November 2023 Work Plan

Sub-Slab Vapor and Soil Gas Characterization

Ollison Property

23737 SW Newland Road
Wilsonville, Oregon

Prepared for:

Estate of David Ollison
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Project No. 114-19002-05

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1.0 INTRODUCTION

EVREN Northwest, Inc. (ENW) has prepared this Work Plan which describes proposed additional characterization of petroleum hydrocarbon-related impacts in the subsurface at the above-referenced property (Figures 1 and 2; subject site). The scope of work described in this work plan has been developed consistent with Oregon Department of Environmental Quality (ODEQ) Vapor Intrusion Guidance and is designed to provide information required for further development of the Conceptual Site Model (CSM).

1.1 BACKGROUND

The subject property is a rural residential property in unincorporated Clackamas County, Oregon. A petroleum release was discovered at the property from an underground storage tank system believed to have formerly operated at the subject property since the 1960s. Investigation and cleanup efforts are underway under the direction of ODEQ which has identified the site as Leaking Underground Storage Tank (LUST) site ID no. 03-19-0934.

Site remediation measures have been conducted through a collaborative effort between Universal Applicators, Inc. and ENW in accordance with an Interim Remedial Action Plan (*IRAP)*[Error! Bookmark not defined.] approved by ODEQ. In March 2023, ENW installed and monitored five new ground water monitoring wells (MW01 through MW05) and in June 2023, a second round of monitoring was conducted at the five ground water monitoring wells. Between August 30, 2023, and September 25, 2023, ENW directed removal of approximately 1,286 tons of petroleum-impacted soil from two excavations (EX01 and EX02) for disposal at Hillsboro Landfill and application of a strong chemical oxidant and an oxygen release compound (ORC-Advanced) to enhance natural attenuation of residual impacts in shallow ground water.

During the most recent ground water monitoring event in October 2023, ground water samples contained residual levels of volatile organic compounds that exceed risk-based concentrations (RBCs) for the *Vapor Intrusion into Buildings* exposure pathway for residential receptors. Ground water impacts are in the vicinity of an on-site shop building and the onsite residence. Therefore, ENW cannot rule out the possibility of an inhalation risk at the site.

2.0 PROPOSED SCOPE OF WORK

Sub-slab vapor and soil gas sampling are considered ideal methods for assessing potential vapor intrusion of volatile constituents from residual impacted soil and ground water are present. Use of sub-slab vapor and soil gas analyses is considered more direct in evaluating the volatilization

pathways, since the assumptions used in modeling phase transitions in the subsurface environment are not required to evaluate those exposure pathways. Additionally, the empirical sub-slab vapor and soil gas data is more indicative of the processes (e.g., chemical and biological degradation) that occur in the subsurface environment.

Work methods and procedures are described in Sections 3.0 through 5.0.

2.1 Sub-Slab Vapor Assessment

Up to four sub-slab vapor samples are proposed in the locations shown on Figure 3. Two of the sub-slab vapor samples will be collected beneath the floor slab of the shop building located immediately north of the former UST excavation and approximately 20 feet northwest of monitoring well MW02 where benzene and gasoline-range organics (GRO) were detected in ground water above RBCs for *Vapor Intrusion into Buildings.* Two sub-slab vapor samples will be sited in the daylight basement of the onsite residence, located northeast of former excavation EX01 and approximately 40 feet northeast of monitoring well MW02. Results of this assessment will allow a direct evaluation of volatilization exposure pathways under current conditions.

ODEQ acknowledges that vapor intrusion into buildings is controlled in part by variations in atmospheric conditions and the heating and ventilation systems inside the building, which uses vary seasonally. To account for seasonal variations in soil vapor intrusion into buildings, ENW proposes to conduct two rounds of sampling, one during the summer months and one during the winter months.

Proposed work methods and procedures are described in Sections 3.0 through 6.0.

2.2 Soil Gas Assessment

Up to four soil gas samples will be collected from shallow soil boring located at the former EX01 location, north of the former E01 location (proximate to MW02), and both east and west of the former EX01 location, as shown on Figure 3.

As with the sub-slab vapor samples, to account for seasonal variations in soil gas, ENW proposes to conduct two rounds of sampling, one during the summer months and one during the winter months.

Proposed work methods and procedures are described in Sections 3.0 through 6.0.

2.3 Report Preparation

The results of this investigation will be presented in two separate reports, one documenting the winter sampling event and one documenting the summer sampling event (presenting the results of both sampling events). The reports will include evaluation of the findings with respect to Oregon environmental cleanup rules and *Risk-Based Decision-Making for the Remediation of Petroleum - Contaminated Sites* (ODEQ, September 22, 2003, revised May 2018)

At a minimum, the report will:

- Document investigative methods and procedures used.
- Compare results to RBCs for currently complete exposure pathways and receptors.
- Identification of data gaps, if any.

3.0 METHODS AND PROCEDURES

This section describes the methods proposed to complete the field work described above. All work will be performed by employees and subcontractors trained and licensed to work with hazardous materials. Safety procedures will be strictly enforced through the use of a Health and Safety Plan. A public utility locate will be ordered prior to work initiation.

Records shall be kept of all field activities and observations. Records shall field measurements, samples collected, samplers involved with each sample, time, weather, and other relevant data. All record-keeping shall be performed in appropriate field books or clipboards with appropriate forms. All field records will be kept secure at all times. All data is confidential until released by Client.

3.1 Equipment Calibration

Monitoring equipment used during sampling (e.g., photoionization detector [PID]) will be calibrated according to manufacturer's specifications at the beginning of each sample day. Meter calibration will be checked at least twice during a sample day (middle and end of day) or when meter drift is suspected. The meters will be calibrated with gases or buffered solutions closest to known field parameters (VOC concentration = 100 $\mu g/m^3$ methane or heptane for PID calibration).

3.2 Decontamination Procedures

All non-disposable sampling equipment will be decontaminated by using a sequential wash of Alconox® solution, rinsed in tap water from a known source (e.g., municipal water), and subjected to a final rinse with distilled or deionized water. Fresh nitrile gloves will be worn during any sample collection and when handling tools which are to be inserted into sampling areas. Solid waste generated during sampling activities (gloves, paper towels, etc.) will be appropriately disposed.

3.3 Sample Collection

Sub-Slab Vapor. Up to four sub-slab vapor samples will be collected from temporary stainless-steel Vapor Pin ® inserts that will be installed through the floor slab of the onsite buildings closest to the ground water contaminant plume. Iso-concentration contours for GRO from the latest ground water sampling event and proposed sample locations are illustrated on Figure 3.

To access the sub-slab environment, a roto-hammer will be used to drill a 5/8-inch hole through the concrete slab, into which a semi-permanent sampling point will be installed. For both soil gas and sub-slab vapor samples, a section of new Teflon® tubing secured to the sample port or Vapor Pin® will provide a sealed vapor pathway to the sampling manifold.

Soil Gas. Up to four Soil-gas samples will be collected from the locations shown on Figure 3. Soil gas samples will be collected by manually advancing a 1.25-inch soil-gas probe assembly (using a slide hammer impact technique) to a depth of approximately five (5) feet and then retracting it four (4) inches to allow the soil gas sampling tip to be pushed downward. A threaded connector will then be pressed firmly into 1/4-inch Teflon®-lined tubing, lowered down the inside of the drive tube and screwed into the top of the sampling tip. New Teflon-lined tubing will be tightly attached to the sampler fitting.

The following additional measures will be conducted prior to and during sample collection of both sub-slab and soil gas samples to ensure sampling integrity:

- In order to allow for conditions to equilibrate to atmospheric pressure, Vapor Pins® and soil-gas tooling will be installed at least 30 minutes prior to purging and sampling.
- Shut-in leak testing will be performed for each sampling manifold over a minimum of 5 minutes by shutting the inlet valve on the manifold and applying a vacuum using a pre-evacuated SUMMA cannister. Pressure will be monitored using the attached vacuum gauge. Any drop in pressure can suggest a potential leak in the system and if pressure is not maintained, all connections will be rechecked, and the leak test repeated until no drop in vacuum is observed over the 5-minute period.
- The sample line and manifold at each sample location will be purged by drawing soil gas vapors through the system for two (2) minutes (sub-slab) or four (4) minutes (soil gas) using a separate dedicated pre-evacuated SUMMA cannister.
- Rags soaked in isopropyl alcohol (IPA) will be placed around the Vapor Pin® penetration or soil gas tooling and around the fittings along the sample train to serve as leak detection. IPA will be included in the list of requested analytes to the project laboratory.

Sub-slab vapor and soil gas samples will be collected into three-liter SUMMA canisters that will be pre-cleaned and certified by the project laboratory. Sampling rates will be regulated to below approximately 167 milliliters per minute (mL/min) using an incorporated flow regulator. Sampling will be initiated by opening the inlet valve on the sample canister and terminated when vacuum pressure inside the Summa drops to below 5 in Hg. Sub-slab vapor samples will be uniquely labelled, packaged, and shipped to the laboratory under chain-of-custody protocols.

Following sample collection, the sampling train will be disconnected, and a photoionization detector (PID) and landfill gas meter will be attached, in turn, to the tubing to screen for VOCs as well as methane, and other gases.

Samples will be analyzed according to the Analysis Plan shown in Section 3.5. Sample containers and holding times for each analytical method are provided in Section 3.5. Each SUMMA canister will be appropriately labeled and shipped by FedEx to Environmental Analytical Laboratories of San Luis Obispo, California under chain-of-custody protocols.

3.4 Analysis Plan

Samples collected during this investigation will be analyzed according to the plan and protocol described in the following tables.

Table 3-1. Proposed Analysis Plan

Analytical Method	Constituents	Soil
EPA TO-15	GRO, GRO-related VOCs 2-Propanol (as leak detection)	All

EPA = U.S. Environmental Protection Agency

Table 3-2. Analytical Protocol

Analyte(s)	Analytical Method	Container and preservative	Holding Time	Preservation
Sub-Slab Vaporl:				
GRO	TO-15	3- Liter SUMMA canister	14-days*	
GRO-related VOCs and IPA	TO-15 (alternate)	3-Liter SUMMA canister	14-days	
Indicators	Total VOCs	Per instrument instruction	Field	
(Data collected during	Total Oxygen	Per instrument instruction	Field	
subslab purge	Carbon Dioxide	Per instrument instruction	Field	

3.5 Investigation-Derived Waste Storage and Disposal

Potentially impacted investigation-derived waste (IDW) may be generated during this investigation. At this time, it is assumed that this waste may be impacted with petroleum-related constituents; however, characterization of all waste will be necessary to properly treat or dispose of generated waste.

Water associated with decontamination of sampling equipment will be drummed, sealed, and labeled. Upon receipt of analytical data, the disposal requirements of the drummed fluid investigation-derived waste will be evaluated. It is anticipated that all waste generated will be handled as a hazardous material and will not be characteristic of hazardous waste. However, water waste determined to be impacted with contaminants at levels regulated under Oregon Hazardous Waste Regulations (OAR 340-100) as characteristic (hazardous waste) must be disposed or treated in a manner consistent with regulatory guidance.

3.6 Sample Transport and COC Procedures

Immediately following collection, all samples will be placed in a secure shipping container and subsequently transported to the analytical laboratory under Chain-of-custody (COC) procedures.

4.0 Report Preparation

A report will be prepared documenting the work conducted as described in Section 2.3. During the course of this investigation, should results indicate a need for additional work, ODEQ will be consulted regarding proposed actions.

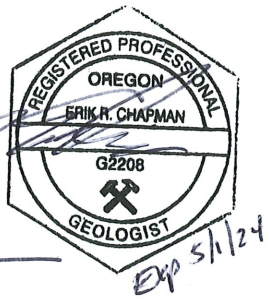
5.0 Proposed Schedule

Onsite investigation can begin as soon as practical following ODEQ approval of this Work Plan, and subsequent approval of an access agreement with the property owner. The first phase of investigation is anticipated to occur in December 2023 and will include the first of the two sampling events.

6.0 Certification

This Work Plan has been prepared under the supervision of the following Oregon-registered Certified Engineering Geologist and Geologist.

EVREN Northwest, Inc.

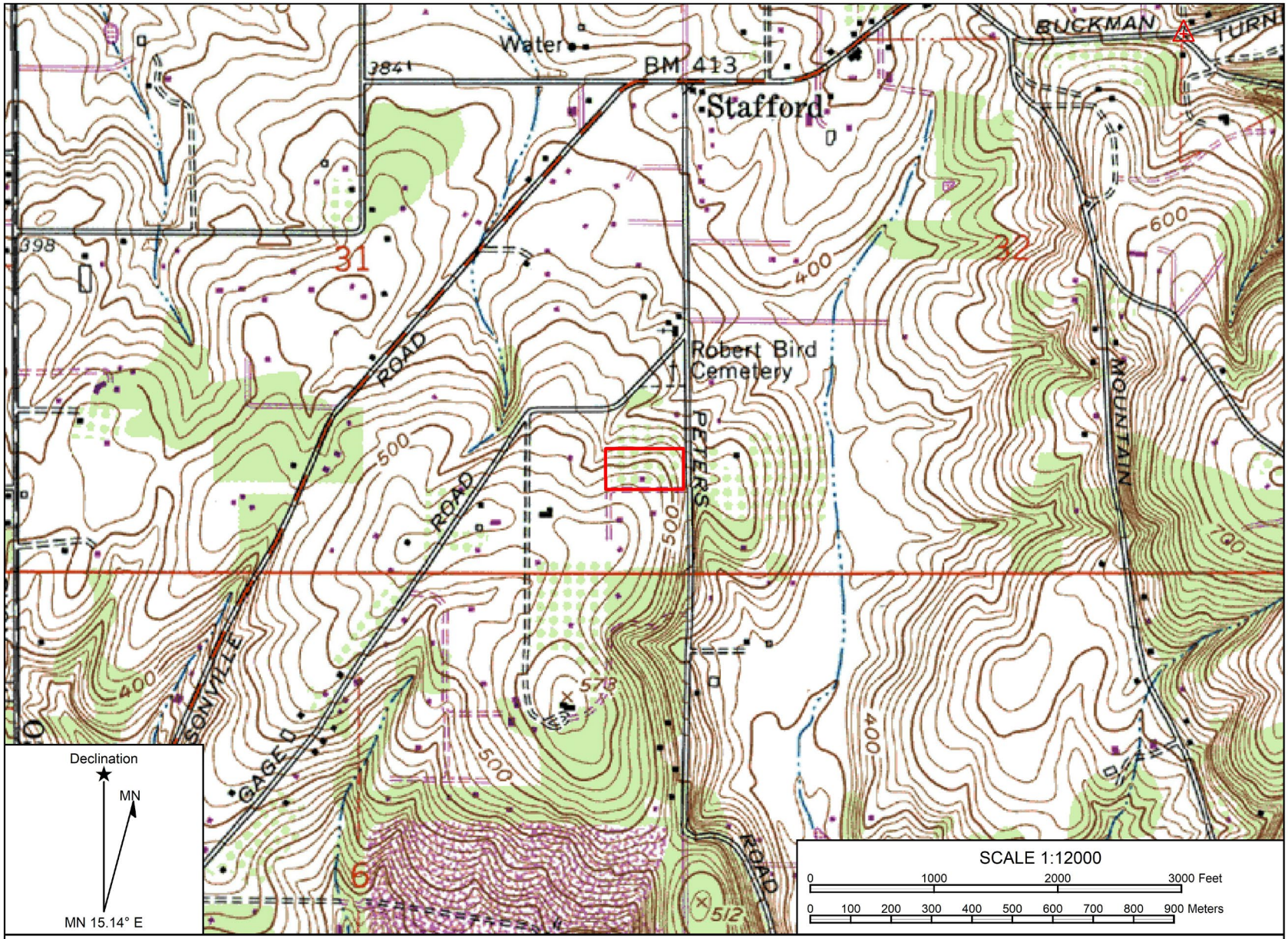


EXP. 2/1/2025

Erik Chapman, R.G.
Principal Geologist

Lynn Green, C.E.G.
Principal Engineering Geologist

FIGURES



Name: CANBY
Date: Jan 1, 1985,
Scale: 1 inch = 1,000 ft.

Location: 045° 20' 55.8190" N, 122° 43' 21.9793" W
Contour Interval: 10 ft

EVREN NORTHWEST INC environmental, natural resource consultants	Date Drawn: 5/11/2022 CAD File Name: 114-19002-fig1sv_map Drawn By: CLR Approved By: LDG	Ollison Property 23737 SW Newland Road Wilsonville, Clackamas County, Oregon	**Site Vicinity Map**	Project No. 114-19002 Figure No. **1**

DRAWN BY	CHECKED BY	APPROVED BY	DRAWING NUMBER
H. ROMER 07/05/2023	E.BRUGGEMAN 10/04/2023	L. GREEN 10/04/2023	114-19002(v01)

LEGEND:

- SUBJECT BUILDINGS
- SUBJECT PROPERTY BOUNDARIES
- UNDERGROUND STORAGE TANK LOCATIONS (REMOVED)
- DOMESTIC WELL
- DECOMMISSIONED DOMESTIC WELL
- MONITORING WELL LOCATION

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2022 AND BOTH UAI AND ENW FIELD NOTES.
2. ALL BUILDING, STREET, AND FEATURE LOCATIONS ARE APPROXIMATE.
3. SYMBOLS REPRESENT LOCATION AND DO NOT ALWAYS REPRESENT EXACT SHAPE, SIZE, OR ORIENTATION.

APPROXIMATE SCALE

0 50 100 FEET

N

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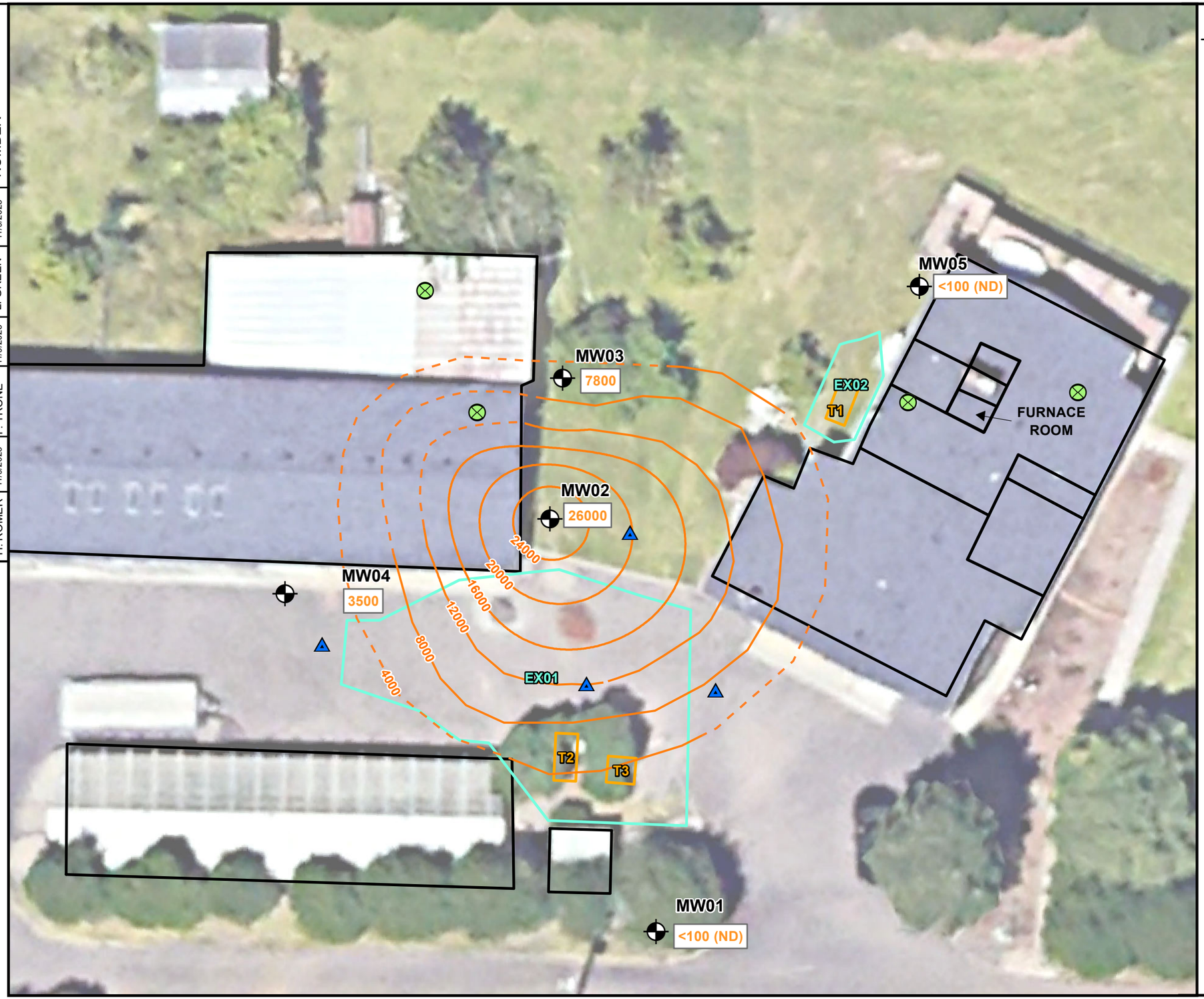
FIGURE 2

SITE PLAN

OLLISON PROPERTY
23737 SW NEWLAND ROAD
WILSONVILLE, CLACKAMAS COUNTY, OREGON

DRAWING NUMBER	114-19002(V01)	
APPROVED BY	L. GREEN	11/9/2023
CHECKED BY	P. TRONE	11/9/2023
DRAWN BY	H. ROMER	11/9/2023



LEGEND:

- SUBJECT PROPERTY BOUNDARY
- SUBJECT BUILDINGS
- EXCAVATION AREA
- DECOMMISSIONED TANK
- GRO ISOPLETH-CONCENTRATIONS (µG/L) (DASHED WHERE ESTIMATED)
- MONITORING WELL
- PROPOSED SOIL GAS SAMPLE LOCATION
- PROPOSED SOIL SUB-SLAB SAMPLE LOCATION

NOTES:

1. BASE MAP DEVELOPED FROM AN AERIAL PHOTOGRAPH MAP DATED 2023 AND ENW FIELD NOTES.
2. ALL BUILDING, STREET, AND FEATURE LOCATIONS ARE APPROXIMATE.
3. SYMBOLS REPRESENT LOCATION AND DO NOT ALWAYS REPRESENT EXACT SHAPE, SIZE, OR ORIENTATION.

0 10 20 40

Feet

N

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FIGURE 3

SAMPLE LOCATION DIAGRAM

OLLISON PROPERTY
23737 SW NEWLAND ROAD
WILSONVILE, OREGON