



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

February 11, 2014

Mr. Tom Ringo
OPG/Pope Resources, LP
19950 7th Avenue NE, Suite 200
Poulsbo, WA 98370

Re: Opinion on Proposed Cleanup of the following Site:

- **Site Name:** Olympic Water & Sewer Inc.
- **Site Address:** 781 Walker Way, Port Ludlow, WA 98365
- **Cleanup Site ID:** 1196
- **Facility/Site No.:** 62223345
- **VCP Project No.:** SW1311

Dear Mr. Ringo:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your proposed cleanup of the Olympic Water & Sewer Inc. facility (Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

Issue Presented and Opinion

Upon completion of the proposed cleanup, will further remedial action likely be necessary to clean up contamination at the Site?

No. Ecology has determined that, upon completion of your proposed cleanup action, no further remedial action will be necessary to clean up contamination at the Site.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA"). The analysis is provided below.

Description of the Site

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with the following release:



- Petroleum Hydrocarbons in the Soil, Groundwater, and Air.

Enclosure A includes a detailed description and diagram of the Site, as currently known to Ecology.

Please note a parcel of real property can be affected by multiple sites. At this time, we have no information that the parcel(s) associated with this Site are affected by other sites.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. Focused Feasibility Study, Olympic Water & Sewer, Inc. Site, 781 Walker Way, Port Ludlow, WA, dated September 24, 2013 by Aspect Consulting, LLC (Aspect).
2. Soil Vapor Extraction Pilot Test Report, Olympic Water & Sewer, Inc. Facility, 781 Walker Way, Port Ludlow, WA, dated May 8, 2012 by SLR International Corp. (SLR).
3. Additional Investigation Report, Olympic Water & Sewer, Inc. Facility, 781 Walker Way, Port Ludlow, WA, dated August 2, 2011 by SLR.
4. Site Hazard Assessment, Olympic Water & Sewer, Inc. Site, 781 Walker Way, Port Ludlow, WA, dated April 26, 2011 by the Washington State Department of Ecology.
5. Site Characterization Report, Olympic Water & Sewer, Inc. Site, 781 Walker Way, Port Ludlow, WA, dated December 17, 2010 by SLR.
6. Well 17 Site Contamination, Initial Findings, and Recommendations, Olympic Water & Sewer, Inc. Site, 781 Walker Way, Port Ludlow, WA, dated April 26, 2009 by Robinson-Noble, Inc.
7. Hydrocarbon Contamination Assessment and Underground Storage Tank Removal, Port Ludlow Water District, Port Ludlow, WA, dated March 4, 1991 by Applied Geotechnology Inc., (AGI).

These documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. You can make an appointment by calling the SWRO resource contact at (360) 407-6365.

This opinion is void if any of the information contained in these documents is materially false or misleading.

Analysis of the Cleanup

Ecology has concluded that, upon completion of your proposed cleanup, **No further remedial action** will likely be necessary to clean up contamination at the Site. That conclusion is based on the following analysis:

1. Characterization of the Site.

Ecology has determined your characterization of the Site is sufficient to establish cleanup standards and select a cleanup action. The Site as presently known is described below.

The Site is currently developed with an Olympic Water and Sewer operations and maintenance facility, which consists of an approximately ½-acre area that includes an office/shop/garage building, a public water supply well (Well #2) and associated pump house, and a storage trailer.

In September 1990, Applied Geotechnical, Inc. (AGI) removed three gasoline underground storage tanks (USTs) at the Site. A 1,000-gallon gasoline UST was located beneath the floor in the northern garage bay, a 2,000-gallon UST was located outside (west) of the northern garage bay, and another 2,000-gallon UST was located approximately 40 feet south of the garage. Following removal, confirmation soil samples were collected from each of the excavations. The results of the sampling indicated that the floor samples from both the 1,000-gallon UST and the northern 2,000-gallon UST [3,000 and 963 milligrams per kilogram (mg/kg), respectively] exceeded the MTCA Method A Cleanup Level for gasoline-range total petroleum hydrocarbon (TPH-Gx) in place at that time [100 milligrams per kilogram (mg/kg)]. Based on these results, additional soil was excavated from both the 1,000-gallon UST and the northern 2,000-gallon UST areas. The UST within the building was excavated to approximately 10 feet below ground surface (bgs) before halting due to concerns for the building structure. The northern 2,000-gallon UST excavation was extended to approximately 12 feet bgs. Samples were collected and submitted to the laboratory for analysis of TPH-Gx. The floor sample from the northern 2,000-gallon UST was 30 mg/kg TPH-Gx, below the MTCA Method A Cleanup Level in place at that time. The floor sample from the 1,000-gallon UST excavation was 1,237 mg/kg TPH-Gx, greater than the MTCA Method A Cleanup Level.

In October 1990, a water sample was collected from the water well (Well #2) and analyzed for benzene, toluene, ethylbenzene, and xylenes (BTEX). None of the tested constituents were detected at levels greater than the method detection limits (MDLs).

In January 1991, AGI assessed the soil conditions beneath the 1,000-gallon UST by drilling an angle boring (MW-1) from outside the building to underneath the former UST. Soil samples collected from the boring at depths of 15 feet and 30 feet did not contain TPH-Gx concentrations greater than the MDLs.

In April 2009, during the drilling of a replacement water supply well (designated Well #17), at the southern part of the facility, the driller noticed gasoline odors at approximately 50 feet bgs. Drilling was stopped and a groundwater sample was collected at that depth. Analytical results showed a TPH-Gx concentration of 5,530 micrograms per liter ($\mu\text{g/L}$) and a benzene concentration of 948 $\mu\text{g/L}$ in the groundwater exceeding their respective MTCA Method A Cleanup Levels of 800 $\mu\text{g/L}$ and 5 $\mu\text{g/L}$. The existing water well (Well #2) was also tested for volatile organic compounds (VOCs), including BTEX, at that time and analytical results showed that none of the tested constituents were found at concentrations greater than the MDLs. Based on the detections of TPH-Gx and BTEX constituents in the groundwater, the Jefferson County Health Department (Health Department) was notified.

The Health Department conducted an Initial Investigation in September 2009 on behalf of Ecology, and an Early Notice Letter was issued by the Ecology at that time listing the Site on the Confirmed and Suspected Contaminated Sites List.

In April 2010, SLR International Corporation (SLR) advanced four soil borings (MW-1A, MW-1B, MW-1C, and MW-2A) in an attempt to install perched groundwater monitoring wells near the former 1,000-gallon UST and near the storage trailer. These locations are shown on Figure 2 included in the Enclosures. Soil samples were collected at 5-foot intervals. Refusal due to cobbles was encountered in each of the borings before groundwater was reached so groundwater monitoring wells were not completed in any of the borings. A soil sample collected from boring MW-1B was submitted to the laboratory for analysis of TPH-Gx, BTEX, methyl tertiary butyl ether (MTBE), 1,2-dibromoethane (EDB), 1,2-dichloroethane (EDC), naphthalene, and lead. TPH-Gx and benzene were detected in this sample at 140 mg/kg and 0.49 mg/kg, respectively, both greater than their MTCA Method A Cleanup Levels. None of the other constituents were detected greater than the MDLs.

In June 2010, SLR installed four groundwater monitoring wells (MW-1, MW-2, MW-3, and MW-4) at the Site to delineate the extent of impacts previously noted. An air-rotary drilling rig was utilized to advance the borings based on the previous difficulties in completing the borings. Soil samples were collected from MW-1 and MW-2 at 40 and 55 feet bgs, MW-3 at 30.5 and 45.5 feet bgs, and MW-4 at 30.5 and 55 feet bgs. Results from MW-2 and MW-3 had exceedances of the MTCA Method A Cleanup Level for benzene. None of the other constituents exceeded their respective MTCA Method A

Cleanup Levels. Groundwater samples were collected from each of the wells and tested for TPH-Gx, BTEX, MTBE, EDB, EDC, naphthalene, and total lead. TPH-Gx, benzene, and ethylbenzene were detected at 8,400 µg/L, 2,100 µg/L, and 960 µg/L, respectively, all above their respective MTCA Method A Cleanup Levels of 800 µg/L, 5 µg/L, and 700 µg/L. TPH-Gx (990 µg/L) and benzene (110 µg/L) were also detected above their MTCA Method A Cleanup Levels in MW-1. None of the tested analytes were detected above their respective MTCA Method A Cleanup Levels in MW-3 or MW-4.

Groundwater samples were collected from the wells (MW-1 through MW-4) again in October 2010. Results from this round were similar to the previous round in June. All analytical results are presented in Table 2, and TPH-Gx and benzene results are shown on Figures 3 and 4, all included in the Enclosures.

Depth to perched groundwater measurements and the boring logs were used to create a cross-section of the Site. This cross-section is included as Figure 6 in the Enclosures. It was surmised that perched groundwater flow on the Site was controlled by the elevation of the clayey to gravelly silt unit with flow converging on the low point of the silt unit where wells MW-1 and MW-2 are located. The neighboring gulley on the western portion of the property was also surveyed to determine if it intersected the shallow perched groundwater. Based on this review, it was determined that the gulley was not intersecting the shallow perched groundwater on the property.

Ecology conducted a Site Hazard Assessment (SHA) in August 2011 at which point the Site was given a Ranking of 2 (Moderate-High Potential Risk).

SLR conducted a supplemental subsurface investigation in April 2011, including advancing one additional groundwater monitoring well (MW-5), completing two borings as soil vapor extraction points (SVE-1 and SVE-2), and inspecting the neighboring gulley and collecting a surface water sample. The gulley is located in the western part of the property and extends south to a low-lying marshy area near Puget Sound. During the previous investigation, the gulley was dry; however, during this investigation, a stream was present. A sample (Stream-4411) was collected at a location in the stream (elevation of approximately 262.25 feet) that was 4 to 11 feet below the elevation of the perched groundwater (273.38 and 266.35 feet at wells MW-4 and MW-3, respectively) at the time of sampling. None of the tested constituents (BTEX and TPH-Gx) were detected above method detection limits in the sample. Data collected from the borings advanced during this investigation were used to refine the impacted soil and groundwater areas, which are depicted on Figure 7 included in the Enclosures.

In December 2011 and January 2012, SLR conducted four SVE pilot tests to evaluate the potential effectiveness of SVE with and without groundwater extraction, determine if groundwater extraction can effectively dewater the shallow perched groundwater, and to

obtain information for future remedial efforts. Following a series of vacuum and de-watering tests, it was concluded that the petroleum hydrocarbons in the higher-permeability soils would be amenable to vapor extraction and groundwater pumping; however, the lower permeability soils would not be as amenable to SVE or groundwater pumping.

Aspect Consulting, LLC. (Aspect) conducted a soil to vapor pathway evaluation at the Site in June 2013. Soil vapor samples were collected from soil vapor probes (VP-1 and VP-2). The results from the samples did not identify any exceedances of the MTCA Site Specific Commercial Land Use Sub-Slab Soil Vapor Screening Levels. The results of the soil vapor sampling are included as Table 2 in the Enclosures.

2. Establishment of cleanup standards.

Ecology has determined the cleanup levels and points of compliance you established for the Site meet the substantive requirements of MTCA.

a. Cleanup levels.

The MTCA Method A Cleanup Levels for soil and groundwater for unrestricted land uses are being used to characterize the Site. MTCA Site Specific Commercial Land Use Sub-Slab Soil Vapor Screening Levels for soil gas are being used to characterize the Site.

b. Points of compliance.

Standard points of compliance are being used for the Site. The point of compliance for protection of groundwater shall be established in the soils throughout the Site. For soil cleanup levels based on human exposure via direct contact or other exposure pathways where contact with the soil is required to complete the pathway, the point of compliance shall be established in the soils throughout the Site from the ground surface to 15 feet bgs. In addition, the point of compliance for the groundwater shall be established throughout the Site from the uppermost level of the saturated zone extending vertically to the lowest most depth that could potentially be affected by the Site. Lastly, the point of compliance for air shall be attained in the ambient air throughout the Site.

3. Selection of cleanup action.

Ecology has determined the cleanup action you selected for the Site meets the substantive requirements of MTCA.

Based on the results of the previous investigations, Aspect prepared a Focused Feasibility Study (FS) and Disproportionate Cost Analysis (DCA) in September 2013. The FS identified and evaluated four potential remedial technologies to supplement the cleanup actions conducted to date (1990 soil removal), including:

- 1) No Additional Action.
- 2) Monitored Natural Attenuation with Environmental Covenant and Institutional Controls.
- 3) In-Situ Chemical Oxidation.
- 4) Excavation and Off-Site Disposal.

Each option was reviewed for potential effectiveness and cost to implement. Based on this evaluation, the preferred cleanup action was determined to be Monitored Natural Attenuation with Environmental Covenant and Institutional Controls.

Based on a review of the above-listed information, Ecology has the following comments:

1. Since the contamination at the Site is isolated within the perched aquifer (approximately 30 to 50 feet bgs) and the municipal pumping wells are separated from the perched groundwater by a thick aquitard (greater than 140 feet in thickness), Ecology agrees with the selection of Monitored Natural Attenuation with Environmental Covenant and Institutional Controls as the preferred cleanup alternative at the Site.
2. Please prepare a long-term groundwater monitoring plan for Ecology review. This plan should include monitored natural attenuation parameters as outlined in Ecology's guidance (<https://fortress.wa.gov/ecy/publications/summarypages/0509091.html>). Also, please include collection of a stream sample and existing (or replacement) water supply well sample during each event to ensure all receptors are being protected.
3. Please prepare a draft Environmental Covenant for Ecology review. For guidance in creating the Environmental Covenant and for a boilerplate copy, please visit the Ecology VCP Site (<http://www.ecy.wa.gov/programs/tcp/vcp/vcp2008/vcpRequirements.html>).
4. In accordance with WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840 (Data Submittal Requirements), data generated for Independent Remedial Actions shall be submitted simultaneously in both a written and electronic format. For additional information regarding electronic format requirements, see the website <http://www.ecy.wa.gov/eim>. Be advised that

according to the policy, any reports containing sampling data that are submitted for Ecology review are considered incomplete until the electronic data has been entered. Please ensure that data generated during on-site activities is submitted pursuant to this policy. **Data must be submitted to Ecology in this format for Ecology to issue a No Further Action determination.** Be advised that Ecology requires up to two weeks to process the data once it is received.

Limitations of the Opinion

1. Opinion does not settle liability with the state.

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Site. This opinion **does not**:

- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. Opinion does not constitute a determination of substantial equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you proposed will be substantially equivalent. Courts make that determination. *See* RCW 70.105D.080 and WAC 173-340-545.

3. Opinion is limited to proposed cleanup.

This letter does not provide an opinion on whether further remedial action will actually be necessary at the Site upon completion of your proposed cleanup. To obtain such an opinion, you must submit a report to Ecology upon completion of your cleanup and request an opinion under the VCP.

4. State is immune from liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.030(1)(i).

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Contact Information

Thank you for choosing to clean up your Property under the Voluntary Cleanup Program (VCP). After you have addressed our concerns, you may resubmit your proposal for our review. Please do not hesitate to request additional services as your cleanup progresses. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our web site: www.ecy.wa.gov/programs/tcp/vcp/vcpmain.htm. If you have any questions about this opinion, please contact me by phone at (360) 407-7263 or e-mail at tmid461@ecy.wa.gov.

Sincerely,



Thomas Middleton L.H.G.
SWRO Toxics Cleanup Program

TMM/ksc:Olympic Water and Sewer Proposed site cleanup likely NFA

Enclosures: A – Description of the Site
 Figure 2 – Site Plan with Monitoring Locations (SLR 2010)
 Table 2 – TPH-Gx and Benzene Groundwater Analytical Results
 Figures 3 and 4 – TPH-Gx and Benzene in Groundwater Figures
 Figure 6 – Site Cross-Section A-A`
 Figure 7 – Estimated Area of Petroleum Impacted Soil
 Table 2 – Soil Vapor Extraction Results
 Figure 1 – Site Location Map

By certified mail: (7010 2780 0000 2503 8612)

cc: Greg Ferris – Aspect Consulting, LLC.
 Larry Smith – Olympic Water and Sewer, Inc.
 Pinky Feria-Mingo – Jefferson County Public Health, Environmental Health Department
 Carol Johnston – Ecology
 Cris Matthews – Ecology
 Scott Rose, Ecology
 Dolores Mitchell, Ecology w/o enclosures

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Enclosure A

Description of the Site

Site Description

The Site is located at 781 Walker Way, Port Ludlow, Washington. The Site consists of an approximately 2-acre parcel of land located about ½ mile northwest of the Port Ludlow Bay. Properties adjacent to the south, west, and east are developed with single-family homes. Properties to the north are developed as a mini-storage facility and single-family residences. A Site Vicinity and Location Map is included as Figure 1 in the Enclosures.

The Site is currently developed with an Olympic Water and Sewer operations and maintenance facility, which consists of an approximately ½-acre area that includes an office/shop/garage building, a public water supply well (Well #2) and associated pump house, and a storage trailer. The ground surface is primarily unpaved, except for the asphalt driveway on the Site.

The Site is currently zoned as code 4800 (Utilities, non-public – Jefferson County). Current and future land use will likely remain commercial.

Based on investigations conducted at the Site, soils on the Site are a mix of dense glacial outwash (sand, gravel, and silts) with interbedded silts to the maximum depth drilled of approximately 60 feet bgs. Based on the drilling log from the water supply well (Well #2) on the Site, a thick sequence of clay and cemented sand occurs from approximately 49 to 215 feet bgs. A cross-section is included as Figure 6 in the Enclosures.

Shallow water at the Site occurs under perched conditions within the glacial deposits (sand and gravel unit) at depths above approximately 60 feet bgs. Depths to groundwater, measured in wells on the Site, range from 20 to 36 feet bgs and vary seasonally. The groundwater flow direction within the perched zone appears to be controlled by the slope/geometry of the clayey silt with flow converging into the low point of the silt unit. This interpretation is consistent with the petroleum concentrations at wells MW-1 and MW-2. Perched groundwater appears to discharge to the intermittent stream at locations in the southern end of the Site.

Deep groundwater ranges from depths between 157 and 377 feet bgs in water supply wells on and surrounding the Site. Soil descriptions taken from the well logs indicate a thick sequence of clay and cemented sand aquitards above the deep groundwater bearing zones. Deep groundwater flow is inferred to flow from the upland areas towards Port Ludlow indicating that the water supply wells are located hydraulically up or cross-gradient of the Site.

PROPERTY
PORT

Fig. No.

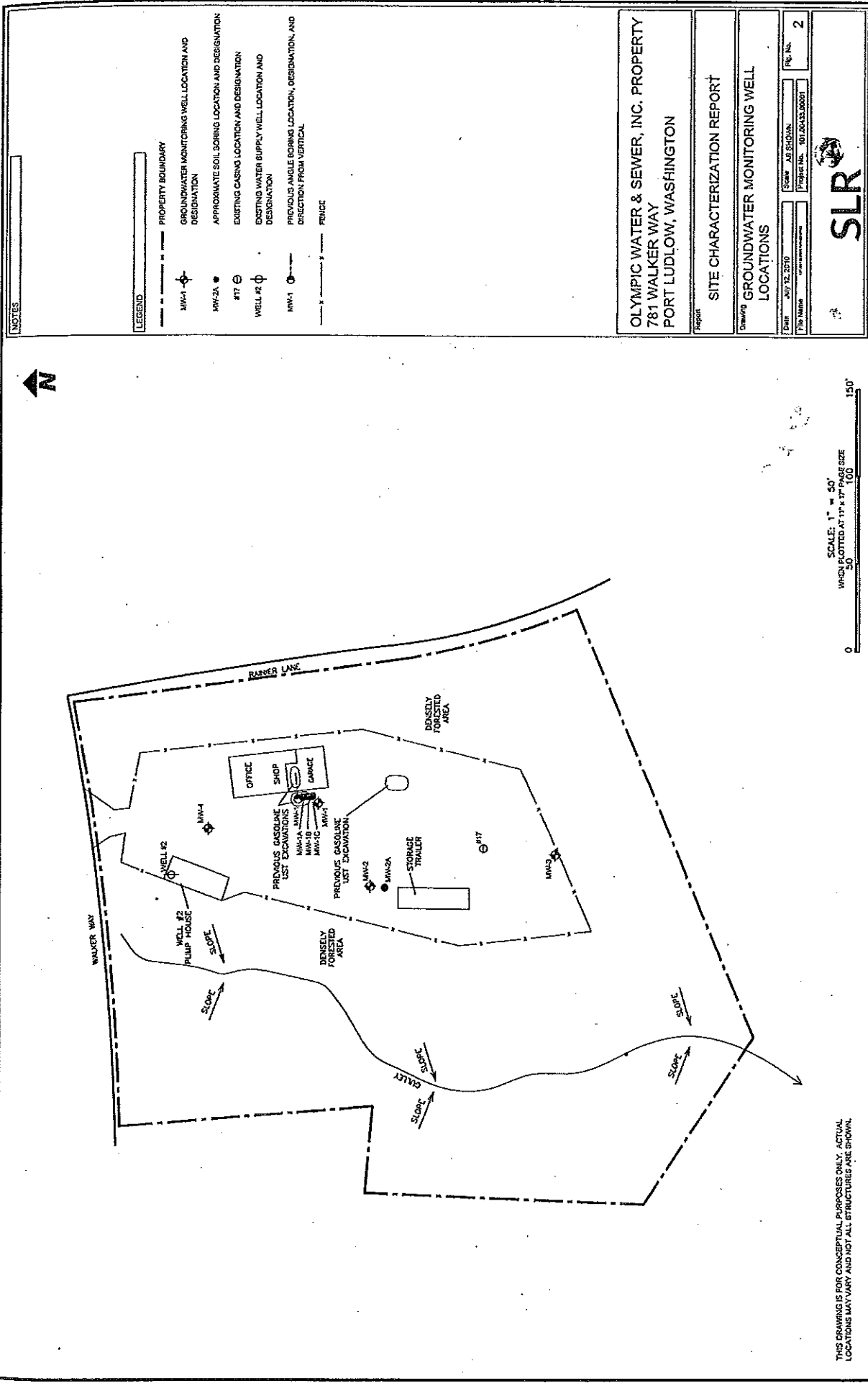


Table 2
Groundwater Sample Analytical Results
Olympic Water and Sewer Property
Port Ludlow, Washington

Well Number	Date Collected	Analytical Results (µg/L)									
		Benzene ^a	Toluene ^a	Ethylbenzene ^a	Total Xylenes ^a	Naphthalene ^a	MTBE ^a	EDC ^a	EDB ^b	GRO ^c	Total Lead ^d
MTC A Cleanup Levels ^e		5	1,000	700	1,000	160 ^f	20	5	0.01	800	15
MW-1	6/14/2010	110	45	1,10	186	<1	<1	<1	<0.01	950	<1
	10/20/2010	520	140	110	221	15	NA	NA	NA	1,900	NA
MW-2	6/14/2010	2,100	620	960	650	100	<1	<1	<0.01	8,400	<1
	10/20/2010	1,300	290	430	530	35	NA	NA	NA	3,900	NA
MW-3	6/14/2010	0.36	<1	<1	<3	<1	<1	<1	<0.01	<100	<1
	10/20/2010	<0.35	<1	<1	<3	<1	NA	NA	NA	<100	NA
MW-4	6/14/2010	<0.35	<1	<1	<3	<1	<1	<1	<0.01	<100	<1
	10/20/2010	<0.35	<1	<1	<3	<1	NA	NA	NA	<100	NA

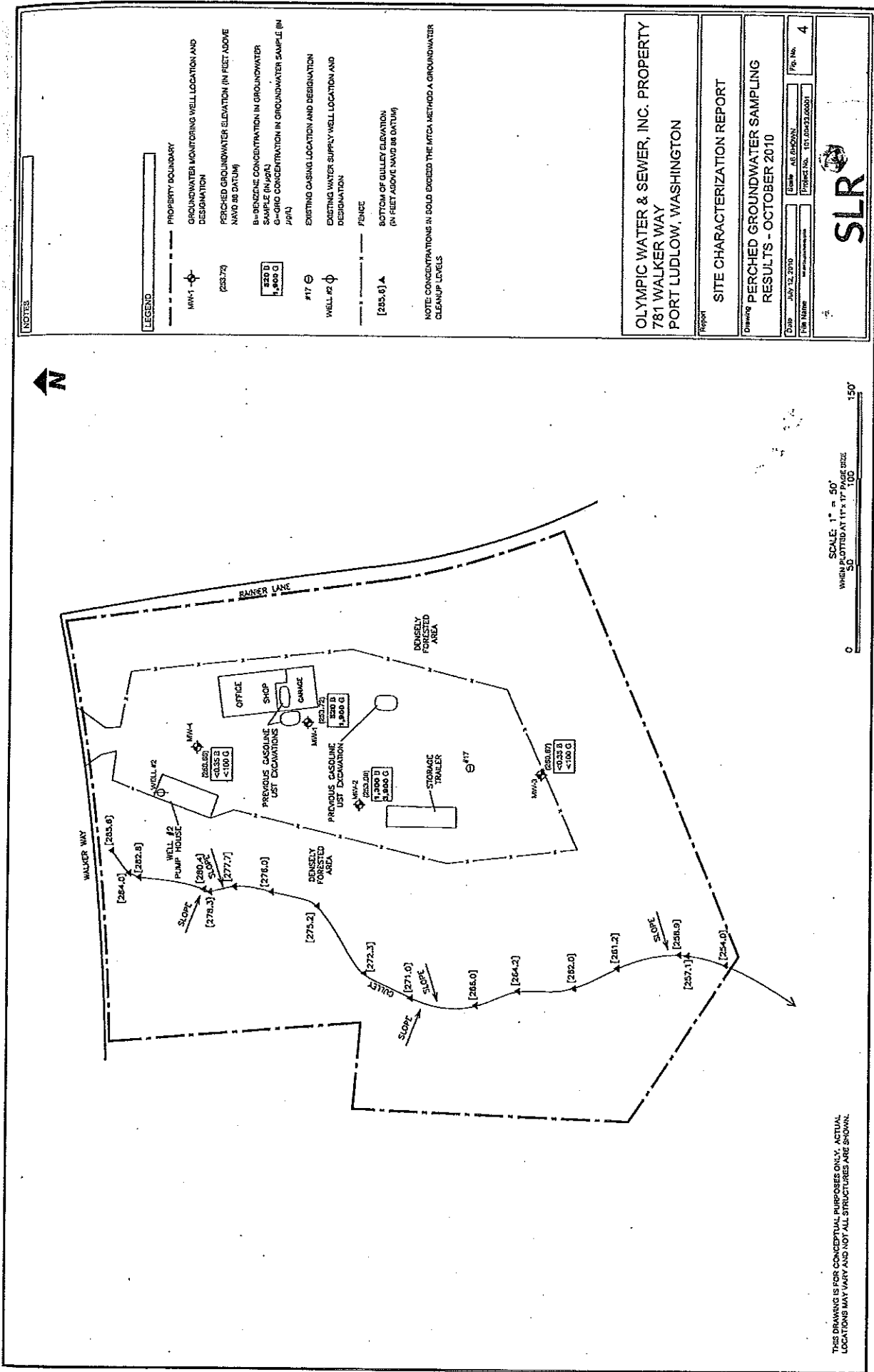
NOTES:
µg/L = micrograms per liter (ppb).
Values shaded and in bold exceed the groundwater cleanup levels.
NA = Not analyzed.
^aBenzene, toluene, ethylbenzene, and total xylenes (BTEX), naphthalene, methyl tertiary butyl ether (MTBE), and 1,2-dichloroethane (EDC) by EPA Method 8260C.
^b1,2-dibromoethane (EDB) by EPA Method 8011 Modified.
^cGasoline-range organics (GRO) by Ecology Method NWTPH-Gx.
^dTotal lead by EPA Method 200.8.
^eChapter 173-340 WAC, Model Toxics Control Act (MTC A) Cleanup Regulation, Method A Cleanup Levels. Amended February 12, 2001.
^fThe cleanup level is the total value for naphthalene, 1-methyl naphthalene, and 2-methyl naphthalene.



Date: JULY 12, 2010
 Scale: AS SHOWN
 Project No.: 101.20033.00001
 Fig. No.: 3
SLR

SCALE: 1" = 50'
 WHEN PLOTTED AT 11" X 17" PAGE SIZE
 SD 100

THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.



SCALE: 1" = 50'
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Date: JULY 12, 2010
 Scale: AS SHOWN
 Project No.: 101.20033.00001
 Fig. No.: 4
SLR

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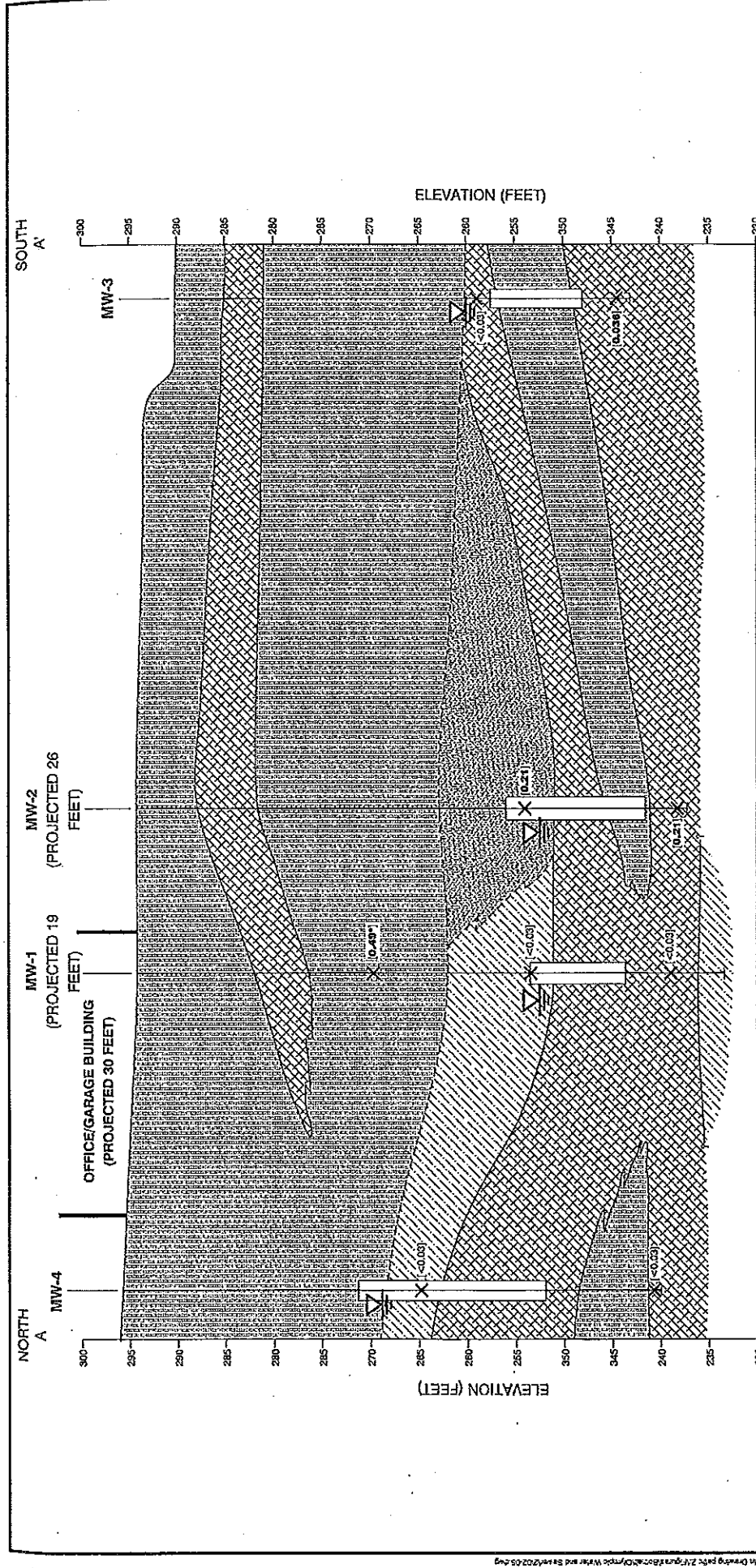
OLYMPIC WATER & SEWER, INC. PROPERTY
 781 WALKER WAY
 PORT LUDLOW, WASHINGTON
Report
 SITE CHARACTERIZATION REPORT
Drawing
 PERCHED GROUNDWATER SAMPLING
 RESULTS - OCTOBER 2010
 Date: JULY 12, 2010
 Scale: AS SHOWN
 Project No.: 101.20033.00001
 Fig. No.: 4

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HORIZONTAL SCALE (FEET)
 0 20 40 60
 1" = 30'

VERTICAL SCALE (FEET)
 0 20 40 60
 1" = 20'

- LEGEND**
- INFERRED LITHOLOGIC CONTACT
 - EXPLORATION LOCATION AND DESIGNATION
 - SCREEN LOCATION
 - INFERRED GROUNDWATER TABLE SURFACE IN 2010
 - BENZENE CONCENTRATIONS IN SOIL SAMPLE IN 2010
 - GRAVELS AND SANDY GRAVEL (GP)
 - SAND, GRAVELLY SAND, AND SAND AND GRAVEL (SP)
 - SILTY SAND (SM) AND SILTY GRAVEL (GM)
 - SILT, CLAYEY SILT, SAND SILT, AND GRAVELLY SILT (MU)

NOTES

- 1) CROSS SECTION LOCATION IS SHOWN ON FIGURE 6
- 2) ELEVATIONS ARE RELATIVE TO NAVD 83 DATUM
- 3) CONCENTRATIONS IN BOLD EXCEED THE MTCR METHOD A SOIL CLEANUP LEVEL.
- 4) * SAMPLE COLLECTED FROM ADJACENT BORING MW-1B.

Table 2 - Summary of June 21, 2013 Sub-Slab Soil Vapor Sampling Results

Olympic Water and Sewer, Inc. Site
781 Walker Way, Port Ludlow, Washington

Sample ID	Analyte Group	Analyte	Carcinogen(C) or Non-Carcinogen(NC)	Units	Result	Result with Leakage Correction	Flag	Reporting Limit	MTCA Method B Indoor Air CUL	Site-Specific Commercial Land Use Sub-Slab Soil Vapor Screening Level ^{4,5}	
VP-1-062113	APH	C ₂ - C ₁ Aliphatic Hydrocarbons ²	NC	µg/m ³	110	110.02		28	2,700	59,063	
		C ₂ - C ₁₄ Aliphatic Hydrocarbons ²	NC	µg/m ³	2,100	2100.38		14	140	3,063	
		C ₇ - C ₁₀ Aromatic Hydrocarbons	NC	µg/m ³	42	42.01		3.5	180	3,938	
	TO-15	Methyl tert-Butyl Ether	C	µg/m ³				ND	0.70	9.6	960
		n-Hexane	NC	µg/m ³				ND	0.70	320	7,000
		1,2-Dichloroethane	C	µg/m ³				ND	0.70	0.098	9.6
		Benzene	C	µg/m ³				ND	0.70	0.32	32.0
		Toluene	NC	µg/m ³	9.8	9.80			0.70	2,200	48,125
		1,2-Dibromoethane (EDB)	C	µg/m ³				ND	0.70	0.01	1.1
		Ethylbenzene	NC	µg/m ³	3.2	3.20			0.70	460	10,063
		m,p-Xylenes	NC	µg/m ³	15	15.00			1.4	46	1,006
		o-Xylene	NC	µg/m ³	4.4	4.40			0.70	46	1,006
		1,3,5-Trimethylbenzene	NC	µg/m ³	2.4	2.40			0.70	2.7	59
	1,2,4-Trimethylbenzene	NC	µg/m ³	7.7	7.70			0.70	2.7	59	
	Naphthalene	NC	µg/m ³	1.2	1.20			0.70	1.4	31	
Tracer	Helium		ppmV	180				28	-	-	
VP-2-062113	APH	C ₂ - C ₁ Aliphatic Hydrocarbons ²	NC	µg/m ³	100			27	2,700	59,063	
		C ₂ - C ₁₄ Aliphatic Hydrocarbons ²	NC	µg/m ³	790			14	140	3,063	
		C ₇ - C ₁₀ Aromatic Hydrocarbons	NC	µg/m ³	16			3.4	180	3,938	
	TO-15	Methyl tert-Butyl Ether	C	µg/m ³				ND	0.68	9.6	960
		n-Hexane	NC	µg/m ³				ND	0.68	320	7,000
		1,2-Dichloroethane	C	µg/m ³				ND	0.68	0.10	9.6
		Benzene	C	µg/m ³				ND	0.68	0.32	32.0
		Toluene	NC	µg/m ³	12				0.68	2,200	48,125
		1,2-Dibromoethane (EDB)	C	µg/m ³				ND	0.68	0.01	1.1
		Ethylbenzene	NC	µg/m ³	10				0.68	460	10,063
		m,p-Xylenes	NC	µg/m ³	45				1.4	46	1,006
		o-Xylene	NC	µg/m ³	28				0.68	46	1,006
		1,3,5-Trimethylbenzene	NC	µg/m ³	1.60				0.68	2.7	59
	1,2,4-Trimethylbenzene	NC	µg/m ³	3.5				0.68	2.7	59	
	Naphthalene	NC	µg/m ³				ND	0.68	1.4	31	
Tracer	Helium		ppmV				ND	27	-	-	

Notes:

Significant non-petroleum related peaks are subtracted from the APH hydrocarbon range areas when present.

¹Hydrocarbon Range data from total ion chromatogram excluding any internal/tuning standards eluting in that range.

²C₂-C₈ Aliphatic Hydrocarbons exclude the concentration of Target APH analytes eluting in that range.

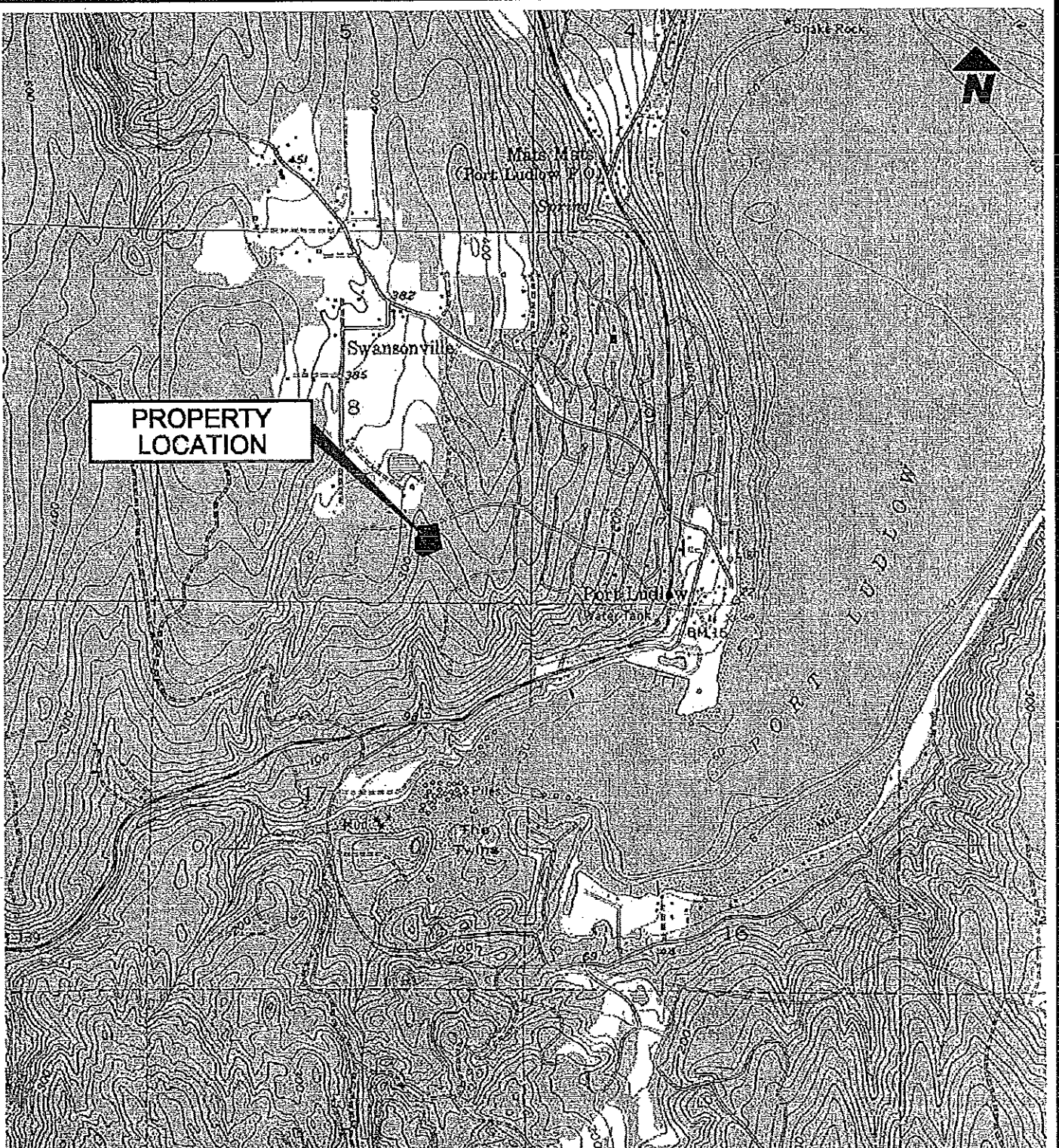
³C₉-C₁₂ Aliphatic Hydrocarbons exclude concentration of Target APH Analytes eluting in that range and concentration of C₉-C₁₀ Aromatic Hydrocarbons.

⁴Conservative cross-slab attenuation factor of 10, per Ecology's *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State* (2009).

⁵Site-specific correction for adult worker exposure scenario, calculated in accordance with WAC 173-340-750 and Ecology's *Draft Guidance for Evaluating Soil Vapor Intrusion in Washington State* (2009).

Table 2

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**PROPERTY
LOCATION**

SOURCE: USGS 7.5 MINUTE QUADRANGLE PORT LUDLOW, WA 1991;
CONTOUR INTERVAL, 20 FEET.

SCALE 1" = 2,000'
WHEN PLOTTED ON 8 1/2 x 11



THIS DRAWING IS FOR CONCEPTUAL PURPOSES ONLY. ACTUAL
LOCATIONS MAY VARY AND NOT ALL STRUCTURES ARE SHOWN.

SLR



22118 20th AVE SE
BLDG. G, SUITE 202
BOTHELL, WA 98021

T: 425-402-8800
F: 425-402-8488

**OLYMPIC WATER & SEWER, INC. PROPERTY
781 WALKER WAY
PORT LUDLOW, WASHINGTON**

Report
ADDITIONAL INVESTIGATION REPORT

Drawing
PROPERTY LOCATION MAP

Date	MAY 10, 2011	Scale	1"=2000'	Fig. No.	1
File Name	01-01.DWG	Project No.	101.00433.00003		

