State of Oregon
Department of Environmental Quality Memorandum

Date: December 30, 2024

To: FILE

Through: Kevin Parrett, Katie Daugherty, Heidi Nelson, and Ken Thiessen

From: Kevin Dana
Northwest Region

Subject: Wirfs Property, ECSI #2424; Staff Memorandum in support of a Conditional No Further Action determination

This document presents the basis for the Oregon Department of Environmental Quality's (DEQ's) recommended Conditional No Further Action (CNFA) determination for the Wirfs Property (the Site) in Portland. As discussed in this report, contaminant concentrations in groundwater and soil gas exceed acceptable risk levels for applicable exposure pathways. Consequently, the No Further Action determination will be conditioned upon adherence to restrictions recorded in an Easement and Equitable Servitudes attached to the property deed.

The proposed CNFA determination meets the requirements of Oregon Administrative Rules (OAR) Chapter 340, Division 122, Sections 010 to 0140; and Oregon Revised Statutes (ORS) 465.200 through 465.455.

The proposal is based on information documented in the administrative record for the Site. A copy of the administrative record index is presented at the end of this report.

1. BACKGROUND

Site location.
The Site's location can be described as follows:
- Address: 3720 NW Yeon Ave., Portland, Multnomah County, Oregon.
- Latitude 45.5484º North; Longitude 122.7181º West
- Tax Lot 200, Township 1 North, Range 1 East, Section 29, Willamette Baseline and Meridian.

Site setting.
The Wirfs Property is located on the south side of NW Yeon Avenue, east of NW 35th Avenue, in the Northwest Industrial area of Portland. (See Attachment 1 for a topographic map and Attachment 2 for an aerial photograph of the Site). A warehouse covers most of the 2.84-acre Site. Paved open spaces are present at the north and south ends of the Site. Railroad spurs border the Site to the east. Another warehouse, at 3738 NW Yeon Avenue, lies between the Site and NW 35th Avenue to the west. Contamination from the Site extends south onto the neighboring property at 3322 NW 35th Avenue.

Hydrogeologic setting.
The Site is located atop the former Guild's Lake, as shown on Attachment 3. Soils at the Site generally consist of fill sands down to 35 feet below ground surface (bgs), with silts and clay from 35 to 50 feet bgs. Groundwater is first encountered at depths ranging from six to eleven (6-11) feet bgs. The groundwater gradient is nearly flat but tilts slightly to the south-southeast (away from the Willamette River, which is 2,300 feet northeast of the Site).

Site history.
Guild's Lake and surrounding marshes were filled in from 1905 through the 1940s. The Wirfs Property was originally developed for wartime housing in the early 1940s. The current warehouse building was constructed in 1948 and was first occupied by Willard Storage Battery Company, a battery manufacturer. The building was subsequently occupied by:

- Great Western Chemical Company, a chemical manufacturer, from 1958 to 1971;
- Ace Hardware, as a warehouse for hardware goods, from 1971 to 1976;
- Barker Manufacturing, a furniture manufacturer, from 1976 to 1978;
- Chase Bag, a paper bag manufacturer, from 1978 to 1992; and
- Daisy Kingdom, a textile and craft manufacturer, from 1992 to 1997.

The Site was apparently vacant from 1997 to 2000. From about 2000 until 2010 the building was used as a storage warehouse by DWA Trade Show & Exposition Services (for the storage of trade show displays). Convoy Supply Ltd. (a roofing, siding, and fencing distributor) has used the Site as a storage warehouse since 2010.

Schnitzer Investment Corporation purchased the Site from "Mitchell Brothers" in June 1968 and sold the Site to Donald & Stephanie Wirfs in August 1998. The Site was purchased by Conax Properties USA, Inc. in 2010.

2. BENEFICIAL LAND AND WATER USE DETERMINATIONS

Land use.
The Wirfs Property and all surrounding properties are located within the Guild's Lake Industrial Sanctuary and are zoned Heavy Industrial with a Prime Industrial overlay (IHk) by the City of Portland, as shown in Attachment 4. The zoning is intended to preserve and protect the Industrial Sanctuary by restricting non-industrial land uses in the area.

Groundwater use.
A search of well logs on file with the Oregon Water Resources Department identified five domestic wells and four industrial wells within a one-mile radius of the Site. The domestic wells serve rural residential properties in the Tualatin Mountains (a.k.a. the "West Hills") nearly a mile southwest of the Site. The nearest industrial wells are located at 3366 NW Yeon Avenue (about one-half mile to the east) and average 600 feet in depth.

The City of Portland is served by a municipal water supply system. The water is primarily obtained from surface water reservoirs in the Bull Run watershed on the western slopes of Mount Hood, and is supplemented by groundwater from the Columbia South Shore Wellfield.

Surface water use.
The nearest surface water body is the Willamette River, approximately 2,300 feet northeast of the Site. The Willamette is used for navigation, fishing and recreation, and provides habitat for wildlife including steelhead and Chinook and Coho salmon. Stormwater at the Site originally discharged through Outfall 17 to the Willamette River in Portland Harbor. However, stormwater in the area was diverted to the Balch Creek Consolidated Conduit in 2011 and now flows to a City of Portland publicly owned treatment works (POTW) on Columbia Boulevard.

3. INVESTIGATION AND CLEANUP WORK

A 1,000-gallon underground storage tank (UST) formerly holding gasoline was reportedly removed from just outside the southwest corner of the building in March 1988. (See Attachment 5 for a map showing the tank location). A single soil sample was collected from beneath the UST and analyzed for gasoline, four petroleum constituents, and the chlorinated solvents perchloroethene (PCE) and trichloroethene (TCE). PCE and TCE were each detected at a concentration of 0.2 parts per million (ppm).

A 12,000-gallon bunker fuel UST was removed from the paved area at the south end of the Site in August 1996. (See Attachment 5 for a map showing the tank location). Soil samples were collected from 12 inches beneath each end of the UST and analyzed for petroleum hydrocarbons. No petroleum hydrocarbons were identified.

Lead Contamination
In September 1997, seven composite surface soil samples were collected from railroad spurs along the east and west sides of the building. (See Attachment 6 for a map of the sample locations. Note that north is to the left). The seven composite samples were analyzed for total lead. Lead was detected along the east side of the building at concentrations up to 7,240 ppm. Lead was detected on the west side of the building at concentrations up to 130 ppm.

Fifty-one (51) additional soil samples were collected from 19 locations (labeled "8" to "26") along the east side of the building and in the southeast corner of the Site to determine the extent of the lead contamination. (See Attachment 7 for a map of the sample locations). Lead concentrations exceeded 1,000 ppm in 10 of the 19 surface soil samples (from six inches bgs), with a maximum concentration of 94,600 ppm. Concentrations decreased rapidly with depth, with a maximum of only 207 ppm lead at 36 inches bgs.

The east rail spur and 295 tons of lead-contaminated soils were removed from the Site in December 1997. The soils were shipped to the Chemical Waste Management landfill in Arlington, Oregon for pre-treatment and disposal. The excavation generally extended 12 inches bgs along 300 feet of rail spur (with some areas extending up to 30 inches bgs), and the contaminated soil area in the southeast corner of the Site was excavated to 18 inches bgs. After completion of the removal, 37 confirmation soil samples were collected from the east sidewall and floor of the excavation and analyzed for total lead. Four of the samples showed residual concentrations of lead above 1,000 ppm. The average residual lead concentration along the rail

spur was determined to be 660 ppm. The cleanup goal at the time was 2,000 ppm. (See Attachment 8 for a diagram of the excavation and confirmation soil sampling results).

Remedial Investigation

Fourteen soil borings (labeled "B-1" through "B-14") were advanced across the Site in January 2010 as part of a subsurface remedial investigation. Boring B-1 was advanced at the north end of the Site, boring B-2 was advanced along the east side of the Site, and the remaining borings were advanced in the open yard at the south end of the Site. (See Attachment 5 for a map of the southern boring locations). A total of 16 soil samples and eight groundwater samples were collected from the borings, and the samples were generally analyzed for petroleum hydrocarbons, volatile organic compounds (VOCs), and lead.

Little or no contamination was detected in the soil samples and in the majority of the groundwater samples. However, the groundwater samples from four borings (generally in the southeast quarter of the yard) were impacted with chlorinated solvents, including PCE at concentrations up to 12,200 parts per billion (ppb) and TCE at concentrations up to 2,880 ppb. A groundwater sample from the lead removal area found total lead at 36.6 ppb.

In February 2010, groundwater samples were collected from three off-site monitoring wells on the adjacent property to the south (labeled "MW-1", "MW-2", and "MW-6" on Attachment 5). Chlorinated solvents were detected in MW-2, the monitoring well closest to the Wirfs Property, including PCE at 105 ppb and TCE at 13.3 ppb. No VOCs were detected in the other two wells.

Eight additional borings (labeled "B-15" through "B-22") were advanced in the open yard at the south end of the Site in April 2010, as shown on Attachment 5. One soil sample and one groundwater sample were collected from each boring. The soil samples were collected at six feet bgs and were analyzed for petroleum hydrocarbons and VOCs. No contaminants were detected in any of the soil samples. The groundwater samples were collected from 8-13 feet bgs and were analyzed for VOCs. VOCs were detected in most of the groundwater samples. The most significant concentrations were detected in boring B-20, in the southeast corner of the Site:

1,1-dichloroethene (9.36 ppb)	perchloroethene (71,300 ppb)
cis-1,2-dichloroethene (10,200 ppb)	trichloroethene (9,970 ppb)
trans-1,2-dichloroethene (142 ppb)	vinyl chloride (448 ppb)

Half of the groundwater samples were analyzed for iron and magnesium, finding iron at concentrations up to 23,000 ppb and magnesium at concentrations up to 14,600 ppb. Finally, boring B-22 was advanced to 50 feet bgs, and groundwater was collected from multiple screened intervals to determine the depth of the contamination. No VOCs were detected at 26-30 feet or 38-42 feet bgs.

In July 2011, four borings (labeled "B-23" through "B-26") were advanced in the area of the rail spurs to the east of the Site. (See Attachment 9 for a map of the boring locations). Two soil samples and a groundwater sample were collected from each boring, and all 12 samples were analyzed for VOCs. No VOCs were detected in the soil samples (which were collected at two

feet and nine feet bgs). The groundwater samples were collected from 11-15 feet bgs. Only cis-1,2-dichloroethene (at concentrations up to 1.41 ppb) and vinyl chloride (at concentrations up to 0.81 ppb) were detected in the groundwater.

Groundwater Monitoring

Four groundwater monitoring wells (labeled "MW-1" through "MW-4") were installed on the Wirfs Property in September 2011. (See Attachment 9 for a map of the monitoring well locations). All four wells extended 15 feet bgs and were screened from 5-15 feet bgs. Soil samples were collected from each well during installation at two feet and six feet bgs and were analyzed for VOCs. Virtually no contamination was detected. Groundwater samples were collected from the wells in October and December 2011 and also analyzed for VOCs. Cis-1,2-dichloroethene ("DCE", at concentrations up to 1,980 ppb), PCE (up to 14,100 ppb), TCE (up to 4,160 ppb), and vinyl chloride (up to 143 ppb) were detected in the southernmost wells (MW-3 and MW-4), with the highest concentrations in MW-4.

The four on-site monitoring wells were sampled quarterly for VOCs in 2012. In the last two quarters, the wells were sampled in conjunction with the three monitoring wells on the south-adjacent property. Little to no groundwater contamination was detected in on-site wells MW-1 and MW-2. DCE (up to 2,770 ppb), PCE (up to 19,600 ppb), TCE (up to 5,900 ppb), and vinyl chloride (up to 96 ppb) were detected in MW-3 and MW-4, with the highest concentrations in MW-4. DCE (up to 17.1 ppb), PCE (up to 173 ppb), TCE (up to 21.4 ppb), and vinyl chloride (up to 2.16 ppb) were also detected in MW-2 on the south-adjacent property. No VOCs were detected in MW-1 or MW-6 on the south-adjacent property.

Phase II Remedial Investigation

Work resumed on the project in July 2014 with the advancement of six additional borings (labeled "B-27" through "B-32") and one additional monitoring well (MW-5A), mostly on the south-adjacent property. (See Attachment 10 for a map of the boring and monitoring well locations). Soil samples were collected at two feet and eight feet bgs from each boring and the monitoring well and were analyzed for VOCs. Little to no contamination was detected. Groundwater samples were also collected from the borings and analyzed for VOCs. Borings B-28 through B-32 were screened from nine to 13 feet bgs. Contaminants including DCE (up to 762 ppb), PCE (up to 32.7 ppb), TCE (up to 42.1 ppb), and vinyl chloride (up to 188 ppb) were detected in B-28 and B-30, while significantly lower concentrations (less than 10 ppb) of contaminants were present in the other borings. Borings B-27 and B-28 were screened from 23-27 feet and 31½-35½ feet bgs. Little to no VOC contamination was detected at these intervals.

Four soil gas samples (labeled "SG-1" through "SG-4") were also collected in the area. (See Attachment 11 for a map of the soil gas sampling locations). All four samples were collected at five feet bgs and analyzed for chlorinated VOCs. PCE was detected at concentrations up to 19,000 micrograms per cubic meter ($\mu g/m^3$). DCE (up to 87 $\mu g/m^3$), TCE (up to 1,400 $\mu g/m^3$), and 1,1,1-trichloroethane ("TCA", up to 26 $\mu g/m^3$) were also detected.

The four on-site monitoring wells were resampled for VOCs in September and December 2014 and March 2015 in conjunction with the four monitoring wells on the south-adjacent property.

DCE (up to 5,960 ppb), PCE (up to 18,900 ppb), TCE (up to 9,210 ppb), and vinyl chloride (up to 124 ppb) were detected in on-site wells MW-3 and MW-4 and in off-site well MW-2. Little to no contamination was detected in the other wells.

Feasibility Study

A Feasibility Study was completed for the Wirfs Property in July 2016. The report noted that lead was the only contaminant that had been detected in on-site soils at levels exceeding risk-based concentrations (RBCs) for occupational exposures. However, the average residual concentration of lead along the former east rail spur was less than the occupational direct contact RBC of 800 ppm. In groundwater, concentrations of PCE and TCE exceeded occupational vapor intrusion RBCs and construction and excavation worker direct contact RBCs. However, four soil gas samples collected in July 2014 had found no exceedances of soil gas RBCs for on-site workers, so the vapor intrusion exposure pathway appeared to be incomplete.

The Feasibility Study recommended that a Health and Safety Plan (HASP) and Contaminated Media Management Plan (CMMP) be prepared for the Site to protect future construction and excavation workers who might come into contact with the contaminated groundwater. It also recommended that an Easement and Equitable Servitudes (EES) be recorded on the property deed to alert future property owners to the groundwater contamination and to require preparation and DEQ approval of a CMMP and HASP prior to conducting any subsurface excavation work in the vicinity of the groundwater contamination.

In a draft Staff Decision Memorandum (prepared in June 2017) DEQ recommended an additional restriction for the EES: that the construction of new buildings or the expansion of existing buildings in the contaminated area be prohibited unless the buildings were equipped with vapor controls, or unless long-term soil gas monitoring showed no vapor intrusion concerns. The memo was released for a 30-day public notice and comment period in July 2017. No comments were received, and the memo was finalized in August 2017.

Source Control Decision

The Wirfs Property was identified as needing a Source Control Decision for the prior discharge of stormwater through Outfall 17 to the Portland Harbor Superfund site and for the potential for groundwater to migrate to the Willamette River. In December 2016, a sediment sample was collected from the on-site stormwater line. Lead was detected in the sediment at a concentration of 23,200 ppm, with a leachable lead concentration of 958 milligrams per liter (mg/L).

The stormwater line was blocked off at the downgradient end of the Site and cleaned out with a water jet in February 2017. A total of 7,919 gallons of liquids and solids were collected and temporarily stored in two on-site Baker tanks. Initial sampling identified up to 40,900 ppb lead in the tanks. In March, the water was pumped through a “chitosan style GelFloc sock” to coagulate and settle out the solids. A total of 6,793 gallons of water were subsequently shipped off-site for recycling and disposal, while the remaining 1,126 gallons of sediments and rinse waters were shipped to the Chemical Waste Management landfill in Arlington for disposal.

DEQ prepared a draft Source Control Decision in November 2017. DEQ noted in the SCD that, since 2012, stormwater from the Site had flowed through the Balch Creek Consolidated Conduit to the Columbia Boulevard POTW, and so did not pose a discharge threat to Portland Harbor. DEQ also determined that the groundwater plume at the south end of the Site was stable and that the groundwater gradient was to the southeast, away from the Willamette River. Consequently, the Wirfs Property did not appear to pose a recontamination threat to Portland Harbor.

DEQ received comments on the draft SCD from the Environmental Protection Agency (EPA), the Yakama Nation, and a consultant representing a consortium of five federally recognized tribes (the "Five Tribes"). Both EPA and the Five Tribes expressed concerns about the adequacy of the Remedial Investigation in determining the nature and extent of the groundwater contamination, while the Yakama Nation expressed a general concern about leaving the highly concentrated plume of groundwater contamination untreated.

The contractor for the Wirfs Property finalized a Response to Comments in July 2018. The contractor was able to provide additional information on the nature and extent of the contamination to EPA and the Five Tribes, addressing many of the concerns regarding the sufficiency of the Remedial Investigation. DEQ provided its own Response to Comments in separate letters to EPA, the Yakama Nation, and the Five Tribes in October 2018, in which DEQ noted that the final remedy for the Site would differ from the proposed remedy. The Source Control Decision was finalized and approved in January 2019.

Record of Decision

The proposed remedy selected in the Feasibility Study and approved by DEQ in the Staff Decision Memorandum required the owners of the south-adjacent property to record the same restrictions on their property as were proposed for the Wirfs Property, as the groundwater contamination extended onto the south-adjacent property. However, in February 2018, a representative of the south-adjacent property owners had written to DEQ that the owners had no interest in recording an EES on their property deed. As the initial proposed remedy could not be implemented as planned, DEQ selected an alternate remedy of chemical oxidation treatment of the groundwater followed by a year of groundwater monitoring. The Record of Decision (ROD) was finalized in January 2020.

Remedial Design

In July 2020, 14 borings were advanced through the paved outdoor storage area at the south end of the Site, as shown on Attachment 12. A membrane interface hydraulic profiling tool (MiHpt) was inserted down each borehole to determine the treatability of the groundwater contamination as well as the vertical extent of the contamination. The data showed that the contamination began at about 10 feet bgs and extended to 24 feet bgs.

In June 2021, three additional borings (labeled "B-33" through "B-35") were advanced and five additional monitoring wells (labeled "MW-5" through "MW-9") were installed at the Site, as shown on Attachment 13. Soil samples were collected from the borings and monitoring wells at 21 feet bgs, finding gasoline (195 ppm), diesel (88.9 ppm), and heavy oils (166 ppm) in addition to DCE (312 ppm), PCE (237 ppm), TCE (19.9 ppm), and vinyl chloride (25.7 ppm). Initial

groundwater samples from the monitoring wells found up to 2,450 ppb gasoline, 5,890 ppb DCE, 9,390 ppb PCE, 2,100 ppb TCE, and 3,840 ppb vinyl chloride. Sampling of the entire on-site monitoring well network (MW-1 through MW-9) in July 2021 identified DCE (up to 20,200 ppb), PCE (up to 9,670 ppb), TCE (up to 2,540 ppb), and vinyl chloride (up to 24,600 ppb), along with trans-1,2-dichloroethene (up to 159 ppb) and 1,4-dioxane (up to 0.435 ppb).

A Remedial Injection Work Plan was completed in May 2022. The project consultant proposed injecting a mixture of three remedial compounds into the groundwater plume to treat the contamination: 3D Microemulsion (3DME), Sulfonated Zero Valent Iron (S-MZVI), and Bio-Dechlor Inoculum Plus (BDI Plus). BDI Plus was described as "an enriched, natural microbial consortium . . . capable of completely dechlorinating contaminants", while 3DME was a food source and S-MZVI helped provide "optimum conditions for anaerobic biological degradation."

Remedial Action

The remedial injections took place in June 2022 at 53 gridded locations, as shown on Attachment 14. In the 3,500 square foot eastern grid, the remedial compounds were injected to depths of 9-17 feet bgs through 22 injection points to address an area of shallow groundwater impacts. In the 5,000 square foot western grid, the remedial compounds were injected to depths of 18-28 feet bgs through 31 injection points to address an area of deeper groundwater impacts.

Four quarters of groundwater monitoring were subsequently conducted (in July and October 2022 and January and May 2023) to determine the effectiveness of the treatment. PCE and TCE concentrations in four of the seven impacted wells increased in the first one or two quarters of monitoring before substantially decreasing by the fourth quarter, indicating mobilization and subsequent remediation, while PCE and TCE concentrations continuously decreased in two other wells. The exception was monitoring well MW-8, south of the western grid, which initially showed little contamination. Concentrations of PCE and TCE in MW-8 spiked substantially in the third quarter of monitoring and remained high in the fourth quarter. The increase was attributed to the remedial compounds spreading south (downgradient) to the well, mobilizing PCE and TCE prior to subsequent remediation, as had occurred in the other wells.

As of May 2023, PCE was present in MW-8 at a concentration of 6,430 ppb, and TCE was present at 1,590 ppb. The second most impacted well, MW-9, showed 141 ppb PCE and 416 ppb TCE, while in five of the nine monitoring wells, PCE and TCE concentrations were 2 ppb or less. However, concentrations of degradation products increased to 28,900 ppb DCE and 48,900 ppb vinyl chloride across the nine wells, along with 201 ppb trans-1,2-dichloroethene.

Confirmation Sampling

In March 2024, a second round of soil gas sampling was conducted to update the results from the first round of sampling in July 2014. Six soil gas samples (labeled "SV-1" through "SV-6") were collected at depths of 5 feet bgs across the south end of the Site, as shown on Attachment 15. PCE was detected at concentrations up to 15,000 $\mu g/m^3$, along with chloromethane (9,500 $\mu g/m^3$), DCE (5,500 $\mu g/m^3$), TCE (1,900 $\mu g/m^3$), and vinyl chloride (180 $\mu g/m^3$). The highest concentrations were measured in the center of the groundwater plume, but a high concentration of PCE (13,000 $\mu g/m^3$) was also observed adjacent to the warehouse building.

Two sub-slab vapor samples (and a duplicate) were subsequently collected from beneath the south end of the building in June 2024, as shown on Attachment 15. The sub-slab vapor samples were collected over a two-week period using passive samplers. Up to 880 µg/m^3 PCE and 89 µg/m^3 TCE were detected.

Nature and extent of contamination.
Lead is present in near-surface soils on the eastern edge of the building. The chlorinated solvents cis-1,2-dichloroethene (DCE), perchloroethene (PCE), trichloroethene (TCE), and vinyl chloride are present in groundwater and soil gas at the south end of the Site.

4. RISK EVALUATION

Conceptual site model.
A conceptual site model identifies the sources of contamination at a site, the human or ecological receptors that could be exposed to the contamination, and the pathways by which the exposures could occur.

To evaluate human exposure to residual chemical contamination requires an assessment of the type and extent of that exposure. This is based on current and reasonably likely future site use. DEQ publishes risk-based concentrations (RBCs) for contaminants commonly encountered, for different types of exposure scenarios. These RBCs are conservative estimates of protective levels of contaminants in soil, groundwater and air. Table 1 shows potential exposure pathways and receptors for this site. Based on this, applicable RBCs are identified and used for risk screening.

Table 1. Identification of applicable RBCs, based on pertinent pathways and receptors

Pathway	Receptor	Applicable RBC?	Basis for exclusion
SOIL			
Ingestion, dermal contact, and inhalation	Residential	No	See Note 1.
	Urban residential	No	See Note 1.
	Occupational	Yes	
	Construction worker	Yes	
	Excavation worker	Yes	
Volatilization to outdoor air	Residential	No	See Note 1 & Note 2.
	Urban residential	No	See Note 1 & Note 2.
	Occupational	No	See Note 2.
Leaching to groundwater	Residential	No	See Note 1 & Note 3.
	Urban residential	No	See Note 1 & Note 3.
	Occupational	No	See Note 3.
GROUNDWATER			
Ingestion and inhalation from tap water	Residential	No	See Note 1 & Note 3.
	Urban residential	No	See Note 1 & Note 3.
	Occupational	No	See Note 3.

Pathway	Receptor	Applicable RBC?	Basis for exclusion
Volatilization to outdoor air	Residential	No	See Note 1.
	Urban residential	No	See Note 1.
	Occupational	Yes	
Vapor intrusion into buildings	Residential	No	See Note 1.
	Urban residential	No	See Note 1.
	Occupational	Yes	
Groundwater in excavation	Construction and excavation worker	Yes	
SOIL GAS			
Vapor intrusion into buildings	Residential	No	See Note 1.
	Urban Residential	No	See Note 1.
	Occupational	Yes	

Notes:
1. The Site and surrounding properties are zoned Heavy Industrial by the City of Portland. Based on the zoning, future residential development in the area is not likely.
2. No volatile contaminants were detected in on-site soils.
3. A municipal water supply is available to the area, and no domestic water wells have been identified in the vicinity of the Site. This exposure pathway is not likely to be complete.

Contaminant concentrations.
Contaminants of Potential Concern (COPCs) are contaminants that are present at a site at concentrations exceeding an RBC for a complete exposure pathway.

The only significant soil contamination at the Wirfs Property is residual lead-contaminated soils along a former rail spur on the east side of the warehouse building. The average residual lead concentration in the area was reported to be 660 ppm. The current RBC for direct contact with lead-contaminated soils at a non-residential site is 800 ppm. As lead concentrations in the area meet current RBCs, no further investigation or cleanup of the soils is necessary.

Contaminants in groundwater at the south end of the Site may volatilize to outdoor air and be inhaled by occupants of the Site. Table 2 shows the maximum concentrations of groundwater contaminants detected in the most recent round of groundwater sampling at the Site, and compares those concentrations with DEQ's volatilization to outdoor air RBCs to determine if there are any COPCs.

Table 2. Screening for Occupational COPCs for the Volatilization to Outdoor Air exposure pathway for groundwater contaminants.

Contaminant of Interest	Maximum GW Concentration	Occupational RBC	COPC (Y/N)
cis-1,2-Dichloroethene	28,900 ppb	>S	N
trans-1,2-Dichloroethene	201 ppb	>S	N
Perchloroethene	6,430 ppb	>S	N

Contaminant of Interest	Maximum GW Concentration	Occupational RBC	COPC (Y/N)
Trichloroethene	1,590 ppb	20,000 ppb	N
Vinyl Chloride	48,900 ppb	5,900 ppb	Y

Notes:
1. The symbol ">S" signifies that the RBC for this pathway exceeds the solubility limit of the contaminant in water.

Groundwater contaminants may volatilize and intrude into the warehouse building. Table 3 shows the maximum concentrations of groundwater contaminants detected in the most recent round of groundwater sampling at the Site, and compares those concentrations with DEQ's chronic and acute screening level values for vapor intrusion into buildings to determine if there are any COPCs.

Table 3. Screening for Commercial COPCs for the Vapor Intrusion into Buildings exposure pathway for groundwater contaminants.

Contaminant of Interest	Maximum GW Concentration	Commercial RBC	COPC (Y/N)
cis-1,2-Dichloroethene	28,900 ppb	1,800 ppb (chronic) NE (acute)	Y
trans-1,2-Dichloroethene	201 ppb	750 ppb (chronic) 10,000 ppb (acute)	N
Perchloroethene	6,430 ppb	130 ppb (chronic) 330 ppb (acute)	Y
Trichloroethene	1,590 ppb	13 ppb (chronic) 27 ppb (acute)	Y
Vinyl Chloride	48,900 ppb	3.3 ppb (chronic) 4,600 ppb (acute)	Y

Notes:
1. NE = Not Established.

Construction and excavation workers may come into contact with contaminated groundwater while working at the Site. Table 4 (on the following page) shows the maximum concentrations of groundwater contaminants detected in the most recent round of groundwater sampling, and compares those concentrations with DEQ's groundwater in excavation RBCs to determine if there are any COPCs.

Table 4. Screening for Construction and Excavation Worker COPCs for the Groundwater in Excavation exposure pathway.

Contaminant of Interest	Maximum GW Concentration	Construct/Excavate Workers RBC	COPC (Y/N)
cis-1,2-Dichloroethene	28,900 ppb	18,000 ppb	Y
trans-1,2-Dichloroethene	201 ppb	180,000 ppb	N
Perchloroethene	6,430 ppb	5,600 ppb	Y
Trichloroethene	1,590 ppb	430 ppb	Y
Vinyl Chloride	48,900 ppb	960 ppb	Y

Finally, contaminants in soil gas and sub-slab vapors may intrude into the warehouse building. Table 5 shows the maximum concentrations of contaminants detected in soil gas and sub-slab vapors in 2024 and compares those concentrations with DEQ's chronic and acute screening level values for vapor intrusion into buildings to determine if there are any COPCs.

Table 5. Screening for Commercial COPCs for the Vapor Intrusion into Buildings exposure pathway for soil vapors.

Contaminant of Interest	Maximum Soil Gas Concentration	Commercial RBC	COPC (Y/N)
Chloromethane	9,500 µg/m^3	13,000 µg/m^3 (chronic) 100,000 µg/m^3 (acute)	N
cis-1,2-Dichloroethene	5,500 µg/m^3	5,800 µg/m^3 (chronic) NE (acute)	N
Perchloroethene	15,000 µg/m^3	1,600 µg/m^3 (chronic) 4,000 µg/m^3 (acute)	Y
Trichloroethene	1,900 µg/m^3	100 µg/m^3 (chronic) 210 µg/m^3 (acute)	Y
Vinyl Chloride	180 µg/m^3	93 µg/m^3 (chronic) 130,000 µg/m^3 (acute)	Y

Notes:
1. NE = Not Established.

In summary, the Contaminants of Potential Concern at this Site are cis-1,2-dichloroethene (DCE), perchloroethene (PCE), trichloroethene (TCE), and vinyl chloride in soil gas and groundwater.

Human health risk.
Contaminants of Concern (COCs) are those chemicals at a site that present an unacceptable risk to human health or the environment.

Direct Contact with Groundwater

At the start of quarterly groundwater monitoring in July 2022, concentrations of DCE, TCE, and vinyl chloride exceeded or nearly exceeded construction and excavation worker direct contact RBCs in MW-5, MW-6, MW-7, and MW-9 at the Site. Concentrations of PCE only exceeded the direct contact RBC in MW-7. By the end of quarterly monitoring in May 2023, DCE concentrations only exceeded direct contact RBCs in MW-6, and PCE and TCE concentrations only exceeded RBCs in MW-8. However, vinyl chloride concentrations continued to exceed RBCs in the four original wells, plus MW-3.

Although contaminant concentrations in groundwater are generally decreasing across the Site and are expected to continue to decrease, five of the nine on-site monitoring wells show vinyl chloride concentrations above construction and excavation worker direct contact RBCs, while a sixth well (MW-8) shows PCE and TCE concentrations above RBCs. Consequently, the four primary groundwater contaminants (including DCE in MW-6) are Contaminants of Concern for the direct contact with groundwater exposure pathway.

Volatilization to Outdoor Air

At the start of quarterly groundwater monitoring in July 2022, concentrations of vinyl chloride exceeded the occupational RBC of 5,900 ppb for the volatilization to outdoor air exposure pathway in on-site monitoring wells MW-5, MW-6, and MW-7. By the end of quarterly monitoring in May 2023, vinyl chloride concentrations in MW-3 also exceeded 5,900 ppb. As shown on Attachment 15, the four impacted monitoring wells are clustered close together in the western half of the groundwater plume.

However, the groundwater volatilization to outdoor air exposure pathway only identifies the *potential* for groundwater contaminants to volatilize to outdoor air in sufficient concentrations to pose an unacceptable inhalation risk to residents or occupants of a site. In March 2024, six soil gas samples were collected at the Site to more accurately measure the volatilization of groundwater contaminants. As shown on Attachment 15, vinyl chloride (VC) was measured in one soil gas sample at a concentration of 180 $\mu g/m^3$, but no vinyl chloride was detected in the other five samples.

As vinyl chloride was only detected in one of six soil gas samples at concentrations of concern, it does not appear that vinyl chloride is volatilizing from the groundwater in sufficient concentrations to pose an actual unacceptable inhalation risk to occupants of the Site. Consequently, vinyl chloride is not a Contaminant of Concern for the volatilization to outdoor air exposure pathway.

Vapor Intrusion into Buildings

At the start of quarterly groundwater monitoring in July 2022, concentrations of vinyl chloride in groundwater exceeded the occupational vapor intrusion RBC in seven of the nine on-site monitoring wells (all but MW-1 and MW-2). Concentrations of PCE, DCE, and TCE in groundwater exceeded occupational vapor intrusion RBCs in four, five, and six of the monitoring wells, respectively. By the end of quarterly monitoring in May 2023, only two wells showed

PCE exceedances and four wells showed TCE exceedances, but DCE concentrations exceeded RBCs in six wells, and vinyl chloride continued to exceed RBCs in seven wells.

However, the groundwater vapor intrusion into indoor air exposure pathway only identifies the *potential* for groundwater contaminants to volatilize and intrude into indoor air in sufficient concentrations to pose an unacceptable inhalation risk to residents or occupants of a site. In June 2024, three sub-slab vapor samples (including a duplicate) were collected beneath the south end of the warehouse to more accurately measure the volatilization of groundwater contaminants below the building. As shown on Attachment 15, only PCE and TCE were detected, at concentrations up to 880 $\mu g/m^3$ and 89 $\mu g/m^3$, respectively. The concentrations are below the soil gas vapor intrusion RBCs of 1,600 $\mu g/m^3$ PCE and 100 $\mu g/m^3$ TCE for a commercial exposure scenario.

While there are currently no unacceptable exposures through the vapor intrusion into buildings exposure pathway for workers at the Site, construction of new buildings or expansion of existing buildings in the contaminated area could lead to unacceptable exposures if mitigation measures are not taken. Consequently, the four primary groundwater contaminants remain Contaminants of Concern for the vapor intrusion into buildings exposure pathway.

Ecological risk.
An ecological risk assessment was not conducted for the Wirfs Property. The Site is located in an industrial area. The nearest significant ecological habitat is the Tualatin Mountains, located about 1,700 feet southwest of the Site, and the nearest surface water body is the Willamette River, about 2,300 feet northeast of the Site. Given the distance to significant ecological habitats, no adverse impacts to ecological receptors are likely.

5. RECOMMENDATION

Perchloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), and vinyl chloride are present in groundwater at the south end of the Wirfs Property at concentrations of concern for construction and excavation workers through the direct contact exposure pathway, and for occupants of the Site through the vapor intrusion into buildings exposure pathway.

To address these concerns, an Easement and Equitable Servitudes (EES) should be recorded with the property deed requiring that any subsurface construction or excavation work that may encounter contaminated groundwater be conducted in accordance with a DEQ-approved Contaminated Media Management Plan (CMMP). The EES should also prohibit the construction of enclosed, occupied structures at the south end of the Wirfs Property, and/or an expansion of the existing warehouse onto the south end of the property, unless vapor mitigation measures are incorporated into the new construction, or unless further investigation or cleanup demonstrates that a vapor mitigation system will not be necessary to protect occupants of the Site.

Following remediation of contamination and based on sample results for soil, groundwater and soil gas, a No Further Action determination is recommended for the Wirfs Property, conditioned

upon adherence to the restrictions in an EES recorded with the property deed. The Conditional No Further Action determination will be recorded in Your DEQ Online (YDO) under Environmental Cleanup Site Information (ECSI) file #2424.

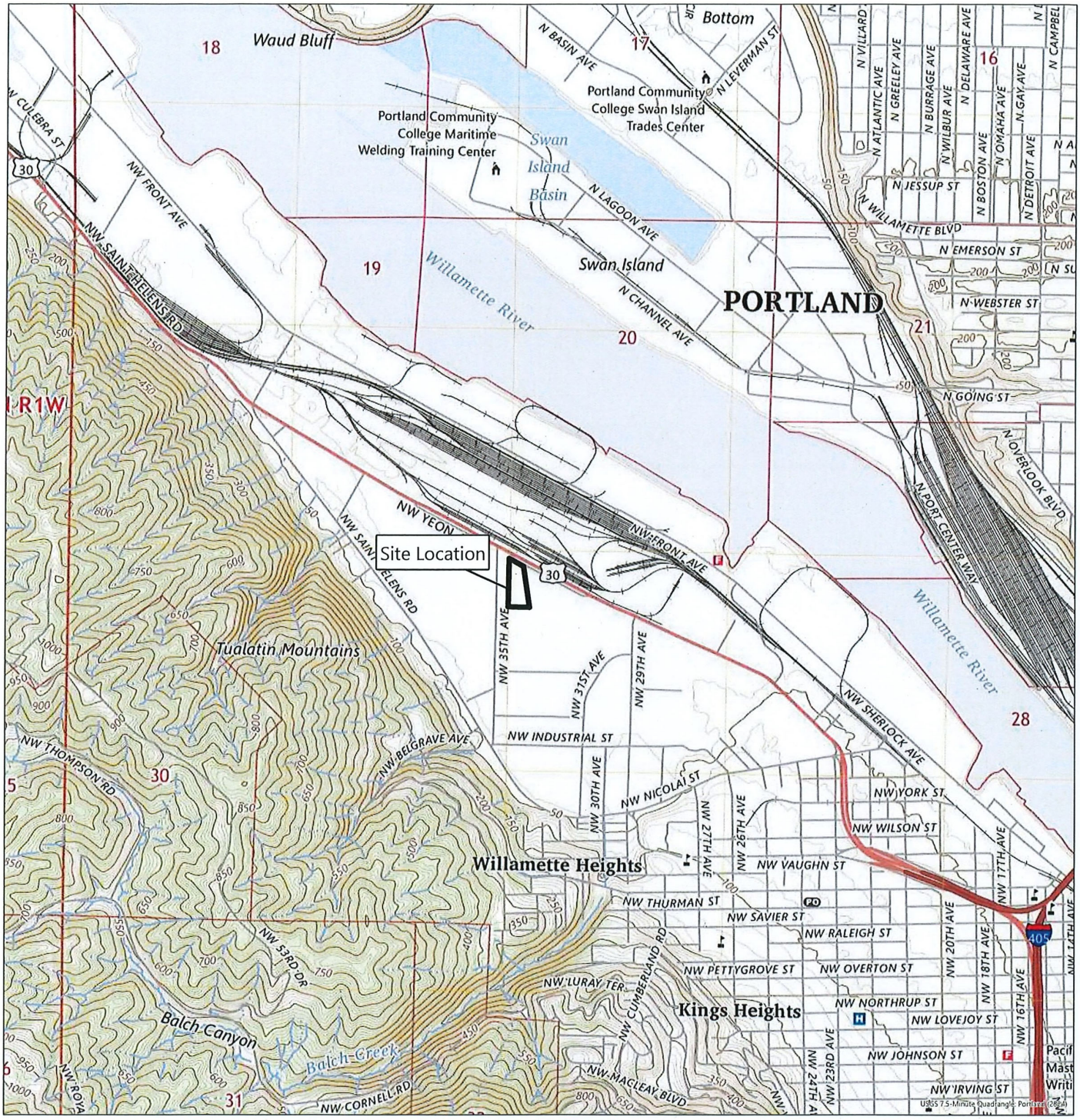
6. ADMINISTRATIVE RECORD

1. CH2M Hill "Remediation of Lead Contaminated Soil" (March 2, 1998).
2. DEQ "Strategy Recommendation" (November 5, 1999).
3. Bridgewater "Preliminary Assessment" (February 29, 2000).
4. PBS "Subsurface Remedial Investigation" (July 12, 2010).
5. PBS "Additional Phase II Investigation" (May 17, 2012).
6. PBS "Phase II Remedial Investigation" (February 3, 2015).
7. PBS "Feasibility Study Report" (July 25, 2016).
8. PBS "Stormwater Sewer Cleanout Report" (April 24, 2017).
9. DEQ "Staff Decision Memo" (August 31, 2017).
10. PBS "Response to Stakeholder Comments" (July 16, 2018).
11. DEQ "Source Control Decision" (January 8, 2019).
12. DEQ "Record of Decision" (January 27, 2020).
13. Cascade "Final Data Report" (August 19, 2020).
14. PBS "Remedial Injection Work Plan" (May 19, 2022).
15. PBS "Site Closure Report" (August 7, 2023).
16. PBS "Soil Gas Assessment Addendum Report" (September 16, 2024).

7. ATTACHMENTS

1. Topographic Map
2. Aerial Photograph
3. Guild's Lake Map
4. Zoning Information
5. UST & Boring Locations Map (2010)
6. Composite Lead Samples Diagram
7. Discrete Lead Samples Diagram
8. Confirmation Lead Samples Diagram
9. Sample Locations Map (2011)
10. Sample Locations Map (2014)
11. Soil Gas Sample Locations Map (2014)
12. Sample Locations Map (2020)
13. Sample Locations Map (2021)
14. Remedial Injections Map (2022)
15. Soil Gas Sample Locations Map (2024)

Attachment 1 - Topographic Map



Site Vicinity

3720 NW Yeon Avenue, Portland, Oregon

Date: September 2024 | Project: 20125.011

Site Boundary

1 INCH = 2,000 FEET

N

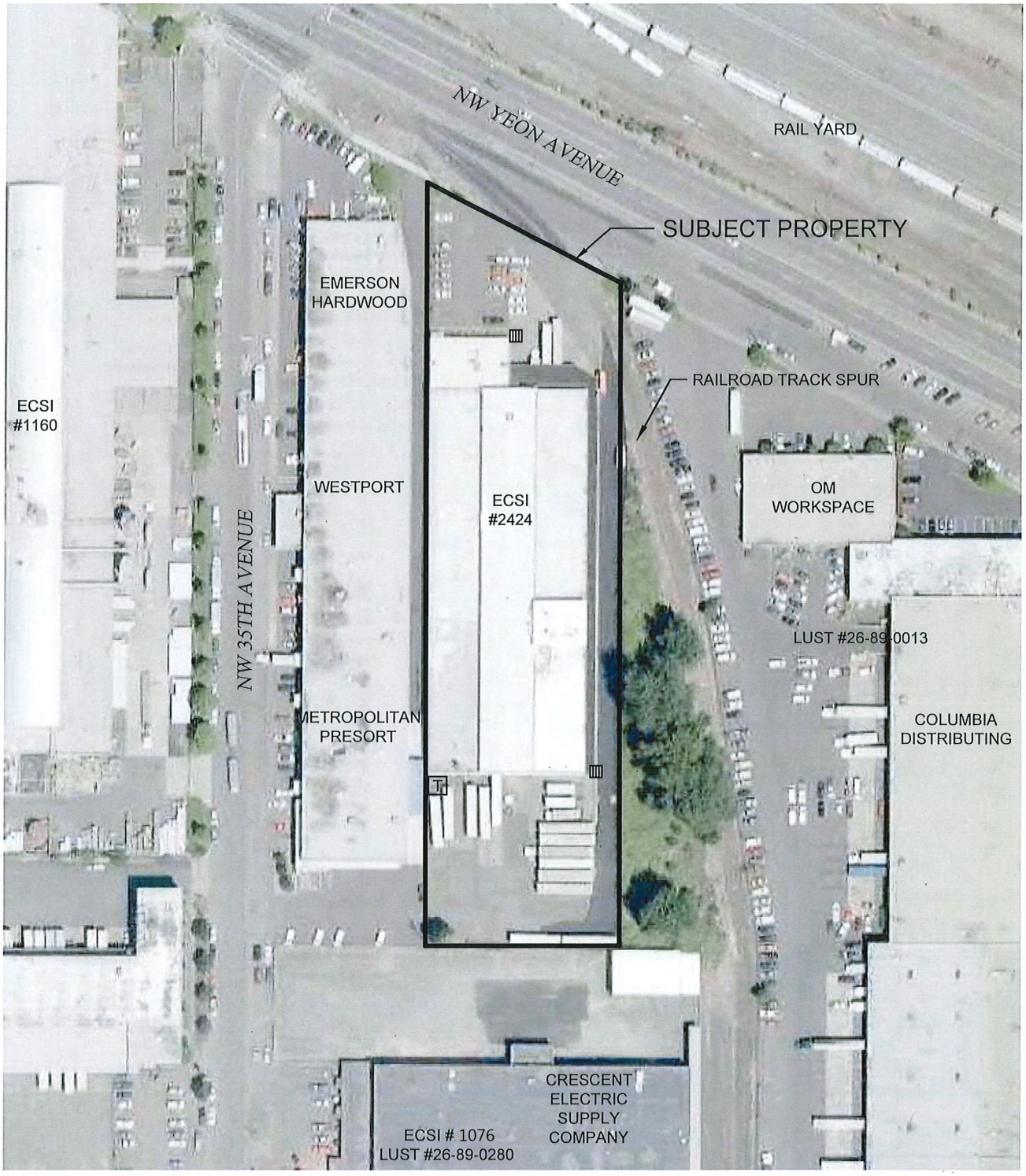
0 2,000 Feet

PBS

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl | L:\Projects\20000\20100-20199\20125 NWYeon\20125.011 Remedial Injection and Monitoring\GIS\June 2023\20125.011_NW_Yeon\20125.011_NW_Yeon.aprx | 7/25/2024 1:06 PM

Attachment 2 - Aerial Photograph



LEGEND

- CATCH BASIN
- PAD MOUNTED TRANSFORMER

NOT TO SCALE

PREPARED FOR: DON WIRFS

PBS	PROJECT #: 20125.008 DATE: JUNE 2016	SITE PLAN 3720 NW YEON AVENUE PORTLAND, OREGON	FIGURE: 2

L:\Projects\20000\20100-20199\20125 NWYeon\DWG\20125.008_FIG_1-2.dwg Jun 21, 2016 11:43am

Attachment 3 - Guild's Lake Map

SOURCE: USGS PORTLAND, OR-WA QUADRANGLE 1905, PHOTO REVISED 1940.

Scale 1" = 1000'

0' 500' 1000' 2000'

PREPARED FOR: KELL, ALTERMAN & RUNSTEIN, L.L.P.

PBS

HISTORICAL LOCATION OF GUILD'S LAKE

3720 NW YEON AVENUE
PORTLAND, OREGON

JUL 2018
20125.008
FIGURE
3

File name: I:\Projects\20000\20100-20199\20125 NW Yeon\DWG\20125.008_FIG_1-2.dwg Layout Tab: FIG-2 User: Rebecca Snellings CAD Plot Date/Time: 7/13/2018 12:36:13 PM

Attachment 4 - Zoning Information

County of Clark, Oregon Metro, Bureau of Land Management, State of Oregon, State of Oregon DOT, State of Oregon GEO, Esri, HERE, Garmin, GeoTechnologies, Inc., ... Powered by Esri

3720 NW YEON AVE

Comprehensive information for this property is available on PortlandMaps.com: R316500

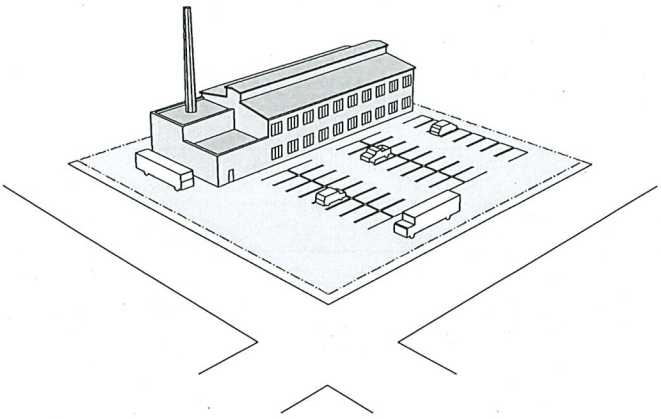
The official zoning quarter section map(s) for this property is 2625 | 2725

This property contains the following Comprehensive Plan Map Designation(s):
Industrial Sanctuary

Detailed zone summaries are available below.

Base zones

Heavy Industrial (IH)



The **IH** zone provides areas where all kinds of industries may locate, including those not desirable in other zones due to their objectionable impacts or appearance.

For specific zoning code details, visit the zoning code website. The regulations for this zone are found in Chapter 33.140.

Generally, the uses and character of this zone are oriented towards:

RETAIL
OFFICE
RESIDENTIAL
INDUSTRY
INSTITUTIONAL
OPEN SPACE

Specific allowable uses include: manufacturing, warehouse and freight movement, wholesale sales, industrial service, railroad yards.

Quick facts

Location	This zone tends to be located amongst industrial areas like Rivergate and Guild's Lake.
Unlimited	there is no maximum building height
Unlimited	there is no FAR applied to the building

This zone is one of three zones that implement the Industrial Sanctuary map designation of the Comprehensive Plan.

Overlay zones

Prime Industrial (k)

The Prime Industrial **(k)** overlay zone limits new parks, open areas and commercial outdoor recreation; prohibits self-service storage and major event entertainment uses; and prohibits future quasi-judicial Comprehensive Plan Map amendments. This overlay preserves Portland's limited supply of prime industrial land for industrial use.

For specific zoning code details, visit the zoning code website. The regulations for this zone are found in Chapter 33.471.

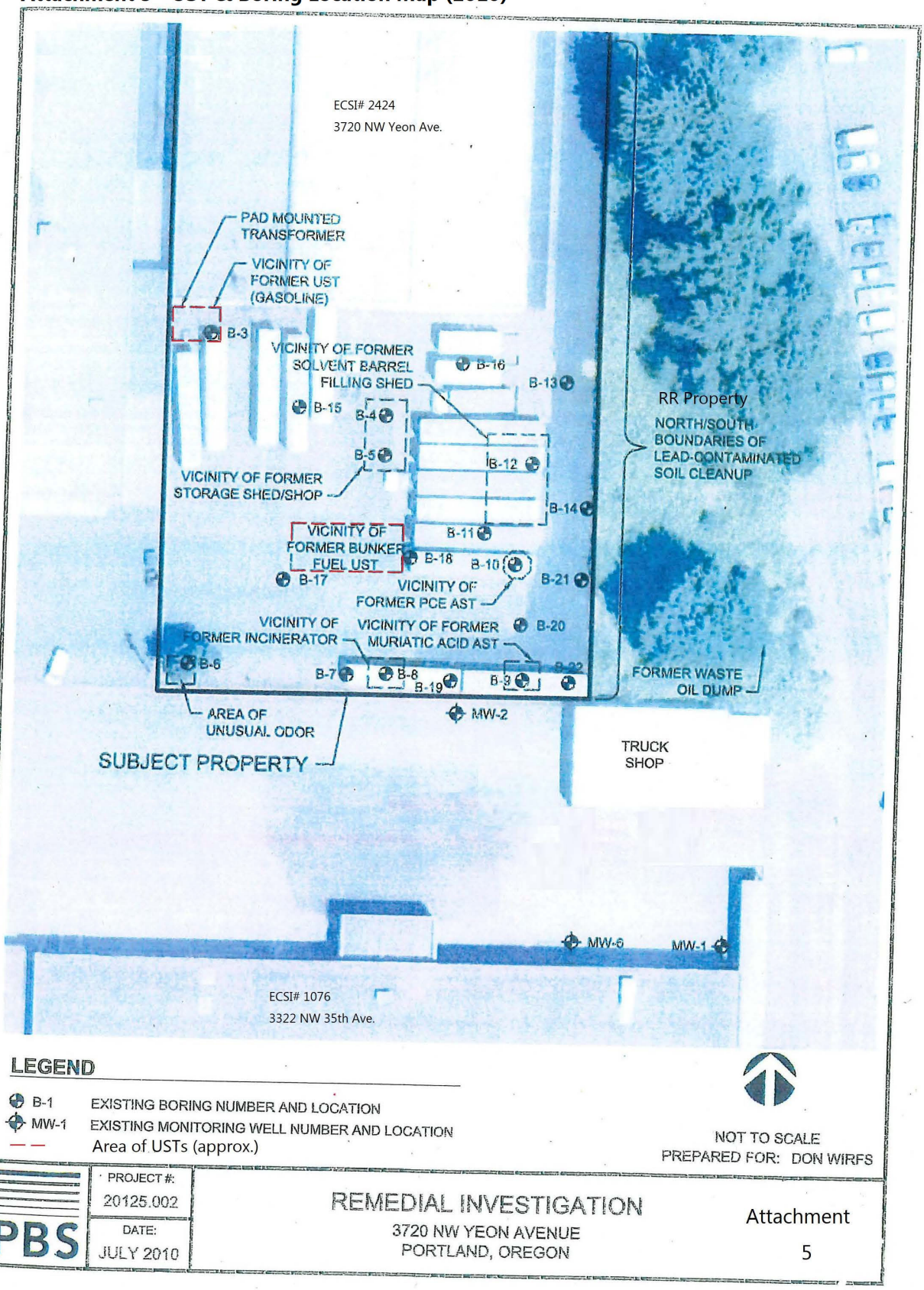
Plan districts

Guild's Lake Industrial Sanctuary Plan District (GS)

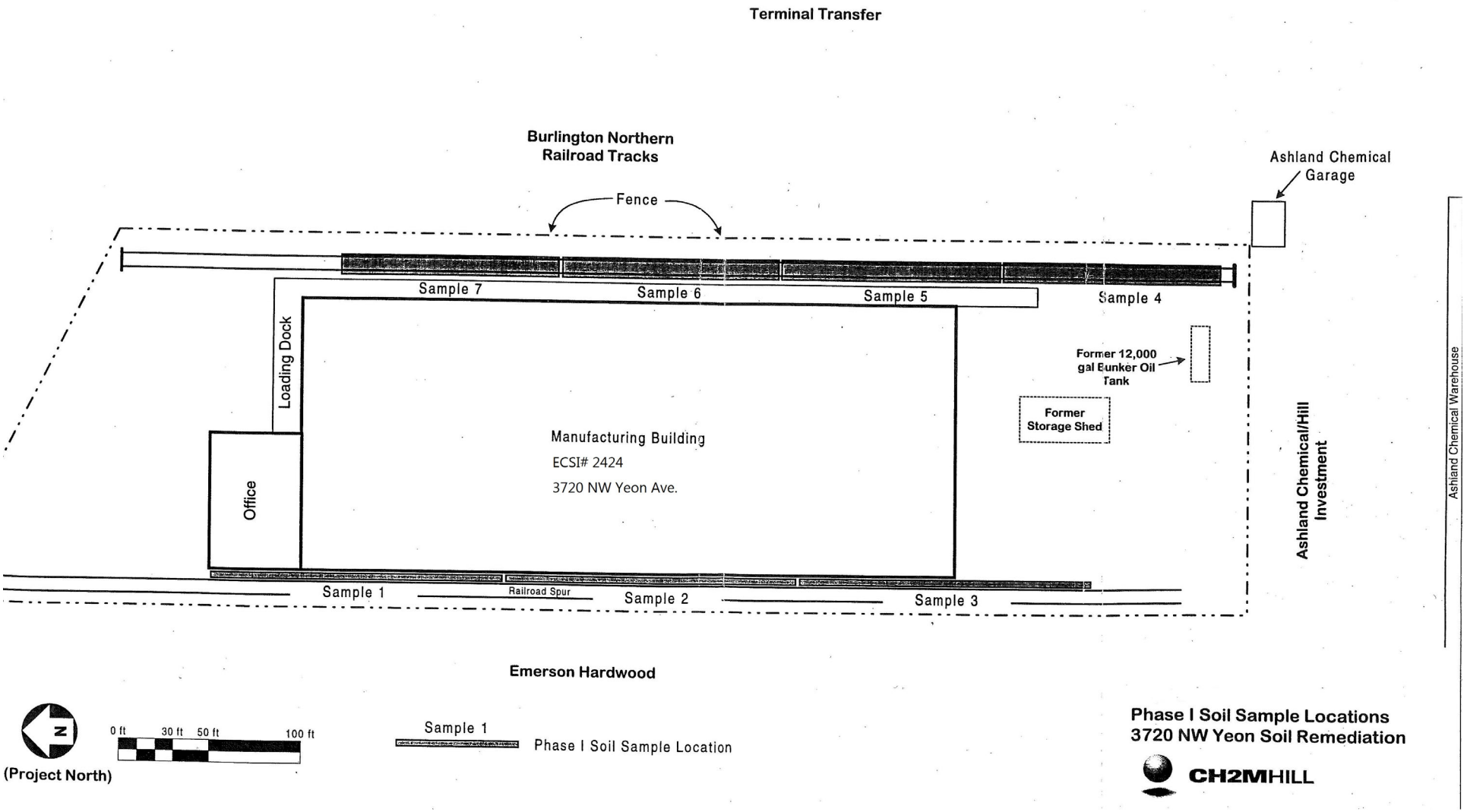
The Guild's Lake Industrial Sanctuary **(GS)** plan district fosters the preservation and growth of this premier industrial area adjacent to Portland's central city. The plan district's large number of well-established industrial firms are dependent on the area's multimodal transportation system, including marine, rail, and trucking facilities, and on the ability of area streets to accommodate truck movements. Because of its proximity to inner-city neighborhoods with high concentrations of commercial and residential uses, the Guild's Lake Industrial Sanctuary is particularly vulnerable to impacts from, and redevelopment to, nonindustrial uses. The provisions of the plan district recognize that the displacement of industrial uses by inappropriate nonindustrial uses potentially threatens the integrity of this district and investments in public and private infrastructure. The provisions of this chapter protect the area from incompatible uses which threaten the district's integrity, stability and vitality and compromise its transportation system.

For specific zoning code details, visit the zoning code website. The regulations for this plan district are found in Chapter 33.531.

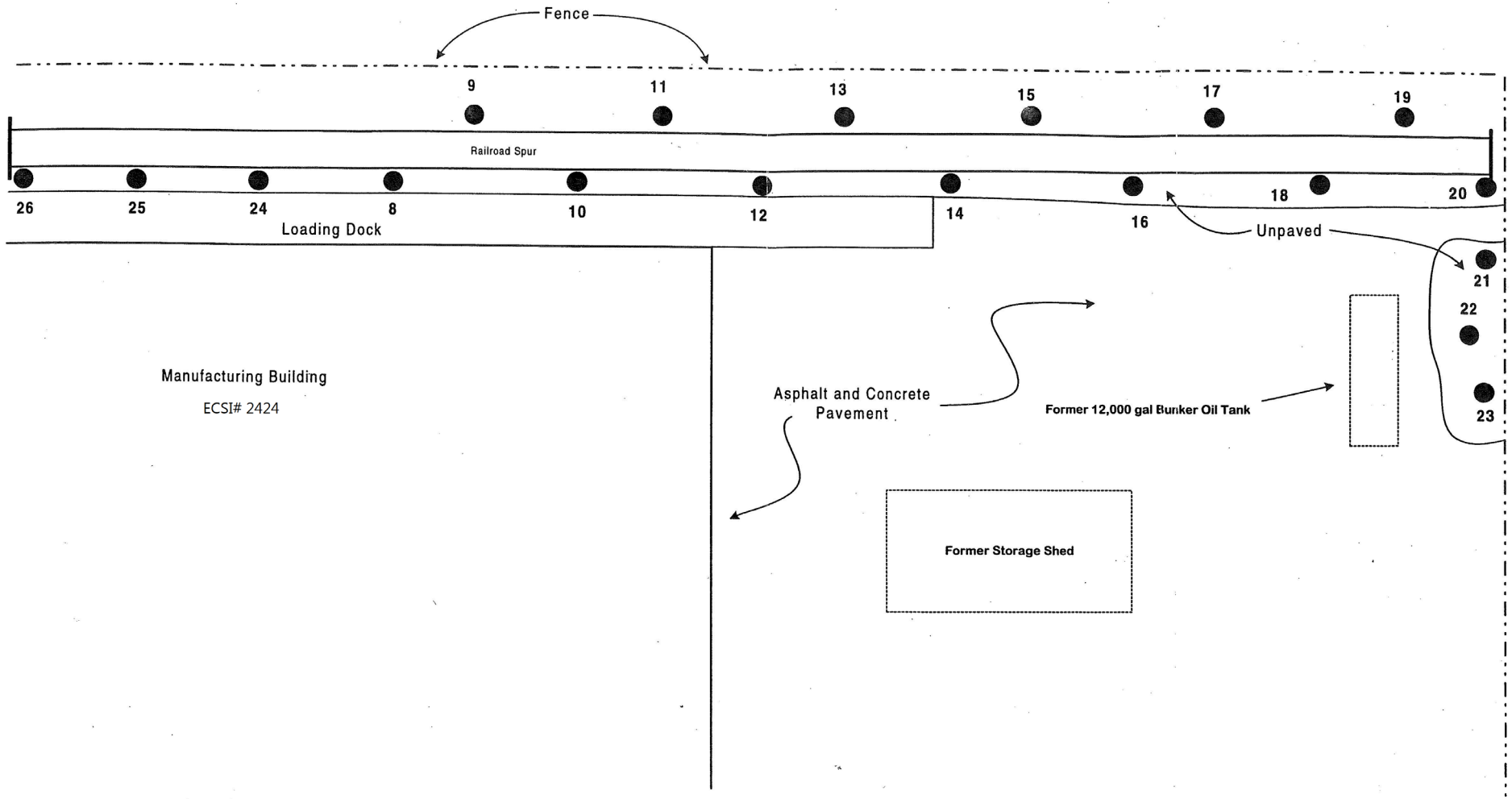
Attachment 5 - UST & Boring Location Map (2010)



Attachment 6 - Composite Lead Samples Diagram



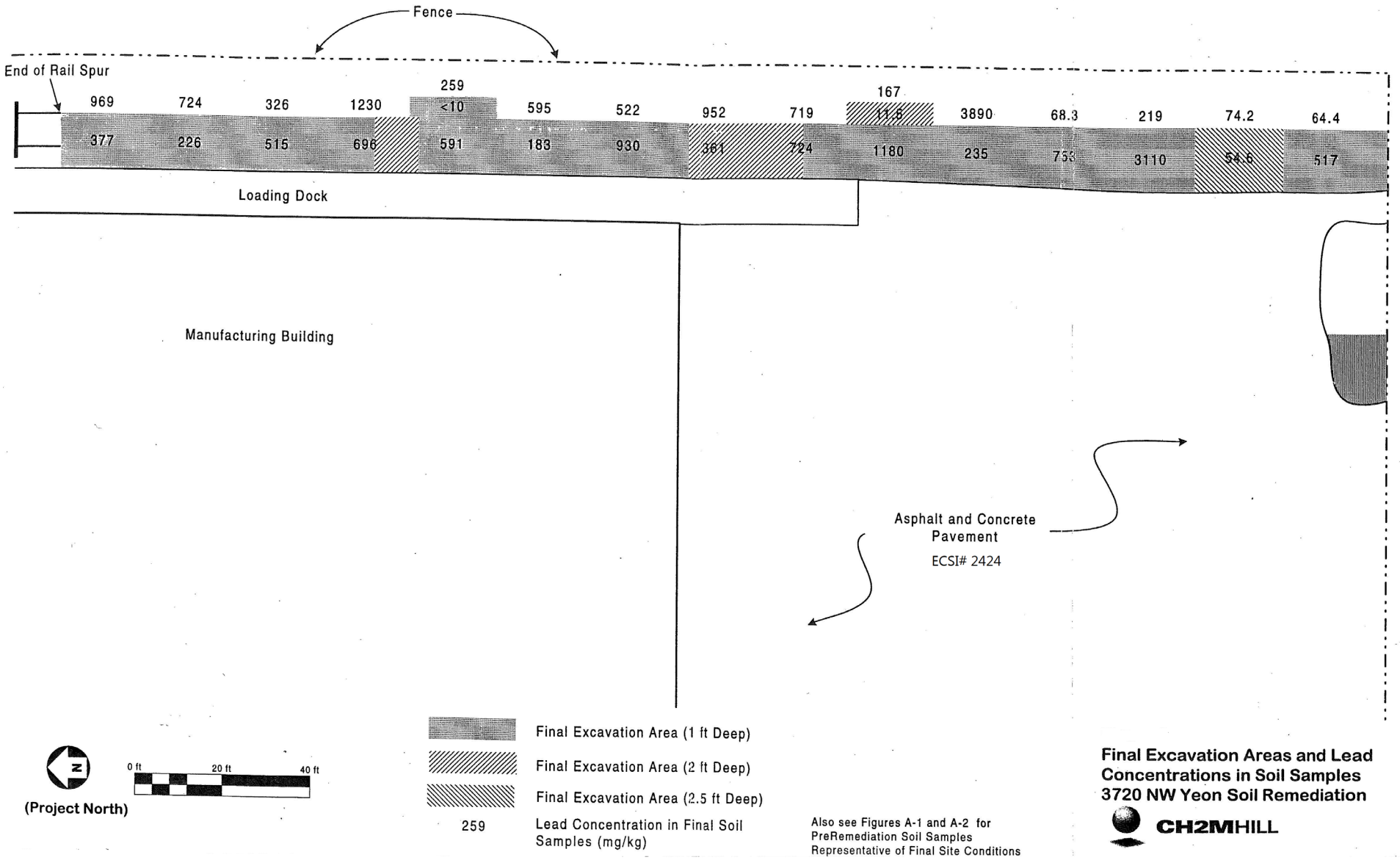
Attachment 7 - Discrete Lead Samples Diagram



Phase II and III Soil Sample Locations
3720 NW Yeon Soil Remediation

CH2MHILL

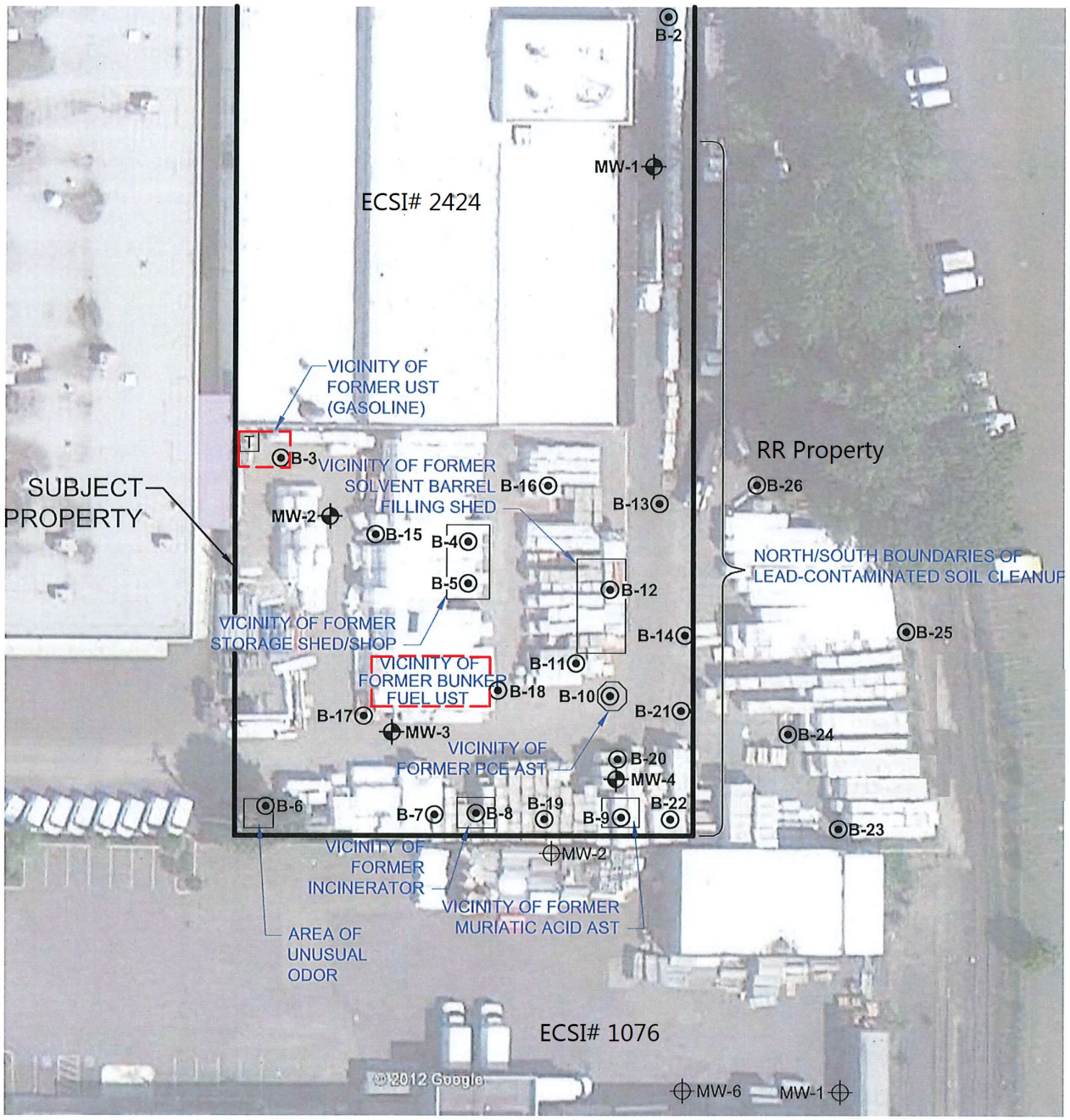
Attachment 8 - Confirmation Lead Samples Diagram



Final Excavation Areas and Lead Concentrations in Soil Samples
3720 NW Yeon Soil Remediation

CH2MHILL

Attachment 9 - Sample Locations Map (2011)



LEGEND

B-1	EXISTING BORING NUMBER AND LOCATION
MW-2	EXISTING OFF-SITE MONITORING WELL NUMBER AND LOCATION
T	PAD-MOUNTED TRANSFORMER
MW-4	MONITORING WELL NUMBER AND LOCATION
— —	Area of former USTs (approx.)

0' 30' 60' 120'

SCALE: 1" = 60'

PREPARED FOR: DON WIRFS

PBS

PROJECT #: 20125.004

DATE: MAY 2012

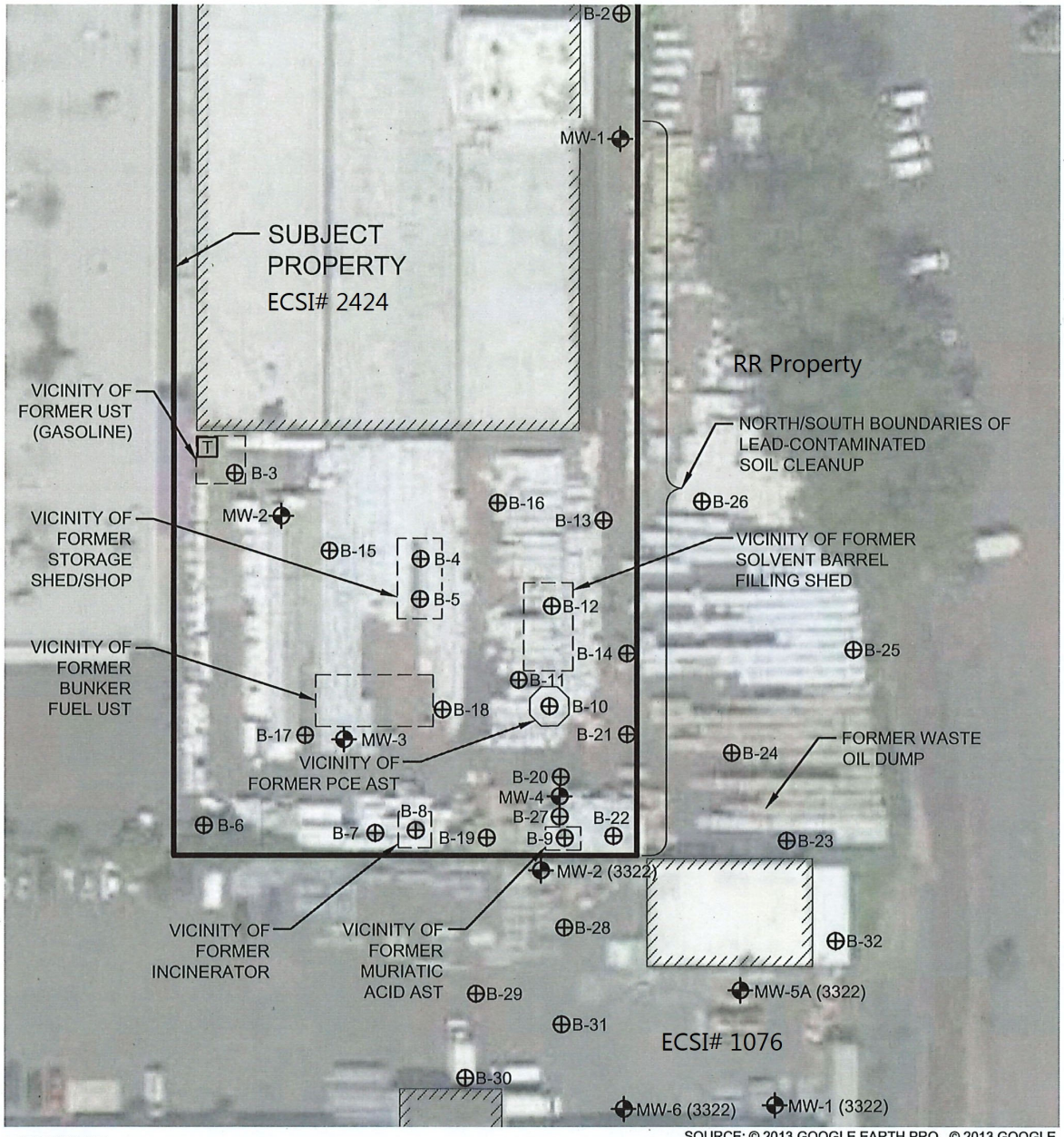
BOREHOLE AND MONITORING WELL LOCATION PLAN

3720 NW YEON AVENUE
PORTLAND, OREGON

Attachment 9

L:\Portland\20000\20001-20499\20125 NW Yeon\20125.004 MW Install\DWG\20125.004_FIG-3.dwg Feb 22, 2012 11:31am

Attachment 10 - Sample Locations Map (2014)



SOURCE: © 2013 GOOGLE EARTH PRO, © 2013 GOOGLE

LEGEND

- ⊕ B-1 — EXISTING BORING NUMBER AND LOCATION
- ⊕ MW-1 — MONITORING WELL NUMBER AND LOCATION
- T — PAD-MOUNTED TRANSFORMER

0' 30' 60' 120'

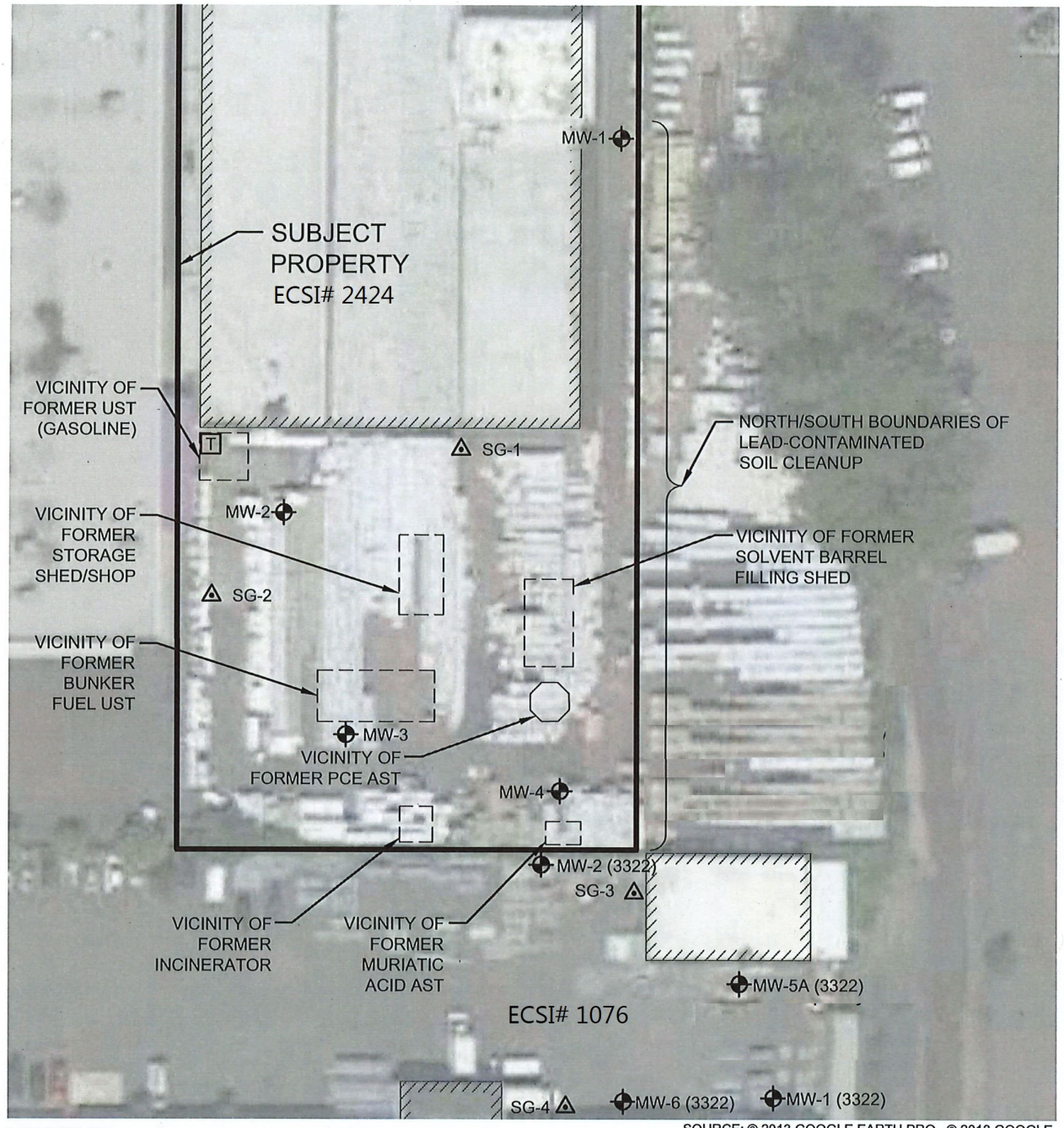
SCALE: 1" = 60'

PREPARED FOR: DON WIRFS

PBS	PROJECT #: 20125.005 DATE: FEB 2015	SITE PLAN WITH BORING LOCATIONS AND MONITORING WELLS 3720 NW YEON AVENUE PORTLAND, OREGON	10

L:\Projects\20000\20100-20199\20125 NW Yeon\20125.005 - 3rd&4th QGWM2012 & Drum Disposal\DWG\20125.005_OCT 2014\20125.005_FIG-3-5.dwg Oct 27, 2014 09:34am

Attachment 11 - Soil Gas Sample Locations Map (2014)



SOURCE: © 2013 GOOGLE EARTH PRO, © 2013 GOOGLE

LEGEND

- SG-1 — SOIL GAS SAMPLE NUMBER AND LOCATION
- MW-1 — MONITORING WELL NUMBER AND LOCATION
- T — PAD-MOUNTED TRANSFORMER

0' 30' 60' 120'

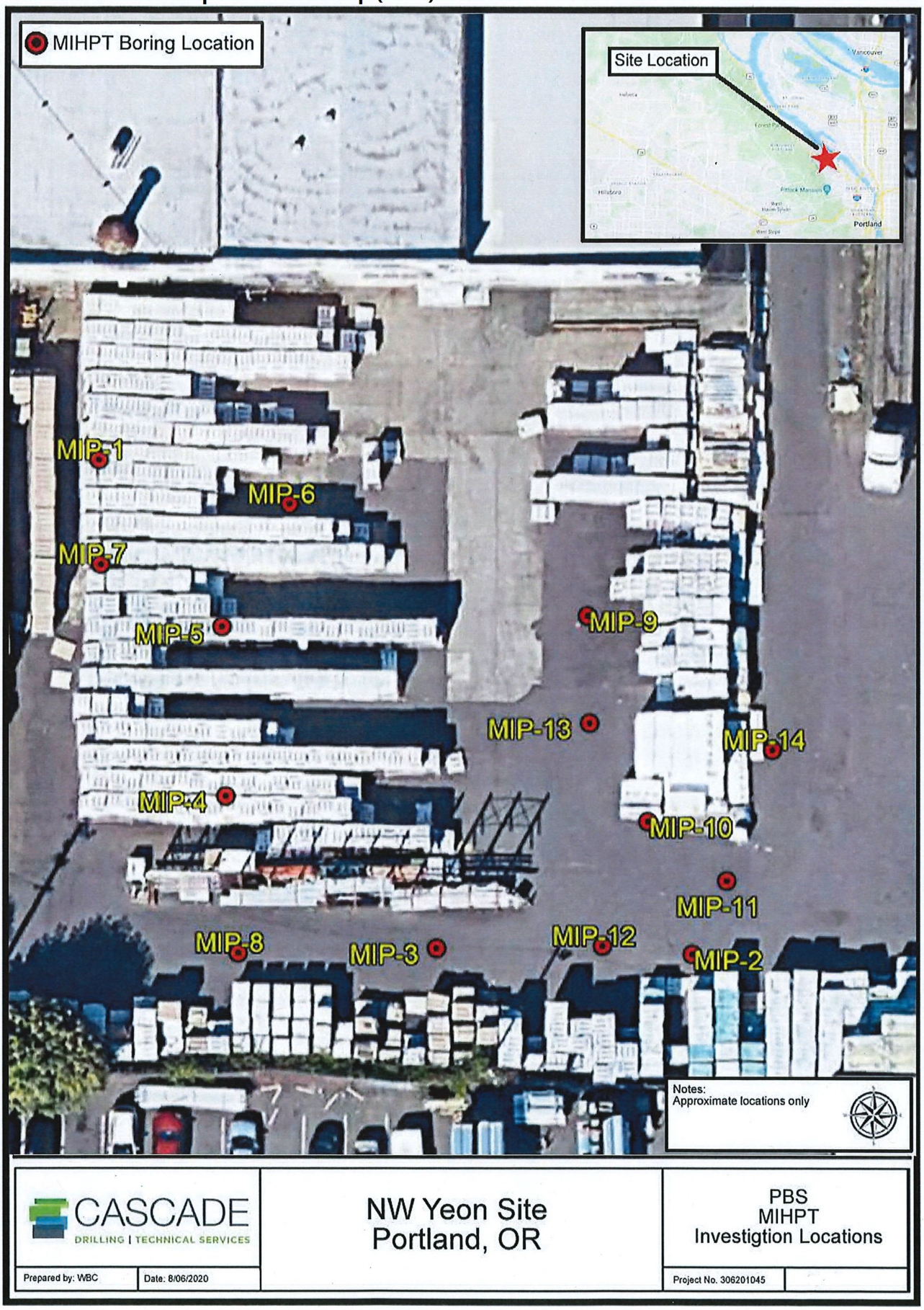
SCALE: 1" = 60'

PREPARED FOR: DON WIRFS

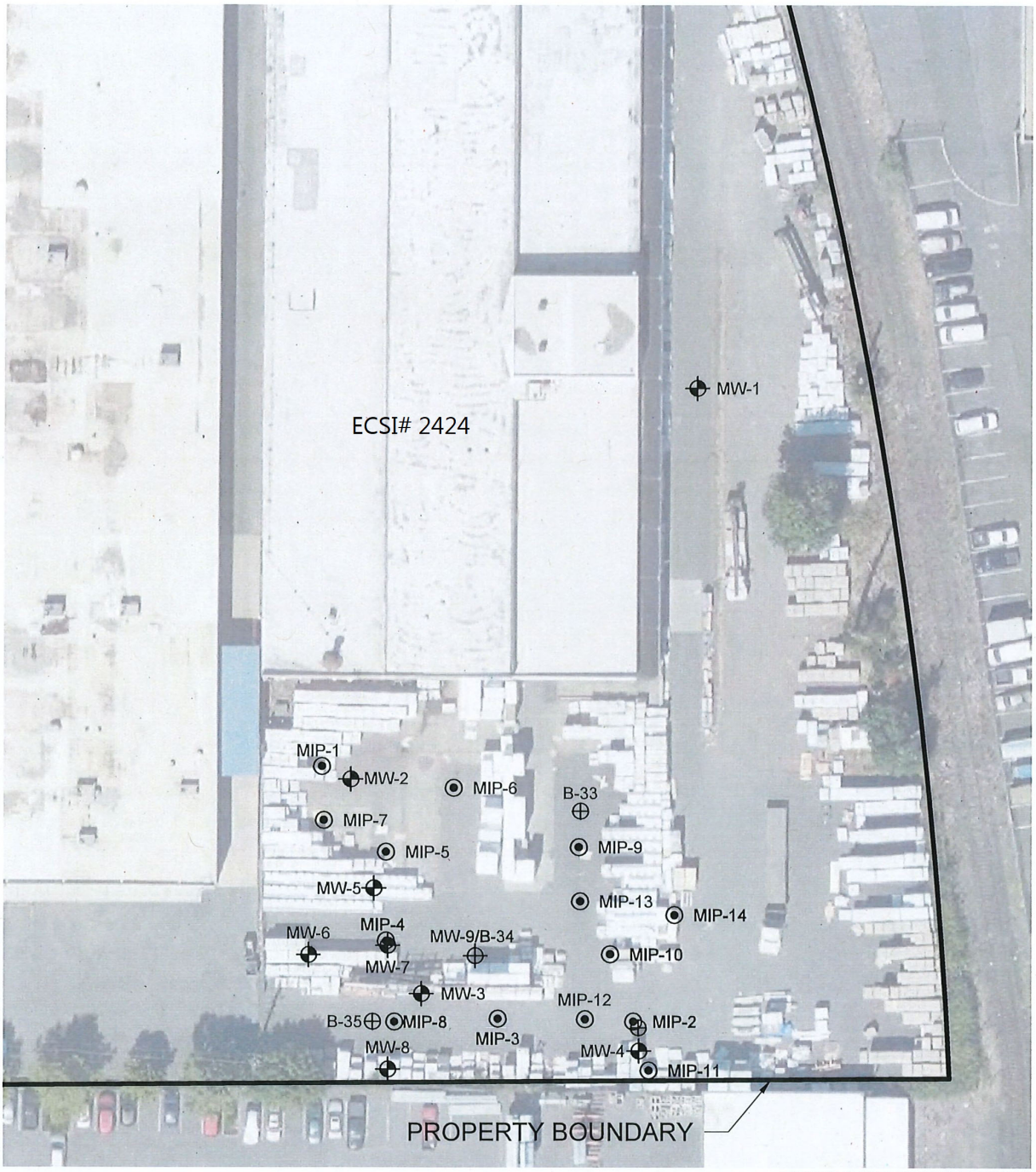
PBS	PROJECT #: 20125.005 DATE: FEB 2015	SITE PLAN WITH SOIL GAS SAMPLING LOCATIONS 3720 NW YEON AVENUE PORTLAND, OREGON	11

L:\Projects\20000\20100-20199\20125 NW Yeon\20125.005 - 3rd&4th GGWM2012 & Drum Disposal\DWG\20125.005_OCT 2014\20125.005_FIG-3-5.dwg Oct 27, 2014 10:48am

Attachment 12 - Sample Locations Map (2020)



Attachment 13 - Sample Locations Map 2021



SOURCE: © 2015 GOOGLE EARTH PRO

LEGEND

MW-1	MONITORING WELL NUMBER AND LOCATION
MIP-1	MEMBRANE INTERFACE HYDRAULIC PROFILING TOOL SAMPLE LOCATION
MW-3/B-10	PREVIOUSLY DECOMMISSIONED MONITORING WELL AND RELATED BORING NUMBER AND LOCATION
B-1	BORING NUMBER AND LOCATION (PBS, 2010)

Scale 1" = 60'

0' 30' 60' 120'

PREPARED FOR: CONAX

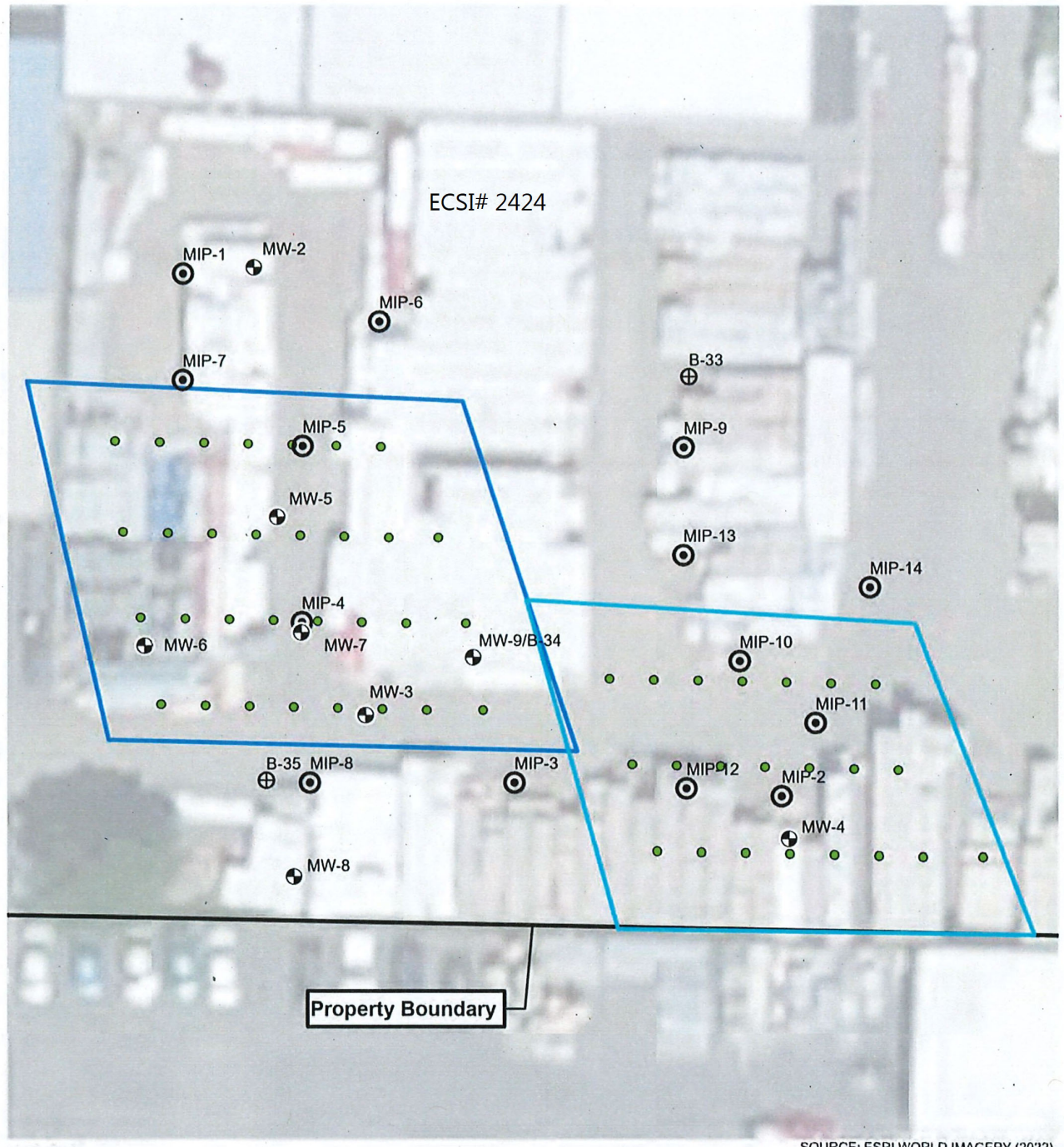
PBS

MONITORING WELL AND HISTORICAL BORING LOCATIONS

3720 NORTHWEST YEON AVENUE
PORTLAND, OREGON

MAY 2022
20125.011
FIGURE
13

Attachment 14 - Remedial Injections Map (2022)



SOURCE: ESRI WORLD IMAGERY (2022).

LEGEND

- PROPOSED INJECTION POINTS
- MEMBRANE INTERFACE HYDRAULIC PROFILING TOOL SAMPLE LOCATION
- MONITORING WELL LOCATION
- BORING LOCATION
- SHALLOW REMEDIAL ACTION AREA
- DEEP REMEDIAL ACTION AREA

SCALE: 1" = 30' (8.5X11 SHEET)

0' 15' 30' 60'

PREPARED FOR: CONAX

PBS

PROPOSED INJECTION POINTS

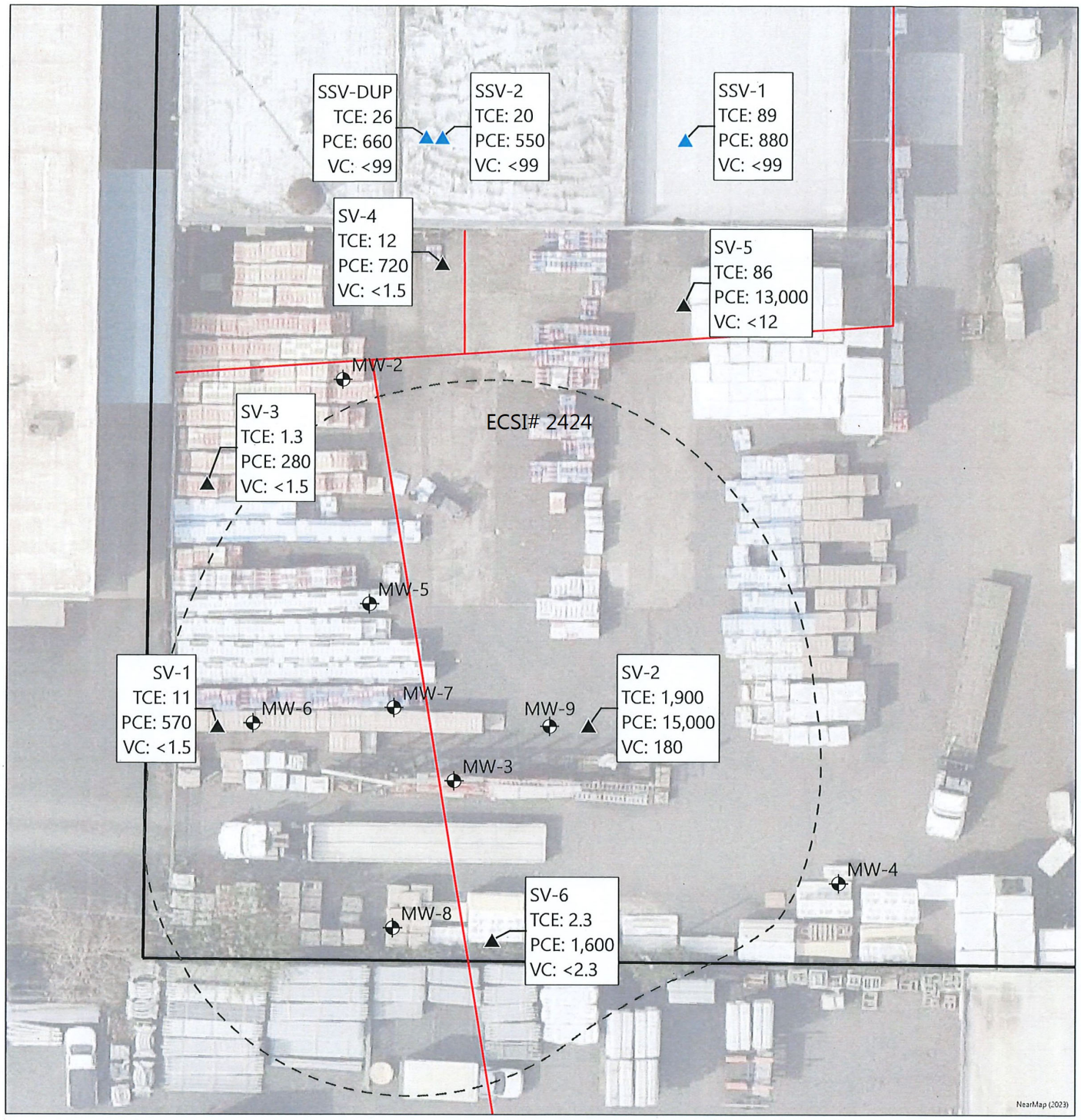
3720 NORTHWEST YEON AVENUE
PORTLAND, OREGON

MAY 2022
20125.011

14

Filename: L:\Projects\20000\20100-20199\20125 NWYeon\20125.011 Remedial Injection and Monitoring\GIS\APRX\NW_Yeon_Remedial_Injection_Monitoring\NW_Yeon_Remedial_Injection_Monitoring.aprx Plot Date/Time: 5/16/2022 3:45 PM

Attachment 15 - Soil Gas Sample Locations Map (2024)



Detail Plan

3720 NW Yeon Avenue, Portland, Oregon

Date: September 2024 | Project: 20125.011

▲ Sub Slab Vapor Sample
▲ Soil Gas Sample
— Storm Sewer Utility (approximate)
⊕ Monitoring Well
[ ] Locality of Facility (LOF)
▭ Site Boundary

Note: Concentrations in µg/m^3

N

1 INCH = 30 FEET

0 30 Feet

PBS

This product is for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

NAD 1983 HARN StatePlane Oregon North FIPS 3601 Feet Intl | L:\Projects\20000\20100-20199\20125 NWYeon\20125.011 Remedial Injection and Monitoring\GIS\June 2023\20125.011_NW_Yeon\20125.011_NW_Yeon.aprx | 7/29/2024 6:35 PM