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*Draft – Issued for Client Review*

## TECHNICAL MEMORANDUM

**TO:** Sunny Becker, Washington State Department of Ecology **DATE:** December 18, 2020

**FROM:** Clare Tochilin, SoundEarth Strategies, Inc.  
Tom Cammarata, SoundEarth Strategies, Inc.

**SUBJECT:** Plastic Sales and Service Site—New Monitoring Well Locations and EOS Interference with Groundwater Level Measurements

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SoundEarth Strategies, Inc. (SoundEarth) has prepared this Technical Memorandum for the Plastic Sales and Service Site (the Site) on behalf of The Lutheran Retirement Home of Greater Seattle (d/b/a The Hearthstone) in response to the Washington State Department of Ecology’s (Ecology) email dated June 4, 2020, in which Ecology provided proposed locations for the shallow and deep groundwater monitoring wells to be installed at the Site in 2020 (Figures 1 and 2). This Technical Memorandum presents SoundEarth’s recommendations regarding the locations of the new monitoring wells based on evaluation of the 2020 groundwater monitoring results, as well as the current and historical groundwater flow directions in the shallow and deep water-bearing zones.

### SUMMARY OF 2020 GROUNDWATER MONITORING RESULTS

SoundEarth has conducted four post-injection groundwater monitoring events at the Site during the First Quarter (January–March), Second Quarter (April–June), Third Quarter (July–September), and Fourth Quarter (October–December) 2020 to evaluate the effectiveness of the Enhanced Reductive Dechlorination (ERD) treatment, which was implemented between March and June 2019. The results from the quarterly 2020 monitoring events, shown on Figures 1 and 2, indicate that the groundwater treatment system is performing as intended to reduce dissolved-phase concentrations of chlorinated volatile organic compounds (CVOCs) and promote the degradation of tetrachloroethene (PCE) and trichloroethene (TCE) to cis-1,2-dichloroethene (cis-1,2-DCE) and vinyl chloride, and ultimately to reduce all of the CVOCs at the Site to concentrations below applicable cleanup levels. Concentrations of PCE and TCE have significantly decreased in the majority of the sampled monitoring and injection wells in both the shallow and deep water-bearing zones relative to pre-injection concentrations. PCE concentrations are now below the Washington State Model Toxics Control Act (MTCA) Method A cleanup level throughout the Site, with the exception of well MW-28 in the shallow water-bearing zone and wells MW-9, MW-10, IW32, and IW34 in the deep water-bearing zone. As anticipated, concentrations of cis-1,2-DCE and vinyl chloride have increased throughout the Site relative to pre-injection concentrations as a result of the degradation of PCE and TCE.

During the Fourth Quarter 2020 monitoring event, concentrations of CVOCs in downgradient shallow zone monitoring well MW-21 remained below MTCA cleanup levels, with the exception of vinyl chloride (4.5 micrograms per liter [ $\mu\text{g/L}$ ]). In downgradient deep zone monitoring well MW-10, concentrations of PCE and TCE were not detected above the laboratory reporting limits during Second and Third Quarters 2020, and a PCE concentration slightly exceeding the cleanup level (6.5  $\mu\text{g/L}$ ) was detected during Fourth Quarter 2020. However, concentrations of cis-1,2-DCE and vinyl chloride now exceed the applicable cleanup levels as a result of the ERD process. Based on these results, concentrations of CVOCs exceeding MTCA cleanup levels likely extend beyond the downgradient monitoring wells at some unknown distance in both the shallow and deep water-bearing zones.

## **PROPOSED MONITORING WELL LOCATIONS**

As agreed by Ecology and The Hearthstone in December 2019, one shallow and one deep monitoring well will be installed at the Site to determine the downgradient extent of CVOCs in the shallow and deep water-bearing zones. Ecology has proposed that the shallow and deep monitoring wells be installed in the sidewalk near the southeastern corner of the north-adjointing property, approximately 30 feet north of monitoring wells MW-10 and MW-21. Based on the results of the 2020 quarterly groundwater monitoring events conducted to date and the known current and historical groundwater flow directions in the shallow and deep water-bearing zones, as well as a conversation with Ecology on September 16, 2020, SoundEarth agrees to install the monitoring wells in the approximate location proposed by Ecology near the southeastern corner of the north-adjointing property to achieve the objectives of defining the downgradient extent of the CVOC plume and determining whether the Site boundary has expanded. The proposed locations of the new shallow and deep monitoring wells at the Site and the rationale for placement of each of the wells are described below.

### **Shallow Water-Bearing Zone**

Prior to the construction of the new building at the Site, which has caused a reversal in flow direction toward the building due to localized drawdown of groundwater associated with the sub-slab drainage system, groundwater in the shallow water-bearing zone flowed in a north-northwesterly direction, as shown on Figure 1. Based on this historical groundwater flow direction, SoundEarth agrees that the shallow zone monitoring well should be installed to the north-northwest of downgradient monitoring well MW-21 in the 4th Avenue Northeast right-of-way to determine the downgradient extent of CVOCs in the shallow water-bearing zone.

In order to determine the exact location where the shallow monitoring well should be installed, SoundEarth proposes to collect reconnaissance groundwater samples from direct-push borings advanced in the vicinity of Ecology's and SoundEarth's proposed monitoring well locations (Figure 1). Based on the CVOC concentrations in the reconnaissance groundwater samples, an appropriate monitoring well location would be selected to define the downgradient Site boundary. This approach will be used to define the extent of CVOCs in shallow groundwater and to minimize the potential that additional downgradient wells (and associated expense) will be needed in the future to define the extent of shallow water-bearing zone contamination. SoundEarth anticipates installing the shallow monitoring well approximately 50 feet north-northwest of MW-21 (approximate location shown in green on Figure 1). The exact location will be determined based upon the results of the reconnaissance groundwater sampling and approval from Ecology prior to installation. Due to drill rig access limitations in the sidewalk of 4th Avenue Northeast,

the direct-push borings and shallow monitoring well will be installed within the western planting strip or parking lane of 4th Avenue Northeast.

### **Deep Water-Bearing Zone**

In the deep water-bearing zone, groundwater has consistently flowed in a northeasterly direction both before and after the new building construction. As it is not feasible to evaluate groundwater conditions in the deep water-bearing zone using direct-push borings due to drilling limitations, SoundEarth agrees to install the deep monitoring well in the approximate location proposed by Ecology near the southeastern corner of the north-adjointing property. Due to overhead access limitations, including tree branches and a lamp post located in this area, the deep monitoring well will be installed approximately 40 feet north of deep monitoring well MW-10 within the western parking lane of 4th Avenue Northeast, as shown on Figure 2.

### **EOS INTERFERENCE WITH WATER LEVEL MEASUREMENTS**

In an email to Ecology dated May 18, 2020, SoundEarth indicated that an accurate groundwater level measurement could not be obtained from monitoring well MW-21 during the First Quarter 2020 groundwater monitoring event due to interference from EOS from recent injections at nearby injection wells IW29 and IW30. Similar conditions were observed in MW-21 during the Second Quarter 2020 groundwater monitoring event, and the resulting groundwater elevations at this location during both quarters were anomalous relative to surrounding wells and SoundEarth's understanding of groundwater flow based upon water level measurements across the Site. Due to the large amount of EOS in this well, SoundEarth concluded that the measured groundwater elevations in MW-21 during the First and Second Quarter 2020 sampling events conducted to date were not representative of actual groundwater conditions in this location, and this well was excluded from the shallow zone groundwater contour maps from those quarters.

In its response dated June 4, 2020, Ecology stated that other wells that are in close proximity to injection wells, including MW-3, MW-5, MW-15, and MW-28, should also be excluded from the shallow zone groundwater contour map if interference from EOS is a concern. Although these wells are located near injection wells, SoundEarth did not observe EOS while measuring or sampling any of the other monitoring wells at the Site during the First and Second Quarters 2020 groundwater monitoring events, as documented on the field forms provided in Attachment A, and therefore has no reason to believe that these measurements are inaccurate. The distribution of residual EOS throughout a site after injections is often inconsistent, and preferential pathways may exist in the vicinity of MW-21, IW29, and IW30, causing EOS to migrate more easily into MW-21, while other monitoring wells at the Site appear to be unimpacted by this regardless of nearby injection wells. Additionally, as depicted on the 2014 and 2018 groundwater contour maps provided in Attachment B, groundwater elevations in MW-21 were not anomalous prior to the EOS injections conducted in 2019, which strongly suggests that EOS interference is the reason for the inaccurate measurements collected from this well during post-injection First and Second Quarter 2020 groundwater monitoring events. If MW-21 was included in the shallow zone contour map for these two quarters, the resulting flow direction in this area would be contradictory to SoundEarth's understanding of groundwater flow at the Site, particularly given the effects of the sub-slab drainage system that have been observed over the last two quarters.

During the Third and Fourth Quarter 2020 groundwater monitoring events, EOS was not observed in monitoring well MW-21. Therefore, the measured groundwater elevations in this well during these quarters appear to be representative of groundwater conditions and have been included in the shallow zone contour maps for these quarters.

#### **CONCLUSION AND NEXT STEPS**

If Ecology agrees that the proposed locations for the monitoring wells are appropriate, we will proceed with necessary permitting and arrange for installation of the proposed borings and monitoring wells with Ecology oversight. In the event that Ecology would like to discuss the data and recommendations presented in this Technical Memorandum regarding the placement of the new shallow and deep zone groundwater monitoring wells to be installed at the Site, we would be glad to meet with Ecology representatives at your earliest convenience.

Attachments: Figure 1, 2020 Q4 Groundwater Analytical Results and Contour Map for Shallow Zone Monitoring Wells  
Figure 2, 2020 Q4 Groundwater Analytical Results and Contour Map for Deep Zone Monitoring Wells  
A, First and Second Quarters 2020 Groundwater Monitoring Field Notes  
B, Pre-Injection Groundwater Contour Maps

cc: Elliott Westerman, The Hearthstone

CJT/TJC:dnm/rt

## **FIGURES**

### LEGEND

- SOUNDEARTH PROPOSED SHALLOW MONITORING WELL LOCATION
- SOUNDEARTH PROPOSED SOIL BORING LOCATION
- CATCH BASIN
- MANHOLE
- SHALLOW-ZONE MONITORING WELL
- DEEP-ZONE MONITORING WELL
- DEEP DEWATERING WELL
- SHALLOW INJECTION WELL
- DEEP INJECTION WELL
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW (SHALLOW ZONE)
- SHALLOW ZONE POTENTIOMETRIC SURFACE CONTOUR (OCTOBER 19-20, 2020)
- GROUNDWATER ELEVATION
- DECOMMISSIONED WELL
- DIRECT-PUSH BORING (GEOENGINEERS 2002/2003)
- DIRECT-PUSH BORING (GEOENGINEERS 2004)
- DIRECT-PUSH BORING (FARALLON 2004)
- DIRECT-PUSH BORING (FARALLON 2006/2007)
- DIRECT-PUSH BORING (FARALLON 2010)
- DIRECT-PUSH BORING (SOUNDEARTH 2008)
- HOLLOW-STEM AUGER (SOUNDEARTH 2009)
- POST-ELECTRICAL RESISTANCE HEATING BORING LOCATION
- STORMWATER LINE
- GAS LINE
- SANITARY SEWER LINE
- WATER LINE
- OVERHEAD POWER LINE
- PROPERTY BOUNDARY LINE
- PARCEL BOUNDARY
- FLOOR DRAIN
- DECOMMISSIONED WELL
- BELOW GROUND SURFACE
- DICHLOROETHENE
- TETRACHLOROETHENE
- TRICHLOROETHENE
- UNDERGROUND STORAGE TANK
- WASHINGTON STATE MODEL TOXICS CONTROL ACT
- DENOTES CONCENTRATION EXCEEDS MTCA METHOD A OR B CLEANUP LEVEL
- DENOTES SAMPLE WAS COLLECTED USING A PASSIVE MEMBRANE SAMPLER

Well ID	Sample Date	Analytical Results (micrograms per liter)				Vend Chloride
		PCE	TCE	Trans-1,2-DCE	1,1-DCE	
Shallow Zone Wells						
MW01	10/30/03	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	06/02/06	1.1	< 0.20	< 0.20	< 0.20	< 0.20
	11/20/08	1.5	< 0.20	< 0.20	< 0.20	< 0.20
	05/04/10	1.8	< 0.20	< 0.20	< 0.20	< 0.20
	09/10/14	1.6	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	0.85	< 0.20	< 0.20	< 0.20	< 0.20
	01/29/20	1.8	< 0.20	< 0.20	< 0.20	< 0.20
	04/21/20	1.0	< 0.20	< 0.20	< 0.20	< 0.20
	07/21/20	1.3	< 0.20	< 0.20	< 0.20	< 0.20
	10/20/20	2.1	< 0.20	< 0.20	< 0.20	< 0.20
MW02	10/30/03	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	06/02/06	< 0.20	5.6	< 0.20	< 0.20	< 0.20
	11/20/08	6.8	4.6	< 0.20	< 0.20	< 0.20
	05/04/10	9.5	3.5	< 0.20	< 0.20	< 0.20
	09/10/14	4.0	0.49	< 0.20	< 0.20	< 0.20
	10/24/18	1.7	0.61	< 0.20	< 0.20	< 0.20
	01/29/20	1.1	0.80	< 0.20	< 0.20	< 0.20
	04/21/20	1.3	0.53	< 0.20	< 0.20	< 0.20
	07/21/20	2.0	1.1	< 0.20	< 0.20	< 0.20
	10/20/20	2.7	1.2	< 0.20	< 0.20	< 0.20
MW03	10/30/03	190	< 2.0	< 2.0	< 2.0	< 2.0
	06/02/06	150	1.1	< 1.0	< 1.0	< 1.0
	11/20/08	230	1.6	2.0	< 1.0	< 1.0
	05/04/10	190	< 1.0	< 1.0	< 1.0	< 1.0
	09/10/14	64	0.38	0.79	< 0.20	< 0.20
	10/24/18	54	0.61	< 0.40	< 0.40	< 0.40
	01/29/20	< 0.40	< 0.40	44	0.57	< 16
	04/21/20	< 0.40	2.6	30	0.62	< 15
	07/21/20	< 0.20	0.20	6.3	0.55	< 74
	10/20/20	< 0.20	0.36	13	0.65	< 13
MW05	10/30/03	270	46	< 2.0	< 2.0	< 2.0
	06/02/06	34	3.6	3.3	< 0.40	< 0.40
	11/20/08	19	110	40	< 1.0	< 2.0
	05/04/10	82	34	27	0.44	< 0.88
	09/10/14	71	22	3.6	0.27	< 0.20
	10/24/18	36	7.6	1.7	< 0.20	< 0.20
	01/29/20	3.4	1.4	130	< 1.0	< 10
	04/21/20	1.1	1.1	130	< 1.0	< 15
	07/21/20	2.3	1.2	170	1.3	< 29
	10/20/20	1.1	< 1.0	220	1.6	< 96
MW06	10/30/03	1,100	330	440	< 2.0	< 110
	10/07/14	10,000	450	220	< 50	< 72
	02/07/19	1,600	110	600	< 2.0	< 18
	01/28/20	38	130	210	< 0.20	< 26
	04/21/20	1.2	8.7	42	0.89	< 26
	07/21/20	0.95	10	29	0.81	< 29
	10/20/20	1.7	19	69	0.90	< 36
	06/01/06	0.22	< 0.20	< 0.20	< 0.20	< 0.20
	11/20/08	0.26	< 0.20	< 0.20	< 0.20	< 0.20
	05/04/10	< 1.0	< 0.20	< 0.20	< 0.20	< 0.20
MW15	10/30/03	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	06/02/06	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	11/20/08	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	05/04/10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	09/10/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	0.78	< 0.20	< 0.20	< 0.20	< 0.20
	01/29/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	04/21/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	07/21/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/20/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
MW16	10/30/03	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	06/02/06	< 1.0	< 0.20	< 0.20	< 0.20	< 0.20
	11/20/08	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	05/04/10	< 1.0	< 0.20	< 0.20	< 0.20	< 0.20
	09/10/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	01/29/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	04/21/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	07/21/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/20/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
MW19	10/30/03	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/02/06	< 1.00	< 0.20	< 0.20	< 0.20	< 0.20
	11/20/08	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	05/04/10	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	09/10/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	01/29/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	04/21/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	07/21/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/20/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
MW21	10/30/03	0.67	< 0.20	8.0	< 0.20	< 1.9
	04/21/20	< 0.20	< 0.20	3.9	< 0.20	< 3.0
	07/21/20	< 0.20	< 0.20	4.4	< 0.20	< 2.3
	10/20/20	0.23	< 0.20	1.7	< 0.20	< 4.5
	09/28/08	650	< 10	< 10	< 10	< 2.0
	11/20/08	360	3.4	< 2.0	< 2.0	< 2.0
	05/04/10	290	< 10	< 10	< 10	< 2.0
	09/09/14	40	0.42	< 0.20	< 0.20	< 0.20
	09/10/14	17	0.27	< 0.20	< 0.20	< 0.20
	10/24/18	30	0.24	< 0.20	< 0.20	< 0.20
MW24	10/30/03	0.92	< 0.20	8.6	< 0.20	< 0.43
	05/04/10	14	0.31	1.1	< 0.20	< 0.20
	10/07/14	12	0.36	0.37	< 0.20	< 0.20
	10/25/18	0.28	< 0.20	0.75	< 0.20	< 0.20
	04/21/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	07/21/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/20/20	0.20	0.50	0.45	< 0.20	< 0.20
	10/20/20	1.6	0.59	1.4	< 0.20	< 0.20
	05/04/10	< 1.0	< 0.20	< 0.20	< 0.20	< 0.20
	09/10/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
MW26	10/30/03	0.24	< 0.20	< 0.20	< 0.20	< 0.20
	01/28/20	0.28	< 0.20	< 0.20	< 0.20	< 0.20
	04/21/20	0.24	< 0.20	< 0.20	< 0.20	< 0.20
	07/21/20	1.4	< 0.20	< 0.20	< 0.20	< 0.20
	10/19/20	1.1	< 0.20	< 0.20	< 0.20	< 0.20
	07/01/11	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/07/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	02/07/19	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	01/28/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	04/21/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
MW27	10/30/03	300	100	710	6.3	< 180
	04/22/20	35	15	280	2.3	< 60
	07/21/20	21	18	200	1.7	< 60
	10/20/20	16	13	170	1.3	< 30
	02/22/20	1.0	0.32	1.2	< 0.20	< 0.30
	05/26/20	1.2	0.32	1.2	< 0.20	< 0.30
	08/26/20	0.77	0.48	1.4	< 0.20	< 0.30
	10/19/20	1.2	0.44	1.7	< 0.20	< 0.30
	02/12/20	< 1.0	1.2	3.7	< 1.0	< 180
	06/26/20	< 1.0	1.5	3.6	< 1.0	< 180
MW28	10/30/03	0.81	1.2	2.4	< 0.40	< 75
	02/12/20	< 1.0	< 1.0	8.1	< 1.0	< 1,500
	05/26/20	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/20/20	< 2.0	< 2.0	6.7	< 2.0	< 400
	10/19/20	< 4.0	< 4.0	< 4.0	< 4.0	< 740
	02/12/20	0.36	< 0.20	< 0.20	< 0.20	< 0.20
	05/26/20	0.23	< 0.20	< 0.20	< 0.20	< 0.20
	07/20/20	0.28	< 0.20	< 0.20	< 0.20	< 0.20
	10/19/20	0.35	< 0.20	< 0.20	< 0.20	< 0.20
	03/22/19	6.3	< 1.0	< 1.0	< 1.0	< 0.20
MW31	10/30/03	1.1	< 0.20	< 0.20	< 0.20	< 0.20
	05/26/20	1.1	< 0.20	< 0.20	< 0.20	< 0.20
	07/20/20	1.1	< 0.20	< 0.20	< 0.20	< 0.20
	10/19/20	1.0	< 0.20	< 0.20	< 0.20	< 0.20
	02/12/20	< 0.20	0.35	1.0	< 0.20	< 0.24
	05/26/20	< 0.20	0.51	1.4	< 0.20	< 0.30
	07/20/20	< 0.20	0.69	2.3	< 0.20	< 0.30
	10/19/20	0.22	1.8	5.0		

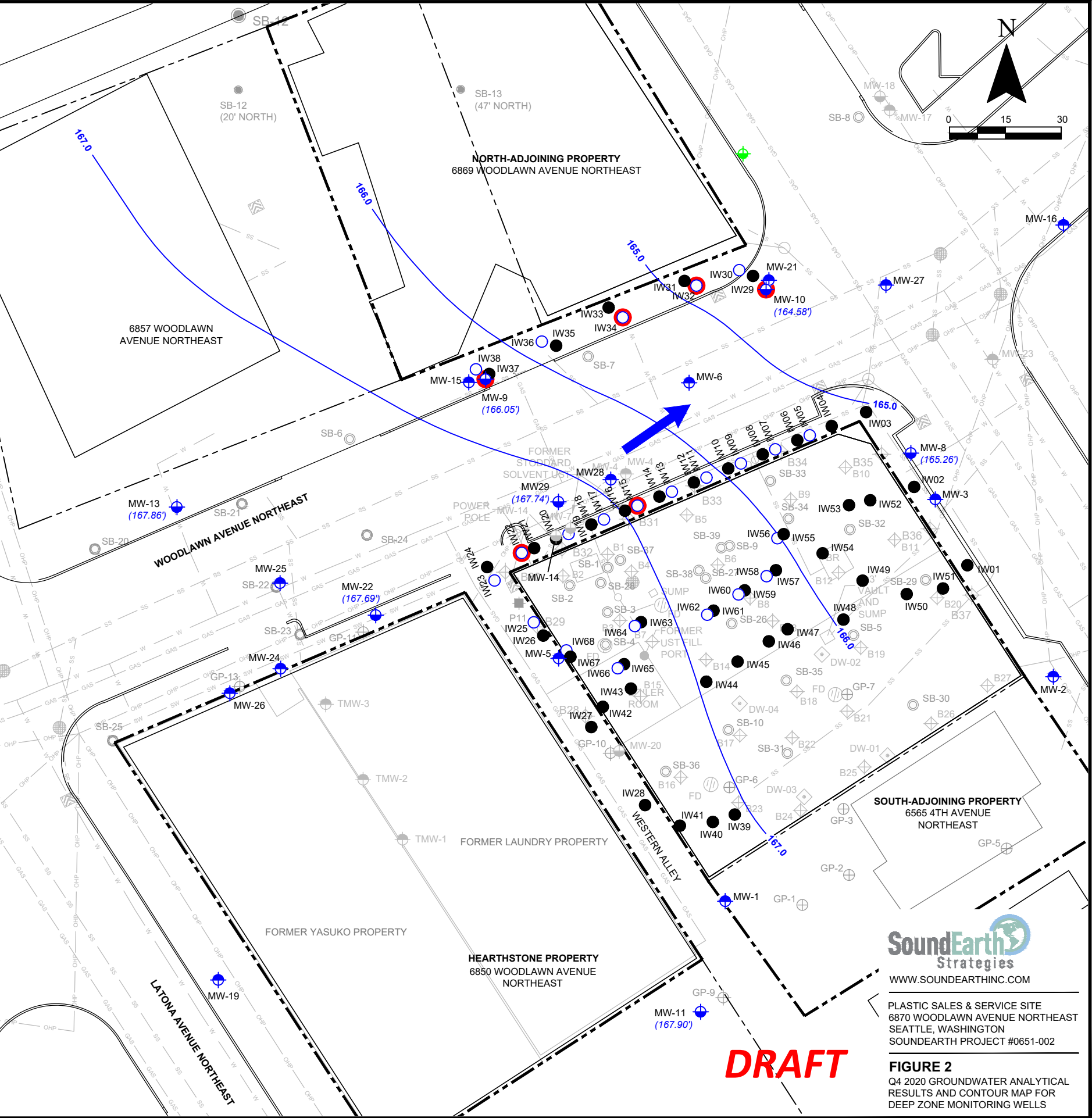
**LEGEND**

- SOUNDEARTH PROPOSED DEEP MONITORING WELL LOCATION
- CATCH BASIN
- MANHOLE
- SHALLOW-ZONE MONITORING WELL
- DEEP-ZONE MONITORING WELL
- DEEP DEWATERING WELL
- SHALLOW INJECTION WELL
- DEEP INJECTION WELL
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW (DEEP ZONE)
- DEEP ZONE POTENTIOMETRIC SURFACE CONTOUR (OCTOBER 19-20, 2020)
- GROUNDWATER ELEVATION
- DECOMMISSIONED WELL
- DIRECT-PUSH BORING (GEOENGINEERS 2002/2003)
- DIRECT-PUSH BORING (GEOENGINEERS 2004)
- DIRECT-PUSH BORING (FARALLON 2004)
- DIRECT-PUSH BORING (FARALLON 2006/2007)
- DIRECT-PUSH BORING (FARALLON 2010)
- DIRECT-PUSH BORING (SOUNDEARTH 2008)
- HOLLOW-STEM AUGER (SOUNDEARTH 2009)
- POST-ELECTRICAL RESISTANCE HEATING BORING LOCATION
- STORMWATER LINE
- GAS LINE
- SANITARY SEWER LINE
- WATER LINE
- OVERHEAD POWER LINE
- PROPERTY BOUNDARY LINE
- PARCEL BOUNDARY
- FLOOR DRAIN
- DECOM DECOMMISSIONED WELL
- bgs BELOW GROUND SURFACE
- DCE DICHLOROETHENE
- PCE TETRACHLOROETHENE
- TCE TRICHLOROETHENE
- UST UNDERGROUND STORAGE TANK
- MTCA WASHINGTON STATE MODEL TOXICS CONTROL ACT
- DENOTES CONCENTRATION EXCEEDS MTCA METHOD A OR B CLEANUP LEVEL
- DENOTES SAMPLE WAS COLLECTED USING A PASSIVE MEMBRANE SAMPLER

**NOTES:**

1. FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010.
2. HISTORICAL DATA FOR DECOMMISSIONED MONITORING WELLS IS NOT INCLUDED. PLEASE SEE FULL DATA TABLES FOR DECOMMISSIONED MONITORING WELL DATA.

Well ID	Sample Date	Analytical Results (micrograms per liter)					
		PCE	TCE	cis-1,2-DCE	trans-1,2-DCE	1,1-DCE	Vinyl Chloride
<b>Deep Zone Wells</b>							
MW08	11/19/04	0.36	< 0.20	< 0.20	< 0.20	--	< 0.20
	06/01/06	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	11/19/08	0.70	< 0.20	< 0.20	< 0.20	--	< 0.20
	05/04/10	< 1.0	< 0.20	< 0.20	< 0.20	--	< 0.20
	09/09/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/25/18	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	01/28/20	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	04/21/20	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	07/20/20	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	10/19/20	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
MW09	11/19/04	210	< 1.0	< 1.0	< 1.0	--	< 1.0
	06/01/06	390	< 2.0	< 2.0	< 2.0	--	< 2.0
	04/20/07	410	< 2.0	< 2.0	< 2.0	--	< 2.0
	11/20/08	220	< 2.0	< 2.0	< 2.0	--	< 2.0
	05/04/10	190	< 0.20	< 0.20	< 0.20	--	< 0.20
	09/10/14	89	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	160	< 1.0	< 1.0	< 1.0	--	< 1.0
	01/29/20	97	3.4	160	< 1.0	--	< 1.0
	04/21/20	72	4.6	120	< 1.0	--	< 0.20
	07/21/20	130	11	170	1.4	--	< 0.20
MW10	11/19/04	250	13	110	< 1.0	--	< 0.20
	06/01/06	250	< 0.20	< 0.20	< 0.20	--	< 0.20
	04/20/07	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	11/20/08	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	05/04/10	3.30	< 0.20	< 0.20	< 0.20	--	< 0.20
	09/10/14	600	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	210	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	04/09/19*	21	1.1	1.8	< 0.20	--	< 0.20
	01/29/20	6.5	3.3	250	< 1.0	--	1.6
	04/22/20	< 2.0	< 2.0	270	< 2.0	--	1.5
MW11	06/02/06	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	11/20/08	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	05/03/10	< 1.0	< 0.20	< 0.20	< 0.20	--	< 0.20
	10/07/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	06/02/06	0.76	< 0.20	< 0.20	< 0.20	--	< 0.20
	11/19/08	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	05/03/10	< 1.0	< 0.20	< 0.20	< 0.20	--	< 0.20
	09/09/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	11/20/08	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
MW12	05/03/10	< 1.0	< 0.20	< 0.20	< 0.20	--	< 0.20
	09/09/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	06/02/06	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	04/20/07	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	11/19/08	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	05/03/10	< 1.0	< 0.20	< 0.20	< 0.20	--	< 0.20
	09/09/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	11/20/08	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
MW13	05/04/10	< 1.0	< 0.20	< 0.20	< 0.20	--	< 0.20
	09/10/14	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	10/24/18	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	01/28/20	4.5	1.1	2.8	< 0.20	--	< 0.20
	04/22/20	0.79	< 0.20	< 0.20	< 0.20	--	< 0.20
	07/21/20	4.6	1.5	0.86	< 0.20	--	< 0.20
	10/19/20	4.5	1.2	0.55	< 0.20	--	< 0.20
	02/12/20	< 0.20	< 0.20	1.5	< 0.20	--	< 0.20
	05/26/20	< 0.20	< 0.20	1.8	< 0.20	< 0.20	< 0.20
	07/20/20	< 0.20	< 0.20	1.9	< 0.20	--	< 0.20
MW15	10/19/20	< 0.20	< 0.20	1.5	< 0.20	--	< 0.20
	02/12/20	0.21	< 0.20	3.3	< 0.20	--	0.58
	05/26/20	0.34	0.44	18	< 0.20	< 0.20	11
	07/20/20	0.36	0.58	28	< 0.20	--	19
	10/19/20	0.33	0.45	27	< 0.20	--	20
	02/12/20	< 0.20	< 0.20	1.5	< 0.20	--	30
	05/26/20	< 0.50	< 0.50	4.8	< 0.50	< 0.50	91
	07/20/20	< 1.0	< 1.0	8.5	< 1.0	< 0.50	160
	10/19/20	< 1.0	< 1.0	8.2	< 1.0	--	150
	MW22	02/12/20	< 40	950	7,100	73	--
05/26/20		< 50	370	5,700	< 50	< 50	250
07/20/20		< 50	260	5,400	< 50	--	250
10/19/20		23	200	4,600	35	--	240
04/09/19		230	21	11	< 0.20	--	1.0
02/12/20		360	3,100	4,100	50.0	--	100
05/26/20		310	2,400	7,700	83	< 50	160
07/20/20		290	2,300	11,000	110	--	220
10/19/20		230	1,400	13,000	140	--	280
MW32		04/09/19	0.37	< 0.20	< 0.20	< 0.20	--
	05/26/20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
	07/20/20	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	10/19/20	< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
	04/09/19	230	21	11	< 0.20	--	1.0
	02/12/20	360	3,100	4,100	50.0	--	100
	05/26/20	310	2,400	7,700	83	< 50	160
	07/20/20	290	2,300	11,000	110	--	220
	10/19/20	230	1,400	13,000	140	--	280
	MW60	04/09/19	0.37	< 0.20	< 0.20	< 0.20	--
05/26/20		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
07/20/20		< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
10/19/20		< 0.20	< 0.20	< 0.20	< 0.20	--	< 0.20
04/09/19		230	21	11	< 0.20	--	1.0
02/12/20		360	3,100	4,100	50.0	--	100
05/26/20		310	2,400	7,700	83	< 50	160
07/20/20		290	2,300	11,000	110	--	220
10/19/20		230	1,400	13,000	140	--	280
MTCA Cleanup Levels For Groundwater		5	5	16	160	400	0.2



**SoundEarth Strategies**  
WWW.SOUNDEARTHINC.COM

PLASTIC SALES & SERVICE SITE  
6870 WOODLAWN AVENUE NORTHEAST  
SEATTLE, WASHINGTON  
SOUNDEARTH PROJECT #0651-002

**FIGURE 2**  
Q4 2020 GROUNDWATER ANALYTICAL RESULTS AND CONTOUR MAP FOR DEEP ZONE MONITORING WELLS

**DRAFT**

**ATTACHMENT A  
FIRST AND SECOND QUARTERS 2020  
GROUNDWATER MONITORING FIELD NOTES**





GROUNDWATER DATA FORM

Reviewed by CJT

Site Name/Facility ID: Plastic Sales and Service Site

Address: 6870 Woodlawn Avenue Northeast

City, State: Seattle, Washington

SoundEarth Project No.: 0651-002

Field Personnel: CED

Date Opened: 1/27/20

Date Measured: 1/27/20

Water Level Instrument Used: #6

Well ID	Well Details		Time		Measured Depth (feet below TOC)			Historical Measurements Depth (feet below TOC)		NAPL Thickness	Max. Ideal Purge Rate	Measure/ Sample Order	Sample Well?	Comments or Issues
	Diameter (in.)	Screened Interval (feet)	Opened	Measured	to Water	Total	to NAPL	Depth						
								to Water	Total					
MW01	2	4 - 19	1057	1255	12.22	—	—	13.11	18.37	—	—	22	Y	
MW02	2	5 - 20	1104	1259	9.59	—	—	9.01	19.45	—	—	23	n	
MW03	2	5 - 20	1128	1321	8.34	—	—	9.45	19.45	—	—	30	n	
MW05	2	2.5 - 17.5	1122	1318	11.25	15.62	—	11.47	17.45	—	—	24	n	
MW06	1	15 - 20	1235	1255	10.12	19.96	—	10.61	19.93	—	—	3	n	
MW08	2	30 - 40	1053	1246	10.21	—	—	10.24	40.15	—	—	19	n	
MW09	2	30 - 40	1130	1325	9.67	—	—	9.1	39.80	—	—	31	n	
MW10	2	30 - 40	1120	1308	10.95	—	—	11.1	40.00	—	—	28	n	
MW11	4	57.5 - 67.5	1545	1620	10.85	(129/24)	—	11.00	65.24	—	—	1	n	
MW12	2	57 - 67	1002	1146	9.30	—	—	9.31	65.78	—	—	4	n	
MW13	2	55.5 - 65.5	0957	1142	8.96	—	—	8.95	66.21	—	—	3	n	
MW15	2	5 - 20	1056	1253	3.69	—	—	11.31	18.18	—	—	21	n	Cont seal
MW16	2	5 - 20	1605	1150	3.81	—	—	6.41	19.60	—	—	5	n	Monument lid broken
MW19	4	10 - 20	0954	1136	12.27	—	—	13.6	19.72	—	—	2	n	Cont seal
MW21	2	14 - 24	1113	1303	11.3	—	—	11.2	23.74	—	—	24	n	EOS Coating water level meter
MW22	2	39.5 - 49.5	1048	1243	9.32	—	—	9.3	49.20	—	—	18	n	
MW24	4	8 - 18	1118	1315	11.04	—	—	12.28	17.34	—	—	27	n	
MW25	2	8 - 18	1055	1115	11.19	14.29	—	11.91	18.29	—	—	2	n	
MW26	2	8 - 18	1054	1250	11.47	—	—	12.26	18.18	—	—	20	n	
MW27	2	8.5 - 13.5	0932	0952	10.89	13.16	—	11.31	13.50	—	—	25	n	
MW28	2	5 - 18	1114	1312	10.39	—	—	10.27	18.61	—	—	28	Y	
MW29	2	25 - 65	1115	1314	8.30	—	—	8.44	64.35	—	—	26	Y	
IW07	2	20 - 45	1012	1154	10.49	42.18	—	—	—	—	—	6	Y	
IW08	2	5 - 15	1013	1159	11.47	14.80	—	—	—	—	—	8	Y	
IW15	2	20 - 45	1014	1204	13.15	38.40	—	—	—	—	—	8	Y	EOS causing issues with WLM sensor
IW16	2	5 - 15	1109	1211	10.00	14.86	—	—	—	—	—	9	Y	" "
IW21	2	5 - 15	1110	1265	5.48	15.70	—	—	—	—	—	10	Y	" "
IW22	4	20 - 45	1020	1218	11.00	44.23	—	—	—	—	—	11	Y	" "
IW31	2	5 - 15	1022	1225	13.14	44.32	—	—	—	—	—	12	Y	" "
IW32	2	20 - 45	1023	1229	13.00	14.94	—	—	—	—	—	13	Y	" "
IW33	2	5 - 17	1024	1233	11.00	15.12	—	—	—	—	—	15	Y	" "
IW34	2	20 - 45	1026	1235	10.82	43.61	—	—	—	—	—	14	Y	" "
IW59	2	2 - 6	1032	—	—	—	—	—	—	—	—	16	Y	" "artesian
IW60	2	8 - 31	1033	—	—	—	—	—	—	—	—	17	Y	" "

\*Use an interface probe to measure LNAPL in this well.

Comments:



GROUNDWATER DATA FORM

Reviewed by CST

Site Name/Facility ID: Plastic Sales and Service Site

Address: 6870 Woodlawn Avenue Northeast

City, State: Seattle, Washington

SoundEarth Project No.: 0651-002

Field Personnel: SNW/KJL

Date Opened: 4/20/20

Date Measured: 4/20/20

Water Level Instrument Used: #1

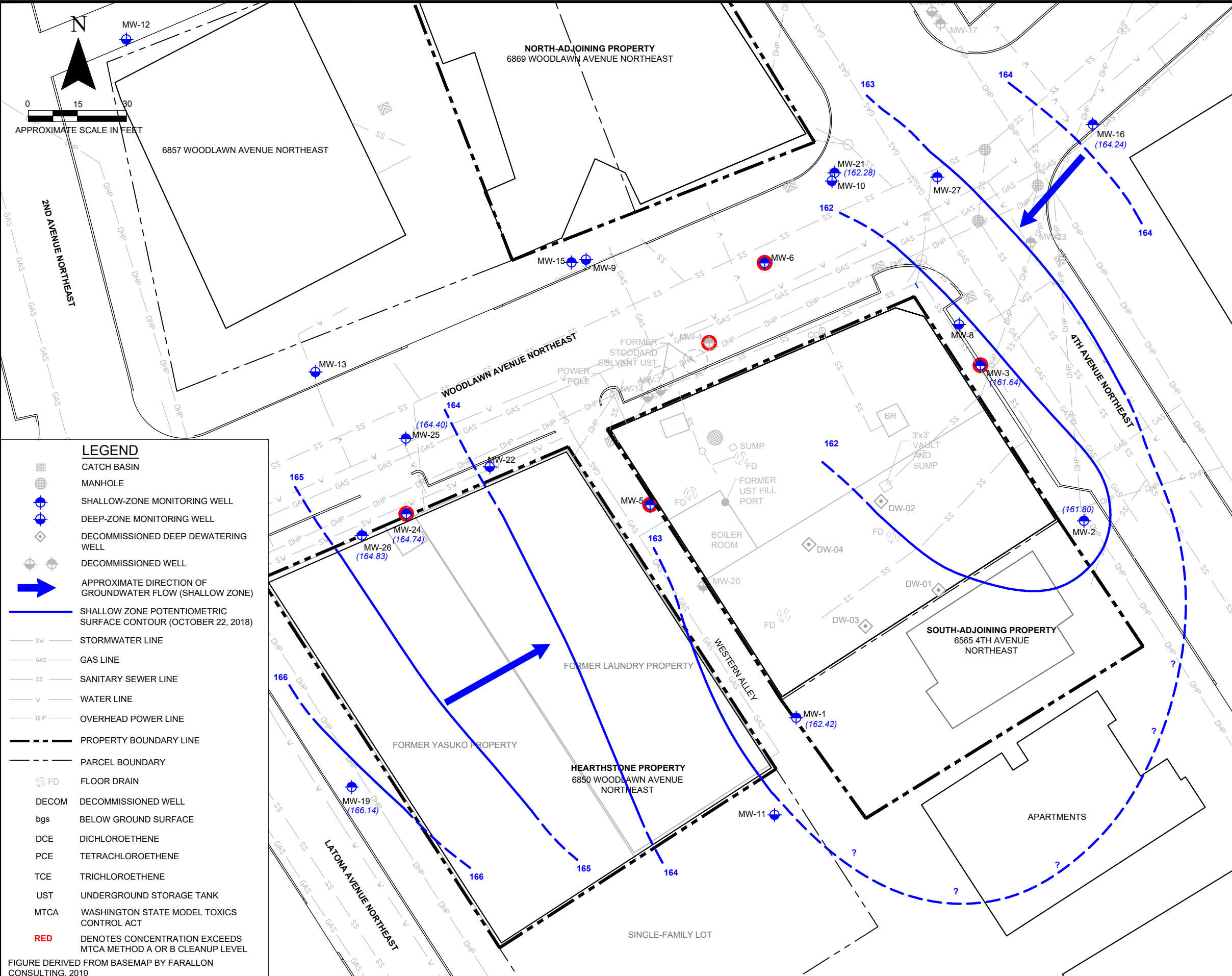
Well ID	Well Details		Time		Measured Depth (feet below TOC)			Historical Measurements (feet below TOC)			Max. Ideal Purge Rate	Measure/Sample Order	Sample Well?	Comments or Issues
	Diameter (in.)	Screened Interval (feet)	Opened	Measured	to Water	Total	to NAPL	Depth		NAPL Thickness				
								to Water	Total					
MW01	2	4 - 19	0911	1034	12.59	—	—	13.11	18.37	—	—	5	y	
MW02	2	5 - 20	0913	1037	10.13	—	—	9.01	19.45	—	—	6	n	
MW03	2	5 - 20	0935	1104	9.20	—	—	9.45	19.45	—	—	13	n	
MW05	2	2.5 - 17.5	0930	1106	11.49	—	—	11.47	17.45	—	—	12	n	Usually runs dry
MW06	1	15 - 20	1327	1357	11.03	19.97	—	10.61	19.93	—	—	3*	n	
MW08	2	30 - 40	0901	1030	10.43	—	—	10.24	40.15	—	—	2	n	
MW09	2	30 - 40	0939	1109	9.87	—	—	9.1	39.80	—	—	14	n	water above TOC
MW10	2	30 - 40	0924	1101	11.8	—	—	11.1	40.00	—	—	11	n	water above TOC
MW11	4	57.5 - 67.5	0947	1116	10.50	—	—	11.00	65.24	—	—	16	n	Water below TOC
MW12	2	57 - 67	1008	1126	9.22	—	—	9.31	65.78	—	—	19	n	
MW13	2	55.5 - 65.5	1005	1123	8.88	—	—	8.95	66.21	—	—	18	n	
MW15	2	5 - 20	0907	1032	6.11	—	—	11.31	18.18	—	—	4	n	No well tag
MW16	2	5 - 20	0942	1112	5.50	—	—	6.41	19.60	—	—	15	n	lid is cracked
MW19	4	10 - 20	1000	1121	13.53	—	—	13.6	19.72	—	—	17	n	buried in landscaping
MW21	2	14 - 24	0915	1040	11.07	—	—	11.2	23.74	—	—	7	n	EOS coating water level meter
MW22	2	39.5 - 49.5	0854	1025	9.27	—	—	9.3	49.20	—	—	1	n	water above TOC
MW24	4	8 - 18	0922	1100	12.28	—	—	12.28	17.34	—	—	10	n	
MW25	2	8 - 18	1145	1215	12.00	14.38	—	11.91	18.29	—	—	2*	n	
MW26	2	8 - 18	0905	1131	12.29	—	—	12.26	18.18	—	—	3	n	
MW27	2	8.5 - 13.5	1034	1104	11.37	13.15	—	11.31	13.50	—	—	1	n	
MW28	2	5 - 18	0918	1044	10.66	—	—	10.27	18.61	—	—	1000	n	
MW29	2	25 - 65	0920	1058	8.24	—	—	8.44	64.35	—	—	1000	y	
IW07	2	20 - 45												
IW08	2	5 - 15												
IW15	2	20 - 45												
IW16	2	5 - 15												
IW21	2	5 - 15												
IW22	4	20 - 45												
IW31	2	5 - 15												
IW32	2	20 - 45												
IW33	2	5 - 17												
IW34	2	20 - 45												
IW59	2	2 - 6												
IW60	2	8 - 31												

\*Use an interface probe to measure LNAPL in this well.

Comments:

**ATTACHMENT B  
PRE-INJECTION GROUNDWATER CONTOUR MAPS**

6/29/2020  
 P:0651 HEARTHSTONE-002 HEARTHSTONE - WOODLAWN EAST/TECHNICAL/CAD/2020/2020 TECH MEMO/0651-002\_2018 GDGM-S.DWG



Well ID	Sample Date	Analytical Results (micrograms per liter)				
		PCE	TCE	DCE	cis-1,2-1,2-DCE	Vinyl Chloride
MW01	11/20/08	1.5	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	1.8	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	1.6	< 0.2	< 0.2	< 0.2	< 0.2
	10/24/18	0.85	< 0.2	< 0.2	< 0.2	< 0.2
MW02	11/19/08	6.80	4.6	< 0.2	< 0.2	< 0.2
	05/04/10	9.50	3.5	< 0.2	< 0.2	< 0.2
	09/10/14	4.0	0.49	< 0.2	< 0.2	< 0.2
MW03	10/25/18	1.7	0.61	< 0.2	< 0.2	< 0.2
	11/19/08	230	1.6	2.0	< 1.0	< 1.0
	05/04/10	150	< 1.0	< 1.0	< 1.0	< 1.0
MW04 (DECOM)	09/10/14	64	0.58	0.79	< 0.2	< 0.2
	10/25/18	54	0.61	< 0.4	< 0.4	< 0.4
	04/20/07	3,100	720	940	< 20	160
	11/20/08	10,000	640	1,100	< 50	130
MW05	05/05/10	10,000	1,000	1,600	< 50	370
	09/10/14	28,000	3,400	3,800	< 200	920
	03/28/08	19	110	40	< 1	2.8
	11/20/08	86	67	37	1.4	5.5
MW06	05/04/10	82	34	27	0.4	0.88
	09/11/14	71	22	5.6	0.3	< 0.2
	11/08/04	29	18	11	< 2.0	6
MW15	05/04/10	4,100	330	440	< 20	110
	10/07/14	10,000	450	320	< 50	72
	11/20/08	0.26	< 0.2	< 0.2	< 0.2	< 0.2
MW16	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	10/22/18	0.78	< 0.2	0.87	< 0.2	< 0.2
MW17 (DECOM)	11/19/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/05/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/09/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW19	10/22/18	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	06/01/06	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	03/11/09	< 1	< 1	< 1	< 1	< 0.2
MW21	05/03/10	< 1	< 0.2	< 0.2	< 0.2	< 0.2
	09/09/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	10/24/18	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
MW23 (DECOM)	11/20/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/09/14	< 0.2	< 0.2	< 0.2	< 0.2	0.73
MW24	10/22/18	< 0.2	< 0.2	1.7	< 0.2	0.37
	11/20/08	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
MW25	03/04/09	290	< 10	< 10	< 10	< 2.0
	05/05/10	40	0.42	< 0.2	< 0.2	< 0.2
	09/10/14	17	0.27	< 0.2	< 0.2	< 0.2
MW26	10/24/18	20	0.24	< 0.2	< 0.2	< 0.2
	05/04/10	14	0.31	1.1	< 0.2	< 0.2
	10/07/14	12	0.36	0.37	< 0.2	< 0.2
MW27	10/25/18	0.28	< 0.2	0.75	< 0.2	< 0.2
	05/04/10	< 1.0	< 0.2	< 0.2	< 0.2	< 0.2
	09/10/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
TMW01 (DECOM)	10/22/18	0.24	< 0.2	< 0.2	< 0.2	< 0.2
	07/01/11	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
	10/07/14	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
TMW02 (DECOM)	04/05/10	15	0.29	< 0.2	< 0.2	< 0.2
	04/05/10	16	< 1	< 1	< 1	< 0.2
	04/05/10	110	1.5	< 1.0	< 1.0	< 1.0
TMW03 (DECOM)	04/05/10	150	1.5	< 1	< 1	< 0.2
	04/05/10	310	3.6	< 2.0	< 2.0	< 2.0
	04/05/10	350	3.7	< 1	< 1	< 0.2

MTCA Cleanup Levels for Groundwater: PCE: 5, TCE: 5, DCE: 16, cis-1,2-1,2-DCE: 160, Vinyl Chloride: 0.2

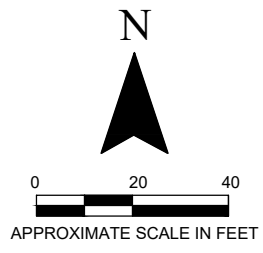


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**FIGURE 1**  
 GROUNDWATER ANALYTICAL RESULTS AND CONTOUR MAP FOR SHALLOW ZONE MONITORING WELLS

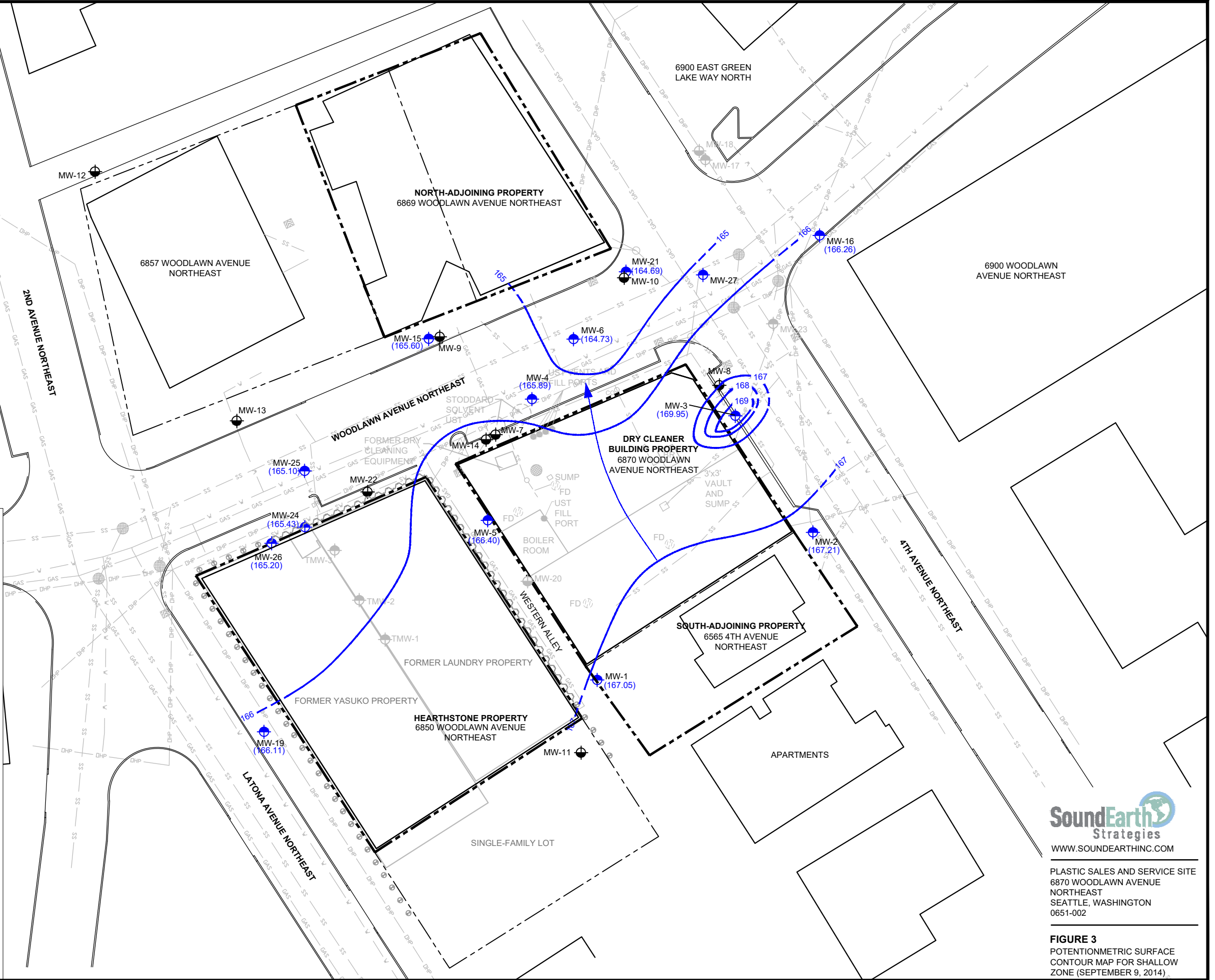
FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010

P:10651 HEARTHSTONE\0651-002 HEARTHSTONE - WOODLAWN EAST\TECHNICAL\CAD\2015\REVISED\_RIFS\_ADDENDUM\0651-002\_2015FSADD\_FIG3\_CM\_SH\_F.DWG 3/9/2016



- LEGEND**
- SHEET PILE SHORING
  - SOLDIER PILES
  - DEEP-ZONE MONITORING WELL
  - SHALLOW-ZONE MONITORING WELL
  - DECOMMISSIONED WELL
  - GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL (SEPTEMBER 9, 2014)
  - SHALLOW ZONE POTENTIOMETRIC SURFACE CONTOUR (SEPTEMBER 9, 2014)
  - APPROXIMATE DIRECTION OF GROUNDWATER FLOW (SHALLOW ZONE)
  - STORMWATER LINE
  - GAS LINE
  - SANITARY SEWER LINE
  - WATER LINE
  - OVERHEAD POWER LINE
  - SITE PROPERTY BOUNDARY
  - PARCEL BOUNDARY
  - CATCH BASIN
  - MANHOLE
  - FLOOR DRAIN

FIGURE DERIVED FROM BASEMAP BY FARALLON CONSULTING, 2010



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**FIGURE 3**  
POTENTIOMETRIC SURFACE  
CONTOUR MAP FOR SHALLOW  
ZONE (SEPTEMBER 9, 2014)