



July 18, 2019

Jim Orr, R.G.
Project Manager
Oregon DEQ
700 NE Multnomah St Ste 600
Portland, Oregon 97232-4100

Subject: Soil Gas Sampling Work Plan
Northwest Pipe Company – Remedial Investigation and Source Control Evaluation
ECSI Site 138

Dear Mr. Orr,

Please find enclosed a Passive Soil Gas Sampling Work Plan that NWP anticipates conducting in October 2019. This work is proposed to help NWP site additional groundwater wells, which the DEQ has requested in past meetings. We believe this effort will help formulate the location and number of wells to support our MNA remedy, and ultimately confirm a conditional Source Control Decision for our site.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephanie Heldt-Sheller", written over a horizontal line.

Stephanie Heldt-Sheller, CHMM
Corporate Environmental Manager

Cc:

Henning Larson, ODEQ
Kelly Madalinski, Port of Portland
Ken Shump, Haute-Géologie LLC;
Gretchen Gee, Jacobs;
Claudia Powers, Ater Wynne LLP;
Mike Merchant, Black Helterline LLP;
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Subject	Passive Soil Gas Investigation Work Plan
Attention	Stephanie Heldt-Sheller, Northwest Pipe Company
Date	July 12, 2019

1. Objective

This technical memorandum presents a proposed soil gas investigation downgradient of volatile organic compound (VOC) concentrations in the Southeast Area of the Northwest Pipe Company site in Portland, Oregon. The intent of this data collection effort is to provide a basis for siting additional groundwater monitoring wells in the area between Northwest Pipe monitoring well MW-03, near the southern boundary of the Northwest Pipe Site, and Port of Portland (Port) monitoring wells T4S1MW-03S and T4S1MW-09, near Terminal 4 Slip 1 on the Port's Terminal 4 property (Figure 1). This investigation plan was developed to respond to the Oregon Department of Environmental Quality (DEQ) and Region 10 of the Environmental Protection Agency (EPA) request, in support of issuing a conditional source control decision and remedial action involving a monitored natural attenuation (MNA) remedy for groundwater containing VOCs in the Southeast Area of the site.

2. Background

Past sampling work in the Southeast Area began in 1988 during Northwest Pipe's due diligence effort prior to acquiring the property and is ongoing (CH2M HILL, 2015). Investigations have shown concentrations of VOCs are present in Southeast Area groundwater, principally the chlorinated solvents tetrachloroethene (PCE) and its breakdown products trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride (VC). TCE is both a breakdown product of PCE and a commercially-available solvent. Therefore, the presence of TCE may be attributable, in part, to past use of products containing TCE.

Elevated VOC concentrations are limited to the shallow unconfined aquifer (CH2M HILL, 2015). The shallow aquifer is located within hydraulic fill (dredged river sediment) placed in the late 1930s and early 1940s over the mudflats that formerly existed in the site vicinity. The hydraulic fill is characterized by fine to medium sand and silty sand extending from the ground surface to approximately 28 feet below ground surface (bgs), saturated in its lower portion under unconfined conditions, and underlain by a thick, low-permeability alluvial confining layer. The confining layer consists of low-permeability silt with interbedded sand from approximately 28 feet to 161 feet bgs. The top of this confining layer represents the historical ground surface prior to site filling and development.

The current groundwater monitoring network in the Southeast Area of the Northwest Pipe site consists of six monitoring wells installed in the shallow aquifer (Figure 1). The direction of groundwater flow is to the southwest toward Terminal 4 Slip 1 on the Port property. Groundwater elevation contours are shown from the most recent sampling event in May 2019 in Figure 1. Given the direction of groundwater flow, recent supplemental groundwater investigation has included selected shallow aquifer wells downgradient of the Southeast Area on the Port property (Figure 1).

3. Proposed Soil Gas Investigation

The purpose of this work is to investigate a portion of the VOC plume in order to site additional wells to supplement the current groundwater MNA monitoring network (Figure 1). An MNA remedy uses the ongoing natural attenuation processes for chlorinated solvents in the shallow aquifer to protect potential receptors of surface water in the Willamette River downgradient of the Southeast Area consistent with reasonably likely beneficial use of the aquifer (EPA 1999, DEQ 2017). To meet this objective, a targeted array of passive soil gas (PSG) samples is proposed. Passive soil gas measurements have been shown to generally correlate with the magnitude of VOC concentrations measured in groundwater by direct groundwater sampling and analysis (EPA 1998). Results of the soil gas measurements will be used to propose additional well locations along the groundwater flow path to support Northwest Pipe's effort to document changes in groundwater concentrations between MW-03 and Port monitoring wells T4S1MW-03S and T4S1MW-09.

The proposed soil gas investigation consists of a total of 20 PSG samples. Eighteen of the PSG samplers will be installed in three transects of six samplers each. Approximate locations of PSG sampler installation are shown in Figure 2. Depending on site access constraints, actual sampling locations may need to be adjusted slightly to avoid obstacles or to provide sampling locations that are safe for site workers. Two additional samplers will be installed near Northwest Pipe monitoring wells MW-03 and MW-04, in the Southeast Area, to provide information on how the soil gas concentrations correspond to groundwater concentrations. Beacon Environmental Services of Forest Hill, Maryland (Beacon) will provide the PSG sampler kits and will perform the laboratory analyses. Soil gas samples will be analyzed by Beacon using gas chromatography/mass spectrometry (GC/MS) instrumentation consistent with EPA Method 8260C (EPA 2015).

3.1 Installation and Retrieval of PSG Samplers

The PSG sampler contains two sets of hydrophobic adsorbent cartridges to absorb soil gas. The PSG samplers will be installed by hand using a hammer drill and drill bits of two sizes. Installation will begin by advancing an approximately 1 ½ inch diameter hole to 1 foot bgs. The hole will then be extended to 3 feet bgs using a ½ inch diameter drill bit. For those locations through asphalt or concrete surfacing, the upper 1 foot of the hole will be outfitted with a pre-cleaned metal pipe sleeve provided in the PSG sample kit. These sleeves prevent horizontal migration of vapors in the more porous subgrade from influencing the soil gas samplers. The PSG sampler will then be installed in the upper portion of the hole, sealed with an aluminum foil plug, and covered with soil or a thin concrete patch for locations through asphalt or concrete surfacing. The samplers will be left in place for approximately 14 days.

To retrieve the PSG samplers, the sampler will be extracted from each location by a length of wire wrapped around the vial. Following extraction, the samplers will be shipped to Beacon's laboratory consistent with Beacon's recommended sample handling protocol, including chain of custody

procedures. A trip blank will be included in the analysis which will remain with the other PSG samples during preparation, shipment, and storage.

In addition to collecting the PSG sample results, groundwater samples will be collected from MW-03 and MW-04 where two PSG samplers will be collocated. It is anticipated that the gas sampling event will be coordinated with the fourth quarter semiannual groundwater monitoring event tentatively scheduled for October 2019.

3.2 Constituents to be Analyzed

The samples will be analyzed using EPA Method 8260C for the constituents listed in Table 1.

Table 1: Constituents Reported for PSG Samplers

Constituents to be Reported
1,1-Dichloroethene
Tetrachloroethene (PCE)
trans-1,2-dichloroethene
Trichloroethene (TCE)
Vinyl Chloride
Note:
Constituent concentrations reported as nanograms.

3.3 Processing of Results

Soil gas results will be evaluated in conjunction with available groundwater concentration data and groundwater level data, taking into account input from the Port of Portland regarding physical obstacles for well locations considering the potential for installing future rail spurs or other land use considerations by Port tenants. Based on this evaluation, Northwest Pipe will propose well locations to supplement the current monitoring network to support MNA monitoring.

4. Reporting

After completing the soil gas investigation, Northwest Pipe proposes to submit the results of the soil gas investigation and the proposed locations of the wells to supplement the MNA monitoring network to DEQ and EPA in a technical memorandum. The memorandum will include soil gas concentration data, laboratory analytical reports, a map of the sample results, and, as appropriate, photographs or other field documentation that Northwest Pipe considers necessary for presenting the results of the work. The memorandum will include a map of the proposed well locations and a description of the proposed well construction.

5. References

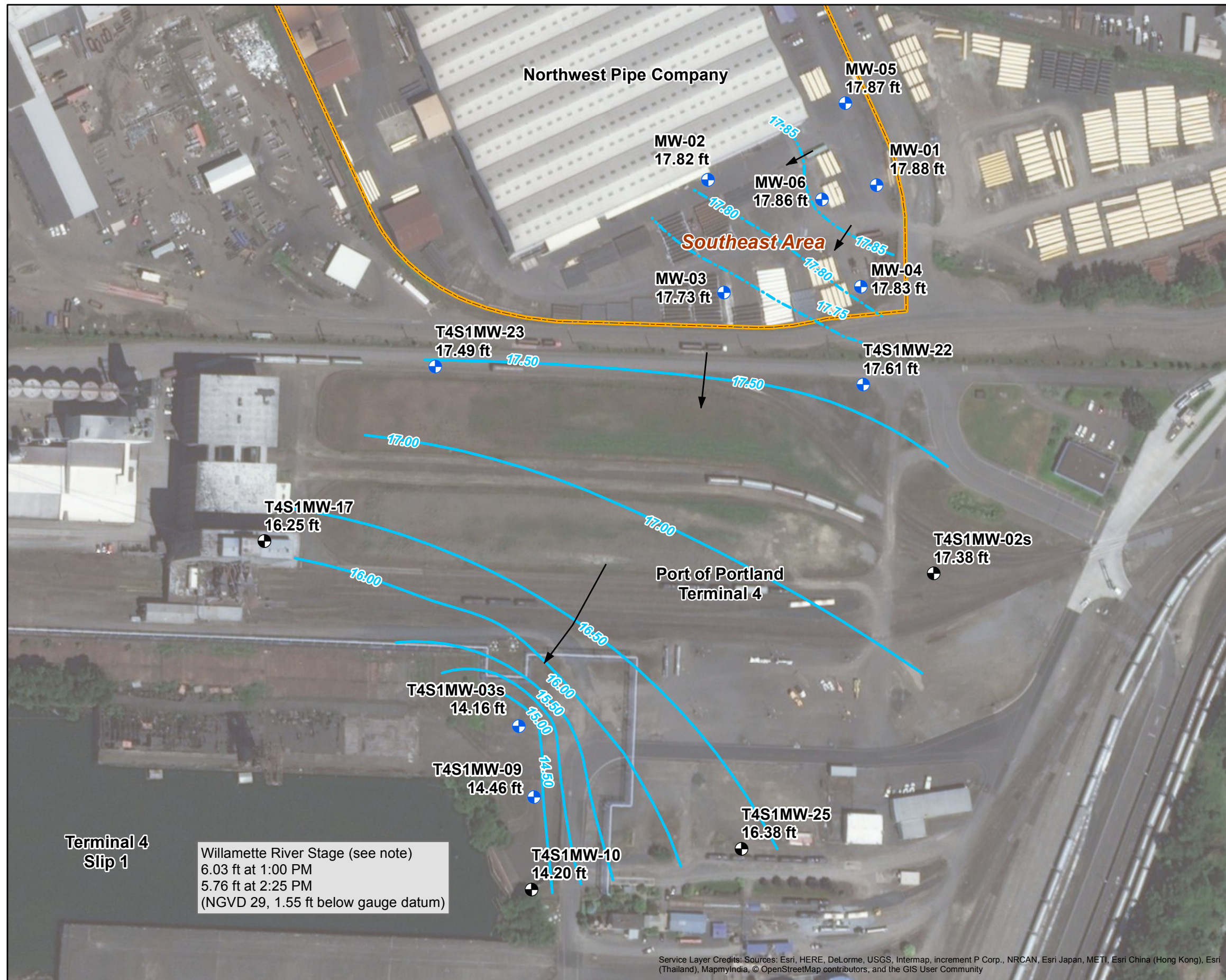
CH2M HILL. 2015. Final Northwest Pipe Company Remedial Investigation and Source Control Evaluation. Prepared for Northwest Pipe Company, ECSI #138, Portland, Oregon. March.

DEQ. 2017. *Guidance for Conducting Beneficial Water Use Determinations at Environmental Cleanup Sites*. Oregon DEQ Environmental Cleanup Program. July 1, 1998, updated November 2017.

EPA. 1998. *Environmental Technology Verification Report, Passive Soil Gas Sampling Technology*, W.L. Gore & Associates, Inc. GORE-SORBER Screening Survey. Prepared for the National Exposure Research Laboratory, Office of Research and Development. EPA/600/R-98/095. August 1998.

EPA. 2015. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. EPA publication SW-846, Third Edition, Final Updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), and V (2015).

EPA. 1999. *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites*. U.S. Environmental Protection Agency Office of Solid Waste and Emergency Response Directive 9200.4-17P. April 1999.



LEGEND

Current Monitoring Network

- Groundwater Quality Monitoring Well
- Well Used for Water Level Only
- Groundwater Elevation Contour (0.5 ft contour interval, ft NGVD29)
- Groundwater Elevation Contour (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
- Groundwater Flow Direction
- Northwest Pipe Facility Boundary

Note: Groundwater levels measured between 1:00 PM and 2:30 PM on May 7, 2019. During this period, the Willamette River stage decreased by 0.27 feet, as measured at the Broadway Bridge river gauge (USGS 14211720).

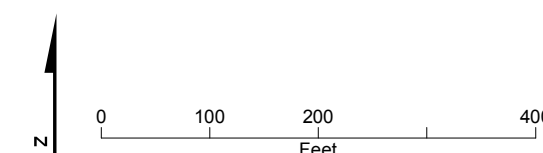
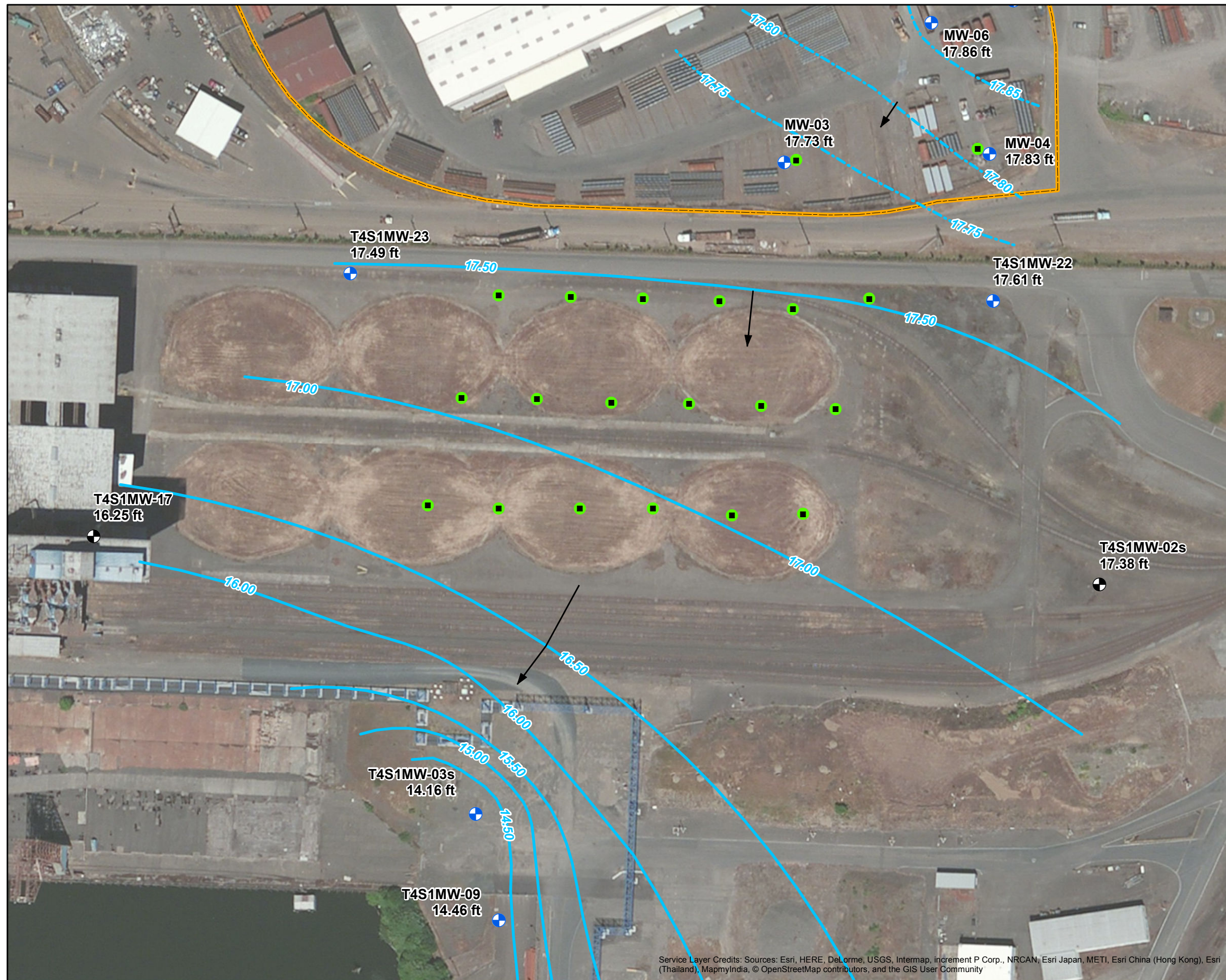


Figure 1. Current Groundwater Monitoring Network and General Flow Direction
Northwest Pipe Company
Portland, Oregon



LEGEND

- Proposed Soil Gas Investigation Location
- Current Monitoring Network**
 - Groundwater Quality Monitoring Well
 - Well Used for Water Level Only
 - Groundwater Elevation Contour (0.5 ft contour interval, ft NGVD29)
 - Groundwater Elevation Contour (0.05 ft contour interval, to show detail in the NW Pipe Southeast Area, ft NGVD29)
 - Groundwater Flow Direction
 - Northwest Pipe Facility Boundary

Note:
Groundwater elevation contours represent measurements from May 7, 2019.

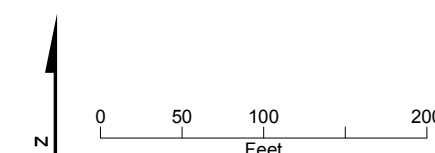


Figure 2. Proposed Soil Gas Investigation
Sample Locations
Northwest Pipe Company
Portland, Oregon

Service Layer Credits: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), MapmyIndia, © OpenStreetMap contributors, and the GIS User Community