0.015	<6.0	<6.0	<12
MW7	5	9/15/11	1,2	mg/kg	<0.018	<0.018	<0.018	<0.037	<0.018	<6.7	<7.4	<13
MW8	10	11/9/11	1,2	mg/kg	2.0	< 0.019	0.39	0.30	0.024	< 6.4	20	< 13
MW8	7	11/9/11	1,2	mg/kg	0.091	< 0.019	0.23	0.31	< 0.019	170	21	370
MW9	5	11/9/11	1,2	mg/kg	< 0.016	< 0.016	< 0.016	< 0.032	< 0.016	< 6.2	< 6.4	30
MW10	6	11/9/11	1,2	mg/kg	0.048	< 0.014	< 0.014	0.054	< 0.014	36	12	30

Notes:

(a) A duplicate sample was collected at location B18 and submitted to the laboratory for analysis as "B100".

(b) A duplicate sample was collected at location B34 and submitted to the laboratory for analysis as "B101".

< = Indicates analyte not detected above method laboratory limtis.

feet bgs = feet below ground surface

mg/kg = milligrams per kilogram

Analytical Method Codes:

1 Soil samples were analyzed for BTEX by EPA Method 8021B.

2 Soil samples were analyzed for gasoline range and diesel range organics by methods NWTPH-Gx and NWTPH-Dx.

Table F4: Current Groundwater Investigation Data Summary - Hydrocarbons, BTEX, VOCs, Metals, and PAHs

Analyte	Analytical Method	Sample ID/ Date: Units	MW-1 9/19/11	MW-2 9/19/11	MW-2D 9/19/11	MW-3 9/19/11	MW-4 9/20/11	MW-5 9/20/11	MW-6 9/20/11	MW-7 9/20/11	MW-8 11/11/11	MW-9 11/11/11	MW-10 11/11/11	KJ-B2-RGW 9/12/11	KJ-B6-RGW 9/12/11	KJ-B15-RGW 9/13/11	KJ-B21-RGW 9/13/11	KJ-B46-RGW 11/10/11	KJ-B47-RGW 11/10/11	KJ-B48-RGW 11/10/11	KJ-B53-RGW 11/10/11	KJ-B55-RGW 11/10/11
Diesel Range Organics	1	mg/L	< 0.10	0.85	0.86	1.6	0.4	0.17	0.29	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.6	< 0.10	< 0.102	< 0.10	< 0.10	0.94
Lube Oil Range Hydrocarbons	1	mg/L	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.24	< 0.2	< 0.2	< 0.2
Gasoline Range Organics	2	mg/L	< 0.25	3.0	2.9	< 0.25	3.4	0.64	0.9	< 0.25	< 0.25	< 0.25	< 0.25	0.62	< 0.25	< 0.25	22	0.27	< 0.25	2.5	< 0.25	3.1
Benzene	3	µg/L	< 1.0	3,900	4,000	8	97	1,900	5.6	< 1.0	33	< 1.0	1.1	1,400	1.4	< 1.0	2,600	380	1,500	24	< 1.0	12
Toluene	3	µg/L	< 1.0	14	13	< 1.0	< 1.00	1.4	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.1	< 1.0	< 1.0	170	1.4	< 1.0	12	< 1.0	4.1
Ethylbenzene	3	µg/L	< 1.0	63	59	1.3	< 1.00	5.5	4.1	< 1.0	< 1.0	< 1.0	< 1.0	17	< 1.0	< 1.0	1,200	2	3.3	69	< 1.0	32
m, p-Xylene	3	µg/L	< 1.0	31	30	< 1.0	< 1.00	2.7	2.6	< 1.0	1.3	< 1.0	< 1.0	17	< 1.0	< 1.0	1,700	1.4	< 1.0	200	< 1.0	5
o-Xylene	3	µg/L	< 1.0	< 1.00	< 1.00	< 1.0	< 1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	3.2	< 1.0	< 1.0	52	2.4	< 1.0	36	< 1.0	< 1.0
1,2-Dibromoethane (EDB)	5	µg/L	< 0.2	< 0.2	< 0.2	< 0.2	< 1	< 0.2	< 0.2	< 0.2												
1,2-Dichloroethane	5	µg/L	< 0.2	0.20	< 0.2	< 0.2	< 1.0	0.2 Y	< 0.2	< 0.2												
1-Methylnaphthalene	6	µg/L	< 0.10	120	130	1.7	120	34	11	0.12												
2-Methylnaphthalene	6	µg/L	< 0.10	110	110	1.0	98	0.28	0.15	< 0.10												
Methyl tertiary-butyl ether (MTBE)	5	µg/L	< 0.5	< 0.5	< 0.5	< 0.5	< 2.5	< 0.5	< 0.5	< 0.5												
Acenaphthene	6	µg/L	0.21	6.1	7.2	0.8	97	5.0	1.9 M	< 0.10												
Acenaphthylene	6	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	1.2	< 0.10	< 0.10	< 0.10												
Anthracene	6	µg/L	< 0.10	0.21 M	0.22	0.31 M	1.8	0.23	0.11	< 0.10												
Benzo(a)anthracene	6	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10												
Benzo(a)pyrene	6	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10												
Benzo(g,h,i)perylene	6	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10												
Chrysene	6	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10												
Dibenzo(a,h)anthracene	6	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10												
Dibenzofuran	6	µg/L	< 0.10	1.8 M	2.1 M	0.47 M	37	1.4	0.72 M	< 0.10												
Fluoranthene	6	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	1.7	0.27	< 0.10	< 0.10												
Fluorene	6	µg/L	< 0.10	3.8	4.5	0.97	37	2.4	1.2	< 0.10												
Indeno(1,2,3-cd)pyrene	6	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10												
Naphthalene	6	µg/L	0.11	160	160	1.5	1,200	1.0	1.7	0.31												
Phenanthrene	6	µg/L	< 0.10	1.7	1.6	0.11 M	33	1.0	0.23	< 0.10												
Pyrene	6	µg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.96	0.2	< 0.10	< 0.10												
Total Benzofluoranthenes	6	µg/L	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10												
Arsenic (dissolved)	4	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.17												
Arsenic	4	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	0.18												
Barium (dissolved)	4	mg/L	0.103	0.056	0.056	0.071	0.029	0.057	0.053	0.018												
Barium	4	mg/L	0.104	0.056	0.056	0.083	0.028	0.097	0.071	0.023												
Cadmium (dissolved)	4	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002												
Cadmium	4	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002												
Chromium (dissolved)	4	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	0.009	0.006	< 0.005	< 0.005												
Chromium	4	mg/L	< 0.005	< 0.005	< 0.005	0.008	0.013	0.022	0.014	< 0.005												
Lead (dissolved)	4	mg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02												
Lead	4	mg/L	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02												
Mercury (dissolved)	4	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001												
Mercury	4	mg/L	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001												
Selenium (dissolved)	4	mg/L	0.07	< 0.05	< 0.05	< 0.05	0.06	< 0.05	< 0.05	< 0.05												
Sellenium	4	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05												
Silver (dissolved)	4	mg/L	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003												
Silver	4	mg/L	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003												

Notes:

< = indicates analyte not detected above method reporting limits

Ecology = Washington State Department of Ecology

mg/L = milligrams per liter

M = Estimated value for an analyte detected and confirmed by an analyst but with low spectral match parameters. This flag is used only for GC-MS analyses.

µg/L = micrograms per liter

Y = The analyte is not detected at or above the reported concentration. The reporting limit is raised due to chromatographic interference. The Y flag is equivalent to the U flag with a raised reporting limit.

Analytical Methods Codes:

1 Ecology Method NWTPH-Dx
2 Ecology Method NWTPH-Gx
3 EPA Method 8021B
4 EPA Method 6010B
5 EPA Method 8260C
6 EPA Method 8270DSIM

Table F5: Previous Investigation Groundwater Data Summary – Hydrocarbons and Other Parameters

Sample ID	Sample Date	Analytical Method	Benzene µg/L	Toluene µg/L	Ethyl-benzene µg/L	Total Xylenes µg/L	o-Xylene µg/L	m, p-Xylene µg/L	Gasoline Range Organics mg/L	Diesel Range Organics mg/L	Lube Oil Range Hydrocarbons mg/L	1,1,1,2-Tetra-chloroethane µg/L	1,1,1-Trichloro-ethane µg/L	1,1,2,2-Tetrachloro-ethane µg/L	1,1,2-Trichloro-ethane µg/L	1,1-Dichloro-ethane µg/L
BW-3 (3_5)	11/17/95	1, 2, 3	4200	1000	1800	7600			41	2.8						
BW-9 (3_5)	11/17/95	1, 2, 3	1700	510	2400	10400			130	65						
CB-GP1-GW-8	6/29/05	4,5	< 0.50	< 0.50	< 0.50	< 1.0			< 0.05	< 0.439	< 0.877					
CB-GP2-GW-10	6/29/05	4,5	< 0.50	< 0.50	< 0.50	< 1.0			< 0.05	< 0.25	< 0.5					
CB-GP3-GW-8	6/29/05	4,5	< 0.50	< 0.50	< 0.50	< 1.0			< 0.05	< 0.25	< 0.5					
CB-GP4-GW-8	6/29/05	4,5	< 0.50	< 0.50	< 0.50	< 1.0			< 0.005	< 0.25	< 0.5					
CB-GP5-GW-18	6/29/05	4,5	13.8	< 2.5	< 2.5	< 5.0			< 0.25	< 0.25	< 0.5					
CB-GP5-GW-18D	6/29/05	4,5	27.8	< 2.5	< 2.5	< 5.0			< 0.25	< 0.25	< 0.5					
CB-GP6-GW-12	6/29/05	4,5	2300	5.03	59	95.6			6.53	0.504	< 0.5					
CB-GP7-GW-12	6/29/05	4,5	89.3	< 0.50	0.796	4.68			0.292	0.374	< 0.5					
CB-GP8-GW-12	6/29/05	4,5	< 0.50	< 0.50	< 0.50	< 1.0			< 0.05	< 0.25	< 0.5					
CB-HA1-GW-4_5	4/27/05	4,5,6	< 0.50	< 0.50	< 0.50	< 1.0			< 0.05	< 0.25	< 0.5					
CB-HA2-GW-5	4/27/05	4,5,6,7	< 0.20	< 0.20	< 0.20		< 0.25	< 0.5	< 0.05	< 0.581	< 1.16	< 0.2	< 0.2	< 0.5	< 0.2	< 0.2
CB-HA3-GW-5	4/27/05	4,5,6,7	< 0.20	< 0.20	< 0.20		< 0.25	< 0.5	< 0.05	0.531	< 0.649	< 0.2	< 0.2	< 0.5	< 0.2	< 0.2
CB-HA3-GW-5D	4/27/05	4,5,6,7	< 0.20	< 0.20	< 0.20		< 0.25	< 0.5	< 0.05	0.301	< 0.5	< 0.2	< 0.2	< 0.5	< 0.2	< 0.2
CBMGW-1 (MW-1)	4/28/05	4,5	< 1.0	< 1.0	< 1.0		< 1.0	< 2.0	< 0.14	< 0.048						
CBMGW-2 (MW-2)	4/28/05	4,5	7,300 J	< 10	84		< 10	< 20	2.6	< 3.0 J						
CBMGW-3 (MW-3)	4/28/05	4,5	260	< 10	91		< 10	< 20	1.4	31						
CBMGW-3D (MW-3)	4/28/05	4,5	270	< 10	97		< 10	< 20	1.3	7.6						
CB-MW1	6/1/06	4,5,7,8,9,11	< 0.5	< 0.50	< 0.5	< 1.0			< 0.05	0.529	< 0.505					
CB-MW2	6/1/06	4,5,7,8,9,11	7150	16.6	88.6	29.6			20.3	< 5.05	< 10.1					
CB-MW3	6/1/06	4,5,7,8,9,11	643	15.3	324	34.8			3.9	< 5.15	< 10.3					
CB-MW3D	6/1/06	4,5	643	16	324	34.7			3.88	2.02	< 0.5					
DP-1-GW	6/1/03	4,5,10	276	5.58	75.2	23.6			1.22	0.739	< 0.5					
DP-2-GW	6/1/03	4,5,10	7410	34.6	72.6	39.2			20.1	4.570	< 0.758					
DP-3-GW	6/1/03	4,5,10	84.8	3.22	56.7	10.3			0.689	1.190	< 0.5					
DP-4-GW	6/1/03	4,5,10	22.9	2.04	97.1	43.8			0.93	0.445	< 0.5					
DP-5-GW	6/1/03	4,5,10	803	358	3.13	27.5			1.28	0.343	< 0.5					
DP-7-GW	6/1/03	4,5,10	2390	7.09	24.5	10.4			5.74	0.380	< 0.5					
DP-8-GW	6/1/03	4,5,10	2390	781	348	2210			12.8	1.310	< 0.5					
DP-9-GW	6/1/03	4,5,10	15700	103	613	820			40.7	2.86	< 0.5					
DP-10-GW	6/1/03	4,5,10	27.9	3.23	23.1	91.5			2.06	0.763	< 0.5					
MW-1	10/1/96	1, 2, 3	< 1.0	< 1.0	< 1.0		< 1 .0	< 2 .0	< 0.12	< 0.18						
MW-1	6/1/03	4,5	< 0.50	< 0.50	< 0.50	< 1.0			< 0.050	0.294	< 0.5					
MW-2	10/1/96	1, 2, 3	16400	23	170		4.5 J	93	1.9	< 1.9						
MW-2	6/1/03	4,5	9000	< 50	354	< 100			21.3	127	< 10					
MW-3	10/1/96	1, 2, 3	7800	130	1300		29	3600	24	98						
MW-3	6/1/03	4,5	185	4.63	86.7	29.4			1.17	17.2	< 0.5					

Table F5: Previous Investigation Groundwater Data Summary – Hydrocarbons and Other Parameters

Sample ID	Sample Date	Analytical Method	1,1-Dichloro-ethene µg/L	1,1-Dichloro-propene µg/L	1,2,3-Trichloro-benzene µg/L	1,2,3-Trichloro-propane µg/L	1,2,4-Trichloro-benzene µg/L	1,2,4-Trimethyl-benzene µg/L	1,2-Dibromo-3-chloro-propane µg/L	1,2-Dibromo-ethane (EDB) µg/L	1,2-Dichloro-benzene µg/L	1,2-Dichloro-ethane µg/L	1,2-Dichloro-propane µg/L	1,3,5-Trimethyl-benzene µg/L	1,3-Dichloro-benzene µg/L	1,3-Dichloro-propane µg/L	1,4-Dichloro-benzene µg/L
BW-3 (3_5)	11/17/95	1, 2, 3															
BW-9 (3_5)	11/17/95	1, 2, 3															
CB-GP1-GW-8	6/29/05	4,5															
CB-GP2-GW-10	6/29/05	4,5															
CB-GP3-GW-8	6/29/05	4,5															
CB-GP4-GW-8	6/29/05	4,5															
CB-GP5-GW-18	6/29/05	4,5															
CB-GP5-GW-18D	6/29/05	4,5															
CB-GP6-GW-12	6/29/05	4,5															
CB-GP7-GW-12	6/29/05	4,5															
CB-GP8-GW-12	6/29/05	4,5															
CB-HA1-GW-4_5	4/27/05	4,5,6															
CB-HA2-GW-5	4/27/05	4,5,6,7	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	< 0.20	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	< 0.2	< 0.2
CB-HA3-GW-5	4/27/05	4,5,6,7	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	0.36	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	< 0.2	< 0.2
CB-HA3-GW-5D	4/27/05	4,5,6,7	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	0.34	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	< 0.2	< 0.2
CBMGW-1 (MW-1)	4/28/05	4,5															
CBMGW-2 (MW-2)	4/28/05	4,5															
CBMGW-3 (MW-3)	4/28/05	4,5															
CBMGW-3D (MW-3)	4/28/05	4,5															
CB-MW1	6/1/06	4,5,7,8,9,11															
CB-MW2	6/1/06	4,5,7,8,9,11															
CB-MW3	6/1/06	4,5,7,8,9,11															
CB-MW3D	6/1/06	4,5															
DP-1-GW	6/1/03	4,5,10															
DP-2-GW	6/1/03	4,5,10															
DP-3-GW	6/1/03	4,5,10															
DP-4-GW	6/1/03	4,5,10															
DP-5-GW	6/1/03	4,5,10															
DP-7-GW	6/1/03	4,5,10															
DP-8-GW	6/1/03	4,5,10															
DP-9-GW	6/1/03	4,5,10															
DP-10-GW	6/1/03	4,5,10															
MW-1	10/1/96	1, 2, 3															
MW-1	6/1/03	4,5															
MW-2	10/1/96	1, 2, 3															
MW-2	6/1/03	4,5															
MW-3	10/1/96	1, 2, 3															
MW-3	6/1/03	4,5															

Table F5: Previous Investigation Groundwater Data Summary – Hydrocarbons and Other Parameters

Sample ID	Sample Date	Analytical Method	2,2-Dichloro-propane µg/L	2-Butanone µg/L	2-Chloro-toluene µg/L	2-Hexanone µg/L	4-Chloro-toluene µg/L	Bromo-benzene µg/L	Bromo-chloro-methane µg/L	Bromoform µg/L	Bromo-methane µg/L	Carbon disulfide µg/L	Carbon tetrachloride µg/L	Chloro-benzene µg/L	Chloro-ethane µg/L	Chloroform µg/L	Chloro-methane µg/L	cis-1,2-Dichloro-ethene µg/L
BW-3 (3_5)	11/17/95	1, 2, 3																
BW-9 (3_5)	11/17/95	1, 2, 3																
CB-GP1-GW-8	6/29/05	4,5																
CB-GP2-GW-10	6/29/05	4,5																
CB-GP3-GW-8	6/29/05	4,5																
CB-GP4-GW-8	6/29/05	4,5																
CB-GP5-GW-18	6/29/05	4,5																
CB-GP5-GW-18D	6/29/05	4,5																
CB-GP6-GW-12	6/29/05	4,5																
CB-GP7-GW-12	6/29/05	4,5																
CB-GP8-GW-12	6/29/05	4,5																
CB-HA1-GW-4_5	4/27/05	4,5,6																
CB-HA2-GW-5	4/27/05	4,5,6,7	< 0.5	4.09	< 0.5	< 2	< 0.5	< 0.5	< 0.2	< 0.2	< 2	< 0.5	< 0.2	< 0.2	< 1	< 0.2	< 1	< 0.2
CB-HA3-GW-5	4/27/05	4,5,6,7	< 0.5	< 2.0	< 0.5	< 2	< 0.5	< 0.5	< 0.2	< 0.2	< 2	< 0.5	< 0.2	< 0.2	< 1	< 0.2	< 1	< 0.2
CB-HA3-GW-5D	4/27/05	4,5,6,7	< 0.5	< 2.0	< 0.5	< 2	< 0.5	< 0.5	< 0.2	< 0.2	< 2	< 0.5	< 0.2	< 0.2	< 1	< 0.2	< 1	< 0.2
CBMGW-1 (MW-1)	4/28/05	4,5																
CBMGW-2 (MW-2)	4/28/05	4,5																
CBMGW-3 (MW-3)	4/28/05	4,5																
CBMGW-3D (MW-3)	4/28/05	4,5																
CB-MW1	6/1/06	4,5,7,8,9,11																
CB-MW2	6/1/06	4,5,7,8,9,11																
CB-MW3	6/1/06	4,5,7,8,9,11																
CB-MW3D	6/1/06	4,5																
DP-1-GW	6/1/03	4,5,10																
DP-2-GW	6/1/03	4,5,10																
DP-3-GW	6/1/03	4,5,10																
DP-4-GW	6/1/03	4,5,10																
DP-5-GW	6/1/03	4,5,10																
DP-7-GW	6/1/03	4,5,10																
DP-8-GW	6/1/03	4,5,10																
DP-9-GW	6/1/03	4,5,10																
DP-10-GW	6/1/03	4,5,10																
MW-1	10/1/96	1, 2, 3																
MW-1	6/1/03	4,5																
MW-2	10/1/96	1, 2, 3																
MW-2	6/1/03	4,5																
MW-3	10/1/96	1, 2, 3																
MW-3	6/1/03	4,5																

Table F5: Previous Investigation Groundwater Data Summary – Hydrocarbons and Other Parameters

Sample ID	Sample Date	Analytical Method	cis-1,3-Dichloro-propene µg/L	Dibromo-chloro-methane µg/L	Dibromo-methane µg/L	Dichloro-bromo-methane µg/L	Dichloro-difluoro-methane (F12) µg/L	Hexachloro-butadiene µg/L	Isopropyl-benzene (Cumene) µg/L	Methyl isobutyl ketone µg/L	Methyl tertiary-butyl ether (MTBE) µg/L	Methylene chloride (Dichloro-methane) µg/L	Naph-thalene µg/L	n-Butyl-benzene µg/L	n-Propyl-benzene µg/L	p-Isopropy-ltoluene µg/L	sec-Butyl-benzene µg/L
BW-3 (3_5)	11/17/95	1, 2, 3															
BW-9 (3_5)	11/17/95	1, 2, 3															
CB-GP1-GW-8	6/29/05	4,5															
CB-GP2-GW-10	6/29/05	4,5															
CB-GP3-GW-8	6/29/05	4,5															
CB-GP4-GW-8	6/29/05	4,5															
CB-GP5-GW-18	6/29/05	4,5															
CB-GP5-GW-18D	6/29/05	4,5															
CB-GP6-GW-12	6/29/05	4,5															
CB-GP7-GW-12	6/29/05	4,5															
CB-GP8-GW-12	6/29/05	4,5															
CB-HA1-GW-4_5	4/27/05	4,5,6															
CB-HA2-GW-5	4/27/05	4,5,6,7	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.5	< 0.5	< 2		< 5	< 0.5	< 0.2	< 0.5	< 0.2	< 0.2
CB-HA3-GW-5	4/27/05	4,5,6,7	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.5	< 0.5	< 2		< 5	< 0.5	< 0.2	< 0.5	< 0.2	< 0.2
CB-HA3-GW-5D	4/27/05	4,5,6,7	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.5	< 0.5	< 2		< 5	< 0.5	< 0.2	< 0.5	< 0.2	< 0.2
CBMGW-1 (MW-1)	4/28/05	4,5															
CBMGW-2 (MW-2)	4/28/05	4,5															
CBMGW-3 (MW-3)	4/28/05	4,5															
CBMGW-3D (MW-3)	4/28/05	4,5															
CB-MW1	6/1/06	4,5,7,8,9,11															
CB-MW2	6/1/06	4,5,7,8,9,11															
CB-MW3	6/1/06	4,5,7,8,9,11															
CB-MW3D	6/1/06	4,5															
DP-1-GW	6/1/03	4,5,10							8.37								
DP-2-GW	6/1/03	4,5,10							< 25.0								
DP-3-GW	6/1/03	4,5,10							5.82								
DP-4-GW	6/1/03	4,5,10							2.05								
DP-5-GW	6/1/03	4,5,10							2.04								
DP-7-GW	6/1/03	4,5,10							< 1.00								
DP-8-GW	6/1/03	4,5,10							< 50.0								
DP-9-GW	6/1/03	4,5,10							37.6								
DP-10-GW	6/1/03	4,5,10							6.24								
MW-1	10/1/96	1, 2, 3							< 1.0								
MW-1	6/1/03	4,5															
MW-2	10/1/96	1, 2, 3							< 100								
MW-2	6/1/03	4,5															
MW-3	10/1/96	1, 2, 3							3.91								
MW-3	6/1/03	4,5															

Table F5: Previous Investigation Groundwater Data Summary – Hydrocarbons and Other Parameters

Sample ID	Sample Date	Analytical Method	Styrene µg/L	tert-Butyl-benzene µg/L	Tetrachloro-ethene µg/L	trans-1,2-Dichloro-ethene µg/L	trans-1,3-Dichloro-propene µg/L	Trichloro-ethene µg/L	Trichloro-fluoro-methane (F11) µg/L	Vinyl chloride µg/L	Acetone µg/L	Chloride mg/L	Sulfate mg/L	Iron (dissolved) mg/L	Lead (dissolved) mg/L	Lead mg/L	Manganese (dissolved) mg/L	Alkalinity as Carbonate mg/L	Nitrate mg/L
BW-3 (3_5)	11/17/95	1, 2, 3														0.134			
BW-9 (3_5)	11/17/95	1, 2, 3														0.0315			
CB-GP1-GW-8	6/29/05	4,5																	
CB-GP2-GW-10	6/29/05	4,5																	
CB-GP3-GW-8	6/29/05	4,5																	
CB-GP4-GW-8	6/29/05	4,5																	
CB-GP5-GW-18	6/29/05	4,5																	
CB-GP5-GW-18D	6/29/05	4,5																	
CB-GP6-GW-12	6/29/05	4,5																	
CB-GP7-GW-12	6/29/05	4,5																	
CB-GP8-GW-12	6/29/05	4,5																	
CB-HA1-GW-4_5	4/27/05	4,5,6													< 0.001				
CB-HA2-GW-5	4/27/05	4,5,6,7	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	22				< 0.001				
CB-HA3-GW-5	4/27/05	4,5,6,7	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	< 10								
CB-HA3-GW-5D	4/27/05	4,5,6,7	< 0.5	< 0.5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.5	< 0.2	< 10				< 0.001				
CBMGW-1 (MW-1)	4/28/05	4,5																	
CBMGW-2 (MW-2)	4/28/05	4,5																	
CBMGW-3 (MW-3)	4/28/05	4,5																	
CBMGW-3D (MW-3)	4/28/05	4,5																	
CB-MW1	6/1/06	4,5,7,8,9,11										2,900	12.8	< 0.15			0.605	< 5	< 4
CB-MW2	6/1/06	4,5,7,8,9,11										115	7.83	16.4			2.95	< 5	< 0.4
CB-MW3	6/1/06	4,5,7,8,9,11										399	19.4	5.55			3.46	< 5	< 1
CB-MW3D	6/1/06	4,5																	
DP-1-GW	6/1/03	4,5,10																	
DP-2-GW	6/1/03	4,5,10																	
DP-3-GW	6/1/03	4,5,10																	
DP-4-GW	6/1/03	4,5,10																	
DP-5-GW	6/1/03	4,5,10																	
DP-7-GW	6/1/03	4,5,10																	
DP-8-GW	6/1/03	4,5,10																	
DP-9-GW	6/1/03	4,5,10																	
DP-10-GW	6/1/03	4,5,10																	
MW-1	10/1/96	1, 2, 3														0.0024 J			
MW-1	6/1/03	4,5																	
MW-2	10/1/96	1, 2, 3														0.0022 J			
MW-2	6/1/03	4,5																	
MW-3	10/1/96	1, 2, 3														0.0099 J			
MW-3	6/1/03	4,5																	

Notes:
< = Indicates analyte not detected above method reporting limits.
J = indicates the analyte was positively identified. The associated numerical value is an estimate.
mg/L = milligrams per liter
µg/L = micrograms per liter

Analytical Method Codes

1 Ecology Method NWTPH-G
2 Ecology Method NWTPH-D
3 EPA Method 239.2
4 Ecology Method NWTPH-GX
5 Ecology Method NWTPH-Dx
6 EPA Method 6020
7 EPA Method 8260B
8 EPA Method 300.0
9 EPA Method 6010B
10 EPA Method 8021B
11 EPA Method 2320B

Table F6: Historical Sediment Analytical Results

Analyte	Method	Units	Study/ Sample ID:	Ecology 2005									EA 2006
				CBMSED-1	CBMSED-2	CBMSED-3	CBMSED-4	CBMSED-5	CBMSED-6	CBMSED-7	CBMSED-9	CBMSED-10	CB-SD1-0_5
Diesel Range Organics	1	mg/kg											< 13.2
Lube Oil	1	mg/kg											< 33.1
Gasoline Range Organics	2	mg/kg		< 9.3	< 9	< 8.5	< 9.3	< 9.7	< 9.2	< 11	< 8.5	< 15	< 4.95
#2 Diesel	1	mg/kg		< 17	< 18	< 19	< 20	< 16	57	< 23	< 18	< 34	
Lead	3	mg/kg		4.83	4.1	3.61	4.73	5.17	6.92	6.17	3.2	9.42	
Benzene	4	µg/kg		< 1.9	< 1.6	< 1.8	< 1.5	< 1.6	1.6	< 2	< 1.6	< 3.3	
Ethylbenzene	4	µg/kg		< 1.9	< 1.6	< 1.8	< 1.5	< 1.6	1.6	< 2	< 1.6	< 3.3	
m, p-Xylene	4	µg/kg		< 3.8	< 3.2	< 3.5	< 3.1	< 3.3	3.2	< 4	< 3.2	< 6.5	
o-Xylene	4	µg/kg		< 1.9	< 1.6	< 1.8	< 1.5	< 1.6	1.6	< 2	< 1.6	< 3.3	
Toluene	4	µg/kg		< 1.9	< 1.6	< 1.8	< 1.5	< 1.6	1.6	< 2	< 1.6	< 3.3	
1-Methylnaphthalene	5	µg/kg		111	62	118	15	76	58	6 J	< 4.9	6.9 J	
2-Chloronaphthalene	5	µg/kg		< 5.4	< 5	< 5.2	< 4.8	< 5.5	< 5.5	< 6.1	< 4.9	< 9.4	
2-Methylnaphthalene	5	µg/kg		15	66	44	19	41	65	8.7	< 4.9	9.5	
Acenaphthene	5	µg/kg		288	226	702	32	276	107	1.1 J	< 4.9	< 9.4	
Acenaphthylene	5	µg/kg		28	45	90	38	101	44	< 1.1	< 4.9	< 9.4	
Anthracene	5	µg/kg		256	341	1,260	259	608	324	9.1	< 4.9	18	
Benzo(a)anthracene	5	µg/kg		404	577	1,880	372	1,460	550	24	16	32	
Benzo(a)pyrene	5	µg/kg		235	318	657	287	742	365	19	10	35	
Benzo(b)fluoranthene	5	µg/kg		369 J	493 J	1,050 J	368 J	1,060 J	439 J	24 J	24 J	52 J	
Benzo(g,h,i)perylene	5	µg/kg		107	131	255	125	322	148	19	9	31	
Benzo(k)fluoranthene	5	µg/kg		526 J	570 J	691 J	494 J	1,430 J	634 J	28 J	27 J	36 J	
Carbazole	5	µg/kg		32	137	218	27	164	74	< 6.1	< 4.9	< 9.4	
Chrysene	5	µg/kg		1,750	2,040	4,030	2,280	3,960	2,980	52	62	78	
Dibenzo(a,h)anthracene	5	µg/kg		46	62	134	61	170	72	7	2.3 J	9.8	
Dibenzofuran	5	µg/kg		150	239	385	42	284	100	3 J	< 5	3.4 J	
Fluoranthene	5	µg/kg		4,340	4,300	12,300	2,770	10,000	4,720	73	173	72	
Fluorene	5	µg/kg		218	314	760	59	548	122	4 J	< 4.9	4.2 J	
Indeno(1,2,3-cd)pyrene	5	µg/kg		119	141	285	134	348	167	14	7.3	23	
Naphthalene	5	µg/kg		80	94	139	39	140	116	4.8 J	< 4.9	5 J	
Phenanthrene	5	µg/kg		1,610 J	2,890 J	5,900 J	387 J	7,170 J	718 J	28 J	72 J	35 J	
Pyrene	5	µg/kg		3,490	3,500	10,400	2,090	8,770	4,880	86	128	109	
Retene	5	µg/kg		46	78	< 5.2	10	< 5.5	25	27	13	20	

Notes:

Results are presented on a dry-weight basis.
"E"- qualified data are not presented.
"J" indicates the analyte was positively identified. The associated numerical value is an estimate.
< indicates analyte not detected above laboratory reporting limit.
CBMSED-3 was part of a lab duplicate split. Duplicate split results not presented.
EA = EA Engineering, Science, and Technology, Inc.
Ecology = Washington State Department of Ecology
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram

Analytical Methods Codes:

1 Ecology Method NWTPH-Dx
2 Ecology Method NWTPH-Gx
3 EPA Method 200.8
4 EPA Method 8260
5 EPA Method 8270

Table F7: Historical Surface Water Analytical Results

Result Parameter Name	Method	Units	Study/ Sample ID: Ecology 1995 Surface Water	Ecology 2005 CBMSW-1	Ecology 2005 CBMSW-2	EA 2006 CB-Bay-Bkgd	EA 2006 CB-Sheen1
Diesel Range Organics	6, 1	µg/L	1400	< 0.000049	< 0.000048	236	368
Gasoline Range Organics	7, 4	µg/L	860	140	140	< 50	85.4
Lube Oil	1	µg/L				< 472	< 472
Benzene	3, 4, 5	µg/L	ND	< 1	< 1	< 0.5	< 0.5
Ethylbenzene	3, 5, 4	µg/L	ND	< 1	< 1	< 0.5	< 0.5
Toluene	3, 5, 4	µg/L	ND	< 1	< 1	< 0.5	< 0.5
Total Xylenes	3, 4	µg/L	ND			< 1	< 1
m, p-Xylene	5	µg/L		< 2	< 2		
o-Xylene	5	µg/L		< 1	1.1		
Lead	8	µg/L		0.085	0.096		
1-Methylnaphthalene	2	µg/L		< 0.06	< 0.07		
2-Chloronaphthalene	2	µg/L		< 0.06	< 0.07		
2-Methylnaphthalene	2	µg/L		< 0.06	< 0.07		
Acenaphthene	2	µg/L		< 0.06	< 0.07		
Acenaphthylene	2	µg/L		< 0.06	< 0.07		
Anthracene	2	µg/L		< 0.06	< 0.07		
Benzo(a)anthracene	2	µg/L		< 0.06	< 0.07		
Benzo(a)pyrene	2	µg/L		< 0.06	< 0.07		
Benzo(b)fluoranthene	2	µg/L		< 0.06 J	< 0.07 J		
Benzo(g,h,i)perylene	2	µg/L		< 0.06	< 0.07		
Benzo(k)fluoranthene	2	µg/L		< 0.06 J	< 0.07 J		
Carbazole	2	µg/L		< 0.06	< 0.07		
Chrysene	2	µg/L		< 0.06	< 0.07		
Dibenzo(a,h)anthracene	2	µg/L		< 0.06	< 0.07		
Dibenzofuran	2	µg/L		< 0.06	< 0.07		
Fluoranthene	2	µg/L		< 0.06	< 0.07		
Fluorene	2	µg/L		< 0.06	< 0.07		
Indeno(1,2,3-cd)pyrene	2	µg/L		< 0.06	< 0.07		

Table F7: Historical Surface Water Analytical Results

Result Parameter Name	Method	Units	Study/ Sample ID: Ecology 1995 Surface Water	Ecology 2005 CBMSW-1	Ecology 2005 CBMSW-2	EA 2006 CB-Bay-Bkgd	EA 2006 CB-Sheen1
Naphthalene	2	µg/L		< 0.06	< 0.07		
Phenanthrene	2	µg/L		< 0.06	< 0.07		
Pyrene	2	µg/L		< 0.06	< 0.07		
Retene	2	µg/L		< 0.06	< 0.07		

Notes:

"J" indicates the analyte was positively identified. The associated numerical value is an estimate.
< = Indicates analyte not detected above method reporting limtis.
EA = EA Engineering, Science, and Technology, Inc.
Ecology = Washington State Department of Ecology
ND = Analyte reported as non-detect, but detection limit unknown.
µg/L = micrograms per liter

Analytical Method Codes:

1 NWTPH-DX
2 EPA Method 8270
3 Method unknown
4 NWTPH-GX
5 EPA Method 8021
6 TPH-Dx
7 TPH-Gx
8 EPA 200.8

Table F8: Previous Investigation Soil Data Summary – BTEX, Hydrocarbons, and Lead

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethy-lbenzene	m,p-Xylene	o-Xylene	Total Xylenes	Diesel Range Organics	Gasoline Range Organics	Lube Oil Range Organics	Lead	Methyl tertiary-butyl ether (MTBE)	Nitrogen	Nitrate-Nitrite as N	Total Kjeldahl Nitrogen	Phosphorus	Potassium	Total Organic Carbon	Chemical Oxygen Demand
B-1	2.5 -3.5	11/1995	1,2	mg/kg	0.547 J		< 0.273	< 1.09	< 0.273		50	13										
B-1	6.2 - 7.2	11/1995	1,2	mg/kg	2.63	0.177 J	2.04	7.78	1.31		670	380										
B-2	2.5 - 3.8	11/1995	1,2	mg/kg	10.3	18.1 J	18.8	21.7 J	7.55 J		53	1,300										
B-2	5.0 - 6.2	11/1995	1,2	mg/kg	0.352 J	0.617	0.506	2.14	0.762		63	110										
B-3	2.5 - 3.7	11/1995	1,2	mg/kg	6.29	9.71					4,030	4,900										
B-3	4.2 - 5.4	11/1995	1,2	mg/kg	0.759 J	0.386 J	0.732	2.28	0.261 J		63	47										
B-4	12 - 13.2	11/1995	1,2	mg/kg	< 0.529	< 0.264	< 0.264	0.266 J	0.0023 J		59	11										
B-4	2.5 - 3.7	11/1995	1,2	mg/kg	0.347 J	< 0.204	< 0.204	0.215 J	0.0045 J		51	12										
B-5	6.0 - 7.2	11/1995	1,2	mg/kg	3.25	0.532	11.9 J	42.7	6.19 J		2,300	990										
B-6	2.5 - 3.7	11/1995	1,2	mg/kg	< 0.464	< 0.232	< 0.232	0.319 J	0.019 J		57	11										
B-6	7.2 - 8.4	11/1995	1,2	mg/kg	2.1	< 0.588	0.083 J	< 0.615 J	< 0.588		48	13										
B-8	3.0 - 4.2	11/1995	1,2	mg/kg	4.44	44	23.1	86.6	32.1		7,400	2,200										
B-8	5.5 - 6.7	11/1995	1,2	mg/kg	35.5	5.28	44.9	107	33.1		2,700	2,600										
B-9	2.5 - 3.7	11/1995	1,2	mg/kg	0.656 J	0.87 J	2.45	10.5	2.26		180 A	260										
B-9	4.5 - 5.7	11/1995	1,2	mg/kg	0.668 J	< 1.09	4.93	14.4	1.06 J		1,470	620										
B-10	2.7 - 3.9	11/1995	1,2,3	mg/kg	< 2.42	< 1.21	< 1.21	< 4.84	< 1.21		58	11		6.1								
B-10	5.5 - 6.7	11/1995	1,2,3	mg/kg	< 2.68	< 1.34	< 1.34	< 1.34	< 1.34		64	13		4.5								
B-11	15	10/1996	1,3,4	mg/kg	< 0.075	< 0.075	< 0.075	< 0.15	< 0.075		< 70	< 9		4.6								
B-11	30	10/1996	1,3,4	mg/kg	< 0.13	< 0.13	< 0.13	< 0.27	< 0.13		< 100 J	< 16		2.2								
B-12	10	10/1996	1,3,4	mg/kg	0.34	< 0.11	0.066 J	0.049 J	< 0.11		< 89	< 13		2.6								
B-12	15	10/1996	1,3,4	mg/kg	0.59	< 0.12	< 0.12	< 0.24	< 0.12		< 110	< 14		4.3								
B-12	5	10/1996	1,3,4	mg/kg	0.79	0.16	2.3	1.7	0.18		870	440		3.4								
B-13	10	10/1996	1,3,4	mg/kg	0.096 J	0.042 J	0.44	1.4	0.03 J		110	100		3.9								
B-13	15	10/1996	1,3,4	mg/kg	0.098 J	0.029 J	0.3	0.92	0.015 J		160	92		6.6								
B-13	20	10/1996	1,3,4	mg/kg	< 0.091	< 0.091	< 0.091	< 0.18	< 0.091		< 99	< 11		< 2								
DP-1	3	6/25/03	5,6,7	mg/kg	0.0901	< 0.05	0.124			0.239	108	13.8	32.3		< 0.100							
DP-1	5	6/25/03	5,6,7	mg/kg	4.29	0.949	39.3			22.2	7,050	2,730	< 1,000		< 1.0							
DP-2	5	6/25/03	5,6,7	mg/kg	0.260	0.0612	0.175			0.795	13.4	7.67	< 25.0		< 0.100							
DP-3	3	6/25/03	5,6,7	mg/kg	< 0.300	< 0.500	9.25			3.36	1,850	769	< 250		< 1.0							
DP-4	3	6/25/03	5,6,7	mg/kg	0.0668	< 0.100	1.46			1.30	98.9	173	< 25.0		< 0.200							
DP-5	3	6/25/03	5,6,7	mg/kg	10.7	202	47.6			219	158	5,150	54.9		< 2.0							
DP-5	5	6/25/03	5,6,7	mg/kg	1.26	2.21	0.728			4.02	16.8	44.7	27.6		< 0.100							
DP-6	5	6/25/03	5,6,7	mg/kg	0.594	0.0960	0.146			0.584	16.6	< 5.0	38.9		< 0.100							
DP-7	5	6/25/03	5,6,7	mg/kg	0.164	< 0.0500	0.100			< 0.100	< 10.0	< 5.0	< 25.0		< 0.100							
DP-8	5	6/25/03	5,6,7	mg/kg	0.643	0.0991	0.700			3.32	23.6	41.3	37.4		< 0.100							
DP-9	5	6/25/03	5,6,7	mg/kg	5.88	1.40	25.8			54.8	5,170	1,910	< 1,000		< 2.0							
DP-10	5	6/25/03	5,6,7	mg/kg	4.89	< 2.50	10.4			40.1	73.4	5,310	< 25.0		< 5.0							
GP1	5	6/29/05	6,8,9	mg/kg	< 0.0217	< 0.0361	< 0.0361			< 0.0723	< 10	< 3.61	< 25									
GP2	5	6/29/05	6,8,9	mg/kg	< 0.0204	< 0.034	< 0.034			< 0.068	< 10	< 3.4	< 25									
GP3	5	6/29/05	6,8,9	mg/kg	< 0.0193	< 0.0322	< 0.0322			< 0.0644	< 10	< 3.22	31.2									
GP5	8	6/29/05	6,8,9	mg/kg	< 0.0219	< 0.0364	< 0.0364			< 0.0729	< 10	< 3.64	< 25									
GP6	7	6/29/05	6,8,9	mg/kg	2.39	0.933	12.9			49.9	108	1,240	32.7									
GP6[(a)]	7	6/29/05	6,8,9	mg/kg	3.09	1.23	17.6			66.9	57.1	1,960	26.6									
GP7	8	6/29/05	6,8,9	mg/kg	0.03	< 0.0382	< 0.0382			0.102	< 10	4.05	< 25									
TP1	2	6/1/06	6,9	mg/kg							12	4.03	< 27									
TP1	4	6/1/06	6,9	mg/kg							719	2,470	< 76.8									
TP2	2	6/1/06	6,9	mg/kg							< 11.7	21.5	< 29.3									
TP2	4	6/1/06	6,9	mg/kg							174	1,900	< 32.2									
TP2	6	6/1/06	6,9,10	mg/kg							208	218	< 30.7			255	<0.127	200	695	3,790	3,640	121,000

Table F8: Previous Investigation Soil Data Summary – BTEX, Hydrocarbons, and Lead

Location	Sample Depth (feet bgs)	Sample Date	Analytical Method	Units	Benzene	Toluene	Ethy-lbenzene	m,p-Xylene	o-Xylene	Total Xylenes	Diesel Range Organics	Gasoline Range Organics	Lube Oil Range Organics	Lead	Methyl tertiary-butyl ether (MTBE)	Nitrogen	Nitrate-Nitrite as N	Total Kjeldahl Nitrogen	Phosphorus	Potassium	Total Organic Carbon	Chemical Oxygen Demand
TP3	1.5	6/1/06	6,9	mg/kg							277	396	28.6									
TP3	4	6/1/06	6,9	mg/kg							25.5	37.2	42.6									
TP3	6	6/1/06	6,9,10	mg/kg							15.2	61.5	< 27.7			295	<0.116	254	464	1,400	6,350	119,000
TP4	2	6/1/06	6,9	mg/kg							< 12.3	< 4.5	< 30.7									
TP4	4	6/1/06	6,9	mg/kg							< 12.2	9.52	< 30.6									
TP5	4	6/1/06	6,9,10	mg/kg							569	43.9	< 63.6			252	0.207	197	670	3,060	5,530	119,000
TP5[a]	4	6/1/06	6,9	mg/kg							85.6	33.3	< 32.1									

Notes:
(a) A duplicate sample was collected at location GP6 and TP5 and submitted to the laboratory for analysis.

< = Indicates analyte not detected above laboratory reporting limtis.
feet bgs = feet below ground surface
mg/kg = milligrams per kilogram
"J" denotes an estimated value.
"A" denotes the value is an estimate, as a small fraction may represent gasoline

Analytical Method Codes:

1 Soil samples were analyzed for BTEX compounds by EPA Method 8020.
2 Soil samples were analyzed for gasoline range and diesel range organics by EPA Method 8020.
3 Soil samples were analyzed for lead by EPA Method 200.7.
4 Soil samples were analyzed for gasoline range and diesel range organics by Washington method NWTPH.
5 Soil samples were analyzed for BTEX compounds and MTBE by EPA Method 8021B.
6 Soil samples were analyzed for gasoline and diesel range organics by methods NWTPH-Gx and NWTPH-Dx.
7 Soil samples were analyzed for heavy fuel oil range hydrocarbons by method NWTPH-Dx.
8 Soil samples were analyzed for BTEX compounds by method NWTPH-Gx.
9 Soil samples were analyzed for lube oil range hydrocarbons by method NWTPH-Dx.
10 Soil samples were analyzed for Chemical Oxygen Demand by EPA410.1; Nitrate-Nitrogen by EPA353.2; Phosphorus and Potassium by SW6010B; Total Kjeldahl Nitrogen by EPA351.2; Total Organic Carbon by SW9060, and Nitrogen by SM4500NB.

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Remedial Investigation/ Feasibility Study Report

Cornet Bay Marina, Whidbey Island, Washington

15 July 2013

Volume 2 of 2

Prepared for

Washington State
Department of Ecology
Toxics Cleanup Program

3190 160th Avenue SE
Bellevue, Washington 98008-5452

K/J Project No. 1396010.00

Appendix G

Laboratory Analytical Reports and
Chain-of-Custody Documentation

Groundwater Sample Results

Soil Sample Results

Soil Vapor Sample Results