

Technical Memorandum

TO: Andy Kallus, Washington State Department of Ecology
FROM: Dylan Frazer, LG, and Larry Beard, PE, on behalf of the Port of Everett
DATE: February 12, 2019
RE: **5-Year Review Groundwater Monitoring Plan**
North Marina West End Site
Everett, Washington

Introduction

This document presents proposed sampling and analysis for the Washington State Department of Ecology (Ecology) 5-year review of the North Marina West End Site (Site) cleanup action located at the Port of Everett (Port) in Everett, Washington (Figure 1). A cleanup action was conducted at the Site under a Consent Decree (No. 11-2-10367-4) between the Port of Everett (Port) and Ecology. The cleanup action, as described in the Cleanup Action Plan (CAP; Ecology 2011), included long-term groundwater monitoring, which concluded in the fourth quarter of 2012 (LAI 2013). Ecology has requested that the Port conduct groundwater monitoring and prepare a report presenting the results to support Ecology's 5-year review of the performance of the Site cleanup action.

Proposed Groundwater Monitoring

Proposed groundwater monitoring to support Ecology's 5-year review includes sampling and laboratory analysis at monitoring wells where any of the groundwater compliance monitoring analytical parameters (arsenic, copper, and vinyl chloride) exceeded their respective cleanup level at the conditional point of compliance during 2012 long-term groundwater compliance monitoring. Cleanup level exceedances were based on either measured groundwater concentrations (copper), or as estimated concentrations based on application of a concentration reduction factor (arsenic and vinyl chloride). Monitoring well locations with at least one exceedance included RI-MW-4, RI-MW-11, RI-MW-11A, and RI-MW-13. Dissolved arsenic was the only contaminant of concern (COC) that exceeded the cleanup level at these locations. The well locations are shown on Figure 2. Groundwater monitoring will be conducted during both the wet season and dry season of 2019.

Because dissolved arsenic was the only parameter that was estimated to exceed the cleanup level at any of these monitoring well locations, laboratory analysis will be limited to this analyte.

Sampling and Analytical Methods

The groundwater samples will be collected using the procedures established in Appendix G of the Remedial Investigation/Feasibility Study (RI/FS) West End Site Work Plan (Work Plan; Landau Associates, Inc.; LAI 2009) and Addendum No. 1 to the Work Plan (LAI 2010). These procedures include collecting the groundwater samples within 1 hour before and 1 hour after a low tide and collecting the samples from the upper 2 feet of the water column to avoid sampling within the

saltwater wedge. At the angled well (RI-MW-11A), field parameters will be measured at multiple depths prior to purging to confirm the depth of the freshwater and saltwater interface.

Laboratory analytical methods and target reporting limits will be the same as those specific in the Work Plan.

Quality Assurance

Procedures for quality assurance established in Appendix G of the Work Plan will be used during the long-term groundwater compliance monitoring. Quality assurance procedures include collection of quality control samples and validation of the analytical data to determine the results were acceptable and met the quality objectives described in the Work Plan. Quality control samples will include one blind field duplicate, a field trip blank, a matrix spike and matrix spike duplicate sample, and a laboratory duplicate.

Validation of the analytical data will be performed by LAI following the guidelines in the appropriate sections of the U.S. Environmental Protection Agency (EPA) Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review (EPA 2016a, b) and will include evaluation of the following:

- Chain-of-Custody records
- Holding times
- Laboratory method blanks
- Surrogate recoveries
- Laboratory matrix spikes and matrix spike duplicates
- Blank results
- Blank spikes/laboratory control samples
- Blind field duplicate results
- Laboratory duplicates
- Corrective action records
- Completeness.

Data Evaluation and Reporting

Groundwater monitoring results will be presented in a 5-year review groundwater monitoring report. Groundwater analytical data will be compared to the Site dissolved arsenic groundwater cleanup level. To estimate concentrations at the conditional point of compliance, dissolved arsenic data will also be presented using a contaminant reduction factor determined by evaluating dissolved arsenic data at RI-MW-11, and the nearby angled well RI-MW-11A.

Schedule

Groundwater monitoring events will be conducted in the wet season and in the dry season of 2019. The project schedule is anticipated to proceed as follows:

- February/March 2019: Wet Season Groundwater Monitoring Event.
- August/September 2019: Dry Season Groundwater Monitoring Event.
- October/November 2019: Submission of 5-Year Review Groundwater Monitoring Report.

LANDAU ASSOCIATES, INC.



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Attachments:

Figure 1 Vicinity Map

Figure 2 Groundwater Monitoring Locations

References

Ecology. 2011. Cleanup Action Plan, North Marina West End Site, Everett, Washington. Washington State Department of Ecology, Toxics Cleanup Program, Olympia, Washington. August 16.

EPA. 2016a. National Functional Guidelines for Inorganic Superfund Methods Data Review. EPA-540-R-2016-001 OLEM 9355.0-133. US Environmental Protection Agency. September.

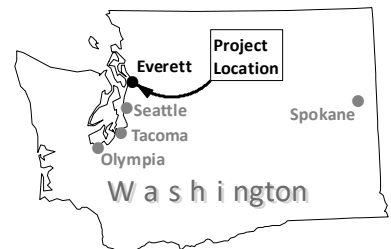
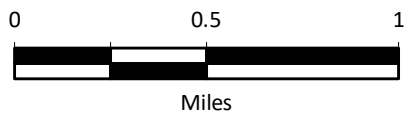
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LAI. 2009. Final RI/FS Work Plan, West End Site, Everett, Washington. Landau Associates, Inc. March 20.

LAI. 2010. Technical Memorandum: RI/FS Work Plan West End Site Addendum No. 1, Groundwater Quality Monitoring at Conditional Point of Compliance, Port of Everett, Washington. Landau Associates, Inc. March 8.

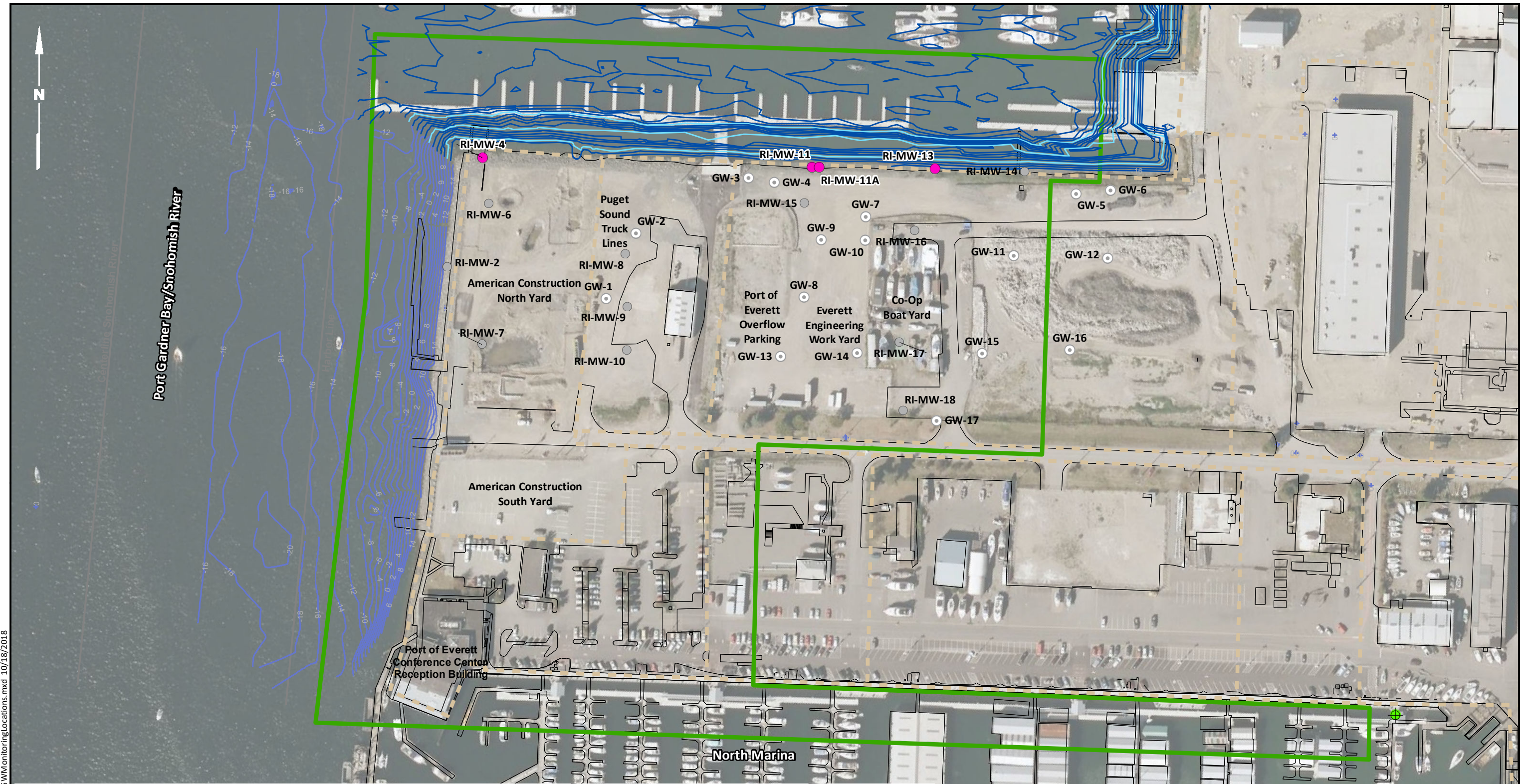
LAI. 2013. Report, 4Q12 Compliance Monitoring, North Marina West End Site, Everett, Washington. Landau Associates, Inc. December 6.

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Data Source: Esri 2012

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Legend

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| Groundwater Compliance Monitoring Sample Location | Previous Direct-Push Groundwater Grab Sample Location | Post Dredge Minor Contour (2' Interval, MLLW) | Approximate Boundary of Leasehold |
| Previous Groundwater Compliance Monitoring Location | Everett Shipyard RI Sediment Location | Post Dredge Major Contour (10' Interval, MLLW) | Bathymetry (MLLW) Based on Data Collected in 2003 & 2004 |
| | | West End Site Boundary | Harbor Line and River Center Line |



Note

1. At locations where lube oil was analyzed, diesel and gasoline range petroleum hydrocarbons were also analyzed but were not detected.

Data Source: Google Earth (2008 Image); Elevation Contours, Harbor Line, and Centerline of Snohomish River: Port of Everett Hydrographic Survey of Tall Ship Moorage; Post Dredge Elevation Contours (2005, PND Engineers)

North Marina West End Site
Everett, Washington

Groundwater Monitoring Locations

Figure
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