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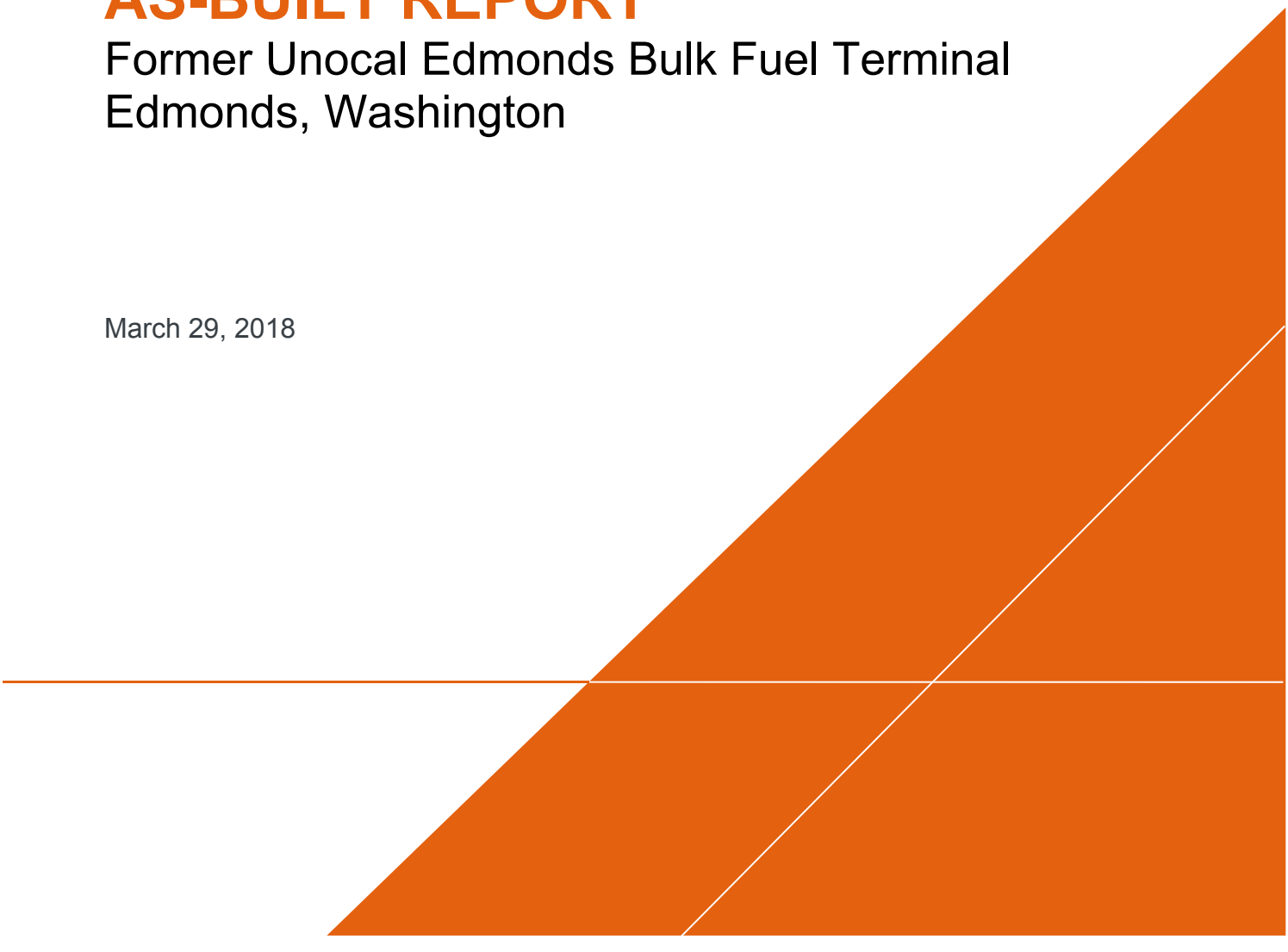
DETENTION BASIN 2 EXCAVATION AS-BUILT REPORT

Former Unocal Edmonds Bulk Fuel Terminal
Edmonds, Washington

March 29, 2018



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Former Unocal Edmonds Bulk Fuel Terminal Edmonds, Washington

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ACRONYMS AND ABBREVIATIONS

AO	Agreed Order
ARAR	applicable or relevant and appropriate requirement
Arcadis	Arcadis U.S., Inc.
bgs	below ground surface
BNSF	Burlington Northenr Santa Fe
CalPortland	CalPortland DuPont facility
CAP	Cleanup Action Plan
CMP	Compliance Monitoring Plan
COC	constituent of concern
cPAH	carcinogenic polycyclic aromatic hydrocarbon
CSID	Cleanup Site Identification Number
CUL	cleanup level
DB-1	Detention Basin 1
DB-2	Detention Basin 2
DB-2 As-Built Report	Detention Basin 2 Excavation As-Built Report
DMR	discharge monitoring report
DPE	dual-phase extraction
DRO	diesel range organics
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EIMS	Environmental Information Management System
Emerald	Emerald Services Inc
fish hatchery	Willow Creek fish hatchery
FS Report	Public Review Draft Final Feasibility Study Report
FSID	Facility Site Identification Number
GPRS	Ground Penetrating Radar Systems, LLC.
GPS	global positioning system

GRO	gasoline range organics
HDPE	high-density polyethylene
HO	heavy oil range organics
HPA	Hydraulic Project Approval
IAWP	Interim Action Work Plan
LNAPL	light nonaqueous phase liquid
MS/MSD	matrix spike/matrix spike duplicate
MTCA	Model Toxics Control Act
NAVD 88	North American Vertical Datum of 1988
NPDES	National Pollutant Discharge Elimination System
NW	northwest
Otak	Otak, Inc.
PID	photoionization detector
POC	point of compliance
PVC	polyvinyl chloride
QC	quality control
REL	remediation level
RL	reporting limit
RTS	Remedial Transportation Services
SAP	sampling and analysis plan
Site	former Unocal Edmonds Bulk Fuel Terminal, located at 11720 Unoco Road, Edmonds, Washington
TEQ	toxic equivalent
TestAmerica	TestAmerica Laboratories, Inc.
TPH	total petroleum hydrocarbons
TWT	temporary water treatment
95% UCL	95 percent upper confidence limit
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

Unocal	Union Oil Company of California
WAC	Washington Administrative Code
WM	Waste Management
WSDOT	Washington State Department of Transportation
µg/L	micrograms per liter

1. INTRODUCTION

On behalf of Chevron Environmental Management Company, Arcadis U.S., Inc. (Arcadis) has prepared this Detention Basin 2 Excavation As-Built Report (DB-2 As-Built Report) for the former Union Oil Company of California (Unocal) Edmonds Terminal located at 11720 Unoco Road in Edmonds, Washington (the Site). The Site location and surrounding area are shown on Figure 1-1.

This DB-2 As-Built Report was prepared in accordance with the requirement of the Compliance Monitoring Plan (CMP), which will be provided as Appendix B of the Draft Cleanup Action Plan (Draft CAP). The Site is being managed by Ecology pursuant to Agreed Order (AO) No. DE 4460 (Ecology 2007). AO No. DE 4460 was amended on June 19, 2017 to allow for work associated with the selected remedy as described in the Public Review Draft Final Feasibility Study Report (FS Report) (Arcadis 2017a) to be implemented before finalizing the Draft CAP. The allowed work is described in the Final Interim Action Work Plan (Final IAWP) and in the Final Engineering Design Report (EDR) (Arcadis 2016b and 2016a).

The former Unocal Edmonds Terminal is formally known as Unocal Edmonds Bulk Fuel Terminal 0178 in Ecology's database. Identifiers are

- Facility Site Identification Number (FSID): 2720
- Cleanup Site Identification Number (CSID): 5180

Previous studies, including historical investigations and remedial actions that have been conducted at the former Unocal Edmonds Terminal and in its immediate vicinity, are summarized in the FS Report (Arcadis 2017a). Ecology's website for the former Unocal Edmonds Terminal is available at: https://fortress.wa.gov/ecy/gsp/Sitepage.aspx?csid=5180. Documents available electronically can be accessed by clicking View Electronic Documents in the sidebar (or clicking on the preceding hyperlink). Documents are also available at the public repository at Edmonds Public Library. The full file can be reviewed at Ecology's Northwest Regional Office in Bellevue (phone 425.649.7000). Data collected during investigations of the former Unocal property are available in Ecology's Environmental Information Management System database (see Study IDs UNOCAL01 and UNOCAL 02). Chevron's website for the former Unocal Edmonds Terminal is: http://www.unocaledmonds.info/.

The DB-2 As-Built Report includes:

- Field activity descriptions, to include any unusual or unexpected events or conditions
- Excavation figures showing final vertical and lateral excavation extents
- Post-excavation figures showing soil sampling locations and results
- Summary, in tons or cubic yards, of soil transmitted off site
- Summary, in gallons, of recovered product and groundwater transmitted off site
- Summary, in gallons, of recovered groundwater that was treated and discharged to Willow Creek
- Daily field documentation and reports
- Copies of chain-of-custody forms and laboratory reports

- Copies of bills of lading
- Electronic database on CD containing sampling data
- Performance monitoring report.

2. SITE DESCRIPTION AND BACKGROUND

2.1 Site Description

The Site, as defined by the Model Toxics Control Act (MTCA), comprises the areas of the Lower Yard and the former Upper Yard. The Site layout, as well as the areas of the Lower Yard, are shown on Figure 2-1.

The approximately 25-acre former Upper Yard is located south of the Lower Yard (Figure 2-1). Unocal sold the former Upper Yard to Point Edwards, LLC in October 2003 and, since then, this area was redeveloped and has been occupied by the Point Edwards condominium complex. Remedial actions in the Upper Yard were conducted in 2003; upon completion, Ecology issued a letter (Ecology 2003) confirming that Unocal successfully completed the cleanup actions and confirming that no further cleanup action was required at the Upper Yard. Therefore, this report focuses solely on work completed in the Lower Yard and, more specifically, on the excavation of Detention Basin 2 (DB-2).

The approximately 22-acre Lower Yard surrounds the former Upper Yard to the north, east, and west, and is currently owned by Unocal. The Lower Yard is currently a vacant property, with no permanent aboveground structures. A concrete pad and a system enclosure are located along lower Unoco Road in the central portion of the Lower Yard. Until summer 2017, the Lower Yard stormwater system conveyed direct precipitation and stormwater to two detention basins (Detention Basin 1 [DB-1] and DB-2) located in the northern part of the Lower Yard and then discharged into Willow Creek. Since fall 2017, the Lower Yard stormwater system conveyed direct precipitation and stormwater to DB-1 only; DB-2 was excavated and backfilled to grade during summer 2017. A Washington State Department of Transportation (WSDOT) stormwater line installed between 1972 and 1975 crosses beneath the Lower Yard at depths of 9 to 12 feet below ground surface (bgs) to the top of the pipe and discharges stormwater collected from State Route 104 to Puget Sound. The WSDOT stormwater line generally runs along the northern edge of lower Unoco Road and trends west across the Lower Yard to the tidal basin leading to Puget Sound, with sections of increasing diameter from 48 inches to 72 inches from east to west.

Willow Creek, a small tributary of Puget Sound adjacent to the Site, runs along the northern portion of the western boundary and the entire eastern boundary of the Lower Yard. Willow Creek is approximately 10 feet wide, is underlain by silt and sand material, and carries surface water into a tidal basin, where the water is conveyed beneath the Port of Edmonds through a culvert to Puget Sound. To the north and northeast of the Lower Yard beyond Willow Creek is Edmonds Marsh, which is a 23-acre freshwater and brackish-water marsh. Willow Creek and Edmonds Marsh are directly connected to Puget Sound and are tidally influenced. At high tide, water flows from Puget Sound upstream into Edmonds Marsh; at low tide, water drains from Edmonds Marsh into Puget Sound. At its nearest point (the southwest corner of the Lower Yard), the Site is approximately 160 feet from the Puget Sound shoreline. The tidal variations in water levels in Puget Sound also influence groundwater elevations at the Site perimeter.

2.2 Background

2.2.1 Cleanup Actions History

After termination of the terminal activities in 1993, Unocal entered into AO No. DE-92TC-N328, which was superseded by AO No. DE 4460 (Ecology 2007) in 2007.

In accordance with the AOs, Unocal conducted interim action cleanup activities at the Upper Yard and Lower Yard. In 2001, Unocal conducted an interim action under AO No. DE92TC-N328 to remove light non-aqueous phase liquid (LNAPL) and petroleum-saturated soil and groundwater from four areas of the Lower Yard. Additional interim actions were conducted in 2003 under AO No. DE92TC-N328, including soil excavations in the southwest Lower Yard, DB-1, Metals Area 3 (located adjacent to the southwest Lower Yard excavation area), and the Point Edwards storm drain line area. Remedial actions were also conducted in the Upper Yard in 2003, and upon completion, Ecology issued a letter (Ecology 2003) confirming that Unocal successfully completed the cleanup actions identified for the Upper Yard. Unocal sold the Upper Yard to Point Edwards, LLC in October 2003. In 2007 and 2008, interim action excavation activities were conducted at the Lower Yard and in Willow Creek, in accordance with AO No. DE 4460 (Ecology 2007). Limits of excavation for the 2001, 2003, 2007, and 2008 remedial actions conducted at the Lower Yard are presented on Figure 2-2.

2.2.2 Cleanup Action Objectives

The objectives of the cleanup action required at the Site per AO No. DE 4460 (Ecology 2007) include the following:

- Remediate soil that contains petroleum hydrocarbon concentrations greater than the soil remediation level (REL) and cleanup levels (CULs) listed in Table 2-1 in the areas of remaining impacts at the Site as described in the FS Report (Arcadis 2017a) and summarized below:
    - *WSDOT stormwater line and Point Edwards storm drain.* Twelve sample locations in soil along the WSDOT stormwater line and two sample locations in soil along the Point Edwards storm drain contain soil with constituent of concern (COC) concentrations greater than site CULs and/or REL.
    - *DB-2 area.* Free-phase and/or residual LNAPL was encountered in the DB-2 area. Additionally, 11 sample locations from 2011 investigations contain soil with COC concentrations greater than site CULs and/or RELs.
- Remove recoverable free product (LNAPL) beneath the Site.
- Obtain the following data necessary to assess future groundwater compliance at the Site:
    - Data necessary to calculate the restoration timeframes for COC concentrations to meet groundwater CULs at the groundwater points of compliance (POCs).
    - Data necessary to evaluate if the remaining soil concentrations will cause an exceedance of groundwater CULs at the groundwater POCs.

The cleanup action also complies with all applicable or relevant and appropriate requirements (ARARs) that apply to the Site as listed in the Final IAWP (Arcadis 2016b).

This DB-2 As-Built Report focuses on the soil remediation and removal of the recoverable free product (LNAPL) in the DB-2 area.

CULs and REL at the Lower Yard are summarized in Table 2-1. Further details regarding CULs and REL identification are provided in the FS Report (Arcadis 2017a).

Table 2-1. CULs and REL for the Lower Yard

Constituents of Concern	Cleanup Levels and Remediation Level
TPH[1]	2,775 mg/kg[3]
Benzene	18 mg/kg[3]
Total cPAHs TEQ[2]	0.14 mg/kg[3]

Notes:

[1] Total petroleum hydrocarbons (TPH) calculated by summing the concentrations of gasoline range organics (GRO), diesel range organics (DRO), and heavy oil range organics (HO).

[2] Total carcinogenic polycyclic aromatic hydrocarbons (cPAHs) calculated by summing the concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene and adjusted for toxicity using toxic equivalency (TEQ) factors to represent a total benzo(a)pyrene concentration (Washington Administrative Code [WAC] 173-340-900).

[3] Proposed soil CUL and REL based on soil direct contact pathway and soil leaching pathway.

2.2.3 Selected Remedy

The selected remedy to complete the cleanup action objectives is described in the FS Report (Arcadis 2017a). The selected remedy includes the excavation of remaining impacts in the DB-2 vicinity and treatment through a dual-phase extraction (DPE) system of the remaining impacts near the WSDOT stormwater line. Impacted soil and LNAPL in the area of DB-2 was excavated, removed from the Site, and transported to an appropriate waste disposal facility. The DPE system installed near the WSDOT stormwater line will dewater soil, expose residual LNAPL to induced vapor flow, remediate COC concentrations in soil to less than CULs and REL, and prevent off-site migration of dissolved-phase COCs and potential LNAPL.

This DB-2 As-Built Report focuses on the excavation of remaining impacts in the DB-2 vicinity, the treatment through a DPE system of the remaining impacts near the WSDOT stormwater line will be described in the DPE System As-Built Report.

3. DETENTION BASIN 2 REMEDIATION ACTIVITIES

DB-2 remediation included the following activities:

- Permitting before implementation of the DB-2 excavation activities
- Utility locate to understand potential active and inactive underground utilities and unknown features before excavation as well as relocating utilities as needed
- Monitoring well decommissioning in the areas of planned excavation and monitoring well installation after remediation activities
- Willow Creek isolation
- Detention basins dewatering
- Soil excavation and LNAPL recovery
- Treatment of extracted groundwater to facilitate construction activities and to meet the requirements of the National Pollutant Discharge Elimination System (NPDES) permit (permit no. WA0991007)
- Stockpile characterization and on-site reuse
- Site restoration including:
    - Importing and placing backfill, and replacement of the storm drain system
    - Restoration and re-planting of Willow Creek banks and the removal of the lined stockpile area and temporary on-site water treatment system
    - Off-site treatment and/or disposal of excavated soil and LNAPL.

This section is organized per the tasks listed above.

Field activities related to DB-2 remediation were implemented from July 31 to October 20, 2017 and were monitored by Arcadis. The contractors involved in DB-2 remediation and the activities performed are listed below:

- Arcadis prepared construction specifications as part of the EDR. Arcadis also observed the construction work completed by Entact, LLC (Entact) of Gibsonia, Pennsylvania, and conducted the construction monitoring and sampling. Arcadis field logs are included in Appendix A.
- Site preparation activities (e.g., vegetation removal, temporary road construction) and soil excavations were completed by Entact using conventional excavation equipment. Daily work logs were prepared by Entact and are included in Appendix B.
- Subsurface utility locations were marked by Ground Penetrating Radar Systems, LLC (GPRS) of Seattle, Washington.
- Otak, Inc. (Otak) of Redmond, Washington, a registered land surveyor in Washington State surveyed the control points for the sample grid on August 28, 2017, the new monitoring wells on November 21, 2017, and conducted the final grade survey on December 8, 2017 and December 22, 2017.
- The water treatment system was provided by ClearCreek of Pacific, Washington.

- Drilling activities associated with monitoring well decommissioning and installation were conducted by Cascade Drilling (Cascade) of Woodinville, Washington, a registered drilling company in Washington State.
- Imported soils for vadose zone backfill and gravel for saturated zone and berm fill were provided by CalPortland DuPont facility (CalPortland) located in DuPont, Washington. Imported soil was transported to the Site by Red E Trucking, Inc. of Redmond, Washington.
- LNAPL and some associated groundwater were removed by Emerald Services Inc[1] (Emerald) of Seattle, Washington. Fluids removed from the Site were transported to the Emerald facility in Seattle for recycling.
- Petroleum-impacted soil was transported from the Site to the Waste Management (WM) transfer facilities in Seattle, Washington by WM and Remedial Transportation Services (RTS) of Bakersfield, California. The impacted soil was then transported by WM via rail to WM's Columbia Ridge Landfill located in Arlington, Oregon.
- Laboratory analysis was performed by TestAmerica Laboratories, Inc. (TestAmerica) in Tacoma, Washington, an Ecology-approved laboratory.

3.1 Permitting

The cleanup action complies with all ARARs that apply to the Site. A State Environmental Policy Act checklist, was made, and approved permits were obtained before implementation of the DB-2 excavation activities:

- On September 2, 2015, the United States Army Corps of Engineers (USACE) of the Seattle District issued Nationwide Permit NWS-2015-392, which was required to install coffer dams related to the implementation of excavation activities near DB-2.
- On September 28, 2016, Ecology issued NPDES Permit No. WA0991007 to discharge groundwater to Willow Creek.
- On March 10, 2017, Washington Department of Fish & Wildlife issued the Hydraulic Project Approval (HPA) 2017-4-141+01.

Though cleanup work at the Site is exempted from obtaining local permits because remedial actions are being implemented under an AO per WAC 173-340-710(9)(b)(vii), the City of Edmonds was consulted to assess any needs for local permitting. The remedial actions planned did not require additional permitting from the City of Edmonds.

NPDES Permit No. WA0991007, USACE Nationwide Permit NWS-2015-392, and HPA 2017-4-141+01 are provided in Appendix C.

[1] Clean Harbors of Kent, Washington, the parent company of Emerald, also appears in the field notes.

3.2 Utility Locate and Rerouting

Before implementation of the DB-2 excavation activities, a utility locate was conducted on site, and utilities in the path of the excavation were rerouted:

- Site utilities maps were consulted, and any potential additional utilities were located by GPRS on August 1 and 2, 2017.
- Washington 811 OneCall was contacted by Entact on August 21, 2017 to request the locations of underground utilities at the Site.
- Two stormwater pipes were plugged upgradient of the DB-2 excavation area. After remediation, these stormwater lines were re-established through the excavation area and discharge into DB-1, as described in Section 3.9.1.

After remediation, temporarily rerouted utilities were re-established in place.

3.3 Monitoring Well Decommission and Installation

Compliance monitoring wells (MW-508, MW-510, and MW-529) and piezometers (P-10 to P-16) in the DB-2 excavation vicinity were decommissioned prior to the start of excavation activities. Before decommissioning, Entact cleared the vegetation on site that could interfere with construction. Arcadis supervised Cascade in the decommissioning of monitoring wells MW-508, MW-510, and MW-529 and piezometers P-10 to P-16 on August 19, 2017. The wells were abandoned in place by Cascade pursuant to Minimum Standards for Construction and Maintenance of Wells (WAC 173-160). The well casing was filled to within 2 feet bgs with hydrated bentonite chips. The upper 2 feet of well casing and annular space surrounding the casing were filled with a concrete plug. Each well was subsequently removed in its entirety with excavation equipment during remedial implementation. Well decommissioning and associated documentation was performed in accordance with the requirements of Ecology. The well abandonment logs for the decommissioned well are presented in Appendix D.

Following the completion of excavation activities, three new monitoring well locations (MW-533, MW-534, and MW-535) were pre-surveyed on October 9, and the wells were installed in the DB-2 excavation vicinity on October 20, 2017. Due to an incomplete well monument and damaged riser, monitoring well MW-E was over-drilled and re-installed in place on October 20, 2017, and was renamed MW-E-R. Arcadis supervised Cascade in the installation of the three new monitoring wells (MW-533, MW-534, and MW-535). Well installation was implemented according to the SAP (Arcadis 2016b). The monitoring wells were advanced to a depth of 13 feet bgs and were constructed in accordance with the requirements of Ecology. The monitoring wells were constructed of 2-inch Schedule 40 polyvinyl chloride (PVC) pipe with 0.02-inch slotted screen. The screen interval was set from 3 to 13 feet bgs. Sand packs were constructed of 2/12 silica sand and extend from 1 foot above the screened interval to the total depth of the well. Each of the monitoring wells was completed with hydrated bentonite chips to 1 foot bgs and a flush traffic-rated well monuments set in concrete at the ground surface. Soil samples were not collected during well installation because wells MW-533, MW-534, and MW-535 were installed in the clean backfill, and well MW-E-R was over-drilled. Boring logs are provided in Appendix E. Otak surveyed the finished well locations and elevations on November 21, 2017. Photographs of the damaged monitoring well MW-E and the new wells installed after the excavation activities are presented in Appendix F.

Well abandonment logs are provided in Appendix D. New monitoring well boring logs are provided in Appendix E. The decommissioned and newly installed well locations are shown on Figure 3-1.

3.4 Willow Creek Isolation

3.4.1 Cofferdam Installation

As part of the DB-2 excavation activities, the berm separating DB-2 from Willow Creek was to be removed and restored in place. Excavation was to occur along the creek banks of jurisdictional waters, as well as in the 100-year floodplain, but not in the active channel. Appropriate permits were therefore obtained before implementation of the DB-2 excavation to install cofferdams in Willow Creek: Nationwide Permit NWS-2015-392 and HPA number 2017-4-141+01 (See Section 3.1). While no in-water excavation work was planned as part of the DB-2 excavation, cofferdams were installed in Willow Creek to prevent disturbances to the aquatic ecosystems by eliminating potential increases in turbidity or accidental discharges associated with near water excavation work.

Cofferdams were constructed at the north and south ends of the DB-2 excavation area. Before cofferdam construction, Willow Creek was seined to push fish out of the isolation area, and fish block nets were installed to keep fish out (See Section 3.4.2). Then two turbidity curtains were installed across the entire width of the creek bed on the upstream and downstream sides of the DB-2 excavation area to reduce the transport of sediments potentially disturbed and suspended in Willow Creek by construction activities. Two 210-foot high-density polyethylene (HDPE) 24-inch-diameter pipe sections were welded (thermal butt-fusion) on site and placed in the Willow Creek channel to allow water to move upstream and downstream of the isolation area after the cofferdam installation. At each extremity of the two bypass pipes, a geomembrane was laid down in the streambed. The two bypass pipes were then covered by a woven geotextile fabric and held in place by bulk bags filled with berm import fill, which formed the basis of the temporary cofferdams. Each cofferdam was constructed across the entire width of Willow Creek, with the west ends of the cofferdams abutting the toe of the Burlington Northern Santa Fe (BNSF) right-of-way, and the east ends abutting the east creek bank of the Lower Yard. Berm import fill complied with the requirements of the EDR (See Section 3.8.1). A 0.5-foot layer of quarry spalls was then placed on top of the plastic sheeting. Each cofferdam measured approximately 30 feet long, 10 feet wide at the base, and 10 feet tall. The two 24-inch-diameter HDPE bypass pipes in the middle of the cofferdams allowed water to flow past the isolation area downstream, and allowed saltwater from downstream to flow into Edmonds Marsh as normally occurs during the tidal cycle.

The temporary cofferdams were removed after completion of the DB-2 excavation near Willow Creek, on September 25, 2017. The Willow Creek bank restoration was complete on September 29, 2017. Fencing and planting along Willow Creek were completed during the first two weeks of October 2017. Washington Department of Fish and Wildlife was notified that work within Willow Creek was complete on October 10, 2017. USACE was notified that excavation work was complete on November 1, 2017. Photographs of the temporary cofferdams installation are presented in Appendix F. The post-construction notification form sent to USACE is provided in Appendix C. Berm import fill characteristics and volumes are presented in Appendix G. The total berm import fill tonnage is presented in Table 3-1.

3.4.2 Fish Collection and Relocation

As part of the Nationwide Permit NWS-2015-392 and HPA number 2017-4-141+01, fish were required to be removed from the isolation area between the temporary cofferdams. According to those permits, on August 29, 30, and 31, 2017, fish were removed and relocated from the approximate 210-foot section of Willow Creek near the remediation area. Details of the fish relocation effort are provided below. Photographs of the relocation effort are contained in Appendix F. Fish relocation results are provided in Table 3-2.

Before construction of the temporary cofferdams and during low tide when fish were most concentrated, Arcadis scientists used a $^{1}/_{8}$-inch mesh seine net to push fish out of the isolation area. Immediately following the seine pass two $^{1}/_{8}$-inch mesh block nets were set up, one upstream and one downstream of the isolation area. This was done to keep fish out of the isolation area and the seine pass was completed before the temporary cofferdams were constructed to minimize the number of fish needing to be removed after completion of the cofferdams. Following setting up the exclusion nets and turbidity curtains, the temporary cofferdams and bypass pipes were installed (See Section 3.4.1).

Following installation of the temporary cofferdams and bypass pipes in the middle of the channel, Arcadis scientists installed $^{1}/_{8}$-inch mesh block nets at the upstream and downstream ends of the isolation area just inside the cofferdams. Pumps were used in between the cofferdams to lower the water level to increase fish removal efficiency. Repeated hauls with a $^{1}/_{8}$-inch mesh seine net were used to capture live fish and relocate them either upstream or downstream of the cofferdams in Willow Creek. The crew would work up one side of the bypass pipes and back down the other, trapping fish in the reach against the block nets to remove as many fish as possible. The numbers of fish were not declining with additional passes as anticipated on the 29 and 30 of August, so on August 31, additional gravel and rock were added to the temporary cofferdams, especially to the areas surrounding the pipes, to make sure there was no fish re-entry into the isolation area. Following this additional material placement on August 31, counts of fish declined in subsequent passes, indicating that fish were effectively excluded from the isolation area.

During the fish removal, special care was taken to look for any potential threatened or endangered species, especially salmonids. Once captured, fish were removed from the seine, counted, then placed in a bucket with Willow Creek water and transported to a suitable release site within Willow Creek either upstream or downstream of the cofferdams. Care was taken to minimize handling of and stress to the fish, and fish appeared to be in good condition. In total, approximately 370 live fish and 434 shrimps were captured and relocated during the removal effort (See Table 3-2). Of the fish, 339 were threespine stickleback (*Gasterosteus aculeatus*; about 1 to 2.5 inches long), six were prickly sculpin (*Cottus asper*; about 2 to 5 inches long), and 25 were juvenile starry flounder (*Platichthys stellatus*; about 3 to 7 inches long). Shrimps were not speciated or individually counted, but rough numbers were estimated. All fish captured and released appeared to be in good condition, with very few (<1%) observed mortalities.

Overall, the Willow Creek fish removal was successful. During the fish removal, and during observations of Willow Creek before the fish removal by Arcadis scientists, no threatened or endangered fish species, including salmonids, were observed. On August 31, the catch of fish dropped to zero by the third pass, demonstrating that the majority of fish had been removed during the initial passes, and fish were not re-entering the reach. Additionally, due to the relatively high number of fish relocated, the limited area between the cofferdams, and the number of seine passes, it is unlikely that other fish species were

present in the reach and went unnoticed during the relocation effort. Photographs of the fish collection and relocation are presented in Appendix F.

3.5 Detention Basins Dewatering

As part of the DB-2 excavation, the southwestern portion of DB-1 was isolated from the rest of DB-1 to safely remove soil in DB-2 area and to allow adequate room to maintain excavation sidewall stability. No in-water excavation work was conducted in DB-1 as part of the DB-2 excavation activities. The DB-1 water level was pumped down using portable pumps before isolation. Water was then removed from the small isolated portion of DB-1 and from DB-2 before excavation and discharge to Willow Creek.

3.6 Soil Excavations and LNAPL Recovery

3.6.1 Soil Excavation

The lateral and vertical extent of the DB-2 excavation was based on the design presented in the EDR (Arcadis 2016a). Additionally, the excavation limits were further advanced based on analytical results of soil confirmation samples and/or field observations made by Arcadis staff (visual observation or odor indicating presence of fuel products) consistent with the Final IAWP.

- DB-2 excavation sampling activities followed a 25-foot reference grid as specified in the SAP (Arcadis 2016b) and shown on Figure 3-2. Control points for the sample grid were surveyed by Otak on August 28, 2017 prior to excavation activities.
- Excavation and soil removal continued until LNAPL was not observed in the sidewalls or on the surface of the groundwater within the excavation. If LNAPL was observed leaching into the excavation from the exposed sidewalls, the excavation remained open until LNAPL was removed from the groundwater surface and was not observed re-entering the excavation (See Section 3.6.2.).
- Excavation and soil removal continued until the analytical results of the confirmation samples were below the applicable CULs or REL. In accordance with the SAP, GRO, DRO, HO and benzene, as well as, cPAHs when either DRO or HO concentrations were observed at or above the laboratory reporting limit (RL) were analyzed by TestAmerica, an Ecology-approved laboratory. TPH concentrations were calculated by summing the concentrations of GRO, DRO, and HO. For results that less than the laboratory RL, half of the laboratory RL was added to determine TPH concentration. Total cPAHs were calculated by summing the concentrations of the individual cPAHs (See Section 2.2.2.) and adjusted for toxicity using TEQ factors to represent a total benzo(a)pyrene concentration (WAC 173-340-900). For results less than the laboratory RL, half of the laboratory RL is added to determine the cPAHs concentration. A total of 60 confirmation samples were collected.
- The vertical excavation boundary was conducted as planned. Soils were excavated to 1 foot North American Vertical Datum of 1988 (NAVD 88) as planned. Elevation was controlled by a field global positioning system (GPS) unit incorporated into the excavation equipment's arm and bucket. Bottom confirmation samples were then collected at this depth and analyses of those samples showed compliance with the applicable CULs or REL. The implemented DB-2 excavation therefore extended to approximately 10 to 12 feet bgs below final grade (corresponding to approximately 1 foot NAVD 88).

- The lateral excavation boundary was as planned with an exception to the northeast. The excavation was extended beyond the planned boundary to the northeast, near grid node A2. One sidewall location (A2 node) presented confirmation soil sample results exceeding the TPH REL and was re-excavated to a lateral extent and resampled until confirmation soil samples contained concentrations of COCs lower than site CULs/REL.

DB-2 excavation activities were staged to maintain safe traffic flow on site. Excavated soil was either loaded directly into trucks or stockpiled in a central location on site before being transferred into trucks for transport off site for proper disposal. The stockpile area receiving the impacted soil was constructed on a bermed, lined, and fully contained area prior to excavation activities.

Final excavation area and volume calculations were completed using AutoCAD software and are based on a two-to-one slope for the sidewalls. The sampling grid, extent of final excavation, and sampling names and locations are shown on Figure 3-2. Excavated soil sample analytical data are summarized in Table 3-1, and the soil analytical reports are included in Appendix G. Final excavation limit and volume are shown on Figure 3-3 and summarized in Table 3-4. Soil waste manifests from the treatment facilities are included in Appendix I. The total soil tonnage disposed off-site is presented in Table 3-5. Data collected during the remediation are available in Ecology's Environmental Information Management System (EIMS) database (see Study IDs UNOCAL01 and UNOCAL 02). Sample location coordinates are also presented in EIMS using the Washington State Plane coordinate system.

3.6.2 LNAPL Recovery

Excavation and soil removal continued until LNAPL was not observed in the sidewalls or on the surface of the groundwater within the excavation. If LNAPL was observed entering the excavation from the exposed sidewalls, the excavation remained open until LNAPL was removed from the groundwater surface and was not observed re-entering the excavation. Recoverable LNAPL was then removed using vacuum dewatering trucks. LNAPL was recovered by Emerald. LNAPL was skimmed from the groundwater using 3,000-gallon or 5,000-gallon vacuum trucks and various diameter suction hoses. Skimming operations continued until LNAPL was not observed entering the excavation from excavation sidewalls for a minimum of 24 hours. Any sidewall or backfill material that came in contact with LNAPL was also removed and taken to the impacted soil stockpile. Approximately 980 gallons of LNAPL and 47,800 gallons of groundwater were recovered and transported off site to Emerald's facility in Seattle, Washington for proper disposal. A summary of the volume of LNAPL recovered is included in Table 3-6. Bills-of-lading from LNAPL recovery operations are included in Appendix J.

3.7 Temporary Water Treatment System Discharge Water

As part of DB-2 excavation dewatering, a temporary water treatment (TWT) system was constructed to handle and treat groundwater accumulating in the DB-2 excavation, as discussed in the EDR and the Final IAWP (Arcadis 2016a, 2016b).

The TWT system was constructed by ClearCreek Systems under the supervision of Arcadis and Entact from August 15 to August 23, 2017 and operated from September 11 until October 9, 2017. Groundwater accumulating in the DB-2 excavation began to be pumped and treated by the TWT system on September 11, 2017. TWT treated water was temporary held in in a 21,000-gallon storage tank until reception of

analytical results confirming the effectiveness of the TWT system. A post-TWT sample, OUTFALL#002-091117, was collected on September 11, 2017 before the first discharge of TWT treated water into Willow Creek, and results showed compliance with the NPDES Waste Discharge Permit No. WA0991007 allowing discharge into Willow Creek to begin on September 12. Discharge into Willow Creek at Outfall # 002 under NPDES Waste Discharge Permit No. WA0991007 was implemented from September 12 to October 9, 2017. Some of the treated water was used to operate the truck wheel wash. Sampling was implemented weekly from September 14 to October 2, 2017. As presented in Tables 3-7 and 3-8, the TWT treated water discharge volumes and flows, and analytical data and field parameters, respectively, were in compliance with NPDES Waste Discharge Permit No. WA0991007.

NPDES Waste Discharge Permit No. WA0991007 requires discharge monitoring reports (DMRs) to be entered by the 28th day of each month, starting December 28, 2016, into Ecology's online system WQebDMR. TWT system treated water field notes are included in Appendix K. TWT system treated water laboratory analytical reports and chain-of-custody documents are included in Appendix L. September and October DMRs are presented in Appendix M.

2017 TWT System Operation Summary:

System Start-Up Date:	9/11/17 (no waste water discharge until 9/12/17)
System Shut-Down Date:	10/9/17
Remedial Technology:	Excavation dewatering and treatment system
System Operation:	During DB-2 excavation activities only.
NPDES Permit Conditions Met:	Yes
Total Volume Treated (Gallons):	243,744

3.8 Stockpiled Soil Analytical Results and Use

3.8.1 Imported Material

Approximately 14,600 tons of material were imported on site:

- 9,100 tons of saturated zone gravel fill
- 3,550 tons of vadose zone sand fill
- 960 tons of berm fill
- 730 tons of gravel borrow
- 140 of quarry spalls
- 90 tons of sand fill
- 30 tons of gravel fill.

Laboratory analytical results were provided for the different fill imported by CalPortland, and the sample collected from the feed stock material at CalPortland was reported as not having detectable amounts of GRO, DRO, HO, volatile and semi-volatile organic compounds, polychlorinated biphenyls, or pesticides; and containing trace amounts of the regulated heavy metals. These trace amounts of the regulated heavy metals (chromium, copper, lead, zinc, and arsenic) could be interpreted as background levels for the

location in which it was extracted. The trace amounts are below available Ecology CULs. Imported fill adhered to the grain size requirements provided in the EDR.

Imported fill characteristics and volumes are presented in Appendix G. The total imported soils tonnage is presented in Table 3-1.

3.8.2 Non-imported Material

A portion of the 2007/2008 backfill located at the west/southwest border of the DB-2 excavation was excavated and segregated in a separate temporary stockpile of approximately 500 cubic yards. The characterization procedure for this stockpile was implemented according to the SAP and CMP.

Seven soil samples were collected from the soil stockpiled from the excavation for potential reuse and submitted for chemical analysis to TestAmerica for GRO, DRO, HO, BTEX, and cPAHs. None of the samples contained analyte concentrations exceeding the Site CULs or REL, and this soil was subsequently used as vadose zone backfill on site.

Analytical results of the stockpiled soil samples are summarized in Table 3-3. Stockpiled soil analytical reports are included in Appendix H.

3.9 Site Restoration

3.9.1 Lower Yard Restoration

Following soil removal, the excavation area was backfilled with clean imported fill and re-used soil as described in Sections 3.8.1 and 3.8.2. Soil excavated from the portion of the 2007/2008 backfill and stockpiled on site was reused as backfill above the groundwater table (vadose zone).

During project implementation, saturated zone gravel fill was placed through the water column up to an elevation of approximately 6 to 7 feet NAVD 88. The former DB-2 was filled in and now grades toward DB-1 and Willow Creek. Vadose zone sand fill was placed and compacted in lifts above the saturated zone gravel fill to final grade. The vadose zone sand fill was placed in 12-inch-thick loose lifts and then compacted to a minimum of 90 percent of its maximum dry density as determined in accordance with the modified Proctor test per ASTM D1557. Field compaction density testing was conducted in accordance with ASTM D6938 by Materials Testing & Consulting, Inc. of Burlington, WA. The Proctor test results and field compaction test results are provided in Appendix N.

The clean, imported 2- to 4-inch quarry spalls used for construction of the haul road was left in place. Final grading is presented on the as-built drawing provided in Appendix O.

The stormwater runoff collection system temporarily plugged during excavation, was restored and extended to discharge directly into DB-1 via gravity flow; pipe invert elevations were surveyed to ensure proper slope. From DB-1, storm water is discharged into Willow Creek at Outfall #002 by pumps reinstalled in the western end of DB-1 and piped into a spreader bar at the outfall area using PVC piping. The pumps are set with float switches to discharge water from DB-1 into Willow Creek before the water level reaches approximately 2 feet below the current southern berm of DB-1. Outfall #002 and storm water collection piping were installed as shown on the as-built drawing presented in Appendix O.

3.9.2 Willow Creek Bank Restoration

Willow Creek bank restoration and final grading was completed with a track excavator operated from an upland position. Required machinery was not used in the active channel. Bank topography was matched to pre-construction conditions to the extent possible.

After finalizing the bank grading, the bank was planted with native plant species typical of the region. Planting was conducted by Greenpoint Landscaping of Edmonds, Washington. BioNet, a biodegradable, woven-fiber matting, was placed over the bank of the creek within the isolation area. Trees, shrubs, and grasses meant to stabilize and protect the bank from erosion and invasive species were planted on the Lower Yard side of the creek, above the high-water line. The plantings were installed through cuts made in the BioNet, at a density and pattern designated in the EDR, into imported mulch material mixed with fertilizer, and the root bases were covered in mulch. The plants were watered by hand for approximately 1 week until regular precipitation began in October 2017.

Photographs of the Willow Creek bank restoration are presented in Appendix F. Final grading of the Willow Creek Bank is presented on the as-built drawing provided in Appendix O.

3.9.3 Water Treatment System Removal

The TWT system was dismantled, cleaned, and returned to Baker Tanks after completion of the DB-2 excavation. Emerald cleaned the sand pods, carbon vessels, and tanks using pressure washers and vacuum trucks. Each component of the TWT system was cleaned to Baker Tanks' specifications and was subsequently taken off site and returned to Baker. Waste water, sludge, sand, and carbon associated with the TWT system cleaning and dismantling were collected via vacuum truck and taken to Emerald's Seattle facility for recycling or treatment.

The containment berm surrounding the water treatment system was also removed. The clean fill material used to construct the berm was used for site grading, and the containment area liner was washed and returned to Baker Tanks.

3.9.4 Impacted Soil Removal

Excavated soil was either loaded directly into trucks or stockpiled in a central location on site before being transferred into trucks for transport off site for proper disposal.

Upon completion of the DB-2 excavation activities, the impacted soil stockpile area and containment were excavated and removed. The contents of the entire stockpile and containment area were loaded into WM trucks and hauled to a WM transfer station with the excavated material. As the final remains of the excavated soil were loaded out, the berm and liner of the impacted stockpile were also removed to a depth of approximately 1 foot bgs.

The appropriate disposal or treatment at the off-site waste facility was determined prior to the field work according to the results of the 2011 investigations conducted in the DB-2 vicinity and described in the IAWP (see locations B-4 to B-11, B-13, B-16, and B-17 on Figure 3-2).

Soil waste manifests from the treatment facility are included in Appendix I. The total soils tonnage transported off site is presented in Table 3-5.

4. DATA VALIDATION

As outlined in the SAP (Arcadis 2016b), the laboratory submitted summary data and quality assurance information to permit independent and conclusive determination of data quality. Data quality was determined using the United States Environmental Protection Agency (USEPA) National Functional Guidelines for Superfund Organic Methods Data Review (USEPA 2017) as guidelines for data review.

Laboratory deliverables for the chemical analyses included the information outlined below:

- Cover page
- Table of contents
- Case narrative for each sample batch that includes a summary of any quality control (QC), sample, shipment, or analytical problems, and documentation of all internal decisions. Problems were outlined, and final solutions documented.
- Glossary
- Sample concentrations reported on standard data sheets in proper units and the appropriate number of significant figures. For undetected values, the lower limit of detection for each compound was reported separately for each sample. Dates of sample extraction, preparation, and analysis were included. Surrogate percent recovery was calculated and reported.
- Summary of the QC samples results including method blank summary; matrix spike/matrix spike duplicate (MS/MSD) percent recoveries, spike level, and relative percent difference; laboratory duplicate results; laboratory control samples/laboratory control duplicate samples
- Laboratory chronicle summarizing the activities performed by the laboratory
- Accreditation summary
- Sample summary
- Copy of the signed chain-of-custody form for each batch of samples as well as a login sample receipt.

Sample holding times were calculated by comparing the date of sample collection (shown on the chain-of-custody form) with the date of sample analysis. Arcadis completed a full data quality review of laboratory deliverables and separate Data Validation Reports, which are attached as Appendix P.

Based on the Arcadis review of laboratory reports, the overall laboratory performance was acceptable, and the overall data quality was within the guidelines specified in the SAP and the USEPA guidelines. No data were marked as rejected.

Samples were identified with a unique alpha-numeric code as required in the SAP. Quality assurance samples were given labels as required in the SAP, except for one trip blank called “Trip Blank” (sample 580-71539-11) rather than “TB-” followed by the date the sample was collected.

The quality assurance samples were collected as follows according to the SAP:

- A total of three duplicate soil samples were collected for a total ratio of one duplicate per 20 samples.

- A total of three MS/MSDs were collected for soil samples for a total ratio of one MS/MSD per 20 samples.
- A total of 17 rinsate blanks were collected (one per day on decontaminated, non-dedicated sampling equipment). Rinsate blanks do not apply to discharge water samples, as the equipment was dedicated.
- A total of 15 soil trip blanks were collected for soil samples (one per cooler containing samples that will be analyzed for volatile compounds). A total of four water trip blanks were collected for water samples (one per cooler containing samples that will be analyzed for volatile compounds).

According to the SAP, Eurofins Lancaster Laboratories Environmental (Eurofins) in Lancaster, Pennsylvania was originally identified for providing the analytical testing specified in the SAP. However, TestAmerica, an Ecology-approved laboratory, was instead selected to complete this task. One sample was sent to both laboratories to compare the results obtained. The comparison is presented in Appendix P.

5. SUMMARY

From July 2017 to October 2017, approximately 8,500 cubic yards of soil were excavated from the Lower Yard as part of DB-2 excavation. Of those 8,500 cubic yards, approximately 500 cubic yards, corresponding to the 2007/2008 backfill, were reused as vadose backfill. Approximately 12,724 tons of soils were disposed off site. Approximately 980 gallons of LNAPL and 47,800 gallons of groundwater were recovered and transported off site. Approximately 3,550 tons of vadose zone sand fill and 9,100 tons of saturated zone gravel fill were used on site.

Of the 60 confirmation soil samples collected during the DB-2 excavation, 58 contained COC concentrations less than the established CULs or REL. The two confirmation samples with TPH concentrations above REL were overexcavated, a new confirmation sample was collected, and the concentration observed was less than the established REL.

The DB-2 excavation successfully removed petroleum-hydrocarbon-impacted soil from the former DB-2 vicinity.

The remaining soil concentrations along the WSDOT line described in Section 2.2.2 will be addressed by the DPE system installed near the WSDOT stormwater line. The treatment through a DPE system of the remaining impacts near the WSDOT stormwater line will be described in the DPE System As-Built Report.

6. REFERENCES

Arcadis. 2016a. Engineering Design Report. Former Unocal Edmonds Bulk Fuel Terminal. March 8.

Arcadis. 2016b. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

Arcadis. 2017a. Public Review Draft Final Feasibility Study Report. Former Unocal Edmonds Bulk Fuel Terminal. June 16.

Arcadis. In Progress. Compliance Monitoring Plan. Former Unocal Edmonds Bulk Fuel Terminal.

Ecology. 2003. Letter RE: Edmonds Bulk Fuel Terminal, Upper Yard: Completion of Cleanup per Interim Action Report. October 9.

Ecology. 2007. AO No. DE 4460

USEPA. 2017. National Functional Guidelines for Superfund Organic Methods Data Review (USEPA-540-R-2017-002). January.

TABLES

Table 3-1
Total Imported Soils Tonnage
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

ARCADIS Design & Consultancy for natural and built assets

#8 x #30 Fill Sand

Date	Imported Daily Tonnage
8/10/2017	88.7
Total Imported Tonnage	**89**

4" x 8" Quarry Spalls

Date	Imported Daily Tonnage
8/15/2017	144.72
Total Imported Tonnage	**145**

8126 Berm Fill

Date	Imported Daily Tonnage
8/17/2017	687.25
9/19/2017	243.5
9/23/2017	31.05
Total Imported Tonnage	**962**

8128 Gravel Borrow

Date	Imported Daily Tonnage
10/13/2017	158.76
10/17/2017	575.08
Total Imported Tonnage	**734**

8129 Saturated Zone Fill

Date	Imported Daily Tonnage
8/7/2017	1174.9
8/8/2017	1151.8
8/15/2017	505.42
8/16/2017	592.47
9/13/2017	218.11
9/14/2017	284.46
9/15/2017	501.9
9/18/2017	684.11
9/19/2017	122.84
9/20/2017	398.63
9/21/2017	625.7
9/22/2017	801.62
9/23/2017	347.66
10/4/2017	456.9
10/5/2017	643.1
10/6/2017	363.17
10/9/2017	458.49
10/11/2017	299.03
10/12/2017	580.22
10/13/2017	59.9
Total Imported Tonnage	**9,096**

8111 Vadose Zone Fill

Date	Imported Daily Tonnage
9/23/2017	343.92
9/27/2017	254.81
9/28/2017	200.42
9/29/2017	139.57
10/2/2017	368.45
10/3/2017	572.31
10/4/2017	185.59
10/9/2017	508.9
10/10/2017	553.18
10/12/2017	269.39
10/13/2017	152.89
Total Imported Tonnage	**3,549**

AASHTO #8 Gravel

Date	Imported Daily Tonnage
8/10/2017	28.7
Total Imported Tonnage	**29**

Notes:
Tonnage in tons
AASHTO = American Association of State Highway and Transportation Officials

Table 3-2
Fish Collection and Relocation Results
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Date	8/29/2017				8/30/2017			8/31/2017			Total
Seine pass [1. 2.]	1	2	3	4	1	2	3	1	2	3	
Threespine Stickleback	11	21	37	30	93	82	20	17	28	0	339
Prickly Sculpin	0	4	0	1	1	0	0	0	0	0	6
Starry Flounder	1	7	10	2	0	1	2	2	0	0	25
Shrimp [3.]	~100	~100	~60	~35	~50	~50	~15	~10	~10	~4	~434

Notes:

~ = approximately

1. Prior to construction of the temporary cofferdams and during low tide when fish were most concentrated, Willow Creek was seined to push fish out of the isolation area and fish block nets were installed to keep fish out. This was done to minimize the number of fish handled/removed from the isolation area. No counts or estimates were made for these passes since fish were not captured/handled during this effort.

2. The numbers of fish were not declining with additional passes as anticipated on the 29 th and 30th of August so on August 31st additional gravel and rock were added to the temporary cofferdams to prevent fish re-entry to the isolation area. Following this, fish counts declined indicating the area was sealed to fish passage.

3. Shrimp numbers were estimates only, each individual shrimp was not counted.

Table 3-3
Soil Analytical Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

ARCADIS Design & Consultancy for natural and built assets

Sample Date	Sample Name	Sample Depth (feet bgs)	Job ID	Benzene (mg/kg)			GRO (mg/kg)			DRO (mg/kg)			HO (mg/kg)			TPH (mg/kg)		Total cPAHs Adjusted for Toxicity (mg/kg)			Comment
	Remediation Level (REL) / Cleanup Levels (CULs)			18 mg/kg			-			-			-			2,775 mg/kg		0.14 mg/kg			
				Result	Lab Q	Q	Result	Lab Q	Q	Result	Lab Q	Q	Result	Lab Q	Q	Sum	Q	Sum	Lab Q	Q	
Detention Basin 2 Excavation Soil Samples																					
9/6/2017	EX-DB2-A3-10	10	580-71085-1	0.025	U	U	14	B		53	U	U	16	J	J	57	J	--	--	--	In compliance with CULs/REL
9/7/2017	EX-DB2-A4-10	10	580-71085-1	0.024	U	U	4.7	U	U	53	U	U	16	J	J	45	J	--	--	--	In compliance with CULs/REL
9/7/2017	EX-DB2-A5-10	10	580-71085-1	0.027	U	U	5.5	U	U	54	U	U	15	J	J	45	J	--	--	--	In compliance with CULs/REL
9/7/2017	EX-DB2-A6-10	10	580-71085-1	0.029	U	U	0.68	U	U	64	U	U	15	J	J	47	J	--	--	--	In compliance with CULs/REL
9/7/2017	EX-DB2-A7-10	10	580-71085-1	0.059	U	U	12	U	U	59	U	U	13	J	J	49	J	--	--	--	In compliance with CULs/REL
9/7/2017	EX-DB2-A8-10	10	580-71085-1	0.035	U	U	6.9	U	U	47	U	U	15	J	J	42	J	--	--	--	In compliance with CULs/REL
9/8/2017	EX-DB2-A3-5-SW	5	580-71120-1	0.023	U	U	4.6	U	U	47	U	U	18	J	J	44	J	--	--	--	In compliance with CULs/REL
9/8/2017	EX-DB2-A4-5-SW	5	580-71120-1	0.020	U	U	4.0	U	U	13	J	J	47	J	J	62	J	--	--	--	In compliance with CULs/REL
9/8/2017	EX-DB2-A5-5-SW	5	580-71120-1	0.022	U	U	4.3	U	U	34	J	J	120			156	J	0.002	JB	J	In compliance with CULs/REL
9/7/2017	EX-DB2-A6-5-SW	5	580-71120-1	0.021	U	U	0.49	U	U	41	J	J	80			121	J	0.002	JB	J	In compliance with CULs/REL
9/7/2017	EX-DB2-A7-5-SW	5	580-71120-1	0.018	U	U	3.6	U	U	20	J	J	64			86	J	0.002	JB	J	In compliance with CULs/REL
9/7/2017	EX-DB2-A8-5-SW	5	580-71120-1	0.021	U	U	4.2	U	U	30	J	J	99			131	J	0.004	J	J	In compliance with CULs/REL
9/12/2017	EX-DB2-B3-10	10	580-71216-1	0.024	U	U	4.8	U	U	49	U	U	19	J	J	46	J	--	--	--	In compliance with CULs/REL
9/12/2017	EX-DB2-B4-10	10	580-71216-1	0.023	U	U	4.5	U	U	51	U	U	19	J	J	47	J	--	--	--	In compliance with CULs/REL
9/12/2017	EX-DB2-B5-10	10	580-71216-1	0.027	U	U	5.3	U	U	56	U	U	28	J	J	59	J	--	--	--	In compliance with CULs/REL
9/12/2017	EX-DB2-B6-10	10	580-71216-1	0.027	U	U	5.4	U	U	57	U	U	32	J	J	63	J	--	--	--	In compliance with CULs/REL
9/12/2017	EX-DB2-B7-10	10	580-71216-1	0.024	U	U	4.9	U	U	50	U	U	15	J	J	42	J	--	--	--	In compliance with CULs/REL
9/12/2017	EX-DB2-B8-10	10	580-71216-1	0.023	U	U	4.7	U	U	49	U	U	22	J	J	49	J	--	--	--	In compliance with CULs/REL
9/13/2017	EX-DB2-A2-10	10	580-71255-1	0.024	U	U	4.9	U	U	62	U	U	12	J	J	45	J	--	--	--	In compliance with CULs/REL
9/14/2017	EX-DB2-B2-10	10	580-71291-1	0.023	U	U	4.6	U	U	14	JF1	J	54	JB	U	43	J	--	--	--	In compliance with CULs/REL
9/14/2017	EX-DB2-C2-10	10	580-71291-1	0.024	U	U	4.8	U	U	57	U	U	57	JB	U	59	UU	--	--	--	In compliance with CULs/REL
9/15/2017	EX-DB2-A1-8-SW	8	580-71327-1	0.027	U	U	5.3	U	U	64	U	U	27	J	J	62	J	--	--	--	In compliance with CULs/REL
9/15/2017	EX-DB2-A2-5-SW	5	580-71327-1	0.037	U	U	7.5	U	U	1,500			1,500			**3,004**		0.039	J	J	Overexcavated; see EX-DB2-A2-4-SW
9/15/2017	EX-DB2-B1-8-SW	8	580-71327-1	0.025	U	U	5.0	U	U	62	U	U	18	J	J	52	J	--	--	--	In compliance with CULs/REL
9/18/2017	EX-DB2-C1-8-SW	8	580-71376-1	0.026	U	U	5.2	U	U	60	U	U	60	U	U	63	UU	--	--	--	In compliance with CULs/REL
9/18/2017	EX-DB2-D1-8-SW	8	580-71376-1	0.027	U	U	5.4	U	U	65	U	U	65	U	U	68	UU	--	--	--	In compliance with CULs/REL
9/18/2017	EX-DB2-D2-10	10	580-71376-1	0.028	U	U	5.6	U	U	62	U	U	62	U	U	65	UU	--	--	--	In compliance with CULs/REL
9/18/2017	EX-DB2-E0-1	1	580-71376-1	0.029	U	U	22			640			800			1,462		0.071	J	J	In compliance with CULs/REL
9/19/2017	EX-DB2-E1-8-SW	8	580-71419-1	0.023	U	U	4.7	U	U	56	U	U	56	U	U	58	UU	--	--	--	In compliance with CULs/REL
9/19/2017	EX-DB2-E1-10	10	580-71419-1	0.029	U	U	5.7	U	U	20	J	J	29	J	J	52	J	--	--	--	In compliance with CULs/REL
9/20/2017	EX-DB2-A2-4-SW	4	580-71458-1	0.076	U	U	15	U	U	1,600			2,200			**3,808**		0.123	B		Overexcavated; See EX-DB2-A2-6-SW
9/20/2017	EX-DB2-F0-1	1	580-71458-1	0.13	U	U	26	U	U	180			470			663		0.076	JB	J	In compliance with CULs/REL
9/20/2017	EX-DB2-F1-10	10	580-71458-1	0.024	U	U	4.9	U	U	62	U	U	62	U	U	64	UU	--	--	--	In compliance with CULs/REL
9/21/2017	EX-DB2-F2-12	12	580-71539-1	0.018	U	U	2.1	J	J	16	J	J	150			168	J	0.002	J	J	In compliance with CULs/REL
9/22/2017	EX-DB2-C3-10	10	580-71539-1	0.023	U	U	4.5	U	U	60	U	U	60	U	U	62	UU	--	--	--	In compliance with CULs/REL
9/22/2017	EX-DB2-C4-10	10	580-71539-1	0.037	U	U	7.4	U	U	69	U	U	20	J	J	58	J	--	--	--	In compliance with CULs/REL
9/22/2017	EX-DB2-C5-10	10	580-71539-1	0.027	U	U	5.5	U	U	61	U	U	61	U	U	64	UU	--	--	--	In compliance with CULs/REL
9/22/2017	EX-DB2-C6-10	10	580-71539-1	0.021	U	U	4.3	U	U	60	U	U	11	J	J	43	J	--	--	--	In compliance with CULs/REL
9/22/2017	EX-DB2-C7-11	11	580-71539-1	0.025	U	U	4.9	U	U	61	U	U	12	J	J	45	J	--	--	--	In compliance with CULs/REL
9/22/2017	EX-DB2-C8-10	10	580-71539-1	0.025	U	U	5.0	U	U	60	U	U	60	U	U	63	UU	--	--	--	In compliance with CULs/REL
9/22/2017	EX-DB2-D3-10	10	580-71539-1	0.025	U	U	5.0	U	U	61	U	U	61	U	U	64	UU	--	--	--	In compliance with CULs/REL
9/25/2017	EX-DB2-A2-6-SW	6	580-71582-1	0.036	U	U	7.2	U	U	67	U	U	22	J	J	59	J	--	--	--	In compliance with CULs/REL
9/26/2017	EX-DB2-E2-10	10	580-71607-1	0.027	U	U	5.4	U	U	63	U	UJ	63	U	U	66	UU	--	--	--	In compliance with CULs/REL
9/27/2017	EX-DB2-D4-10	10	580-71638-1	0.029	U	U	5.8	U	U	60	U	U	60	U	U	63	UU	--	--	--	In compliance with CULs/REL
9/27/2017	EX-DB2-D5-10	10	580-71638-1	0.025	U	U	5.0	U	U	20	J	J	15	J	J	38	J	--	--	--	In compliance with CULs/REL
9/27/2017	EX-DB2-D6-10	10	580-71638-1	0.026	U	U	5.2	U	U	44	U	U	44	U	U	47	UU	--	--	--	In compliance with CULs/REL

Table 3-3
Soil Analytical Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Sample Date	Sample Name	Sample Depth (feet bgs)	Job ID	Benzene (mg/kg)			GRO (mg/kg)			DRO (mg/kg)			HO (mg/kg)			TPH (mg/kg)		Total cPAHs Adjusted for Toxicity (mg/kg)			Comment
	Remediation Level (REL) / Cleanup Levels (CULs)			18 mg/kg			-									2,775 mg/kg		0.14 mg/kg			
				Result	Lab Q	Q	Result	Lab Q	Q	Result	Lab Q	Q	Result	Lab Q	Q	Sum	Q	Sum	Lab Q	Q	
9/27/2017	EX-DB2-D7-11	11	580-71638-1	0.026	U	U	5.2	U	U	58	U	U	58	U	U	61	UU	--	--	--	In compliance with CULs/REL
9/27/2017	EX-DB2-D8-10	10	580-71638-1	0.025	U	U	5.0	U	U	58	U	U	58	U	U	61	UU	--	--	--	In compliance with CULs/REL
9/29/2017	EX-DB2-E3-11	11	580-71704-1	0.024	U	U	4.9	U	U	56	U	U	56	U	U	58	UU	--	--	--	In compliance with CULs/REL
9/29/2017	EX-DB2-E4-10	10	580-71704-1	0.024	U	U	4.9	U	U	59	U	U	59	U	U	61	UU	--	--	--	In compliance with CULs/REL
9/29/2017	EX-DB2-E5-10	10	580-71704-1	0.026	U	U	5.2	U	U	64	U	U	64	U	U	67	UU	--	--	--	In compliance with CULs/REL
9/29/2017	EX-DB2-E6-11	11	580-71704-1	0.028	U	U	5.6	U	U	63	U	U	63	U	U	66	UU	--	--	--	In compliance with CULs/REL
10/2/2017	EX-DB2-E7-10	10	580-71754-1	0.027	U	U	4.6	J	J	62	U	U	62	U	U	67	J	--	--	--	In compliance with CULs/REL
Stockpile Soil Samples																					
10/2/2017	SP-B1-B6-1	na	580-71754-1	0.02	U	U	4.0	U	U	49	U	U	49	U	U	51	UU	--	--	--	In compliance with CULs/REL
10/2/2017	SP-B1-B4-4	na	580-71754-1	0.02	U	U	4.0	U	U	23	J	J	25	J	J	50	J	--	--	--	In compliance with CULs/REL
10/2/2017	SP-B1-I8-1	na	580-71754-1	0.02	U	U	3.9	U	U	52	U	U	52	U	U	54	UU	--	--	--	In compliance with CULs/REL
10/2/2017	SP-B1-C6-13	na	580-71754-1	0.019	U	U	3.9	U	U	19	J	J	18	J	J	39	J	--	--	--	In compliance with CULs/REL
10/2/2017	SP-B1-H4-4	na	580-71754-1	0.013	U	U	1.7	J	J	33	J	J	30	J	J	65	J	--	--	--	In compliance with CULs/REL
10/2/2017	SP-B1-B5-7	na	580-71754-1	0.019	U	U	3.8	U	U	50	U	U	14	J	J	41	J	--	--	--	In compliance with CULs/REL
10/2/2017	SP-B1-D8-2	na	580-71754-1	0.018	U	U	43			130			17	J	J	190	J	0.001	J	J	In compliance with CULs/REL
Quality Assurance Samples																					
Duplicate Samples																					
9/8/2017	DUP01-SO-09082017	na	580-71120-1	0.019	U	U	3.9	U	U	19	J	J	56			77	J	0.004	JB	J	Parent sample: EX-DB2-A5-5-SW
9/19/2017	DUP02-SO-09192017	na	580-71419-1	0.027	U	U	5.4	U	U	62	U	U	27	J	J	61	J	--	--	--	Parent sample: EX-DB2-E1-10
9/29/2017	DUP03-SO-09292017	na	580-71704-1	0.024	U	U	4.8	U	U	61	U	U	61	U	U	63	UU	--	--	--	Parent sample: EX-DB2-E4-10

Notes

mg/kg = milligrams per kilogram.

Sample depth in feet below ground surface (bgs). The depth mentioned in the sample name is the depth according to the planned final grade.

Benzene by Method United States Environmental Protection Agency (USEPA) 8260C

GRO = Gasoline by Washington State Department of Ecology (Ecology) Method NWTPH-Gx

DRO = diesel range organics by Ecology Method NWTPH-Dx (after silica gel cleanup)

HO = heavy oil range organics by Ecology Method NWTPH-Dx (after silica gel cleanup)

Total petroleum hydrocarbons (TPH) concentration calculated by summing the concentrations of GRO, DRO and HO. For results which do not exceed laboratory reporting limit (RL), half of the laboratory RL is added to determine TPH concentration.

Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) analyzed by USEPA 8270D SIM when either DRO or HO concentrations were observed at or above the laboratory RL. Total cPAHs calculated by summing the concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene and adjusted for toxicity using toxic equivalency factors to represent a total benzo(a)pyrene concentration (WAC 173-340-900). For results which do not exceed laboratory RL, half of the laboratory RL is added to determine cPAHs concentration.

na: not applicable

--: cPAHs not analyzed. No DRO/HO concentrations at or above the laboratory RL.

Lab Q: qualifier attributed by the laboratory

Q: Qualifier after data validation

U: Not detected at the laboratory reporting limit (RL). Values shown are the laboratory RLs.

B: Compound was found in the laboratory method blank and the sample. [The sample may have been cross-contaminated at the laboratory]

J: Result is less than the laboratory RL but greater than or equal to the laboratory method detection limit (MDL) and the concentration is an estimated value.

F1: matrix spike and/or matrix spike duplicate recovery is outside acceptance limits

UJ: the analyte was analyzed for, but was not detected and the reported quantitation limit is approximate

For summed results:

UU: The constituents making up the total are all non-detects.

J: At least one of the constituent making up the total is an estimated value.

B: Compound was found in the laboratory method blank and the sample. [The sample may have been cross-contaminated at the laboratory]

BOLD Exceeds site-specific REL. Shaded Overexcavated

Table 3-4
Summary of Detention Basin 2 Excavation
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Final Detention Basin 2 Excavation Size	
Excavated Volume [1]	Disposal Weight [2]
Approximately 8,500 cubic yards[3]	12,724 tons

Notes:

1. Final excavation volume calculations were completed using AutoCAD software and are based on a two-to-one slope for the sidewalls.

2. Final disposal weight tonnage is based on the soil waste manifests from the Waste Management treatment facility.

3. Of those 8,500 cubic yards, approximately 500 cubic yards corresponding to the 2007/2008 backfill were reused as vadose backfill.

Table 3-5
Total Exported Soils Tonnage
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

ARCADIS Design & Consultancy for natural and built assets

Date	Exported Daily Tonnage
9/8/2017	253
9/11/2017	278
9/12/2017	271
9/13/2017	415
9/14/2017	631
9/15/2017	613
9/18/2017	338
9/19/2017	653
9/20/2017	812
9/21/2017	869
9/22/2017	783
9/23/2017	251
9/25/2017	758
9/26/2017	748
9/27/2017	640
9/28/2017	896
9/29/2017	785
10/2/2017	1,059
10/3/2017	759
10/4/2017	477
10/5/2017	307
10/6/2017	129
Total Exported Tonnage	**12,724**

Notes:
Tonnage in tons

Table 3-6
Total Exported Water and LNAPL
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Date	Bill of Lading Number	Total Volume Removed (gal)	Estimated Percent LNAPL [1]	Estimated LNAPL Volume Removed (gal)	Estimated Water Volume Removed (gal)
9/15/2017	81967 [2]	1,434	2%	28	1,356
9/22/2017	81978	2,730	2%	55	2,675
9/26/2017	81980	2,817	2%	56	2,761
9/26/2017	81981	2,801	2%	56	2,745
9/27/2017	81982	2,827	2%	57	2,770
9/27/2017	81983	2,800	2%	56	2,744
9/28/2017	81664	2,200	2%	44	2,156
9/28/2017	81665	2,000	2%	40	1,960
9/29/2017	81984	5,000	2%	100	4,900
9/29/2017	81985	4,985	2%	100	4,885
10/2/2017	81986	3,182	2%	64	3,118
10/2/2017	81987	3,201	2%	64	3,137
10/3/2017	81988	3,219	2%	64	3,155
10/3/2017	81989	3,212	2%	64	3,148
10/4/2017	81990	3,210	2%	64	3,146
10/4/2017	81991	3,213	2%	64	3,149
			Total:	**976**	**47,805**

Notes:

LNAPL = light non-aqueous phase liquid

gal = gallons

[1] Estimated percent LNAPL based on field observations

[2] Include the purge water from the July 2017 groundwater baseline event (approximately 50 gallons). Those 50 gallons are not accounted in the total estimated water removed.

Table 3-7
TWT Treated Water Discharge Volumes and Flows
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

ARCADIS Design & Consultancy for natural and built assets

Discharge Date	Discharge Water	Daily Volume (gallons)	Average Daily Flow (gpm)
NPDES Permit No. WA0991007 Discharge Limits	**Treated water**	**21,600**	**15**
From 01/01/2017 to 09/11/2017	Stormwater	NA	NA
Sample OUTFALL#002-091117 collected on 9/11/17 before any discharge of treated water.			
9/12/2017	Treated Water Discharge Beginning		
9/12/2017	Treated water	5,667	3.94
9/13/2017	Treated water	15,746	10.93
9/14/2017	Treated water	19,638	13.64
Sample OUTFALL#002-091417 colllected on 9/14/17			
9/15/2017	Treated water	15,040	10.44
9/16/2017	No discharge - weekend		
9/17/2017	No discharge - weekend		
9/18/2017	Treated water	18,635	12.94
9/19/2017	Treated water	11,118	7.72
Sample OUTFALL#002-091917 colllected on 9/19/17			
9/20/2017	Treated water	11,194	7.77
9/21/2017	Treated water	9,622	6.68
9/22/2017	Treated water	6,126	4.25
9/23/2017	No discharge - weekend		
9/24/2017	No discharge - weekend		
9/25/2017	Treated water	20,008	13.89
9/26/2017	Treated water	10,563	7.34
Sample OUTFALL#002-092617 colllected on 9/26/17			
9/27/2017	Treated water	12,650	8.78
9/28/2017	Treated water	5,249	3.65
9/29/2017	Treated water	11,879	8.25
9/30/2017	No discharge - weekend		
10/1/2017	No discharge - weekend		
10/2/2017	Treated water	12,408	8.62
Sample OUTFALL#002-100217 colllected on 10/02/17			
10/3/2017	Treated water	12,386	8.60
10/4/2017	Treated water	9,097	6.32
10/5/2017	Treated water	18,015	12.51
10/6/2017	Treated water	18,703	12.99
10/7/2017	No discharge - weekend		
10/8/2017	No discharge - weekend		
10/9/2017	Treated Water Discharge End		
Total TWT Treated Water Volume (gallons) and Average Flow (gpm)		**243,744**	**8.91**

Notes:

NPDES = National Pollutant Discharge Elimination System

gpm = gallon per minute

Day 1 daily volume = Day 2 AM Totalizer Reading - Day 1 AM Totalizer Reading

Average daily flow = daily volume / 24 hours / 60 minutes

TWT = Temporary Water Treatment

NA = not available

Table 3-8
TWT Treated Water Discharge Analytical Data and Field Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Sample Date	Sample Name	Laboratory Analyzes										Field Parameters	
		Benzene		cPAHs		Gasoline		Diesel		Heavy Oil		pH	Chitosan
	NPDES Permit No. WA0991007 Discharge Limits	16 µg/L		0.05 µg/L		800 µg/L		500 µg/L		500 µg/L		6-9	Absence
		µg/L	Q	µg/L	Q	µg/L	Q	µg/L	Q	µg/L	Q	pH unit	--
9/11/2017	OUTFALL#002-091117	2	U	0.018	U	250	U	28	JB	250	U	8.1	Absent
9/14/2017	OUTFALL#002-091417	2	U	0.020	U	250	U	50	JB	260	U	7.4	Absent
9/19/2017	OUTFALL#002-091917	2	U	0.019	U	250	U	40	JB	270	U	7.0	Absent
9/26/2017	OUTFALL#002-092617	2	U	0.017	U	250	U	100	U	260	U	8.0	Absent
10/2/2017	OUTFALL#002-100217	2	U	0.018	U	250	U	100	U	250	U	7.3	Absent

Notes:

NPDES = National Pollutant Discharge Elimination System

Benzene by Method United States Environmental Protection Agency (USEPA) 624

Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) analyzed by USEPA Method 625. Total cPAHs calculated by summing the concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene and adjusted for toxicity using toxic equivalency factors to represent a total benzo(a)pyrene concentration (WAC 173-340-900). For results which do not exceed lab. method detection limit (MDL), half of the lab. MDL is added to determine cPAHs concentration.

Gasoline by Washington State Department of Ecology (Ecology) Method NWTPH-Gx

Diesel and Heavy Oil by Ecology Method NWTPH-Dx (after silica gel cleanup)

pH by pH meter onsite

Chitosan acetate by chitosan acetate field screening test: absence/presence

µg/L = micrograms per liter.

Q: Laboratory (lab.) qualifier

U: Not detected at the lab. reporting limit (RL). Values shown are the lab. RLs besides for cPAHs where value shown are the lab. MDLs.

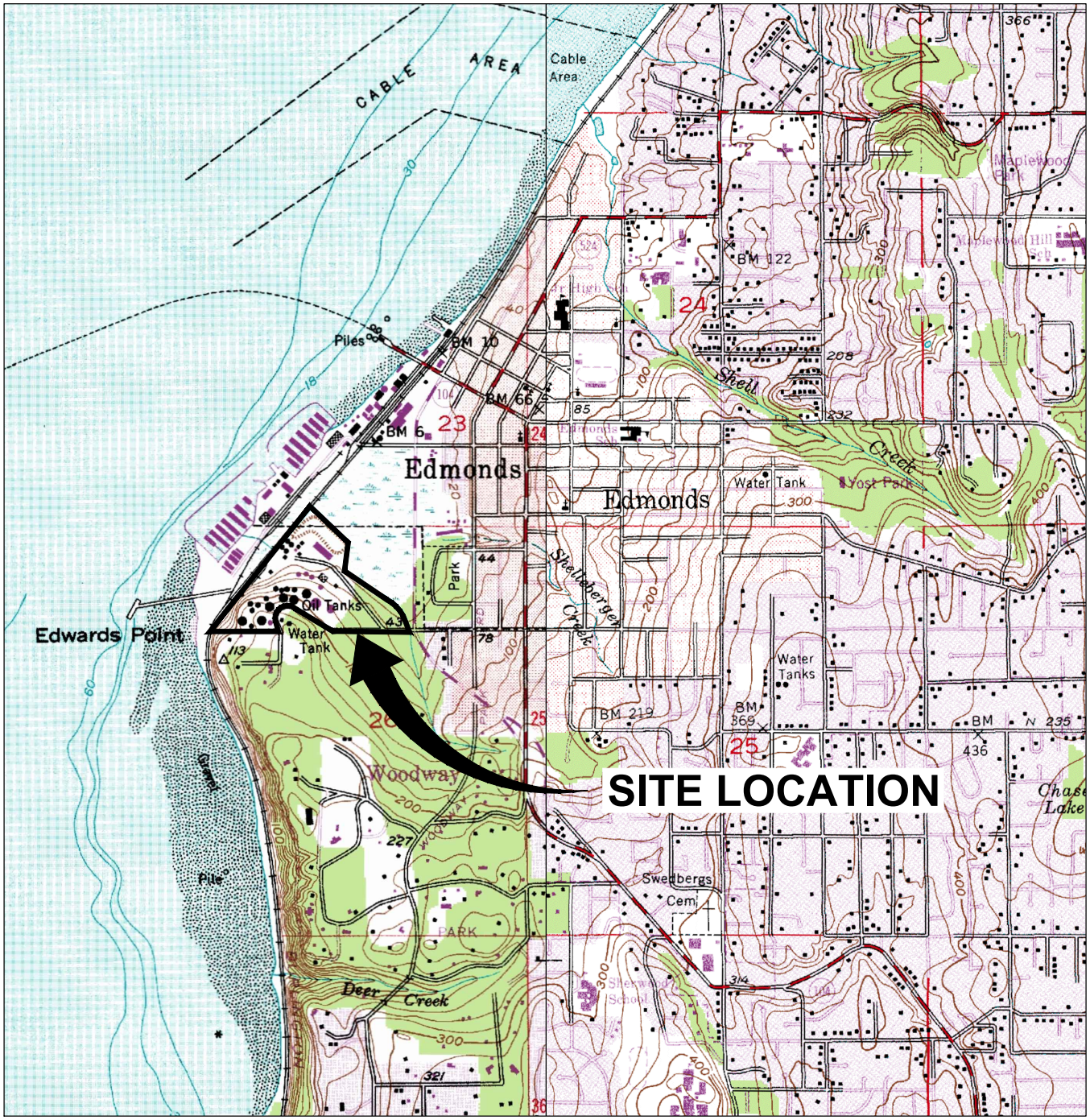
B: Compound was found in the lab. method blank and the sample. [The sample may have been cross-contaminated at the lab.]

J: Result is less than the lab. RL but greater than or equal to the lab. MDL and the concentration is an approximate value.

gpm = gallon per minute

TWT = temporary water treatment

FIGURES



REFERENCE: BASE MAP USGS QUADS., 7.5 MIN. SERIES (TOPOGRAPHIC) - EDMONDS EAST, WASH. AND EDMONDS WEST, WASH.

0 2000' 4000'

GRAPHIC SCALE

WASHINGTON

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL BULK FUEL TERMINAL
EDMONDS, WASHINGTON

DETENTION BASIN 2 EXCAVATION AS-BUILT REPORT

SITE LOCATION

ARCADIS Design & Consultancy for natural and built assets

FIGURE
1-1

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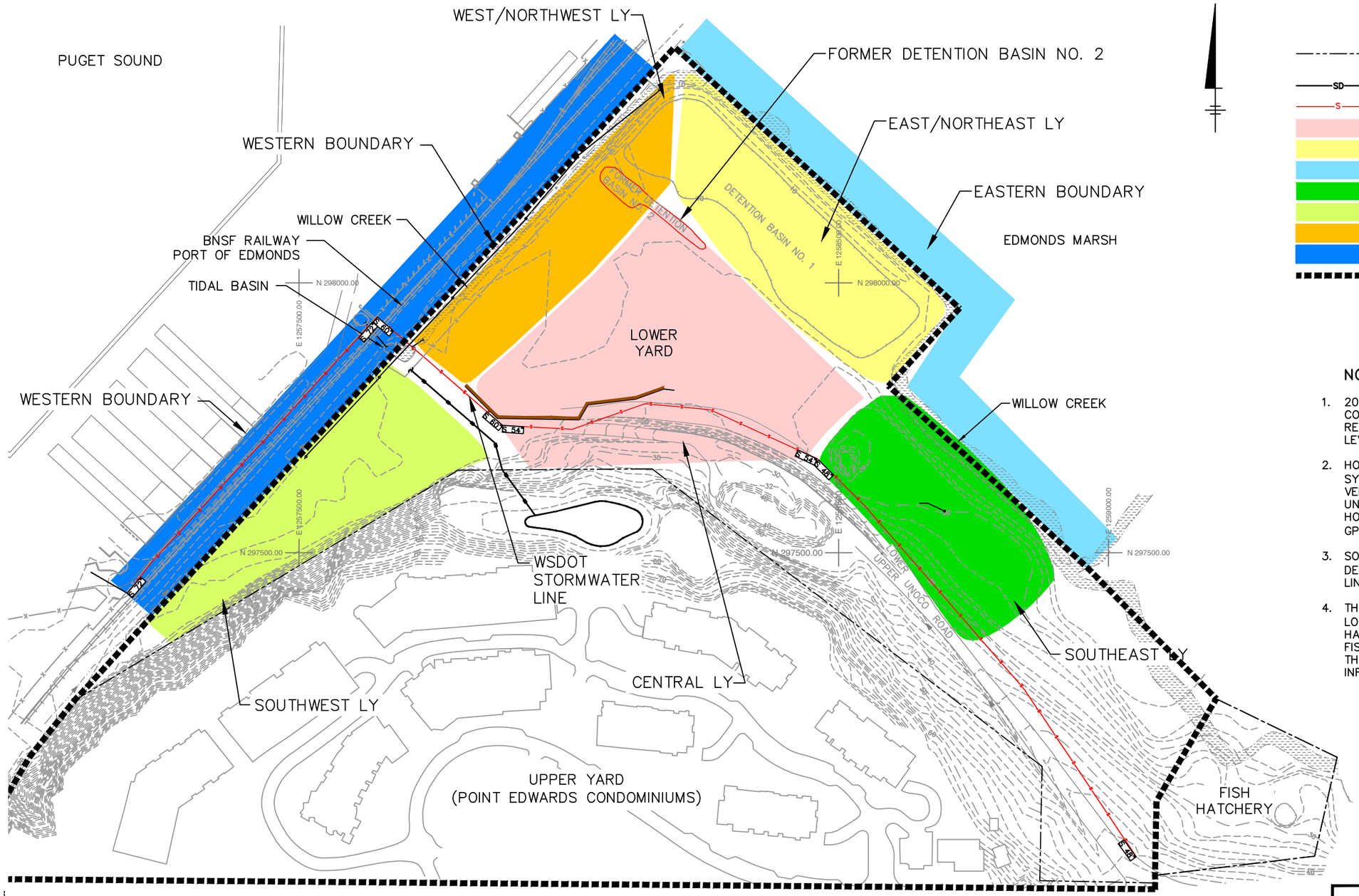

LEGEND:

- FORMER UNOCAL BULK FUEL PROPERTY BOUNDARY
- SD — POINT EDWARDS STORM DRAIN LINE
- S — WSDOT STORMWATER LINE
- CENTRAL LY
- EAST/NORTHEAST LY
- EASTERN BOUNDARY
- SOUTHEAST LY
- SOUTHWEST LY
- WEST/NORTHWEST LY
- WESTERN BOUNDARY
- SITE BOUNDARY

NOTES:

1. 20–MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
   VERTICAL DATUM: N.A.V.D. 88
   UNITS: U.S. SURVEY FEET
   HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.
4. THE SITE IS NOW COMPRISED OF THE AREAS OF THE LOWER YARD (LY) AND THE UPPER YARD WHERE A HAZARDOUS SUBSTANCE HAS COME TO BE LOCATED. THE FISH HATCHERY IS NO LONGER INCLUDED AS PART OF THE SITE AS A RESULT OF THE REVIEW OF HISTORICAL INFORMATION.

0 200’ 400’
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL BULK FUEL TERMINAL
EDMONDS, WASHINGTON

DETENTION BASIN 2 EXCAVATION AS-BUILT REPORT

SITE LAYOUT

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2-1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER LD: R. OBERLANDER PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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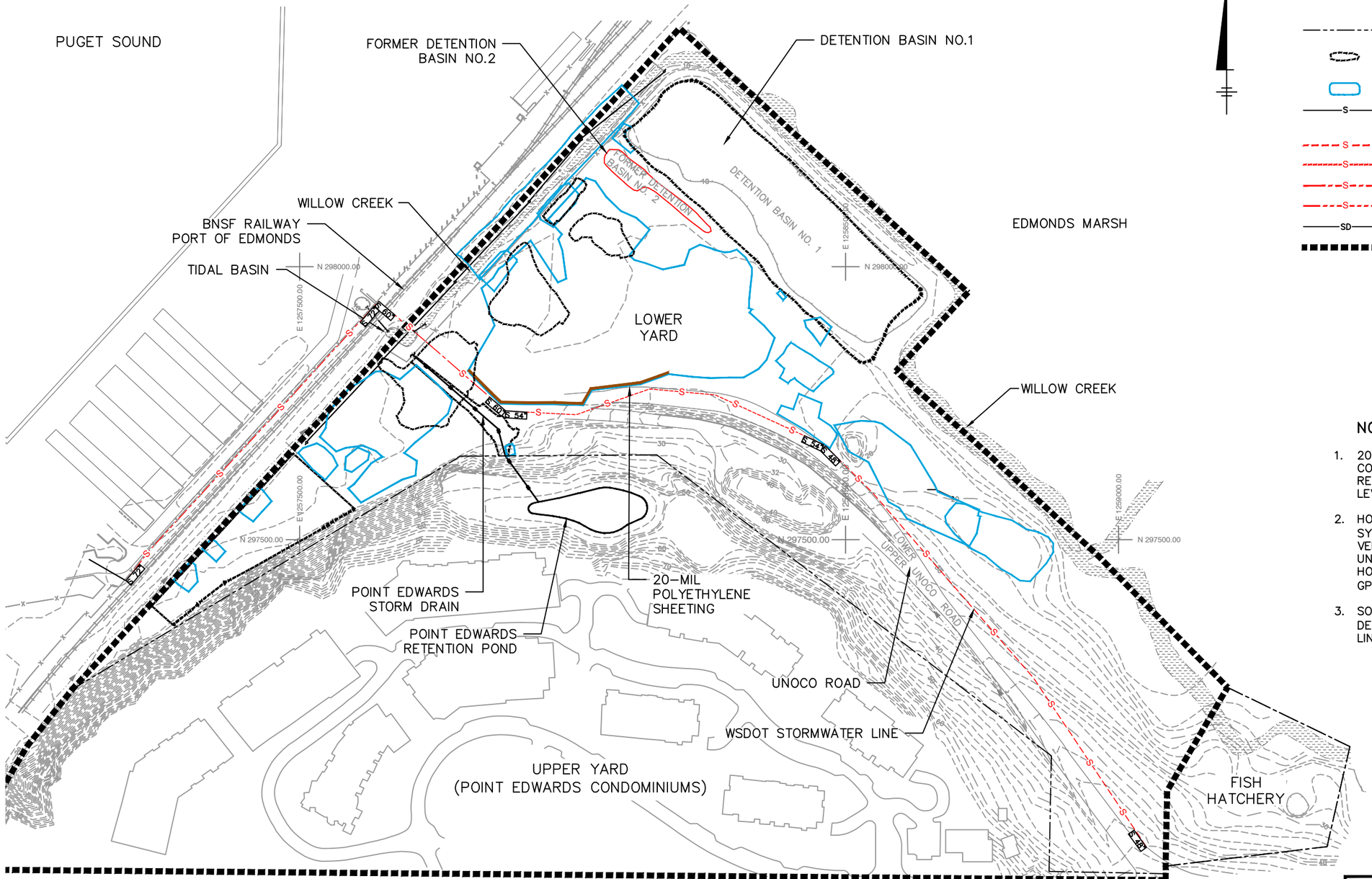

LEGEND:

- FORMER UNOCAL BULK FUEL PROPERTY BOUNDARY
- 2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
- 2007/2008 EXCAVATION BOUNDARIES
- S — WSDOT STORMWATER LINE (DIAMETER OF STORMWATER LINE INDICATED BY DASHED LINE)
- S — 48" DIAMETER STORMWATER LINE
- S — 54" DIAMETER STORMWATER LINE
- S — 60" DIAMETER STORMWATER LINE
- S — 72" DIAMETER STORMWATER LINE
- SD — POINT EDWARDS STORM DRAIN LINE
- SITE BOUNDARY

NOTES:

1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
   VERTICAL DATUM: N.A.V.D. 88
   UNITS: U.S. SURVEY FEET
   HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL BULK FUEL TERMINAL
EDMONDS, WASHINGTON
DETENTION BASIN 2 EXCAVATION AS-BUILT REPORT

2001, 2003, 2007, AND 2008 EXCAVATION LIMITS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
2-2

PUGET SOUND

WILLOW CREEK

BNSF RAILWAY
PORT OF EDMONDS

TIDAL BASIN

LOWER YARD

EDMONDS MARSH

UPPER YARD
(POINT EDWARDS CONDOMINIUMS)

FORMER DETENTION BASIN NO. 2

DETENTION BASIN NO. 1

WILLOW CREEK

MW-530 LM-2 MW-529 D-1 P-15 MW-535 D-6R MW-533 P-13 P-14 P-16 P-12 MW-510 P-10 MW-534 P-11 MW-508 D-6 MW-139R MW-509 MW-518 D-5 MW-507 MW-506 MW-515 MW-516 MW-101 MW-517 MW-513 MW-505 MW-504 MW-104 MW-514 MW-20R TB MW-E-R MW-522 MW-531 AS-1 DPE-3 DPE-4/PZ-3 MW-525 MW-512 MW-526 MW-503 MW-129R MW-8R MW-520 DPE-1 MW-532 DPE-2 MW-511 MW-502 MW-523 MW-521 MW-519 MW-143 MW-126 MW-147 MW-524 MW-151 MW-149R MW-150 MW-13U MW-501 MW-500 MW-135 MW-527 MW-136 MW-528 MW-203 MW-131 MW-108 MW-109 D-2 D-3 D-4 D-7

LEGEND:

- MW-515 INTERIOR MONITORING WELL LOCATION AND DESIGNATION
- MW-518 PERIMETER MONITORING WELL LOCATION
- MW-508 DECOMMISSIONED WELL LOCATION DUE TO EXCAVATION ACTIVITIES
- P-11 DECOMMISSIONED PIEZOMETER DUE TO EXCAVATION ACTIVITIES
- MW-13 MONITORING WELL
- D-1 STAFF GAUGE
- AS-1 AIR SPARGE WELL LOCATION
- DPE-10 DUAL PHASE EXTRACTION (DPE) WELL LOCATION
- PROPERTY BOUNDARY
- WSDOT STORMWATER LINE
- POINT EDWARDS STORM DRAIN LINE
- EXCAVATION BOUNDARY

NOTES:

1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
   VERTICAL DATUM: N.A.V.D. 88
   UNITS: U.S. SURVEY FEET
   HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.
4. MONITORING WELL MW-E WAS RE-INSTALLED IN PLACE ON OCTOBER 20th, 2017 AND RENAMED MW-E-R.

0 80' 160'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL BULK FUEL TERMINAL
EDMONDS, WASHINGTON

DETENTION BASIN 2 EXCAVATION AS-BUILT REPORT

COMPLIANCE MONITORING WELL LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3-1

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER LD: R. OBERLANDER PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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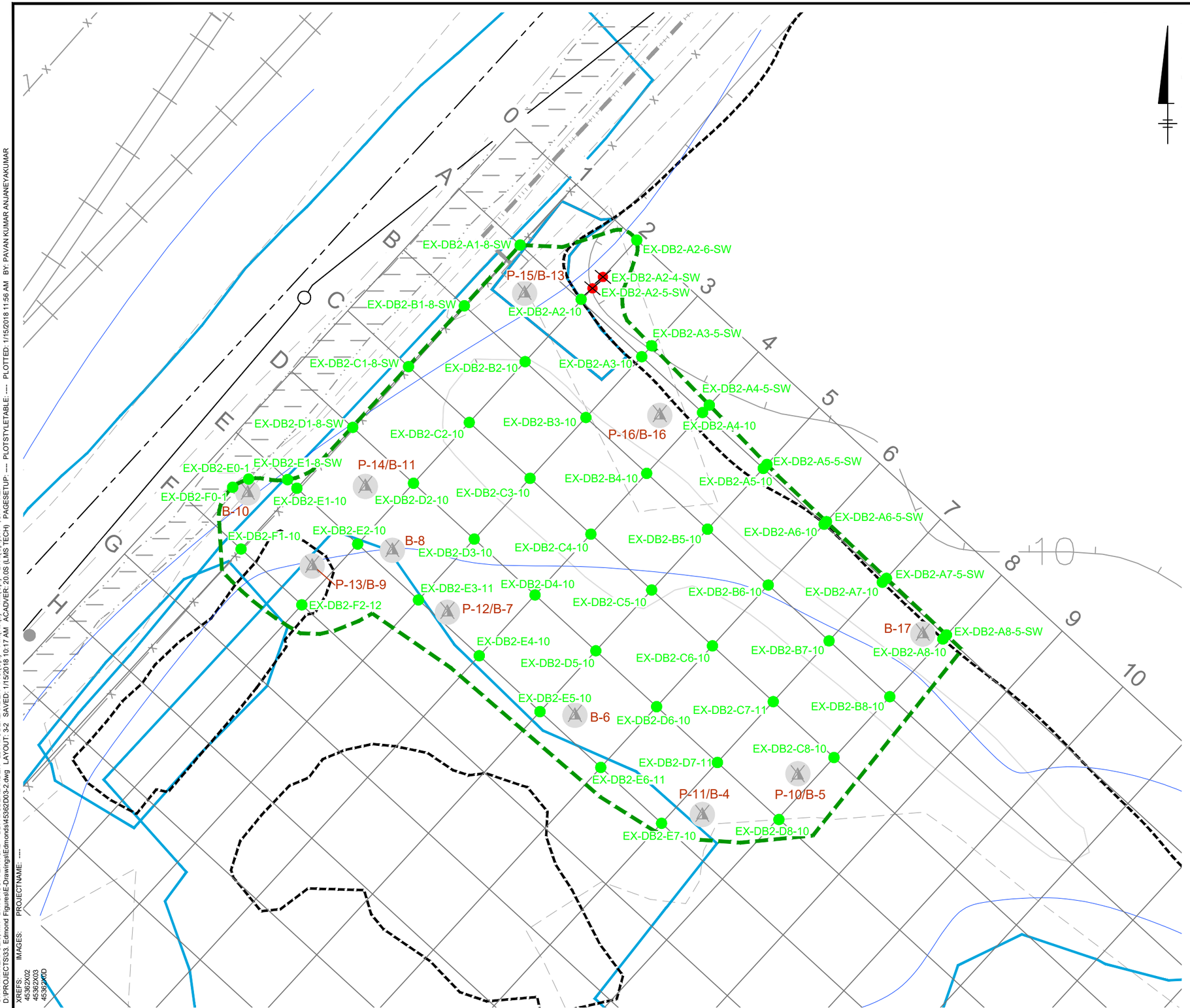

LEGEND:

- FORMER UNOCAL BULK FUEL PROPERTY BOUNDARY
- FORMER 2011 SOIL SAMPLE COLLECTION LOCATION WITH CONCENTRATIONS OF TPH AND/OR CPAHS EXCEEDING APPLICABLE SITE CULs AND/OR REL EXCAVATED IN 2017.
- 2017 DETENTION BASIN 2 EXCAVATION
- 2007/2008 EXCAVATION BOUNDARIES
- 2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE

DETENTION BASIN 2 CONFIRMATION SOIL SAMPLES:

- SAMPLES WITH ANALYTE CONCENTRATIONS LESS THAN CLEANUP LEVELS AND REMEDIATION LEVEL
- OVEREXCAVATED SAMPLES WITH ANALYTE CONCENTRATIONS ABOVE REMEDIATION LEVEL

ACRONYMS AND ABBREVIATIONS:

CPAHs	CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS
CULS	CLEANUP LEVELS
REL	REMEDIATION LEVEL
TPH	TOTAL PETROLEUM HYDROCARBONS

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
   VERTICAL DATUM: N.A.V.D. 88
   UNITS: U.S. SURVEY FEET
   HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
2. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORM DRAIN LINE HAS NOT BEEN SURVEYED.
3. SOIL CONFIRMATION SAMPLES INCLUDE "EX" FOR EXCAVATION, DB2 FOR THE EXCAVATION AREA DESIGNATION, THE GRID CELL LOCATION, AND THE SAMPLE DEPTH IN FEET BELOW GROUND SURFACE. SIDEWALL SAMPLES ALSO INCLUDE "SW" AFTER THE SAMPLE DEPTH.
4. THE DEPTH MENTIONED IN THE SAMPLE NAME IS THE DEPTH ACCORDING TO THE PLANNED FINAL GRADE.

0 30' 60'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL BULK FUEL TERMINAL
EDMONDS, WASHINGTON
DETENTION BASIN 2 EXCAVATION AS-BUILT REPORT

DETENTION BASIN 2 CONFIRMATION SAMPLE LOCATIONS

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3-2

CITY: MINNEAPOLIS, MN DIV/GROUP: ENV/CAD DB: R. OBERLANDER LD: R. OBERLANDER PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
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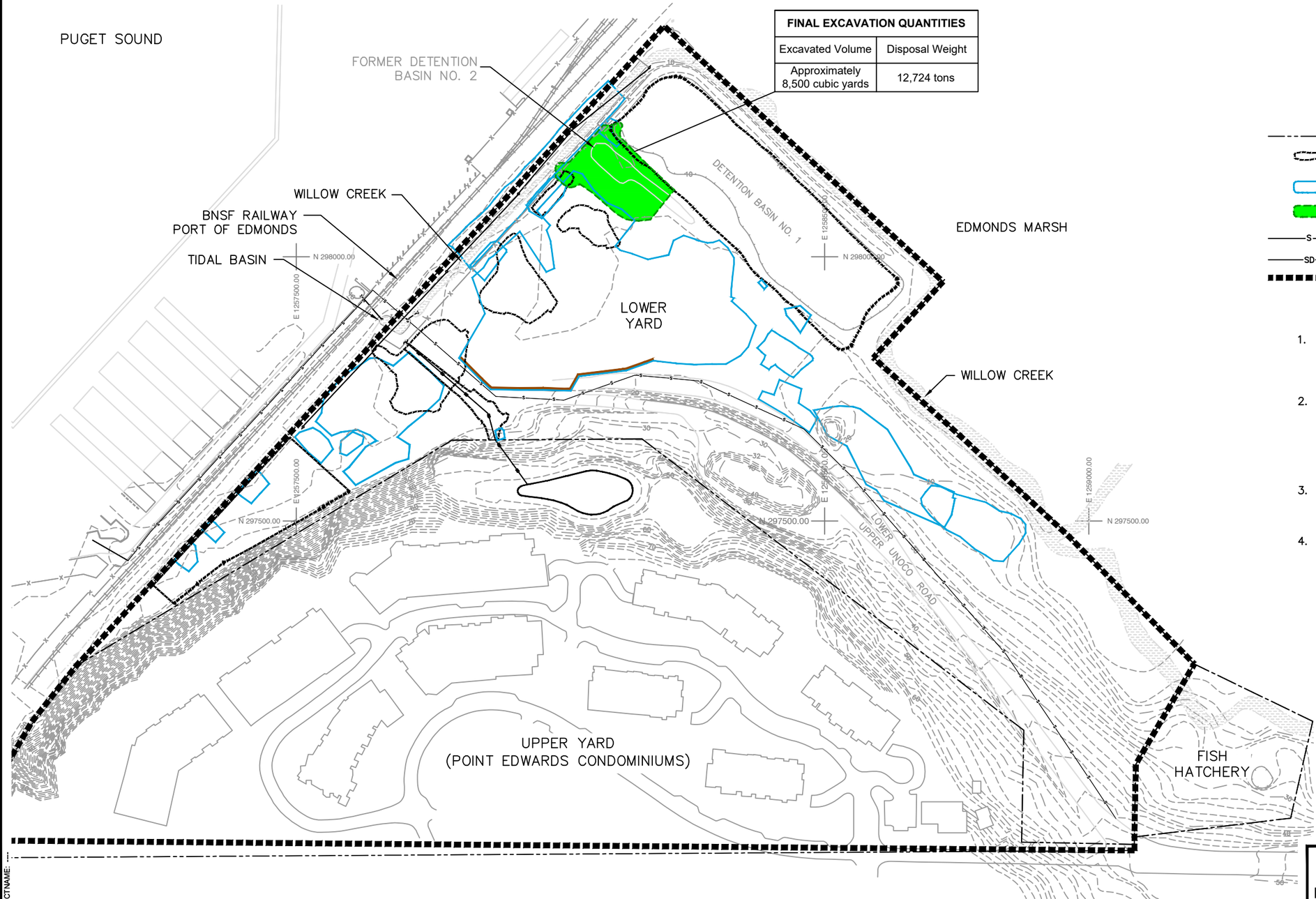

FINAL EXCAVATION QUANTITIES	
Excavated Volume	Disposal Weight
Approximately 8,500 cubic yards	12,724 tons

LEGEND:

- FORMER UNOCAL BULK FUEL PROPERTY BOUNDARY
- 2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
- 2007/2008 EXCAVATION BOUNDARIES
- 2017 DETENTION BASIN 2 EXCAVATION
- S — WSDOT STORMWATER LINE
- SD — POINT EDWARDS STORM DRAIN LINE
- SITE BOUNDARY

NOTES:

1. 20-MIL POLYETHYLENE SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 7.5 FEET ABOVE MEAN SEA LEVEL.
2. HORIZONTAL DATUM: WASHINGTON STATE COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
   VERTICAL DATUM: N.A.V.D. 88
   UNITS: U.S. SURVEY FEET
   HORIZONTAL AND VERTICAL CONTROL ESTABLISHED BY GPS VIA VERTICAL REFERENCE STATION NETWORK (VRSN).
3. SOUTHEAST PORTION OF WASHINGTON STATE DEPARTMENT OF TRANSPORTATION (WSDOT) STORMWATER LINE HAS NOT BEEN SURVEYED.
4. FINAL EXCAVATION VOLUME CALCULATIONS WERE COMPLETED USING AUTOCAD SOFTWARE AND ARE BASED ON A TWO-TO-ONE SLOPE FOR THE SIDEWALLS. FINAL DISPOSAL WEIGHT TONNAGE IS BASED ON THE SOIL WASTE MANIFESTS FROM THE TREATMENT FACILITY.

0 200' 400'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL BULK FUEL TERMINAL
EDMONDS, WASHINGTON
DETENTION BASIN 2 EXCAVATION AS-BUILT REPORT

DETENTION BASIN 2 EXCAVATION LIMIT AND VOLUME

ARCADIS Design & Consultancy for natural and built assets

FIGURE
3-3

CITY: EMV, CA DIV/GROUP: ENVCAD DB: ASR PM: TM:E TR: LYR: ON=*;OFF=*REF*; (FRZ)
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