

David L. South  
Ron Timm  
Toxics Cleanup Program  
Washington State Department of Ecology  
Northwest Regional Office  
3190 160th Avenue SE  
Bellevue, WA 98008-5452

Arcadis U.S., Inc.  
1100 Olive Way  
Suite 800  
Seattle, Washington 98101  
Tel 713 953 4800  
Fax 713 977 4620  
www.arcadis.com

Subject:

Baseline Monitoring Event Work Plan

Environment

Date:

June 9, 2017

Contact:

Scott Zorn

Dear Mr. South and Mr. Timm:

Arcadis U.S., Inc. (Arcadis), on behalf of Chevron Environmental Management Company (Chevron), is proposing to conduct a baseline groundwater sampling event at the Lower Yard of the Former Unocal Edmonds Terminal located at 11720 Union Oil Company Road in Edmonds, Washington.

Phone:

206 713 8292

Email:

Scott.zorn@arcadis.com

As discussed in the Draft Compliance Monitoring Plan<sup>1</sup> (CMP) submitted to Washington State Department of Ecology (Ecology) in April 15, 2016, Arcadis will perform a baseline sampling event prior to implementation of the remedial actions described in the Final Interim Action Work Plan<sup>2</sup> submitted to Ecology in July 19, 2016. It is anticipated that this baseline groundwater sampling event will be implemented a week before the excavation activities near Detention Basin No. 2, scheduled on August 1, 2017.

Our ref:

B0045362.0009

The baseline groundwater sampling event will include gauging and sampling of interior and perimeter compliance monitoring wells as listed in Table 1 below and shown on Figure 1. Additionally, monitoring wells in the southeast Lower Yard, (MW-108, MW-109, MW-135, MW-136, MW-500 and MW-501), in the southwest Lower Yard, (MW-147, MW-149-R, MW-150, MW-523, and MW-524) and in the southeast Lower Yard near the fish hatchery (MW-13U, MW-134X, MW-203, MW-527 and MW-528) will be gauged.

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<sup>1</sup> Arcadis. 2016. Draft Compliance Monitoring Plan. Former Unocal Edmonds Bulk Fuel Terminal. April 15.

<sup>2</sup> Arcadis. 2016. Final Interim Action Work Plan. Former Unocal Edmonds Bulk Fuel Terminal. July 19.

**Table 1 Groundwater Compliance Monitoring Wells**

Perimeter Wells	Interior Wells
LM-2	MW-126
MW-8R	MW-143
MW-20R	MW-502
MW-101	MW-503
MW-104	MW-504
MW-129R	MW-505
MW-139R	MW-506
MW-510	MW-507
MW-518	MW-508
MW-522	MW-509
MW-529	MW-511
MW-530	MW-512
	MW-513
	MW-514
	MW-515
	MW-516
	MW-517
	MW-519
	MW-520
	MW-521
	MW-525
	MW-526
	MW-531
	MW-532
	MW-E

As discussed in the CMP, compliance monitoring wells MW-508, MW-510 and MW-529 in the DB-2 excavation vicinity will be decommissioned prior to excavation activities. Therefore, monitoring wells MW-508, MW-510 and MW-529 will be monitored one last time during the baseline sampling event and the results will be compared to results from three monitoring wells to be installed following the completion of excavation activities.

Prior to the groundwater sampling event, the surface water elevations will be measured at the six measuring stations in Willow Creek (TB, D-1, D-2, D-3, D-4, and D-5) and Detention Basin No. 1 (D-6). Monitoring wells will then be gauged to measure water levels, the presence of recoverable light non-aqueous phase liquid (LNAPL). The surface water elevations and depths to groundwater in monitoring wells will be measured within 2-hours of low tide. The tide charts for Edmonds, Washington during the sampling event will be included with the data (these data will be obtained from the National Oceanic and Atmospheric Administration tide prediction<sup>3</sup>). Times of groundwater elevation measurement and times of groundwater sample collection will be recorded.

<sup>3</sup> Available at <https://tidesandcurrents.noaa.gov/noaatidepredictions.html?id=9447427&legacy=1>

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Groundwater samples will be collected using low-flow methods to monitor dissolved-phase constituent of concern (COC) concentrations in compliance wells and to assess monitored natural attenuation (MNA) parameters. During purging, water quality parameters (dissolved oxygen, oxidation-reduction potential, pH, conductivity, and temperature) will be monitored.

Groundwater samples will be submitted to an Ecology-approved laboratory under a chain-of-custody and analyzed in accordance with following methods:

- COCs:
  - Benzene by United States Environmental Protection Agency (USEPA) Method 8021B
  - Gasoline range organics (GRO) by Ecology Method NWTPH-Gx
  - Diesel range organics (DRO) and heavy oil range organics (HO) by Ecology Method NWTPH-Dx (after silica gel cleanup)
  - Carcinogenic polycyclic aromatic hydrocarbons<sup>4</sup> (cPAHs) by USEPA Method 8270 SIM
- MNA parameters:
  - Sulfate and nitrate by USEPA Method 300.0
  - Dissolved methane by USEPA Method RSK 175
  - Dissolved manganese by USEPA Method 200.8 (field filtered)
  - Ferrous iron (Hach field kit)

If you have any questions or would like to discuss this matter further, please feel free to contact Scott Zorn of Arcadis at 206.713.8292.

Sincerely,

Arcadis U.S., Inc.



Scott Zorn  
AFS Service Leader

Copies:

Kim Jolitz – Chevron EMC  
Kevin Bartoy – WSDOT

Enclosures:

## Figures

- 1 Former Unocal Bulk Fuel Terminal Location Map
- 2 Monitoring Well Locations

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<sup>4</sup> cPAHs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

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



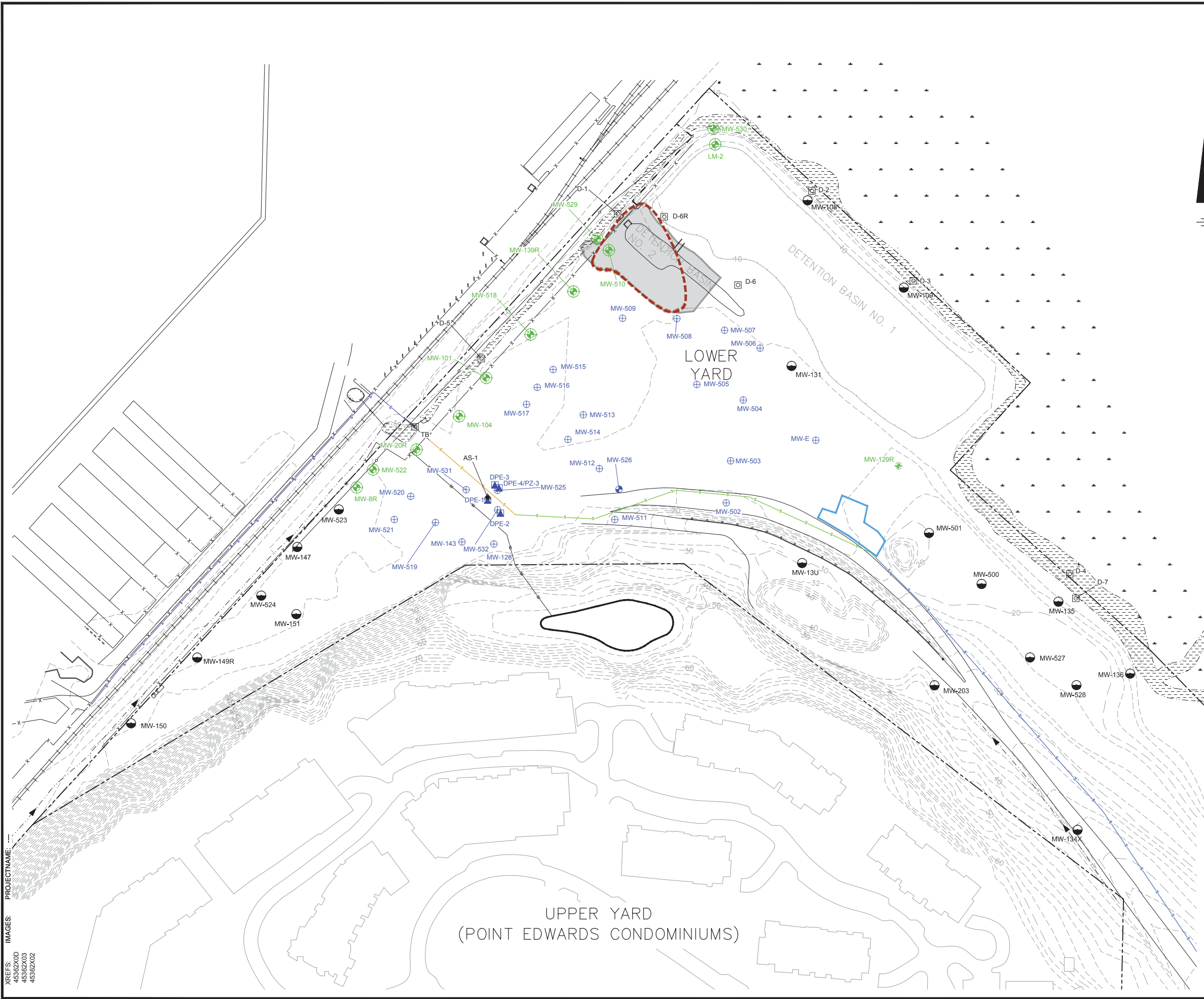
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY  
 FORMER UNOCAL BULK FUEL TERMINAL  
 EDMONDS, WASHINGTON  
**BASELINE GROUNDWATER EVENT SAMPLING  
 WORK PLAN**

**FORMER UNOCAL BULK FUEL  
 TERMINAL LOCATION MAP**



FIGURE  
**1**

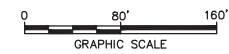
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**LEGEND:**

- ESTIMATED RECOVERABLE LNAPL BOUNDARY
- MW-515 INTERIOR MONITORING WELL LOCATION AND DESIGNATION
- MW-518 PERIMETER MONITORING WELL LOCATION
- MW-13 MONITORING WELL
- D-1 STAFF GAUGE
- AS-1 AIR SPARGE WELL LOCATION
- DPE-1 DUAL PHASE EXTRACTION (DPE) WELL LOCATION
- PROPERTY BOUNDARY
- WSDOT STORMWATER LINE
- POINT EDWARDS STORM DRAIN LINE
- EXCAVATION BOUNDARY

- 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 WSDOT STORMWATER LINE HAS NOT BEEN SURVEYED.



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**BASELINE GROUNDWATER EVENT SAMPLING  
 WORK PLAN**

**MONITORING WELL LOCATIONS**

