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**T E C H N I C A L   M E M O R A N D U M**

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**FROM:** Paul Grabau, Principal Hydrogeologist

**DATE:** March 14, 2014

**RE:** **SCOPE OF WORK FOR MARCH 2014 GROUNDWATER MONITORING  
AND SAMPLING  
WHIDBEY MARINE & AUTO SUPPLY SITE  
FREELAND, WASHINGTON  
FARALLON PN: 454-001**

Farallon Consulting, L.L.C. (Farallon) has prepared this Technical Memorandum to present the scope of work for performing groundwater monitoring and sampling at select monitoring wells for the former Whidbey Marine & Auto Supply facility at 1689 Main Street in Freeland, Washington (herein referred to as the Site) (Figure 1). The groundwater sampling activities will be conducted the week of March 24, 2014. An aerial photograph showing monitoring well locations is provided on Figure 2.

The cleanup action at the Site is being conducted under the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program and in accordance with the provisions of the Washington State Model Toxics Control Act Cleanup Regulation (MTCA) as established in Chapter 173-340 of the Washington Administrative Code. The Site has been assigned Toxics Cleanup Program Identification No. NW1529 by Ecology.

## **BACKGROUND**

Environmental investigation and cleanup activities have been ongoing at the Site following the discovery and reporting of a release of gasoline from an underground storage tank in 2005. The initial investigation and cleanup activities were focused on the Perched Groundwater Zone found at approximately 55 feet below ground surface (bgs) beneath the former Whidbey Marine & Auto Supply facility and adjacent properties. Total petroleum hydrocarbons as gasoline-range organics (GRO) and benzene, toluene, ethylbenzene, and xylenes (BTEX) have been detected at concentrations exceeding MTCA Method A cleanup levels in groundwater samples collected from various Site monitoring wells.

Groundwater samples collected from four monitoring wells installed in 2009 in the Sea Level Aquifer, which was encountered at approximately 105 feet bgs, indicated that dissolved-phase GRO and BTEX had migrated downward in groundwater from the Perched Groundwater Zone and impacted the Sea Level Aquifer. Four additional monitoring wells, designated MW-13 through MW-16, were installed in the Sea Level Aquifer and sampled in December 2013. The progress report documenting the monitoring well installation and sampling activities will be submitted to Ecology once the internal review of the document, currently in process, is completed. A summary of the groundwater analytical results for the December 2013 monitoring event was submitted to Ecology in January 2013.

## **OBJECTIVE**

The objective of the work described herein is to further characterize groundwater in the Sea Level Aquifer at the Site and to assess the anomalous detection of total petroleum hydrocarbons as diesel-range organics (DRO) and as oil-range organics (ORO) in the groundwater sample collected from Perched Groundwater Zone monitoring well MW-2 during the December 2013 monitoring event.

## **FIELD ACTIVITIES**

Groundwater samples will be collected from the Sea Level Aquifer monitoring wells MW-10 through MW-16 using low-flow sampling techniques with a submersible bladder pump. Based on monitoring conducted in February 2014, there likely is light non-aqueous phase liquid (LNAPL) present in monitoring well MW-9, and therefore a groundwater sample will not be collected from the well if LNAPL is encountered at the time of the upcoming monitoring event. The presence of chemical oxidant precipitate in monitoring well MW-2 precludes the use of a pump for sampling; therefore, the well will be sampled using a clean, disposable bailer. Prior to sampling, the depth to groundwater will be measured in each monitoring well at the Site using an electronic water-level indicator for monitoring wells MW-1 through MW-4, MW-10, MW-11, and MW-14 through MW-16 and using an oil-water interface probe for monitoring wells MW-6 through MW-9, MW-12, and MW-13. The oil-water interface probe is not used for depth to ground measurements in the monitoring wells with low or no detectable concentrations of constituents of concern in groundwater to prevent the possibility of cross-contamination between wells.

Field measurements for pH, temperature, specific conductivity, dissolved oxygen, and oxidation/reduction potential will be recorded during purging of groundwater, prior to sampling at monitoring wells MW-10 through MW-16, using a water quality analyzer equipped with a flow-through cell. Groundwater samples will be collected after the temperature, conductivity, and pH parameters stabilize. Stabilization is determined as a relative percent difference of less than 3 percent for temperature and conductivity between readings for three consecutive measurements and a change of  $\pm 0.1$  pH unit between readings for three consecutive measurements. Monitoring well MW-2 will be sampled after a minimum of five well casing volumes of groundwater have been removed. Wastewater generated during the monitoring and sampling event will be stored temporarily in labeled 55-gallon drums on the Site.

Groundwater samples will be analyzed for GRO by Northwest Method NWTPH-Gx and for BTEX by U.S. Environmental Protection Agency Method 8021B. Monitoring wells MW-2, MW-12, and MW-13 will also be analyzed for DRO and ORO by Northwest Method NWTPH-Dx.

## REPORTING

Following the completion of the field activities described herein, a Progress Report will be prepared to summarize the investigation activities and present the analytical results. At a minimum, the report will include the following:

- A summary of the groundwater monitoring and sampling activities;
- A summary of the analytical results and summary tables for groundwater samples collected;
- A summary table of depths to groundwater and groundwater elevations in the Site monitoring wells;
- A figure depicting groundwater elevations and analytical results for the Sea Level Aquifer monitoring wells; and
- Farallon's conclusions pertaining to the monitoring results.

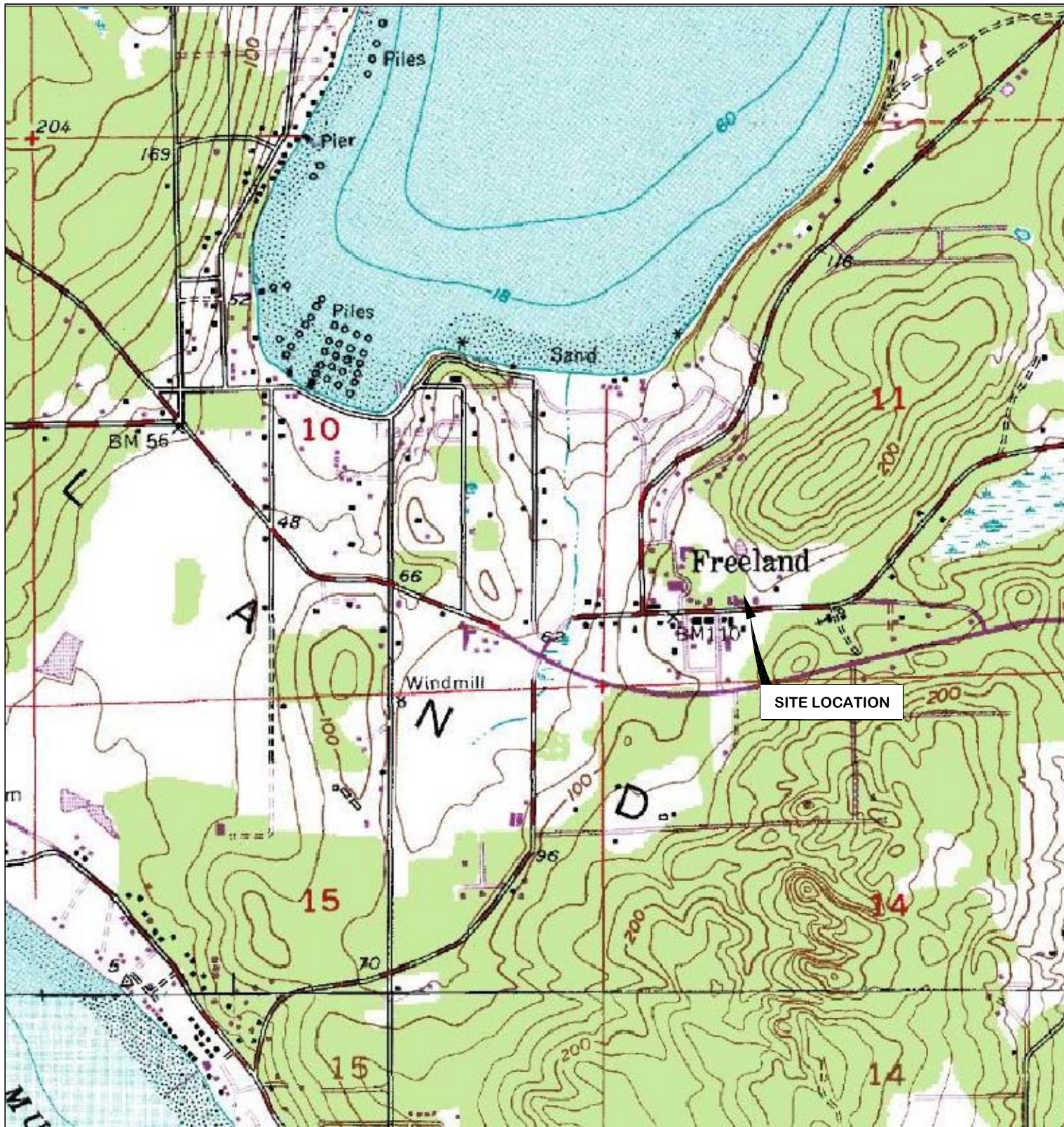
The Progress Report will be submitted to Ecology, the property owners who provided access for the monitoring wells, and other interested parties within 45 days of the completion of quality assurance/quality control review of the analytical data.

Attachments: Figure 1, *Site Vicinity Map*

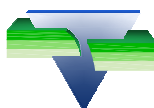
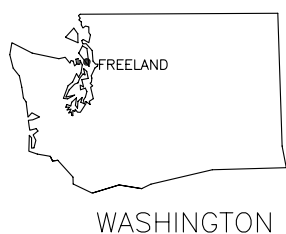
Figure 2, *Aerial Photograph Showing Monitoring Well Locations*

PG:bw





REFERENCE: 7.5 MINUTE USGS QUADRANGLE FREELAND, WASHINGTON. DATED 1993



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## FIGURE 1

SITE VICINITY MAP  
WHIDBEY MARINE & AUTO SUPPLY  
1689 MAIN STREET  
FREELAND, WASHINGTON

FARALLON PN: 454-001

Drawn By: DEW

Checked By: PJ

Date: 7/11/07

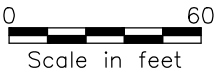
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LEGEND

- PERCHED ZONE MONITORING WELL
- SEA LEVEL AQUIFER MONITORING WELL



 <b>FARALLON CONSULTING</b> 975 5th Avenue Northwest Issaquah, WA 98027	<b>FIGURE 2</b> AERIAL PHOTOGRAPH SHOWING MONITORING WELL LOCATIONS WHIDBEY MARINE & AUTO SUPPLY SITE FREELAND, WA		
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Drawn By: DEW	Checked By: PG	Date: 3/11/14	Disk Reference: AERIAL