Cleanup Action Plan
TOC Facility No. 01-176

24205 and 24225 56th Avenue West
Mountlake Terrace, Washington

By

Washington State Department of Ecology
Shoreline, Washington

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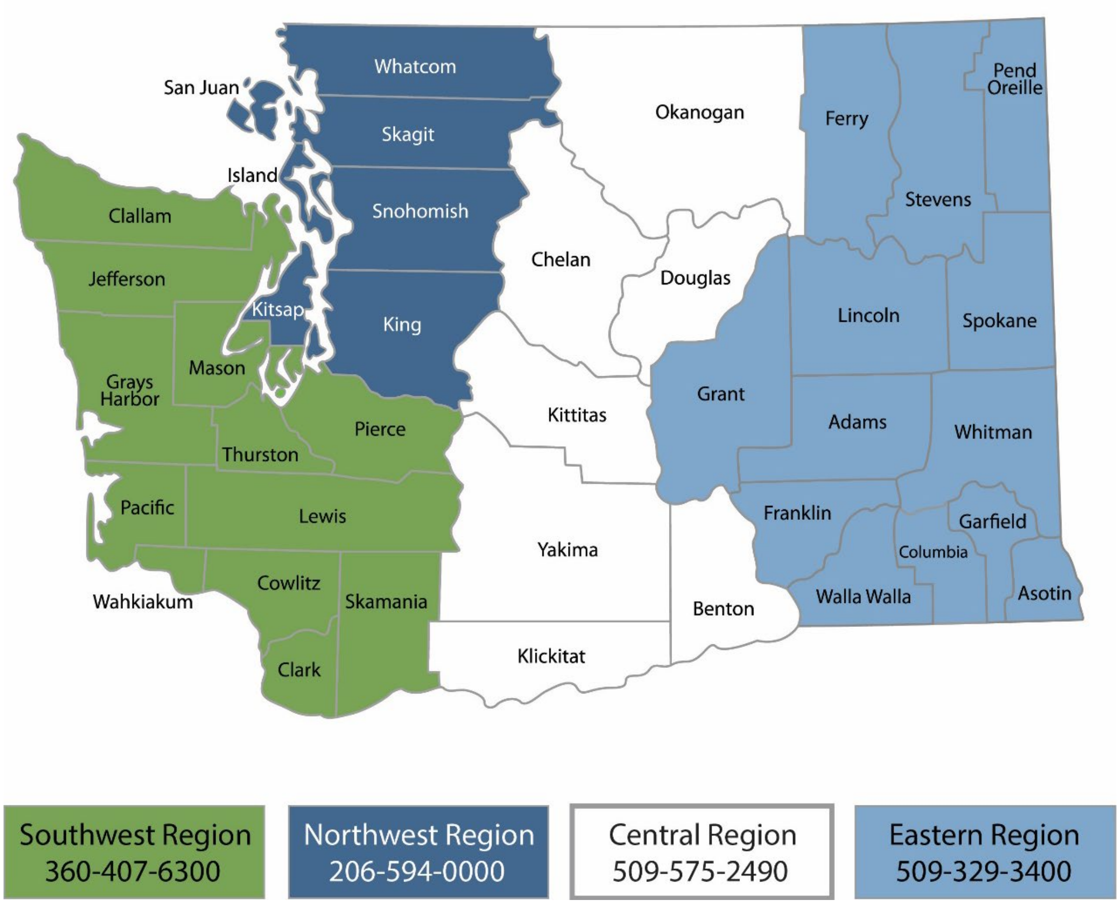

Region	Counties served	Mailing Address	Phone
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Eastern	Adams, Asotin, Columbia, Ferry, Franklin, Garfield, Grant, Lincoln, Pend Oreille, Spokane, Stevens, Walla Walla, Whitman	4601 North Monroe Spokane, WA 99205	509-329-3400
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DEPARTMENT OF
ECOLOGY
State of Washington

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Acronyms and Abbreviations

AO	Agreed Order No. DE 8661
ARARs	applicable or relevant and appropriate requirements
AWS	air/water separator
BTEX	benzene, toluene, ethylbenzene, and xylenes
CAP	Cleanup Action Plan
COCs	constituents of concern
COPCs	constituents of potential concern
cPAHs	carcinogenic polycyclic aromatic hydrocarbons
DPE	dual-phase extraction
DRO	diesel-range organics
Ecology	Washington State Department of Ecology
EDB	1,2-dibromoethane
EDC	1,2-dichloroethane
Farallon	Farallon Consulting, L.L.C.
GAC	granular activated carbon
GRO	gasoline-range organics
HASP	health and safety plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
JYK Holdings	JYK Holdings, LLC
LNAPL	light nonaqueous-phase liquid
MPE	multi-phase extraction
MTBE	methyl tertiary-butyl ether
MTCA	Model Toxics Control Act Cleanup Regulation
µg/L	micrograms per liter
O&M	operation and maintenance

OWS	oil/water separator
ORO	oil-range organics
PAH	polycyclic aromatic hydrocarbon
PPCD	Prospective Purchase Consent Decree
PQL	practical quantitation limit
PSCAA	Puget Sound Clean Air Agency
RI/FS Report	Remedial Investigation Report/Feasibility Study
SEPA	State Environmental Policy Act
SoundEarth	SoundEarth Strategies, Inc.
Stantec	Stantec Consulting Services Inc.
SVE	soil vapor extraction
TOC	TOC Holdings Co., formerly Time Oil Co.
TPH	total petroleum hydrocarbons
USTs	underground storage tanks
WAC	Washington Administrative Code

1.0 Introduction

This document presents the Cleanup Action Plan (CAP) for the TOC Holdings Co., formerly known as Time Oil Co. (TOC) Facility No. 01 176 (Site) located in Mountlake Terrace (Figure 1). The CAP was prepared in accordance with the requirements of the Model Toxics Control Act, Chapter 70A.305 of the Revised Code of Washington, and its implementing regulations, Chapter 173-340 of the Washington Administrative Code (WAC) (collectively, MTCA).

1.1 General Facility Information and Site/Property

The Site is defined by the extent of contamination attributable to releases of petroleum hydrocarbons at or from the former Time Oil gasoline service station located at 24205 56th Avenue West in Mountlake Terrace, Washington (Source Property). The Site is identified by Facility Site ID 93355524 and Cleanup Site ID 6885. The Site encompasses portions of the Source Property, the south-adjoining property at 24225 56th Avenue West (Adjoining Property), the property at 24309 56th Avenue West (Drake Parcel), and a portion of the adjoining 56th Avenue West right-of-way located to the west of the Source Property, Adjoining Property, and Drake Parcel (Figures 1 and 2). The Source Property and the Adjoining Property total approximately 1.16 acres of land and are collectively referred to as the “Property.”

1.2 Purpose and Objective

This document is a requirement of MTCA. The purpose of the CAP is to document the selected cleanup action for the Site and to specify the cleanup standards and other requirements the cleanup action must meet.

The objective of this CAP is to describe the cleanup action selected for the Site, which will constitute the statement of work under the PPCD.

Specific MTCA requirements for CAPs are set forth in WAC 173-340-380(5). Consistent with these requirements, this CAP provides the following sections:

- **Section 2, Site Description and Background**, describes the Site and surrounding properties and evaluates vulnerable populations and overburdened communities proximate to the Site.
- **Section 3, Remedial Investigation Activities and Interim Actions**, summarizes the remedial investigation activities and interim actions performed at the Site.

- **Section 4, Conceptual Site Model**, summarizes the conceptual site model for the Site.
- **Section 5, Cleanup Standards**, presents the cleanup levels, points of compliance, and local, state, and federal laws applicable to the Site
- **Section 6, Cleanup Action Requirements and Goals**, identifies the requirements and goals for the cleanup action.
- **Section 7, Cleanup Action Alternatives**, summarizes the cleanup action alternatives evaluated for the Site and identifies the selected alternative.
- **Section 8, Description of Cleanup Action**, describes in detail the cleanup action selected for the Site, including the compliance monitoring requirements, implementation schedule, restoration time frame, and contingency actions.
- **Section 9, References**, provides a list of the documents cited in this CAP.

1.3 Preliminary Determination

The Washington State Department of Ecology (Ecology) has made a preliminary determination that the cleanup action described in this CAP will comply with the requirements specified in WAC 173-340-360. Specifically, these requirements include a cleanup action that will be protective of human health and the environment (including likely vulnerable populations and overburdened communities), comply with applicable state and federal laws, comply with cleanup standards, prevent or minimize present and future releases and migration of hazardous substances in the environment, provide for compliance monitoring, use permanent solutions to the maximum extent practicable, provide for a reasonable restoration time frame, and consider public concerns and tribal rights and interests.

1.4 Project Background and Regulatory History

TOC operated a retail gasoline service station on the Source Property from 1968 to 1990. The service station included three underground storage tanks (USTs), six fuel dispensers, and associated product lines. In 1991, the USTs, fuel dispensers, and associated product lines were decommissioned by removal during closure of the service station.

Between 1991 and 2017, TOC performed remedial investigations to determine the extent of contamination at the Site and performed interim actions to remediate the contamination. The remedial investigations and interim actions were performed independently and pursuant to Agreed Order No. DE 8661 (Agreed Order) that TOC and the Washington State Department of Ecology (Ecology) entered in 2011. The Agreed Order required TOC to prepare a remedial investigation report, complete a feasibility study, perform interim actions, and develop a cleanup action plan for the Site.

In 2017, TOC filed a Chapter 7 liquidation bankruptcy and stopped performing all remedial work at the Site. As a result of the bankruptcy, ownership of the Source Property and Adjoining Property was transferred to the trustee of the bankruptcy estate (TOC Trustee). JYK Holdings is under contract with the TOC Trustee to acquire the Source Property and Adjoining Property. Closing of the transaction is conditioned on JYK Holdings entering into a Prospective Purchaser Consent Decree (PPCD) with Ecology that will limit its liability for the Site in exchange for it committing to implement certain remedial actions.

JYK Holdings has completed a remedial investigation and feasibility study for the Site. The remedial investigation characterized the extent of the contamination at the Site and the threat the contamination poses to human health and the environment. The results from the remedial investigation were used to conduct a feasibility study to evaluate cleanup action alternatives for the Site and select a preferred cleanup action for the Site. The remedial investigation and feasibility study are presented in the *Remedial Investigation Report/Feasibility Study,* prepared by Farallon, dated March 6, 2025 (RI/FS Report).

2.0 Site Description and Background

The Site is located in Mountlake Terrace, Washington just north of the boundary between Snohomish County and King County in an area zoned as a Town Center-Reserve district that is intended to allow for a mixture of multifamily, retail commercial, and professional office uses.

The Site consists of portions of three parcels and a right-of-way. The three parcels, which are described below, encompass a total of 1.99 acres of land east of the 56th Avenue West right-of-way (Figures 1 and 2). The following parcels and right-of-way comprise the Site:

- Source Property (24205 56th Avenue West): The Source Property consists of Snohomish County Parcel No. 00489300003501, which totals 0.33 acre of vacant land. The TOC Trustee is the current owner of the parcel. JYK Holdings is under contract with the TOC Trustee to acquire the Source Property.
- Adjoining Property (24225 56th Avenue West): The Adjoining Property consists of Snohomish County Parcel No. 00489300003400, which totals 0.83 acre of land developed with a vacant one-story commercial building. The TOC Trustee is the current owner of the parcel. JYK Holdings is under contract with the TOC Trustee to acquire the Adjoining Property.
- Drake Parcel (24309 56th Avenue West): The Drake Parcel consists of Snohomish County Parcel No. 00489300003300, which totals 0.83 acre of land developed with a one-story commercial building occupied by the Getaway Tavern. Katrina Grimes is the current owner of the parcel.
- The 56th Avenue West right-of-way.

The general location of the Site is depicted on Figure 1. The lateral extent of the Site is depicted on Figure 2. The vertical extent of the Site is depicted on Figure 3.

A fruit stand operated on the Source Property between 1962 and 1975. TOC developed the Source Property with a retail gasoline service station in 1968. A building was constructed in 1976 and used as a convenience store. The retail gasoline service station operated on the Source Property until 1990. The service station included three USTs (one 6,000-gallon UST, one 8,000-gallon UST, and one UST with a capacity of either 4,000 or 6,000 gallons), six fuel dispensers, and associated product lines (Figure 4). Between 1990 and 1991, the fuel dispensers and three USTs were removed from the Source Property. A release of petroleum hydrocarbons to the subsurface was confirmed during the UST removal; petroleum-contaminated soil removed from the UST excavation was placed back into the excavation. Remedial investigation activities began on the Source Property in 1991. In 1996, a dual-phase extraction (DPE) system was installed at the Source Property (see Section 3.0). The DPE system was discontinued in 2005 due to a decline in the system's effectiveness. Between approximately 1995 and 2008, TOC leased the Source Property to B&B Cable, a telecommunications cabling contractor. B&B Cable vacated the Source Property in January 2008. In May 2008, the building was demolished. The Source Property has been vacant since 2008. Between 2012 and 2017, TOC operated a multi-phase extraction (MPE) system at the Source Property (see Section 3.0).

The Adjoining Property was initially developed in 1961 with the existing one-story commercial building (Figure 4). Information regarding the use and occupancy of the Adjoining Property prior to 1978 was not available. By 1978, the existing building was remodeled as a restaurant. In 2010, TOC purchased the Adjoining Property. Between 2012 and 2017, TOC operated an MPE system at the Adjoining Property (see Section 3.0). The Adjoining Property operated as a restaurant until 2014. The Adjoining Property has been vacant since 2014.

The Drake Parcel was initially developed in 1961 as a convenience store. There is no evidence that the convenience store included a fueling facility. In 1977, the original building was remodeled into the existing tavern, currently known as the Getaway Tavern. Between 2012 and 2017, TOC operated an MPE system at the Drake Parcel (see Section 3.0).

JYK Holdings is under contract to purchase the Source Property and Adjoining Property. JYK Holdings intends to redevelop the Source Property and Adjoining Property into a mix of residential and/or commercial uses. The cleanup action will be implemented regardless of JYK Holdings' redevelopment plans. It is assumed that the Drake Parcel will continue with the existing commercial use.

2.1 Vulnerable Populations and Overburdened Communities

Farallon conducted an evaluation of potential impacts to likely vulnerable populations and overburdened communities in the vicinity of the Site in accordance with *Implementation Memorandum No. 25: Identifying Likely Vulnerable Populations and Overburdened Communities under the Cleanup Regulations* dated January 2024, prepared by Ecology (2024) (Implementation Memorandum No. 25). The purpose of this evaluation is to identify and reduce the impact of environmental and health disparities in Washington State and improve the health of Washington State residents, and to support Ecology's determinations regarding site prioritization, cleanup decisions, and site hazard rankings. Farallon has performed the assessment required by MTCA and Implementation Memorandum No. 25 and, as more fully discussed below, has determined that vulnerable populations and overburdened communities in the vicinity of the Site have not been impacted by contamination at the Site and that the proposed cleanup action will mitigate potential exposure to environmental harms.

Implementation Memorandum No. 25 indicates that the potentially exposed population includes a likely vulnerable population or overburdened community if the population meets any of the following criteria:

- The potentially exposed population is located in a census tract that ranks a 9 or 10 on the Environmental Health Disparities Index from the Washington State Department of Heath's Environmental Health Disparities Map (EHD Map);
- The potentially exposed population is located in a census tract that is at or above the 80th Washington State percentile of the Demographic Index from the U.S. Environmental Protection Agency (EPA) Environmental Justice Screening and Mapping Tool (EJ Screening Tool); or
- The potentially exposed population is located in a census tract that is at or above the 80th Washington State percentile of the Supplemental Demographic Index from the EJ Screening Tool.

Farallon used the EPA EJ Screening Tool and the EHD Map to evaluate whether vulnerable populations are present in the vicinity of the Site. The Site is located within Census Tract 53061051100, which is in the 38th Washington State percentile of the Demographic Index and 30th Washington State percentile of the Supplemental Demographic Index from the EJ Screening Tool (Appendix A). According to the EHD Map, the Site is located in an area that ranks a 7 on the Environmental Health Disparities Index (Appendix A).

Based on the overall rank of 7 on the Environmental Health Disparities Index and Demographic Index and Supplemental Demographic Index state percentiles less than 80, vulnerable populations and overburdened communities are not reasonably likely to be exposed to hazardous substances at the Site.

3.0 Remedial Investigation Activities and Interim Actions

This section summarizes the remedial investigation activities and interim actions completed at the Site and at properties and rights-of-way in the vicinity of the Site. Additional details are provided in the Draft Remedial Investigation Report prepared by SoundEarth Strategies, Inc. (SoundEarth) (2013) dated November 27, 2013 (Draft RI Report) and the RI/FS Report.

Remedial investigation activities and interim actions have been undertaken at the Site since 1991. The constituents of potential concern (COPCs) evaluated during the investigations were those associated with petroleum releases: total petroleum hydrocarbons (TPH) as gasoline-range organics (GRO), as diesel-range organics (DRO), and as oil-range organics (ORO); benzene, toluene, ethylbenzene, and xylenes (BTEX); select fuel additives including methyl tertiary-butyl ether (MTBE), 1,2-dichloroethane (EDC), and 1,2-dibromoethane (EDB); carcinogenic polycyclic aromatic hydrocarbons (cPAHs); and lead. Boring and monitoring well locations are depicted on Figure 5.

Between 1990 and 1991, the three USTs, fuel dispensers, and associated product lines at the Source Property were decommissioned by removal. During the removal activities, petroleum hydrocarbons were detected in soil.

From 1992 to 2013, remedial investigation activities were conducted at the Site to characterize the nature and extent of contamination attributable to releases of petroleum hydrocarbons at or from the former Time Oil gasoline service station. The activities included installation of soil gas probes, advancement of borings, installation of monitoring wells, installation of remediation wells, characterization of light non-aqueous phase liquid (LNAPL), and collection and analysis of soil gas, soil, and groundwater samples. During the remedial investigation, soil gas samples were collected from nine soil gas probes proximate to the former UST system on the Source Property; 318 soil samples were collected from 111 borings; and 1,439 groundwater samples were collected from a comprehensive monitoring well network of 106 monitoring wells.

Between 2005 and 2013, remedial investigation activities were also performed at two properties located south of the Site, including the Herman Property at 24311 56th Avenue West and Shin/Choi Property at 24325 56th Avenue West (Figure 2). The remedial investigation activities included the advancement of eight borings that were completed as monitoring wells on the Herman Property, advancement of four borings that were completed as monitoring wells on the Shin/Choi Property, and collection and analysis of soil and groundwater samples.

The remedial investigation activities performed between 1992 and 2013 are documented in the Draft RI Report, which was submitted to Ecology in 2013. Details of the 1992 through 2013 data, including data summary tables and figures resulting from these investigations, are presented in the Draft RI Report.

From 1996 to 2017, interim actions were conducted at the Site that included the installation and operation of DPE and MPE systems and LNAPL recovery. In 1996, a DPE system was installed at the Source Property to remediate soil and groundwater in the Shallow Water-Bearing Zone contaminated by petroleum hydrocarbons and remove LNAPL. A total of 4,628 pounds of vapor-phase petroleum hydrocarbons and 18,983 gallons of groundwater were extracted and treated during operation of the DPE system. The DPE system was shut down in 2005 following confirmation it had effectively remediated soil and groundwater in the Shallow Water-Bearing Zone.

Between 2011 and 2012, three MPE systems were installed to remediate residual petroleum-contaminated groundwater, soil vapor, and LNAPL in the Intermediate Water-Bearing Zone. Operation of the MPE systems resulted in extraction of 4,698 pounds of vapor-phase petroleum hydrocarbons and extraction/treatment of 4,846,204 gallons of petroleum-contaminated groundwater. The MPE systems ceased operating in 2017 after TOC filed for bankruptcy. The locations of the former DPE and MPE systems are shown on Figure 5.

In addition to operation of the DPE and MPE systems, multiple LNAPL recovery events were conducted at the Site from 2005 to 2013. During the events, LNAPL was removed from monitoring wells using various methods that included recovery socks, passive skimmers, and bailers.

Between 2013 and 2016, groundwater monitoring was performed at the Site to evaluate the effectiveness of the interim actions. The interim actions and groundwater monitoring activities performed before November 2013 are documented in the Draft RI Report. The interim actions and groundwater monitoring activities performed between November 2013 and 2016 are documented in various reports available in the Ecology Toxics Cleanup Program Cleanup Site Database for the Site.

In 2023, a groundwater monitoring event was performed to evaluate current groundwater conditions at the Site. The groundwater monitoring event included measuring depth to groundwater and collecting groundwater samples at 20 monitoring wells installed in the Shallow-Intermediate Water-Bearing Zone or the Intermediate Water-Bearing Zone. These monitoring wells were selected based on previous analytical results from the monitoring well network and proximity to the MPE systems.

Groundwater analytical results for monitoring wells screened in the Intermediate Water-Bearing Zone demonstrate that petroleum hydrocarbon concentrations have significantly decreased from when the MPE systems were first started in 2012. Based on these data, the completed interim actions have remediated a significant mass of contamination in soil and groundwater and promoted natural attenuation.

4.0 Conceptual Site Model

The analytical results of soil and groundwater samples collected across the Site indicate that the only COPCs that remain at the Site are GRO and BTEX. Accordingly, GRO and BTEX are the constituents of concern (COCs) at the Site. The soil contamination that remains at the Site is confined in the Intermediate Water-Bearing Zone proximate to the remaining groundwater contamination at the Site. Groundwater analytical results indicate that the Intermediate Water-Bearing Zone is the only water-bearing zone containing COCs at concentrations exceeding MTCA Method A cleanup levels. Figures 2 and 3 depict the lateral and vertical extent of contamination that remains at the Site.

A summary of the groundwater conditions in each of the water-bearing zones present at the Site is provided below:

- **Shallow Water-Bearing Zone:** The DPE system operated at the Source Property until 2005. The system was decommissioned and removed in 2011 after performance monitoring demonstrated that groundwater in the Shallow Water-Bearing Zone had been successfully remediated. Groundwater analytical results indicate COPCs are no longer present at concentrations exceeding MTCA Method A cleanup levels in the Shallow Water-Bearing Zone (Figure 3).
- **Intermediate Water-Bearing Zone:** Groundwater analytical results indicate that GRO, benzene, and xylenes are the only COPCs that remain present at concentrations exceeding MTCA Method A cleanup levels in three locations in the Intermediate Water-Bearing Zone: 1) down-gradient of the former USTs on the Source Property, proximate to monitoring wells MW09, MW10, MW20, MW25, and MW32; 2) on the southwestern portion of the Adjoining Property, proximate to MW57; and 3) on the western portion of the Drake Parcel, proximate to monitoring wells MW69 and MW98 (Figure 2). Each area of groundwater contamination is bounded in up-, cross-, and down-gradient directions. Specifically, multiple monitoring wells have been installed in the 56th Avenue West and 242nd Street Southwest rights-of-way, along the eastern boundaries of the Source Property, Adjoining Property, and Drake Parcel; and along the southern boundary of the Drake Parcel. COPCs have never been detected at concentrations exceeding MTCA cleanup levels in groundwater samples collected from the monitoring wells, including monitoring wells MW85 and MW89, located along the southern boundary of the Drake Parcel.

- **Deep Water-Bearing Zone:** COCs have not been detected at concentrations exceeding MTCA cleanup levels in groundwater samples collected from the Deep Water-Bearing Zone, except for DRO, benzene, and lead in two groundwater samples collected in 2005 and 2006 prior to proper development of the monitoring wells (MW30 and MW40). Subsequent groundwater samples collected from monitoring wells MW30 and MW40 did not contain concentrations of COCs exceeding MTCA cleanup levels. Therefore, the historical exceedances are attributable to improper sampling techniques and are not representative of groundwater conditions. Based on these data, COPCs are not present at concentrations exceeding MTCA Method A cleanup levels in the Deep Water-Bearing Zone. The analytical results for groundwater samples collected from the Deep Water-Bearing Zone at MW26, MW30, MW39, MW40, MW64, and MW78 vertically bound the groundwater contamination at the Site.

Historically, concentrations of COCs exceeded the MTCA Method A cleanup levels in shallow soil proximate to the former UST system on the Source Property. As contamination migrated to the south and southeast, beyond the Source Property boundary, it migrated downward to depths corresponding to the Intermediate Water-Bearing Zone (between 22 and 50 feet bgs) beneath the Adjoining Property, Drake Parcel, and the eastern portion of the 56th Avenue West right-of-way. Prior to implementation of the interim actions, contaminated soil was bounded in up-, cross-, and down-gradient positions relative to the former UST system on the Source Property. Based on the results of the interim actions completed at the Site, soil contamination has been significantly reduced and the remaining soil contamination at the Site is confined in the Intermediate Water-Bearing Zone proximate to the remaining groundwater contamination at the Site. The groundwater contamination is bounded in the down-gradient portion of the Site, as demonstrated by the analytical results from monitoring wells MW84, MW85, MW86, and MW89, confirming that groundwater contamination is not migrating beyond the Drake Parcel and therefore not commingling with contamination from unrelated sources on the Herman Property or Shin/Choi Property. Furthermore, the groundwater plumes are generally stable and/or shrinking, which indicates that the interim actions have remediated a significant mass of contamination in soil and groundwater and promoted natural attenuation.

5.0 Cleanup Standards

Cleanup standards consist of 1) cleanup levels established for the hazardous substances present at a site, and 2) the location where these cleanup levels must be met (i.e., point of compliance). Other applicable or relevant and appropriate requirements (ARARs) may also apply to a site because of the type of action and/or location of the site. This section presents the cleanup standards and ARARs for the Site.

5.1 Constituents of Concern

The COCs for the Site consist of those hazardous substances that remain present at concentrations exceeding their respective cleanup levels.

GRO and BTEX have been identified as the COCs in soil because they are the only COPCs that have been detected at concentrations exceeding MTCA Method A cleanup levels.

GRO, benzene, and xylenes have been identified as the COCs in groundwater because they are the only COPCs that have been detected at concentrations exceeding MTCA Method A cleanup levels following completion of the interim actions at the Site.

Although DRO and ORO were historically detected in groundwater at concentrations exceeding the MTCA Method A cleanup level, the results were flagged by the laboratory and likely caused by overlap from the GRO detections in the same samples. In addition, DRO has not been detected at concentrations exceeding the MTCA Method A cleanup level in soil samples collected at the Site. Therefore, DRO and ORO are not considered to be COCs for groundwater at the Site.

MTBE, EDB, EDC, semivolatile organic compounds, and cPAHs are not considered COCs for groundwater because they were not detected at concentrations exceeding laboratory practical quantitation limits (PQLs) and/or MTCA Method A cleanup level in groundwater samples collected from permanent monitoring wells at the Site.

5.2 Cleanup Levels

Cleanup levels for the Site have been developed in accordance with MTCA to be protective of human health and the environment.

The cleanup levels for the COCs in soil are based on the MTCA Method A cleanup levels for unrestricted land use, as summarized below.

- GRO: 30 milligrams per kilogram (mg/kg);
- Benzene: 0.03 mg/kg;
- Toluene: 6 mg/kg;
- Ethylbenzene: 7 mg/kg; and
- Xylenes: 9 mg/kg.

The cleanup levels for the COCs in groundwater are based on the MTCA Method A cleanup levels protective of drinking water, as summarized below:

- GRO: 800 micrograms per liter (µg/L);
- Benzene: 5 µg/L; and
- Xylenes: 1,000 µg/L.

5.3 Points of Compliance

The points of compliance are the locations at which cleanup levels for the COCs must be attained to meet the requirements of MTCA:

- In accordance with WAC 173-340-740(6), the point of compliance for soil is defined as all soil at the Site where COCs have been detected at concentrations exceeding MTCA cleanup levels; and
- In accordance with WAC 173-340-720(8), the point of compliance for groundwater is defined as the uppermost level of the saturated zone extending vertically to the lowest depth at the Site that potentially could be impacted by COCs.

5.4 Applicable or Relevant and Appropriate Requirements

Pursuant to MTCA, the cleanup action will be exempt from the procedural requirements of Chapters 70A.15, 70A.205, 70A.300, 77.55, 90.48, and 90.58 of the Revised Code of Washington, and of any laws requiring or authorizing state or local government permits or approvals. However, the cleanup action must still comply with the substantive requirements of such permits or approvals in accordance with WAC 173-340-520. The cleanup action must also comply with any applicable federal regulations and obtain any required federal permits as necessary.

The primary ARARs related to the cleanup action are the following:

- Model Toxics Control Act, Chapter 70A.305 of the Revised Code of Washington (Chapter 70A.305 RCW);
- Washington State Solid Waste Management Laws and Regulations (Chapter 70.95 RCW; Chapter 173-351 WAC; and Chapter 173-304 WAC); and
- Guidance for Remediation of Petroleum Contaminated Sites, revised June 2016, prepared by Ecology (2010).

These primary ARARs are anticipated to be the most applicable to the cleanup action because they provide the framework for the cleanup action, including applicable and relevant regulatory guidelines, cleanup standards, waste disposal criteria, and standards for documentation of the cleanup action.

Other ARARs that may be applicable for the cleanup action are the following:

- The Water Quality Standards for Groundwaters of the State of Washington (Chapter 173-200 WAC);
- The Hazardous Waste Management Act (Chapter 70.105 of the Revised Code of Washington [Chapter 70.105 RCW]);
- Dangerous Waste Regulations (Chapter 173-303 WAC);
- Accreditation of Environmental Laboratories (Chapter 173-50 WAC);
- The Occupational Safety and Health Act (Part 1910 of Title 29 of the Code of Federal Regulations [29 CFR 1910] and Chapter 296-62 WAC);
- The State Environmental Policy Act (Chapter 43.21 RCW; Chapter 197-11 WAC; and Chapter 173-802 WAC);
- The State National Pollutant Discharge Elimination System Program (Chapter 173-220 WAC);
- The State Waste Discharge General Permit Program (Chapter 173-226 WAC);
- Maximum Contaminant Levels, National Primary Drinking Water Regulations (WAC 246-290-310 and 46 CFR 141);

- Safety Standards for Construction Work (Chapter 296-155 WAC);
- Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 WAC); and
- Applicable local permits and ordinances indicated by the City of Mountlake Terrace Municipal Code.

6.0 Cleanup Action Requirements and Goals

As detailed in the RI/FS Report, Farallon identified the requirements and goals for the cleanup action. A cleanup action must satisfy the following general requirements, as specified in WAC 173-340-360(3)(a):

- Protect human health and the environment, including likely vulnerable populations and overburdened communities;
- Comply with cleanup standards;
- Comply with applicable state and federal laws;
- Prevent or minimize present and future releases and migration of hazardous substances in the environment;
- Provide resilience to climate change impacts that have a high likelihood of occurring and severely compromising its long-term effectiveness;
- Provide for compliance monitoring;
- Not rely primarily on dilution and dispersion unless the incremental costs of any active remedial measures over the costs of dilution and dispersion grossly exceed the incremental degree of benefits;
- Provide for a reasonable restoration time frame;
- Use permanent solutions to the maximum extent practicable; and
- Consider public concerns.

In addition to the general requirements listed above, MTCA requires that cleanup action alternatives be evaluated for action-specific requirements (WAC 173-340-360(3)(b)), media-specific requirements (WAC 173-340-360(3)(c)), and public concerns and tribal rights and interests (WAC 173-340-360(3)(d)).

Site-specific cleanup action goals were identified in accordance with WAC 173-340-351(6)(a). The cleanup action goals listed below provide additional framework for developing and evaluating remedial technologies and cleanup action alternatives.

- Achieve cleanup standards using a permanent solution as defined in WAC 173-340-200 that meets MTCA requirements for cleanup actions per WAC 173-340-360 and WAC 173-340-370;

- Eliminate the exposure pathways for COCs in soil and groundwater; and
- Implement a cleanup action alternative that allows for potential future residential land use.

7.0 Cleanup Action Alternatives

This section summarizes the cleanup action alternatives evaluated for the Site. Additional details are provided in the RI/FS Report.

7.1 Identification of Cleanup Action Alternatives

The following four cleanup action alternatives were evaluated in the feasibility study:

- **Cleanup Action Alternative 1 –Excavation and Disposal.** This alternative would involve the excavation, removal, and disposal of contaminated soil and groundwater from the Site. An estimated 21,200 tons of contaminated soil would be removed through excavation and tens of thousands of gallons of contaminated groundwater would be removed through dewatering. Groundwater monitoring would be performed for one year after completion of the excavation and dewatering. The restoration time frame for this alternative was estimated at two years.
- **Cleanup Action Alternative 2 – Multi-Phase Extraction.** This alternative would involve the use of MPE to treat contaminated soil and groundwater at the Site. Two of the existing MPE systems would be rehabilitated and expanded to remediate the three discrete areas of contaminated soil and groundwater at the Site. The MPE systems would use a total of 14 MPE wells, consisting of eight existing MPE wells (MW09, MW10, MW20, MW25, MW32, MW57, MW69, and MW98) and six new MPE wells. The MPE systems would operate for three years followed by two years of groundwater monitoring. The restoration time frame for this alternative was estimated at five years.
- **Cleanup Action Alternative 3 – Subsurface Injections.** This alternative would involve the injection of a chemical oxidant solution into the subsurface to treat the three discrete areas of contaminated soil and groundwater at the Site. The solution would be delivered to the subsurface via permanent injection wells, with an assumed radius of influence of 10 feet. Three injection events would likely be necessary to achieve cleanup standards. Groundwater monitoring would be performed before, during, and after the injection events. The restoration time frame for this alternative was estimated at 10 years.

- **Cleanup Action Alternative 4 – Monitored Natural Attenuation.** This alternative would involve the imposition of engineered controls and institutional controls to protect against exposure to the contaminated soil and groundwater at the Site and monitoring of groundwater to evaluate the rate of natural attenuation. An engineered cap would be constructed over contaminated soil and an institutional control in the form of an environmental covenant would be recorded against the Source Property, Adjoining Property, and Drake Parcel to limit activities that could expose, extract, or disturb contaminated soil or groundwater. Groundwater monitoring would be performed at eight existing monitoring wells for 30 years unless cleanup standards for groundwater are achieved sooner. The restoration time frame for this alternative was estimated at 30 years.

7.2 Evaluation of Cleanup Action Alternatives

As detailed in the RI/FS Report, the cleanup action alternatives were evaluated to determine whether they meet the requirements of WAC 173-340-360 and conform, as appropriate, to the expectations in WAC 173-340-370. The evaluation indicates that all the cleanup action alternatives meet the MTCA requirements for a cleanup action.

MTCA requires evaluation of the following for each cleanup action alternative:

- Whether the alternative provides for a reasonable restoration time frame. The requirements and procedures for determining whether a cleanup action alternative provides for a reasonable restoration time frame are provided in WAC 173-340-360(4).
- Whether the alternative uses permanent solutions to the maximum extent practicable. The requirements and procedures for determining whether a cleanup action alternative uses permanent solutions to the maximum extent practicable, as required under RCW 70A.305.030(1) and WAC 173-340-360(3)(a)(x). A permanent cleanup action or permanent solution is defined in WAC 173-340-200.

7.3 Restoration Time Frame

The restoration time frame is the period of time needed for a cleanup action to achieve the cleanup levels at the point of compliance. To determine whether a cleanup action alternative provides for a reasonable restoration time frame, the following factors must be considered:

- Potential risks posed by the Site to human health and the environment, including likely vulnerable populations and overburdened communities;

- Practicability of achieving a shorter restoration time frame. A restoration time frame is not reasonable if an active remedial measure with a shorter restoration time frame is practicable;
- Long-term effectiveness of the alternative. A longer restoration time frame may be reasonable if the alternative has a greater degree of long-term effectiveness than one that primarily relies on disposal, isolation, or containment;
- Current use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site;
- Potential future use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site;
- Availability of alternative water supplies;
- Likely effectiveness and reliability of institutional controls;
- Ability to control and monitor migration of hazardous substances from the Site;
- Toxicity of the hazardous substances at the Site; and
- Natural processes that reduce concentrations of hazardous substances and have been documented to occur at the Site or under similar site conditions.

As detailed in the RI/FS Report, each of the cleanup action alternatives evaluated in the feasibility study are considered to provide a reasonable restoration time frame, with the exception of Cleanup Action Alternative 4.

7.4 Disproportionate Cost Analysis

A disproportionate cost analysis was performed as part of the feasibility study, as documented in the RI/FS Report. The purpose of the disproportionate cost analysis was to determine whether a cleanup action uses permanent solutions to the maximum extent practicable by comparing the relative benefits and costs of cleanup action alternatives. In accordance with WAC 173-340-360(5)(d), the disproportionate cost analysis quantifies the environmental benefits using the following six criteria: protectiveness, permanence, long-term effectiveness, management of implementation risks, technical and administrative implementability, and cost.

As detailed in the RI/FS Report, environmental benefit was quantified by scoring each cleanup action alternative with respect to the six criteria listed above. The results of the disproportionate cost analysis are provided below.

	Composite Benefit Score	Estimated Total Cost
Cleanup Action Alternative 1	7.0	$23,082,000
Cleanup Action Alternative 2	9.1	$1,482,000
Cleanup Action Alternative 3	7.9	$1,727,000
Cleanup Action Alternative 4	4.9	$753,000

Cleanup Action Alternative 2, involving the rehabilitation, expansion, and operation of two MPE systems, was selected as the preferred cleanup action alternative based on the results of the feasibility study. This alternative satisfies the MTCA general requirements in WAC 173-340-360(3)(a), meets the additional requirements specified in 173-340-360(3)(b), WAC 173-340-360(3)(c), and WAC 173-340-360(3)(d), and satisfies the expectations specified in WAC 173-340-370. This alternative will provide a permanent solution for the Site and achieve cleanup standards in a reasonable restoration time frame.

8.0 Description of Cleanup Action

This section describes the cleanup action selected for the Site, including the compliance monitoring requirements, implementation schedule, restoration time frame, and contingency actions.

8.1 Rehabilitation, Expansion, and Operation of MPE Systems

8.1.1 Function of MPE Systems

MPE is an in-situ technology that combines soil vapor extraction (SVE) with groundwater extraction to remove LNAPL, groundwater, and soil gas from the subsurface. Groundwater extraction is used to dewater the contaminated soils so that they become accessible for remediation by SVE using downhole pumps to remove contaminated groundwater and/or LNAPL, and a vacuum system to collect vapors from the subsurface.

The pumping system lowers the water table around an MPE well to expose more of the formation. COCs in the exposed vadose zone are accessible to SVE. Contaminated soil vapor and groundwater flow to a common collection point for treatment and discharge to the atmosphere and municipal sewer system, respectively. Operation of an MPE system also produces aerobic soil conditions, which are conductive to bioremediation of the Site COCs.

8.1.2 Existing MPE Systems

There are three existing MPE systems at the Site. The compound of the first MPE system is located on the Source Property and the piping for this system is located only on the Source Property. The compound of the second MPE system is located on the Adjoining Property and the piping for this system is located on both the Adjoining Property and the Drake Parcel. The compound of a third MPE system is also located on the Adjoining Property. The locations of the existing MPE systems are depicted on Figure 6.

Each MPE system consists of a series of MPE wells connected to a compound where equipment for the MPE system is housed. Only two of the existing MPE systems will be rehabilitated and expanded. The third MPE system will be decommissioned and removed. Security fences currently surround the compounds on the Source and Adjoining Properties. However, the fences have been vandalized and will be replaced during system rehabilitation and expansion.

The first MPE system that will be rehabilitated and expanded includes nine MPE wells (MW11, MW15, MW18, MW24, MW27, MW29, MW32, MW90, and MW91) (Figure 6). The compound for this MPE system is located on the Source Property and contains an SVE blower, an air compressor, process piping manifolds, an air/water separator (AWS), an oil/water separator (OWS), an air flow meter, a catalytic oxidizer, a product drum, granular-activated carbon (GAC) canisters, and a flow totalizer. The catalytic oxidizer was bypassed during the most recent operation of the MPE system in accordance with a Puget Sound Clean Air Agency (PSCAA) permit. The condition of the equipment in the compound is unknown but it is expected that none of the equipment can be returned to operation. Each MPE well is connected to the compound by three subsurface pipes (Figure 6). One pipe is designed to supply compressed air to the down-hole pneumatic pump in the well; another pipe is designed to convey groundwater and LNAPL from the well to the OWS; and a third pipe is designed to convey vapors from the well to the AWS. A discharge pipe connects the OWS to three 55-gallon GAC canisters prior to discharge to the sanitary sewer line at the exterior of the compound (Figure 6). A security fence surrounds the compound (Figure 6).

The second MPE system that will be rehabilitated and expanded includes nine MPE wells (MW69, MW70, MW84, MW95, MW96, MW97, MW98, MW99, and MW101) (Figure 6). The compound for this MPE system is located on the Adjoining Property and contains an SVE blower, an air compressor, process piping manifolds, an AWS, an OWS, an air flow meter, a catalytic oxidizer, a product drum, GAC canisters, and a flow totalizer. The catalytic oxidizer was bypassed during the most recent operation of the MPE system in accordance with a PSCAA permit. The condition of the equipment in the compound is unknown but it is expected that none of the equipment can be returned to operation. Each MPE well is connected to the compound by three subsurface pipes (Figure 6). One pipe is designed to supply compressed air to the down-hole pneumatic pump in the well, another pipe is designed to convey groundwater and LNAPL from the well to the OWS; and a third pipe is designed to convey vapors from the well to the AWS. A discharge pipe connects the OWS to three 55-gallon GAC canisters prior to discharge to the sanitary sewer line at the exterior of the compound (Figure 6). A security fence surrounds the compound (Figure 6).

The MPE system that will be decommissioned includes six MPE wells (MW31, MW41, MW57, MW92, MW93, and MW94) (Figure 6). The compound for this MPE system is located on the Adjoining Property and contains an SVE blower, an air compressor, process piping manifolds, an AWS, an OWS, an air flow meter, a catalytic oxidizer, a product drum, GAC canisters, and a flow totalizer. The catalytic oxidizer was bypassed during the most recent operation of the MPE system in accordance with a PSCAA permit. The condition of the equipment in the compound is unknown but it is expected that none of the equipment can be returned to operation. Each MPE well is connected to the compound by three subsurface pipes (Figure 6). One pipe is designed to supply compressed air to the down-hole pneumatic pump in the well; a second pipe is designed to convey groundwater and LNAPL from the well to the OWS; and a third pipe is designed to convey vapors from the well to the AWS. A discharge pipe connects the OWS to three 55-gallon GAC canisters prior to discharge to the sanitary sewer line at the exterior of the compound (Figure 6). A security fence surrounds the compound (Figure 6).

8.1.3 Inspection of Existing MPE Systems

The two existing MPE systems that will be rehabilitated and expanded will be inspected to evaluate whether any of the equipment in the compounds can be rehabilitated and put back into operation, whether the down-hole pneumatic pumps in the MPE wells can be rehabilitated and put back into operation, whether the piping that connects the MPE wells to the compounds is functional, and whether the discharge pipes that connect the OWS to the sanitary sewer line are functional. The results of the inspection will inform what elements of the existing MPE systems can be retained and those that need to be replaced.

8.1.4 Permitting

Permit applications will be submitted following finalization of the Engineering Design Report, as summarized below.

8.1.4.1 State Environmental Policy Act

The State Environmental Policy Act (SEPA) (WAC 197-11) and the SEPA procedures (WAC 173-802) provide the framework for state agencies to evaluate the environmental consequences of a project and ensure appropriate measures are taken to mitigate environmental impacts. The City of Mountlake Terrace requires a SEPA checklist for projects if soil excavation is greater than 1,000 cubic yards. The cleanup action will include excavation of approximately 300 cubic yards of soil for installation of the new system piping. Therefore, a SEPA checklist is not required for the cleanup action.

8.1.4.2 City of Mountlake Terrace Permits

The City of Mountlake Terrace requires permits for construction-related activities including clearing, grading, and shoring. In addition, the City of Mountlake Terrace likely requires a

Special Use Permit for 1) the discharge of contaminated groundwater into the sanitary sewer; and 2) any work conducted within City rights-of-way. A Special Use Permit application will be submitted to the City of Mountlake Terrace for the cleanup action.

8.1.4.3 Puget Sound Clean Air Agency Permit

PSCAA potentially requires a permit for the discharge of contaminated vapors or the operation of vapor treatment equipment. A permit application will be submitted to the Puget Sound Clean Air Agency for the cleanup action.

8.1.4.4 State Waste Discharge Permit

Ecology requires State Waste Discharge permits for discharges of wastewater to publicly owned treatment works such as the City of Edmonds Wastewater Treatment Plant. The State Waste Discharge permit would establish maximum daily effluent limits and sampling requirements. A State Waste Discharge Permit application will be submitted to Ecology for the cleanup action.

8.1.5 Rehabilitation and Expansion of MPE Systems

The existing MPE systems will be rehabilitated and expanded in accordance with an Engineering Design Report, which will be prepared and submitted for Ecology review and approval after the existing MPE systems are inspected in accordance with Section 8.1.3. It is anticipated that the Engineering Design Report will specify the following for the existing MPE system on the Source Property:

- All existing MPE equipment in the compound that cannot be rehabilitated will be decommissioned and removed. The new equipment might include an SVE blower, an air compressor, process piping manifolds, an AWS, an OWS, an air flow meter, a carbon filter, a product drum, GAC canisters, and/or a flow totalizer.
- Pumps will be removed from the eight existing MPE wells that will not be used (MW11, MW15, MW18, MW24, MW27, MW29, MW90, and MW91) (Figure 6). The subsurface piping that connects those wells to the compound will be abandoned in-place by cutting and capping the piping at the system compound.
- Two new MPE wells will be installed in the locations depicted on Figure 7. These two wells plus the five existing wells (MW09, MW10, MW20, MW25, and MW32) that will be rehabilitated will serve as the MPE well network for this MPE system.

- A set of three subsurface pipes will be installed to connect each new MPE well to the compound (Figure 7). One pipe will be designed to supply compressed air to the down-hole pneumatic pump in the well; another pipe will be designed to convey groundwater and LNAPL from the well to the OWS; and a third pipe will be designed to convey vapors from the well to the AWS.
- Down-hole pneumatic pumps will be installed in all seven MPE wells, either the existing pumps with be rehabilitated and installed or new pumps will be installed.
- A new flow totalizer will be installed on the discharge pipe that connects the OWS to the sanitary sewer line (Figure 7).
- The existing security fencing will be replaced with new security fencing.

It is anticipated that the Engineering Design Report will specify the following for the existing MPE system on the Adjoining Property and Drake Parcel:

- All existing MPE equipment in the compound that cannot be rehabilitated will be decommissioned and removed. The new equipment might include an SVE blower, an air compressor, process piping manifolds, an AWS, an OWS, an air flow meter, a carbon filter, a product drum, GAC canisters, and/or a flow totalizer.
- Pumps will be removed from the five existing MPE wells (MW31, MW41, MW92, MW93, and MW94) on the Adjoining Property and the seven existing MPE wells (MW70, MW84, MW95, MW96, MW97, MW99, and MW101) on the Drake Parcel that will not be used (Figure 6). The subsurface piping that connects those wells to the compound will be abandoned in-place by cutting and capping the piping at the system compound.
- Four new MPE wells will be installed in the locations depicted on Figure 7. These four wells plus the three existing wells (MW57, MW69, and MW98) that will be rehabilitated will serve as the MPE well network for this MPE system.
- A set of three subsurface pipes will be installed to connect each new MPE well to the compound (Figure 7). One pipe will be designed to supply compressed air to the down-hole pneumatic pump in the well; another pipe will be designed to convey groundwater and LNAPL from the well to the OWS; and a third pipe will be designed to convey vapors from the well to the AWS.
- Down-hole pneumatic pumps will be installed in all seven MPE wells; either the existing pumps will be rehabilitated and installed, or new pumps will be installed.

- A new flow totalizer will be installed on the discharge pipe that connects the OWS to the sanitary sewer line (Figure 7).
- The existing security fencing will be replaced with new security fencing.

The new MPE wells will be installed using a sonic drill rig. Prior to drilling, the area in the vicinity of the new MPE wells will be cleared for underground utilities by a private utility locating service. Farallon will observe and record subsurface conditions during drilling. The information recorded will include soil types encountered, visual and olfactory indications of soil contamination, and qualitative measurement of volatile organic vapors present in soil using a photoionization detector.

The new MPE wells will be constructed of 4-inch-diameter Schedule 40 polyvinyl chloride casing with 15 to 20 feet of 0.010-inch slotted screens to a total depth of approximately 40 feet bgs, using a similar construction as the existing MPE wells. The MPE wells will be completed in flush-mounted steel monuments and developed immediately following installation. The new MPE wells will be surveyed for location and elevation by a Washington State licensed surveyor.

The new subsurface pipes that will connect each new MPE well to the system compounds will be installed proximate to existing subsurface pipes wherever practicable. Trenches of up to approximately 3 feet wide will be excavated along the path of the new pipes to allow for installation. Prior to trenching, the area in the vicinity of the new pipes will be cleared for underground utilities by a private utility locating service.

8.1.5.1 Operation and Maintenance of MPE Systems

The MPE systems will be operated for a maximum of three years in accordance with an MPE Operation and Maintenance Plan, which will be prepared and submitted for Ecology review and approval before the MPE systems are put into operation. The effectiveness of each MPE system will be evaluated through performance monitoring as detailed in Section 8.2.2 and 7.2.3. The results of performance monitoring will be used to make modifications to the applied vacuum and flow rates to maximize the effectiveness of the MPE system during operation. If performance monitoring indicates that concentrations of GRO and BTEX in groundwater in a discrete area of the Site attain compliance with MTCA Method A cleanup levels before three years, then the MPE wells in that area will be shut down and compliance monitoring will be performed in accordance with Section 8.2.3. After three years of operation, the MPE systems will be shut down irrespective of the concentrations of GRO and BTEX in groundwater and compliance monitoring will be performed in accordance with Section 8.2.3.

The MPE systems will be inspected and maintained on a monthly basis throughout the period of operation. Maintenance will include system progress monitoring, equipment maintenance, collection of operational data, system pulsing to optimize system performance, and monitoring and sampling of vapor emissions.

The vapor emissions from the MPE systems will be monitored on a monthly basis to ensure compliance with the PSCAA permit and to evaluate petroleum removal rates. The concentrations of air phase hydrocarbons (APH) and BTEX in the vapors will be used to determine whether system adjustments are necessary to optimize the MPE systems. Vapor samples will be submitted for laboratory analysis of APH by Massachusetts Method APH and BTEX by U.S. Environmental Protection Agency (EPA) Method TO-15.

8.2 Compliance Monitoring

Groundwater extracted from the MPE wells will be monitored on a monthly basis to ensure compliance with the State Waste Discharge permit and to evaluate petroleum removal rates. The concentrations of GRO and BTEX in the groundwater will be used to determine whether system adjustments are necessary to optimize the MPE systems. Groundwater samples will be submitted for laboratory analysis of GRO by NWTPH-Gx and BTEX by EPA Method 8021B.

Compliance monitoring is required to ensure the protectiveness of the cleanup action. Compliance monitoring, as specified in WAC 173-340-410, consists of protection monitoring, performance monitoring, and confirmation monitoring. The objectives of each type of compliance monitoring are summarized below:

- **Protection monitoring** is used to confirm that human health and the environment are adequately protected during implementation of the cleanup action. Protection monitoring requirements will be described in a Site-specific health and safety plan (HASP) that will be prepared before field work commences. All personnel that work at the Site will be directed to comply with the HASP.
- **Performance monitoring** is used to confirm that the cleanup action has attained cleanup standards. Performance monitoring will consist of the analysis of vapor and groundwater discharge sample collected from the MPE systems, analysis of

groundwater samples collected during and after operation of the MPE systems, and analysis of soil samples collected after operation of the MPE systems.

- **Confirmation monitoring** is used to confirm the long-term effectiveness of the cleanup action. Confirmation monitoring will consist of the analysis of soil and groundwater samples collected after the MPE systems stop operating.

8.2.1 Protection Monitoring

A site-specific HASP will be prepared for the cleanup action that meets the minimum requirements identified in federal (29 CFR 1910.120 and 1926) and state (WAC 173-340-810 and 296-62) regulations. The HASP will identify all known physical, chemical, and biological hazards; hazard monitoring protocols; and administrative controls required to mitigate the identified hazards. Construction workers will be required to complete 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training in accordance with 29 CFR 1910.120 and Annual 8-Hour HAZWOPER refresher training, as needed.

8.2.2 Performance Monitoring – MPE Systems

Monitoring of the MPE systems' input and output operational parameters (including vacuum pressure, velocity, volatile organic vapors, lower explosive limits, carbon dioxide, oxygen, flow rates, temperature, and operational hours) will be performed in accordance with an Ecology-approved MPE Operation and Maintenance Plan to ensure that the systems are functioning as designed, to allow modifications to increase the systems' effectiveness, and to monitor the systems' influence on groundwater quality. Performance monitoring will include collection and analysis of influent and effluent vapor and groundwater samples to ensure compliance with the State Wate Discharge permit and PSCAA permit as detailed in Section 8.1.5.1.

8.2.3 Performance and Confirmation Monitoring – Groundwater

Groundwater monitoring will be conducted to evaluate the effectiveness of the cleanup action. Performance groundwater monitoring will consist of the collection and analysis of groundwater samples from the compliance monitoring well network in accordance with the Groundwater Monitoring Plan (Appendix B). Performance groundwater monitoring will be performed on a quarterly basis during operation of the MPE systems.

The compliance monitoring well network consists of existing monitoring wells MW09, MW10, MW20, MW25, MW32, MW57, MW69, and MW98 (Figure 8).

Groundwater monitoring events will include measuring depth to groundwater, measuring thickness of light non-aqueous phase liquid (LNAPL) where detected, and collecting groundwater samples from the monitoring well network (Figure 8).

Field personnel will remove the locking well cap from each monitoring well, and groundwater levels will be allowed to equilibrate to atmospheric pressure for at least 30 minutes. The depth to groundwater and thickness of LNAPL, if present, will be measured in each monitoring well to the nearest 0.01 foot using an electronic oil/water interface meter to the top of the well casing. The total depth of each monitoring well will be measured to evaluate siltation of the well-screen interval and to calculate the submerged well casing volume. Reusable equipment will be decontaminated between uses at each location.

Each monitoring well will be purged at a low flow rate ranging from 100 to 300 milliliters per minute using a peristaltic, bladder, or submersible pump and dedicated tubing. Additionally, groundwater samples may be collected with a disposable polyethylene bailer if necessary, based on low groundwater levels and/or low yielding wells, which is consistent with historical groundwater monitoring at the Site. Temperature, pH, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential will be monitored using a YSI multiparameter meter during purging to determine when stabilization of these parameters occurs. Following stabilization of the parameters, groundwater samples will be collected directly from the low-flow pump outlet. If a monitoring well is completely dewatered during purging, samples will be collected after sufficient recharging has occurred to allow filling of all sample containers.

Laboratory-prepared sample containers will be filled directly from the pump outlet, with care taken to minimize turbulence and not handle the seal or lid of the container when the samples are placed into the containers. The groundwater samples will be placed on ice in a cooler under standard chain-of-custody protocols and submitted to an Ecology-accredited laboratory for analysis of GRO by Northwest Method NWTPH-Gx and BTEX by EPA Method 8021B.

Groundwater samples will also be collected for analysis of monitored natural attenuation parameters (nitrate, manganese, ferrous iron, sulfate, methane, and alkalinity) from up to five monitoring wells in accordance with Ecology's *Guidance on Remediation of Petroleum-Contaminated Groundwater by Natural Attenuation*.

To demonstrate compliance with the applicable MTCA Method A cleanup levels, Stage 3 monitoring will be completed as described in Ecology's *Guidance for Remediation of Petroleum Contaminated Sites* (Publication No. 10-09-057) dated November 2010, revised June 2016

(Ecology 2010). Compliance groundwater monitoring will consist of a minimum of four quarterly groundwater monitoring events following shutdown of the MPE systems. If MTCA Method A cleanup levels are not achieved within one year after the MPE systems are shut down, then groundwater monitoring will continue for one additional year unless cleanup levels are achieved sooner. If cleanup levels are not achieved after the two-year monitoring period, then contingency actions described in Section 8.4 will be implemented, including recordation of an environmental covenant for the portions of the Site where contaminated groundwater remains. Based on the extensive cleanup that has been conducted at the Site over the past 30 years and the stable to decreasing concentrations of COCs at the Site, no additional groundwater monitoring is proposed following recordation of an environmental covenant.

8.2.4 Performance and Confirmation Monitoring – Soil

Soil and groundwater samples will be collected to demonstrate compliance with the soil cleanup levels.

Empirical groundwater data will be used to demonstrate that soil at depths greater than 15 feet bgs is in compliance with the applicable cleanup levels and protective of the soil to groundwater leaching pathway. Compliance sampling for groundwater is described in Section 8.2.3.

Soil data will be used to demonstrate that soil at depths less than 15 feet bgs is in compliance with applicable cleanup levels and protective of the direct contact pathway. Based on the results from the remedial investigation, soil within the Shallow Water-Bearing Zone was contaminated at depths shallower than 15 feet bgs proximate to the former USTs on the Source Property. A DPE system operated at the Source Property until 2005 and performance monitoring demonstrated that groundwater in the Shallow Water-Bearing Zone had been successfully remediated.

Confirmation soil sampling will be performed to evaluate the direct contact exposure pathway proximate to formerly contaminated soil in the Shallow Water-Bearing Zone on the Source Property. Up to eight borings will be advanced to a maximum depth of 15 feet bgs for the collection of soil samples proximate to the historical soil exceedances in the Shallow Water-Bearing Zone on the Source Property. The borings will be located proximate to the former USTs, boring B02, and monitoring wells MW28, MW32, and MW34. Farallon will observe and record subsurface conditions during drilling. The information recorded will include soil types encountered, visual and olfactory indications of soil contamination, and qualitative measurement of volatile organic vapors present in soil using a photoionization detector. Soil samples will be collected at 5-foot intervals from the ground surface to the bottom of the boring. Selected soil samples will be collected and transferred directly into laboratory-prepared glass sample containers for analysis of GRO by Northwest Method NWTPH-Gx and BTEX by Method 8021B. Additional sample volume will be collected for potential analysis of the following to aid in calculation of a site-specific Method B cleanup level protective of the direct contact pathway, if needed:

- Volatile petroleum hydrocarbons by Northwest Method NWVPH;
- Extractable petroleum hydrocarbons by Northwest Method NWEPH;
- Gasoline target volatile organic compounds by EPA Method 8260D; and
- cPAHs by EPA Method 8270E.

If concentrations of COCs exceed MTCA Method A cleanup levels in one or more soil samples, a site-specific Method B cleanup level protective of the direct contact pathway will be calculated for the Site. If the site-specific MTCA Method B cleanup level is not attained at the point of compliance for direct contact, then engineered controls and institutional controls will be implemented as described in Section 8.4. The soil analytical results will be used to calculate the estimated mass of contaminated soil left in-place following operation of the MPE system in accordance with WAC 173-340-380(5)(l).

8.3 Implementation Schedule and Restoration Time Frame

It is anticipated the cleanup action will be implemented separately from and in advance of future redevelopment of the Source Property and Adjoining Property. The cleanup action will be implemented in accordance with the following schedule:

- Within 90 days after entry of the PPCD by the court, the two existing MPE systems that will be rehabilitated and expanded will be inspected.
- Within 90 days after the inspection is complete, a draft Engineering Design Report will be submitted to Ecology for review and approval.
- Within 120 days after Ecology approves the final Engineering Design Report, a draft MPE Operation and Maintenance Plan will be submitted to Ecology for review and approval.

- Within 270 days after Ecology approves the final Engineering Design Report, the existing MPE systems will be rehabilitated and expanded in accordance with the Engineering Design Report.
- Within 30 days after the MPE systems are rehabilitated and expanded or Ecology approves the final MPE Operation and Maintenance Plan, whichever occurs later, the MPE systems will be put into operation.
- The MPE systems will operate for a maximum of three years. Following shutdown of the MPE systems, up to two years of compliance groundwater monitoring will be performed.
- Within 90 days after completion of compliance groundwater monitoring, a draft Cleanup Action Report will be submitted to Ecology for review and approval.

The restoration time frame for the cleanup action is five years. This time frame includes up to three years of operation of the MPE systems and up to two years of compliance groundwater monitoring. If performance monitoring indicates that the concentrations of GRO and BTEX in groundwater attain compliance with MTCA Method A cleanup levels, then the MPE systems will be shut down and compliance monitoring will be performed in accordance with Section 8.2.3. After three years of operation, the MPE systems will be shut down irrespective of the concentrations of GRO and BTEX in groundwater and compliance monitoring will be performed in accordance with Section 8.2.3. If cleanup levels are not achieved after the two-year monitoring period, then one or more contingency actions described in Section 8.4 will be implemented.

8.4 Contingency Actions

One or more contingency actions may be necessary depending on the results from the compliance monitoring at the Site. This section describes the different contingency actions that may be warranted for the Site.

8.4.1 Institutional Controls

Institutional controls are measures taken to limit or prohibit activities that may interfere with the integrity of a cleanup action or that may result in exposure to hazardous substances at a site. An institutional control in the form of an environmental covenant may be required for affected portions of the Site if concentrations of COCs exceeding MTCA Method A cleanup levels remain in soil or groundwater following completion of the cleanup action. If necessary, an environmental covenant would be prepared following completion of the cleanup action and submitted to Ecology for review and approval. The approved environmental covenant would be executed and recorded in accordance with Chapter 64.70 RCW.

8.4.2 Engineered Controls - Capping

An engineered control is a containment or treatment system designed and constructed to prevent or limit the movement of, or the exposure to, hazardous substances. An engineered control in the form of a cap may be needed if compliance soil sampling (Section 8.2.4) identifies that the direct contact exposure pathway is complete at the Site following operation of the MPE systems. The plans and specifications for the cap would be set forth in a work plan. The cap would be constructed in accordance with the work plan. The cap would be inspected and maintained in accordance with an inspection and maintenance plan. An environmental covenant would be required to provide notice of the cap and to require the landowner to inspect and maintain the cap in accordance with the inspection and maintenance plan.

8.4.3 Engineered Controls - Vapor Intrusion Mitigation

An engineered control in the form of a vapor intrusion mitigation system may be needed if compliance soil or groundwater monitoring (Sections 8.2.3 and 8.2.4) identify exceedances of vapor intrusion screening levels within the horizontal or vertical screening distances specified in Ecology's *Guidance for Evaluating Vapor Intrusion in Washington State*, dated March 2022. The plans and specifications for the vapor intrusion mitigation system would be set forth in a work plan. The vapor intrusion mitigation system would be constructed in accordance with the work plan. The vapor intrusion mitigation system would be inspected and maintained in accordance with an inspection and maintenance plan. An environmental covenant would be required to provide notice of the vapor intrusion mitigation system and to require the landowner to inspect and maintain the vapor intrusion mitigation system in accordance with the inspection and maintenance plan.

9.0 References

Farallon Consulting, L.L.C. (Farallon). 2025. *Remedial Investigation Report/Feasibility Study TOC Facility No. 01-176, 24205 and 24225 56th Avenue West, Mountlake Terrace, Washington*. Prepared for JYK Holdings, LLC. March 6.

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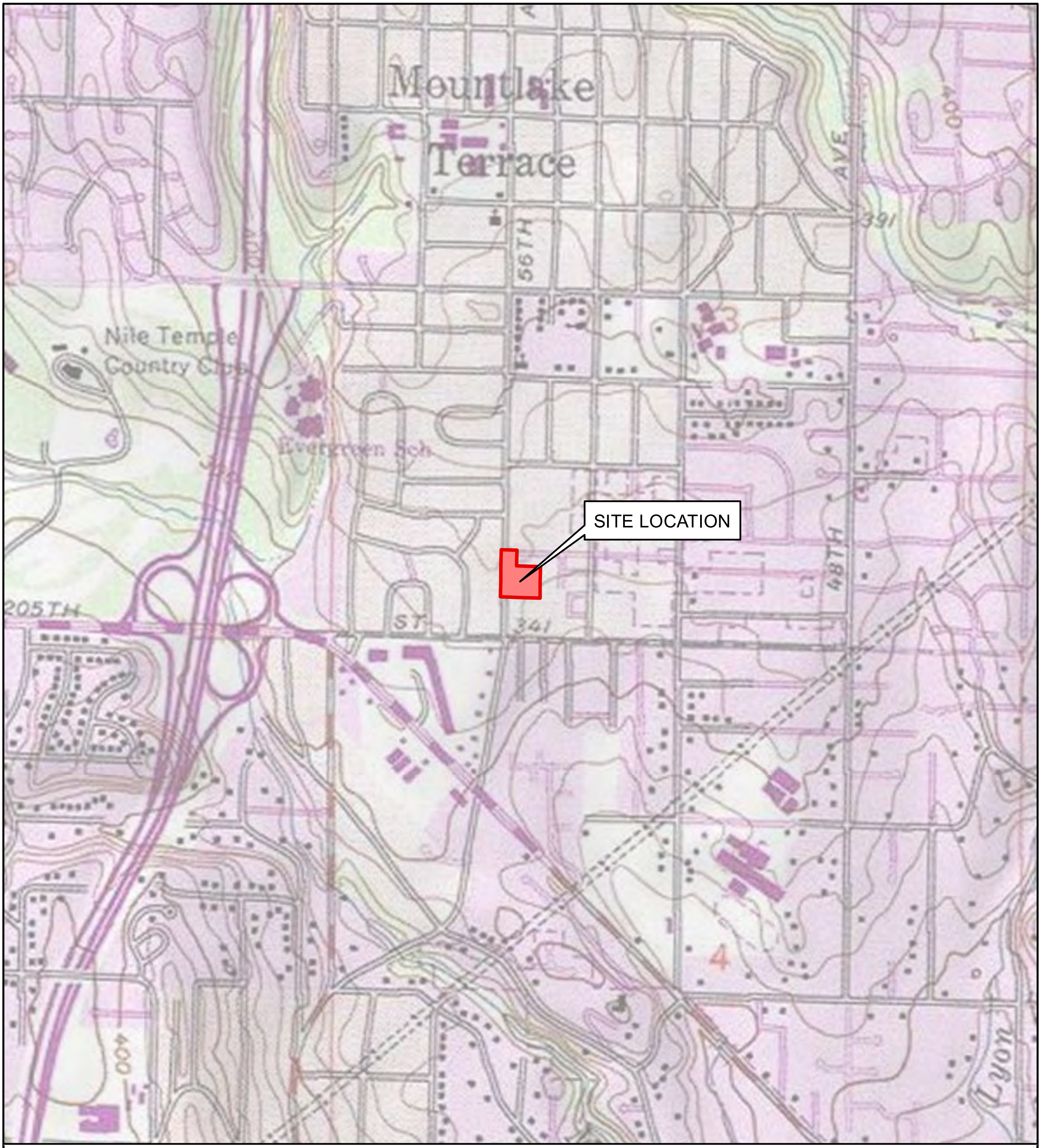
———. No Date. Toxics Cleanup Program – Cleanup Site Database Search for TOC Facility No. 01 176. <https://apps.ecology.wa.gov/gsp/CleanupSiteDocument s.aspx?csid=6885>

Figures



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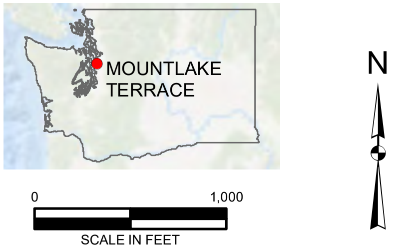

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FIGURE 1

SITE VICINITY MAP
TOC FACILITY 01-176
24205 AND 24225 56th AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: lmurock
Checked By: SS
Date: 5/29/2024
Disc Reference:
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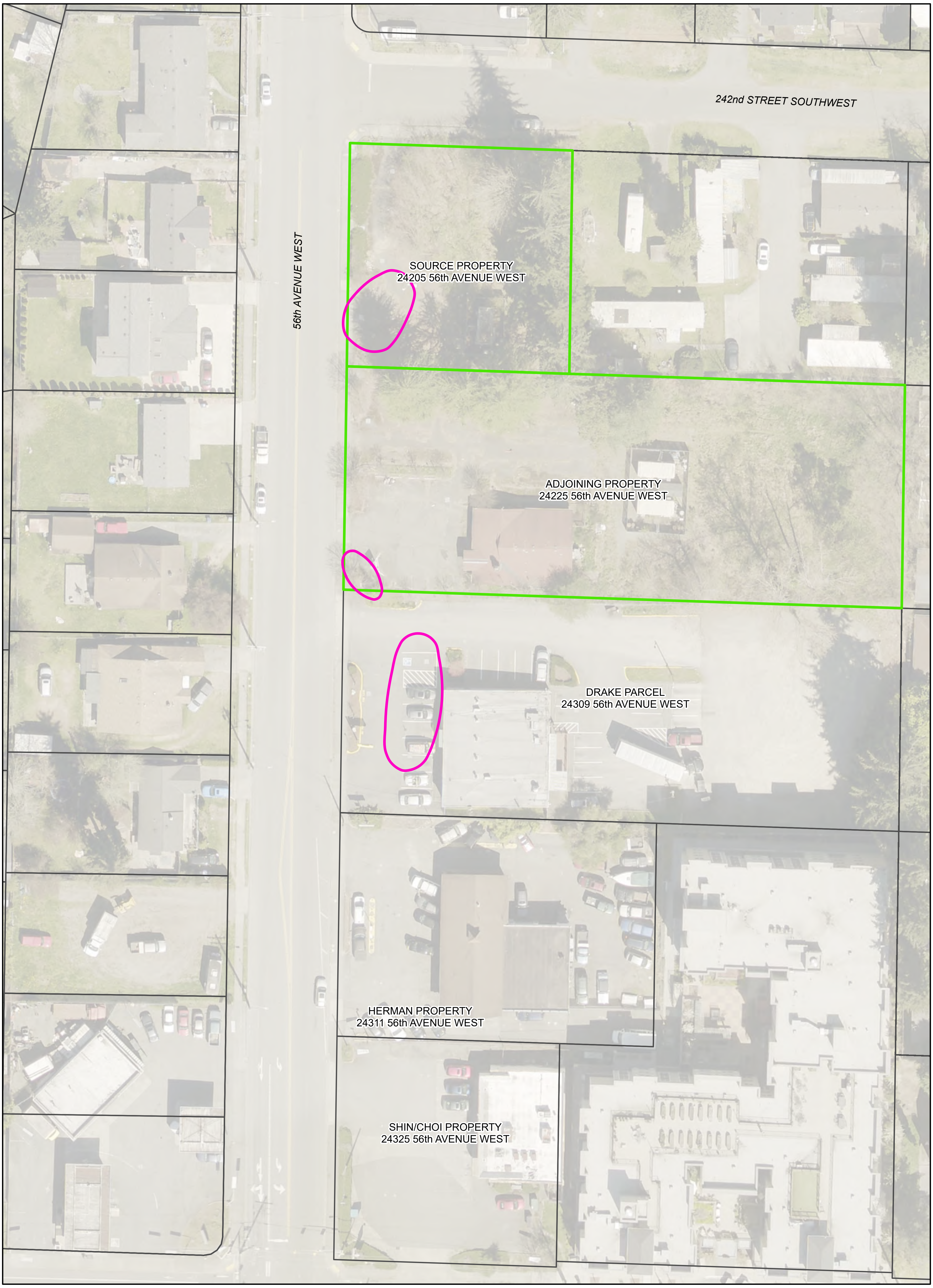

LEGEND

🟩 PROPOSED PARCELS FOR PURCHASE

🟪 SITE

☐ SNOHOMISH COUNTY PARCEL BOUNDARY

N

0 50
SCALE IN FEET

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
2. FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION.

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FIGURE 2

LATERAL EXTENT OF SITE
TOC FACILITY 01-176
24205 AND 24225 56th AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: lmurock
Checked By: SS
Date: 10/10/2024
Disc Reference:

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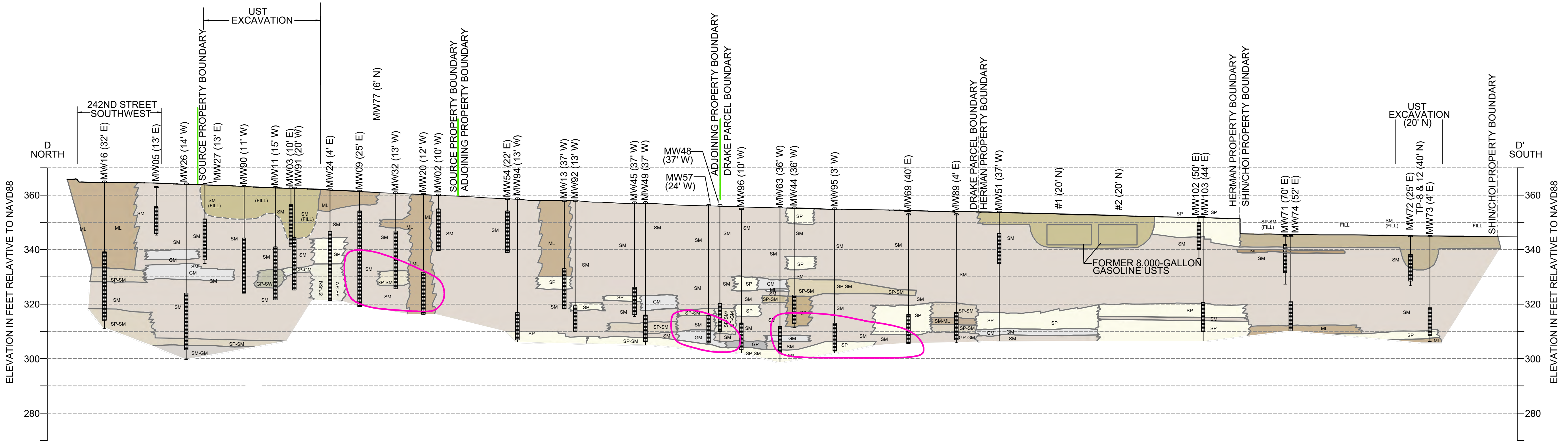


LEGEND

▨ **SM** SILTY SANDS, SAND - CLAY MIXTURES

▨ **SP** POORLY GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES

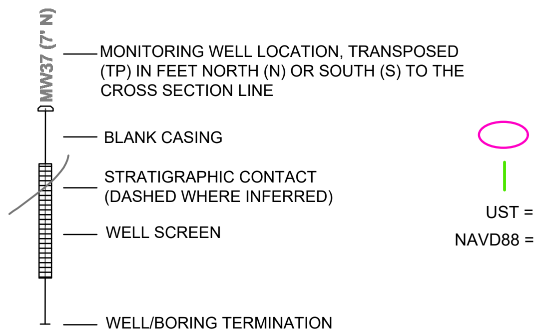
▨ **SW** WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES

▨ **GP** POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES

▨ **GM** SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES

▨ **ML** INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY CLAYEY FINE SANDS

▨ **FILL** SILTY SANDS WITH GRAVEL



○ SITE BOUNDARY

| PROPOSED PURCHASE PARCEL BOUNDARY

UST = UNDERGROUND STORAGE TANK

NAVD88 = NORTH AMERICAN VERTICAL DATUM OF 1988

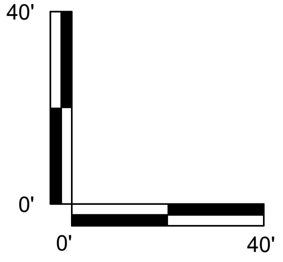


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FIGURE 3

VERTICAL EXTENT OF SITE
TOC FACILITY 01-176
24205 AND 24225 56TH AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: RB | Checked By: SS | Date: 9/3/2024

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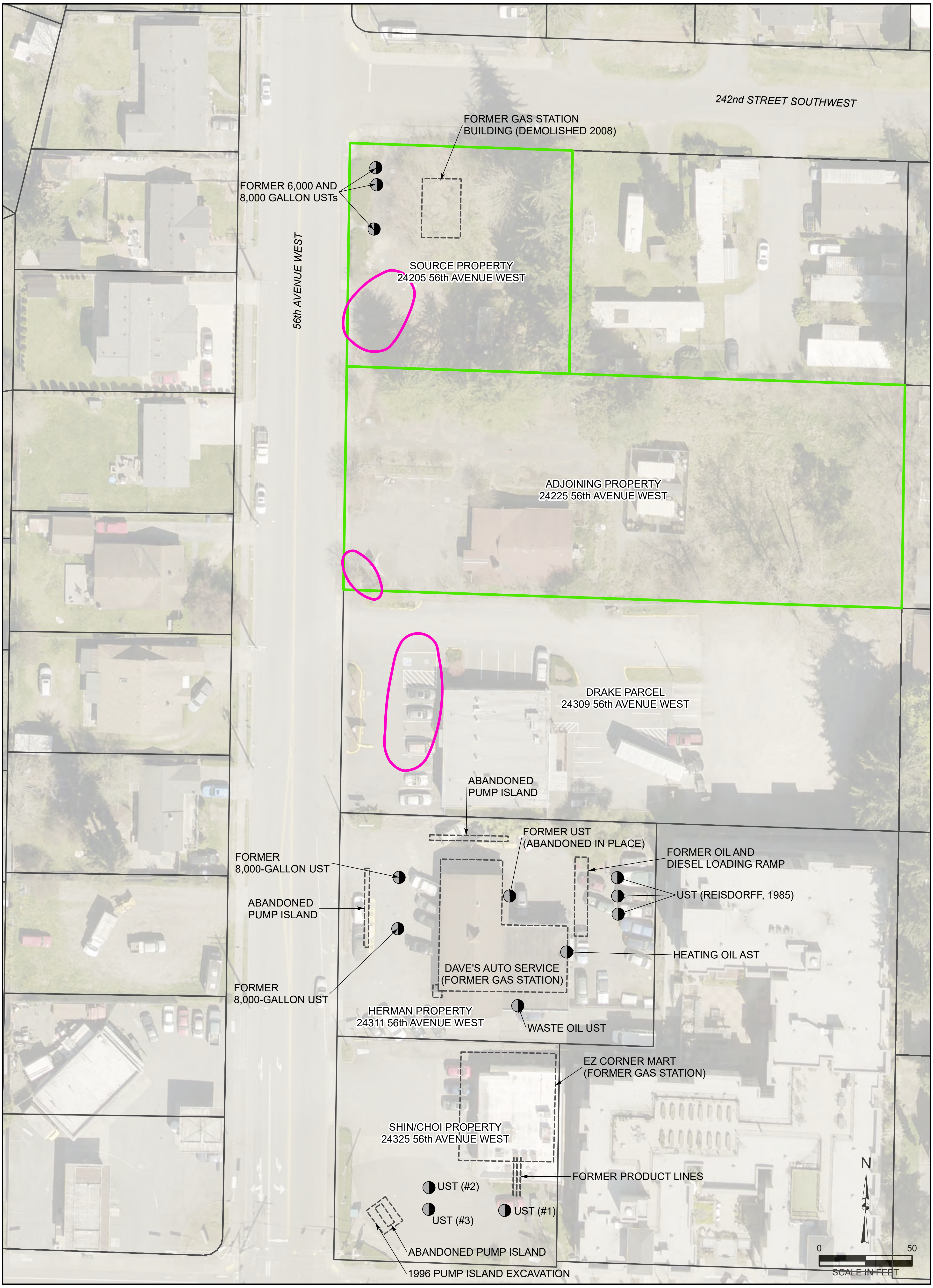

LEGEND

◐ FORMER STORAGE TANKS
▭ HISTORICAL PROPERTY FEATURE
🟩 PROPOSED PARCELS FOR PURCHASE
▭ SITE
▭ SNOHOMISH COUNTY PARCEL BOUNDARY

AST = ABOVEGROUND STORAGE TANK
UST = UNDERGROUND STORAGE TANK

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FIGURE 4

HISTORICAL FEATURES
TOC FACILITY 01-176
24205 AND 24225 56th AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: aguse
Checked By: SS
Date: 10/11/2024
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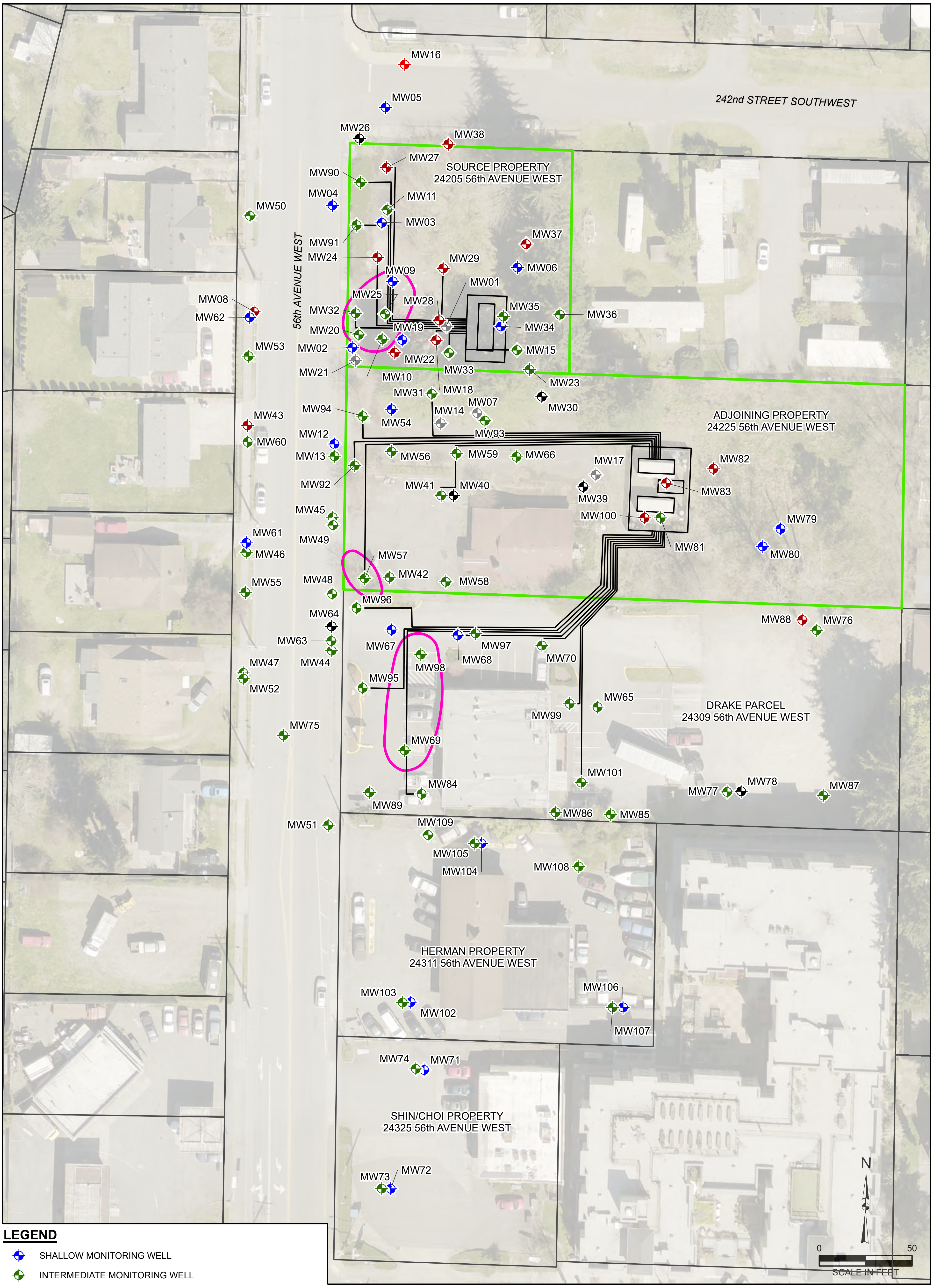

LEGEND

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- INTERMEDIATE-DEEP MONITORING WELL
- SHALLOW-INTERMEDIATE MONITORING WELL
- ABANDONED
- SYSTEM PIPING
- 🟩 PROPOSED PARCELS FOR PURCHASE
- ☐ APPROXIMATE SYSTEM LAYOUT
- ☐ SITE
- ☐ SNOHOMISH COUNTY PARCEL BOUNDARY

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FIGURE 5

SAMPLING LOCATIONS
TOC FACILITY 01-176
24205 AND 24225 56th AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: lmurock
Checked By: SS
Date: 10/10/2024
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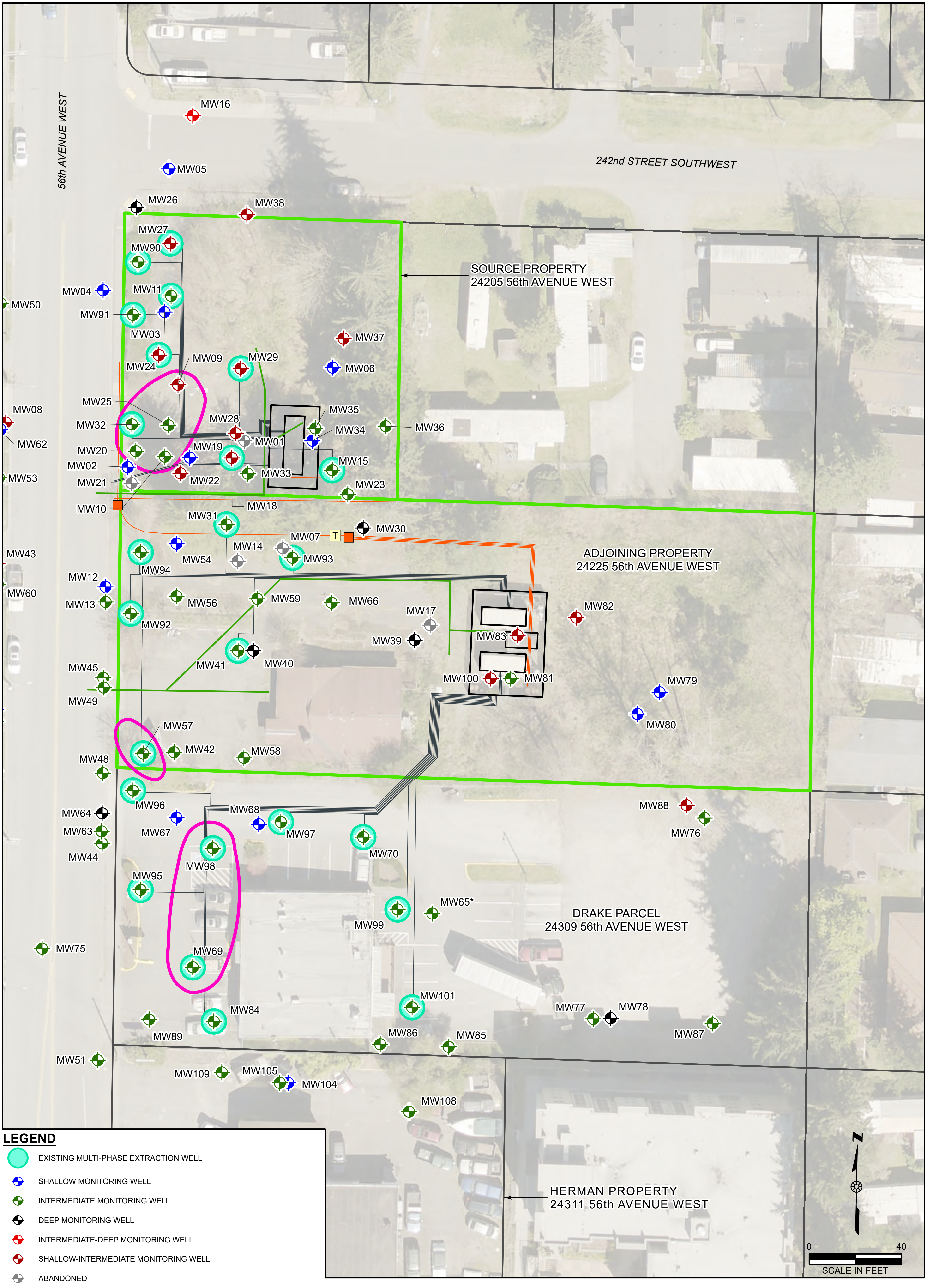

LEGEND

- 🟢 EXISTING MULTI-PHASE EXTRACTION WELL
- ⊕ SHALLOW MONITORING WELL
- ⊕ INTERMEDIATE MONITORING WELL
- ⊕ DEEP MONITORING WELL
- ⊕ INTERMEDIATE-DEEP MONITORING WELL
- ⊕ SHALLOW-INTERMEDIATE MONITORING WELL
- ⊕ ABANDONED
- 🟧 ELECTRICAL VAULT
- T PAD-MOUNTED TRANSFORMER
- — EXISTING SYSTEM PIPING
- — ELECTRIC LINE
- — SANITARY SEWER LINE
- 🟩 PROPOSED PARCELS FOR PURCHASE
- ☐ APPROXIMATE MPE SYSTEM LAYOUT
- ▭ SITE
- ☐ SNOHOMISH COUNTY PARCEL BOUNDARY

MPE = MULTI-PHASE EXTRACTION

NOTES:
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FIGURE 6

EXISTING MPE SYSTEMS
TOC FACILITY 01-176
24205 AND 24225 56TH AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: lmurock
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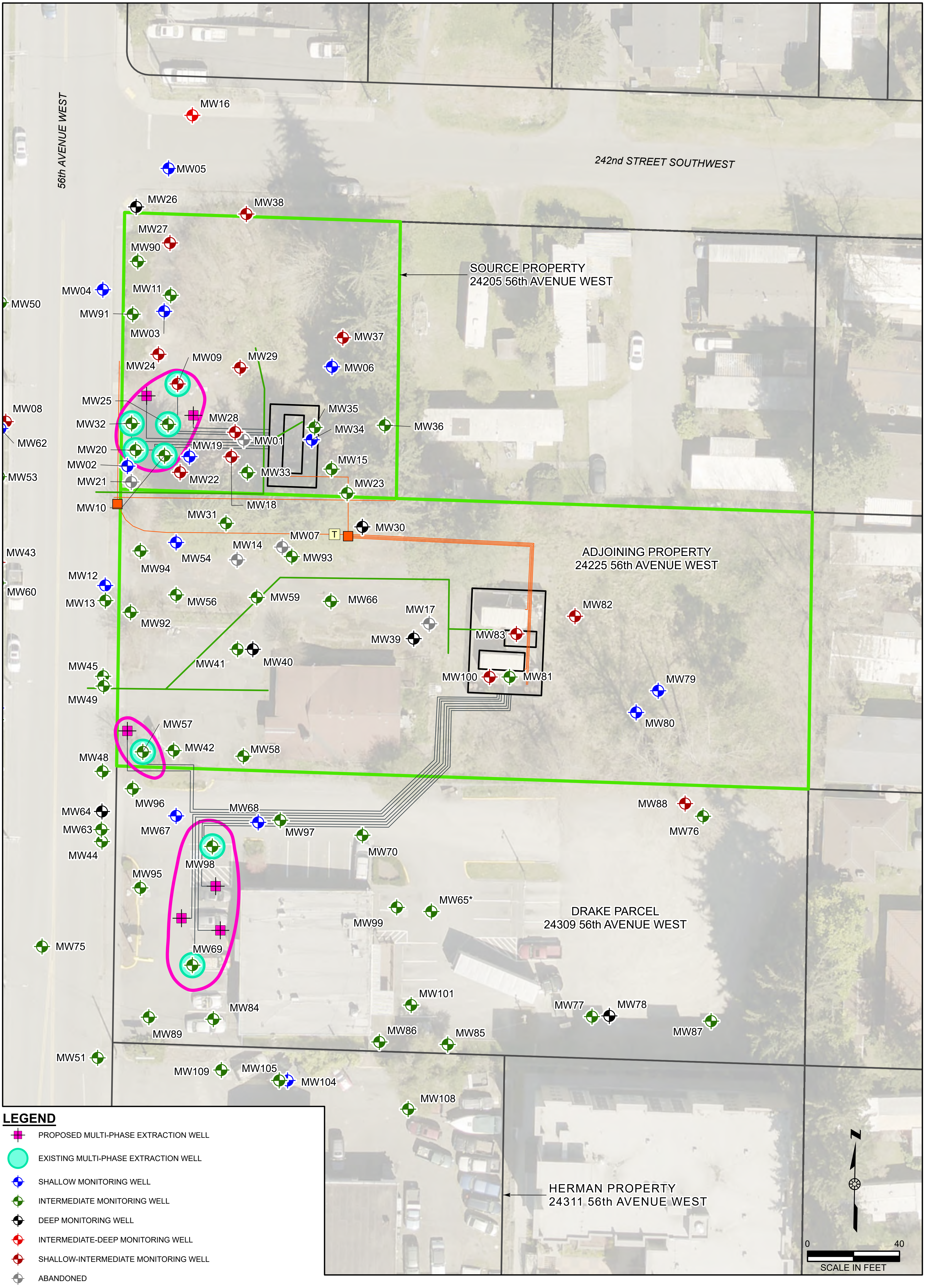

LEGEND

- ✚ PROPOSED MULTI-PHASE EXTRACTION WELL
- ● EXISTING MULTI-PHASE EXTRACTION WELL
- ⊕ SHALLOW MONITORING WELL
- ⊕ INTERMEDIATE MONITORING WELL
- ⊕ DEEP MONITORING WELL
- ⊕ INTERMEDIATE-DEEP MONITORING WELL
- ⊕ SHALLOW-INTERMEDIATE MONITORING WELL
- ⊕ ABANDONED
- ■ ELECTRICAL VAULT
- T PAD-MOUNTED TRANSFORMER
- — PROPOSED NEW SYSTEM PIPING
- — ELECTRIC LINE
- — SANITARY SEWER LINE
- 🟩 PROPOSED PARCELS FOR PURCHASE
- ☐ APPROXIMATE MPE SYSTEM LAYOUT
- ☐ SITE
- ☐ SNOHOMISH COUNTY PARCEL BOUNDARY

MPE = MULTI-PHASE EXTRACTION

NOTES:
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FIGURE 7

REHABILITATED AND EXPANDED MPE SYSTEMS
TOC FACILITY 01-176
24205 AND 24225 56TH AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: lmurock | Checked By: SS | Date: 10/11/2024 | Disc Reference:

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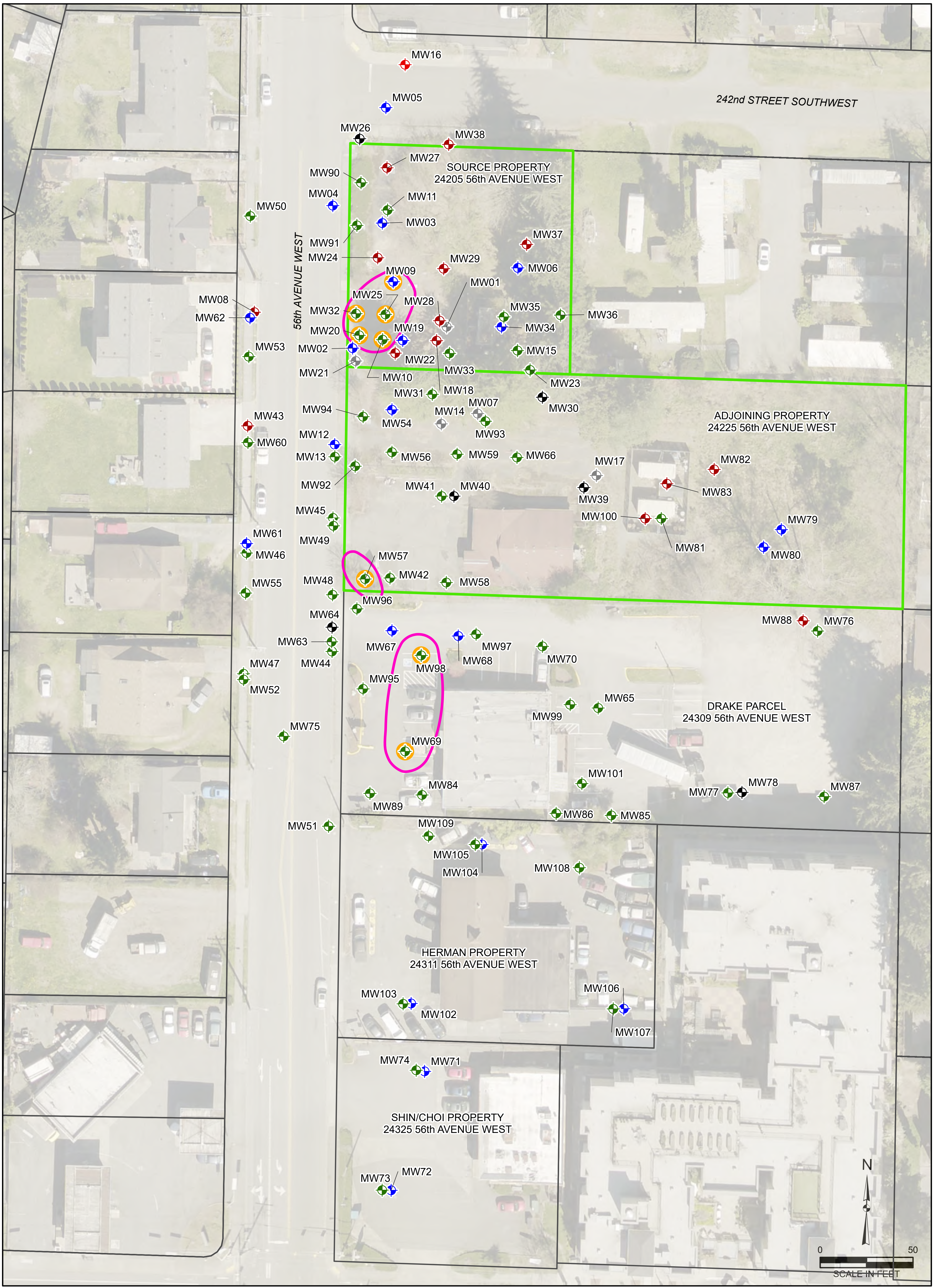

LEGEND

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- INTERMEDIATE-DEEP MONITORING WELL
- SHALLOW-INTERMEDIATE MONITORING WELL
- ABANDONED
- ● PROPOSED COMPLIANCE MONITORING WELL
- 🟩 PROPOSED PARCELS FOR PURCHASE
- ☐ SITE
- ☐ SNOHOMISH COUNTY PARCEL BOUNDARY

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FIGURE 8

COMPLIANCE MONITORING WELL NETWORK
TOC FACILITY 01-176
24205 AND 24225 56th AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: lmurock | Checked By: SS | Date: 10/10/2024 | Disc Reference:

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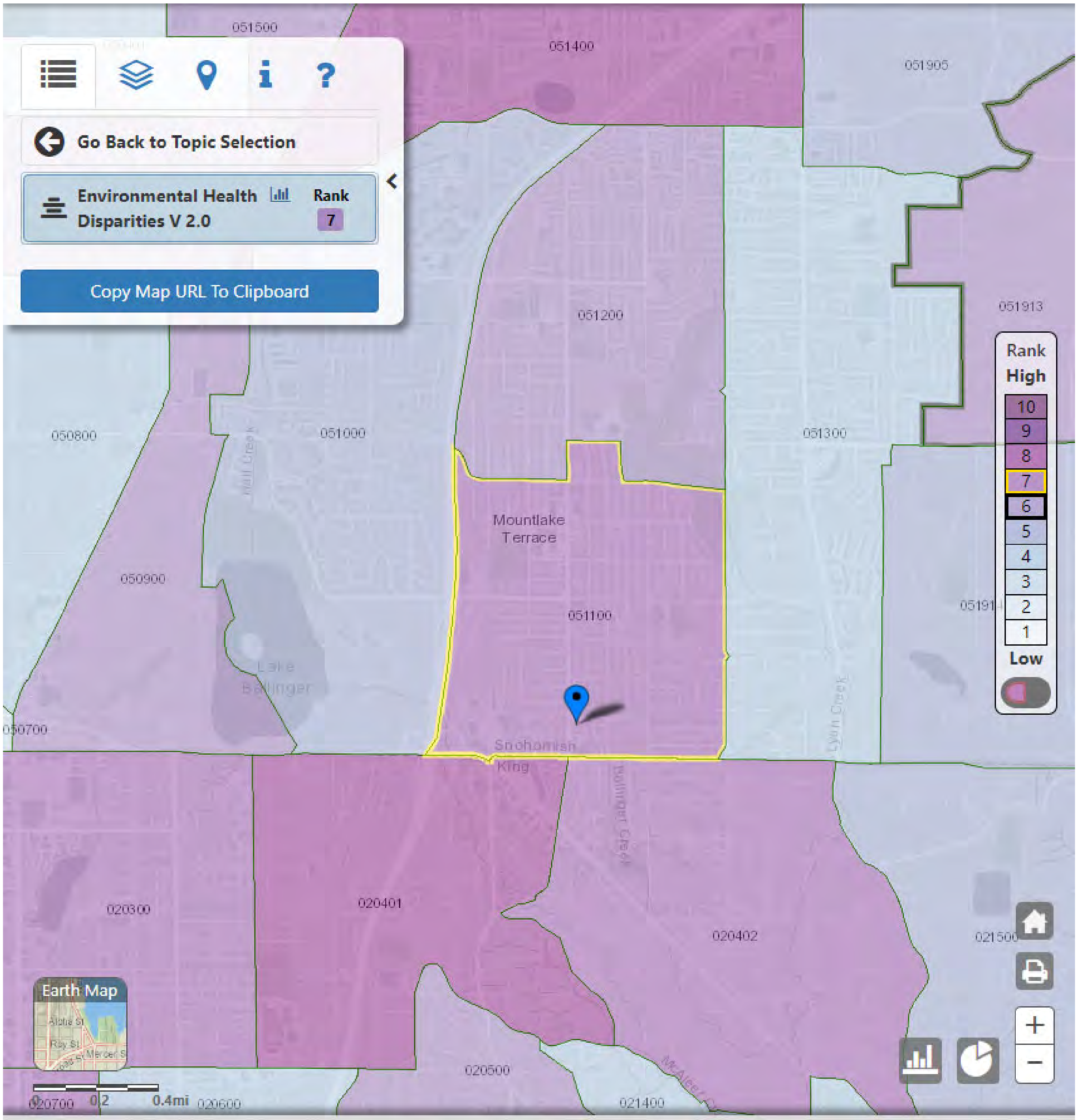
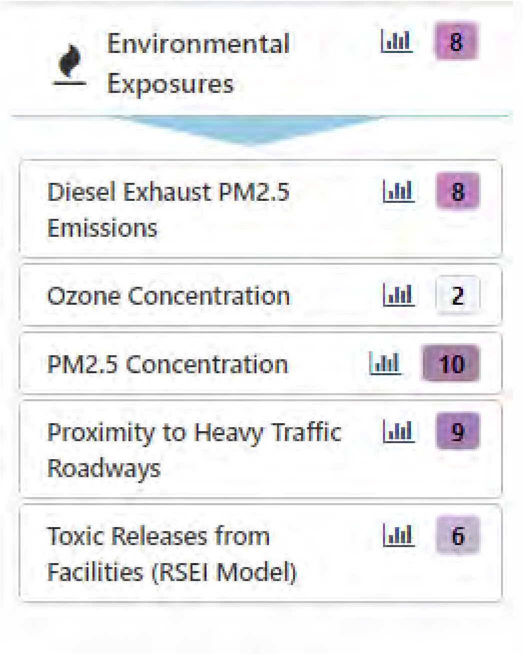
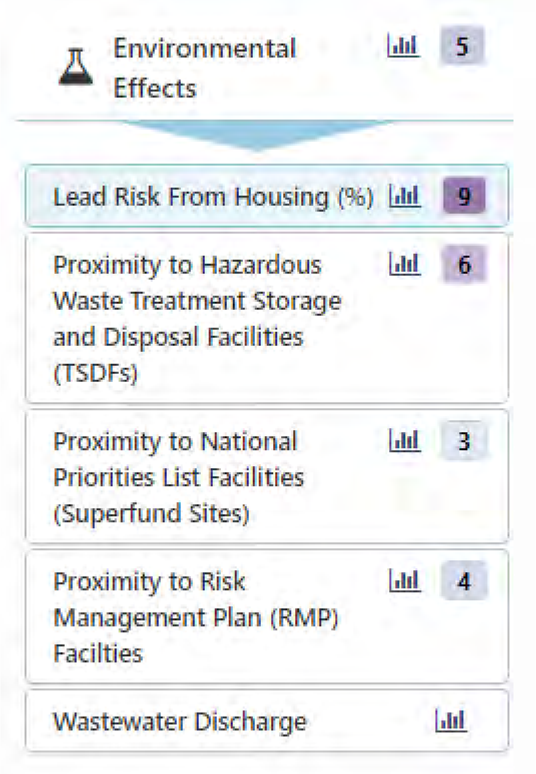
Appendix A. Vulnerable Population and Overburdened Community Evaluation

Washington State Department of Heath's Environmental Health Disparities Map Results
Census Tract 53061051100

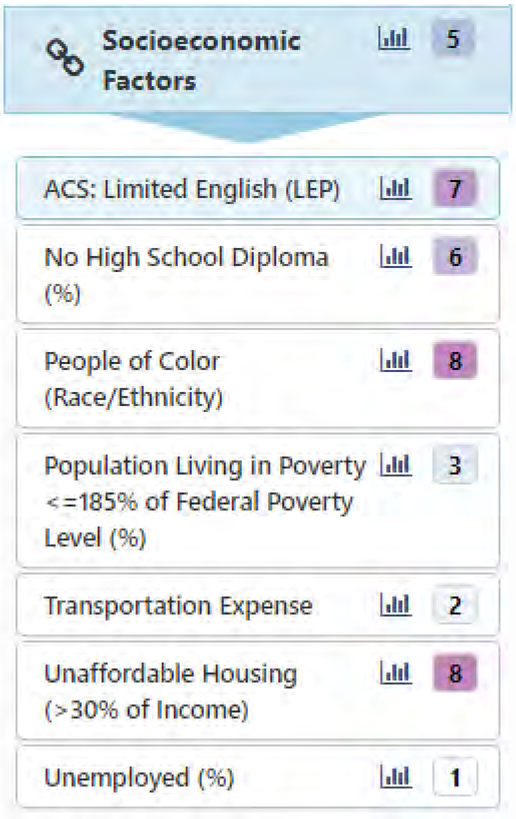




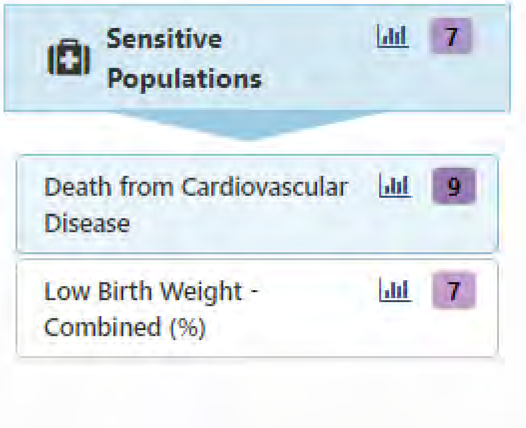
Environmental Exposures	8
Diesel Exhaust PM2.5 Emissions	8
Ozone Concentration	2
PM2.5 Concentration	10
Proximity to Heavy Traffic Roadways	9
Toxic Releases from Facilities (RSEI Model)	6



Environmental Effects	5
Lead Risk From Housing (%)	9
Proximity to Hazardous Waste Treatment Storage and Disposal Facilities (TSDFs)	6
Proximity to National Priorities List Facilities (Superfund Sites)	3
Proximity to Risk Management Plan (RMP) Facilties	4
Wastewater Discharge	



Socioeconomic Factors	5
ACS: Limited English (LEP)	7
No High School Diploma (%)	6
People of Color (Race/Ethnicity)	8
Population Living in Poverty <=185% of Federal Poverty Level (%)	3
Transportation Expense	2
Unaffordable Housing (>30% of Income)	8
Unemployed (%)	1



Sensitive Populations	7
Death from Cardiovascular Disease	9
Low Birth Weight - Combined (%)	7

EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Mountlake Terrace, WA

Tract: 53061051100
Population: 3,967
Area in square miles: 0.79

LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	76%
Spanish	6%
French, Haitian, or Cajun	2%
German or other West Germanic	1%
Other Indo-European	3%
Korean	2%
Chinese (including Mandarin, Cantonese)	1%
Vietnamese	2%
Tagalog (including Filipino)	2%
Other Asian and Pacific Island	2%
Arabic	3%
Total Non-English	24%

COMMUNITY INFORMATION

Low income: 13 percent

People of color: 29 percent

Less than high school education: 6 percent

Limited English households: 2 percent

Unemployment: 2 percent

Persons with disabilities: 21 percent

Male: 51 percent

Female: 49 percent

82 years
Average life expectancy

$42,305
Per capita income

Number of households: 1,746

Owner occupied: 60 percent

BREAKDOWN BY RACE

White: 71%

Black: 1%

American Indian: 0%

Asian: 13%

Hawaiian/Pacific Islander: 0%

Other race: 0%

Two or more races: 6%

Hispanic: 9%

BREAKDOWN BY AGE

From Ages 1 to 4	6%
From Ages 1 to 18	15%
From Ages 18 and up	85%
From Ages 65 and up	22%

LIMITED ENGLISH SPEAKING BREAKDOWN

Speak Spanish	0%
Speak Other Indo-European Languages	0%
Speak Asian-Pacific Island Languages	100%
Speak Other Languages	0%

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2017 -2021. Life expectancy data comes from the Centers for Disease Control.

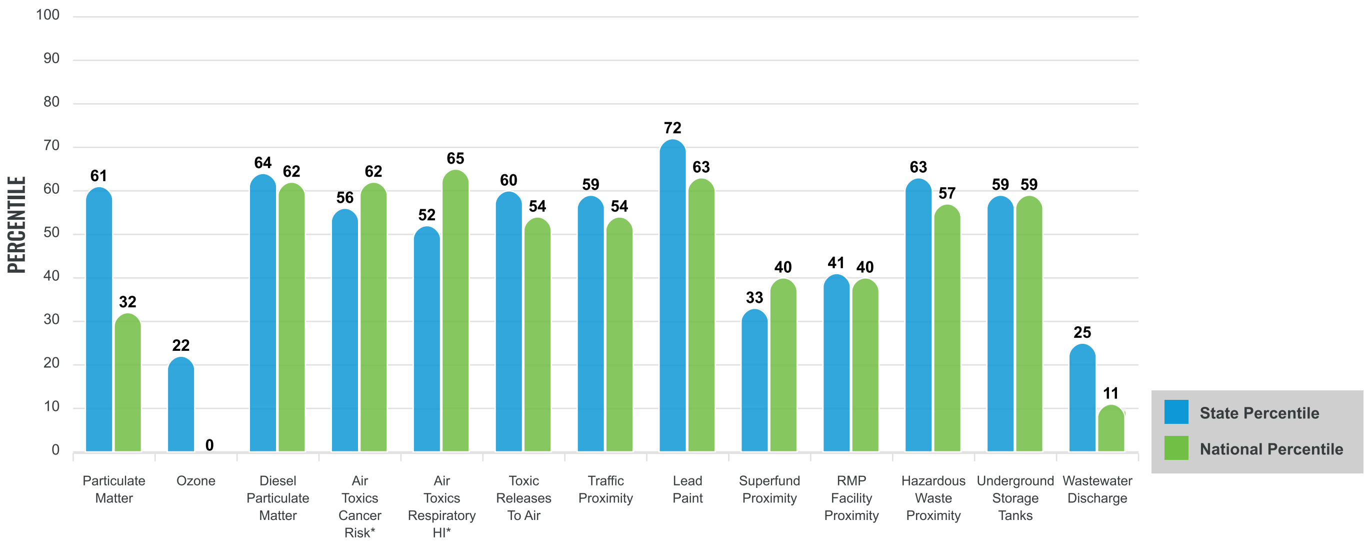
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

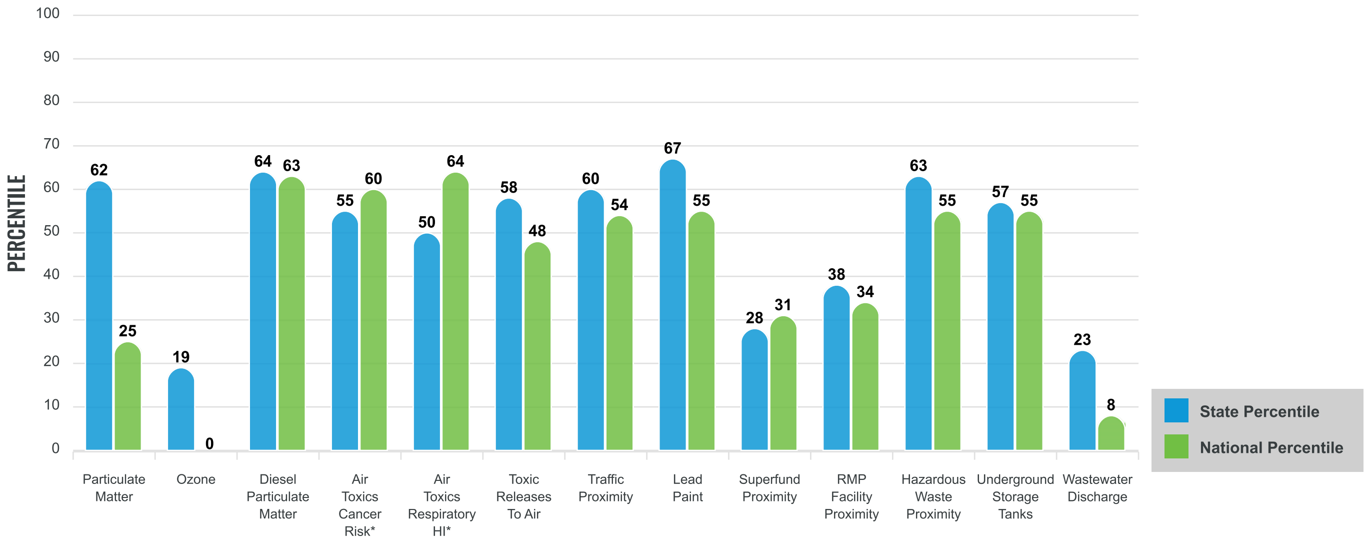
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected block group or buffer area compares to the entire state or nation.

Report for Tract: 53061051100

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter (μg/m^3)	7.45	7.02	73	8.08	31
Ozone (ppb)	46.2	49.8	21	61.6	0
Diesel Particulate Matter (μg/m^3)	0.474	0.355	78	0.261	89
Air Toxics Cancer Risk* (lifetime risk per million)	30	27	37	25	52
Air Toxics Respiratory HI*	0.4	0.39	39	0.31	70
Toxic Releases to Air	1,300	1,800	66	4,600	64
Traffic Proximity (daily traffic count/distance to road)	250	190	80	210	79
Lead Paint (% Pre-1960 Housing)	0.64	0.23	90	0.3	82
Superfund Proximity (site count/km distance)	0.044	0.18	29	0.13	39
RMP Facility Proximity (facility count/km distance)	0.14	0.4	41	0.43	42
Hazardous Waste Proximity (facility count/km distance)	2.2	1.6	77	1.9	76
Underground Storage Tanks (count/km^2)	9.1	6.3	79	3.9	87
Wastewater Discharge (toxicity-weighted concentration/m distance)	1.4E-06	0.024	23	22	9
SOCIOECONOMIC INDICATORS					
Demographic Index	21%	28%	38	35%	34
Supplemental Demographic Index	8%	12%	30	14%	23
People of Color	29%	32%	51	39%	48
Low Income	13%	24%	32	31%	24
Unemployment Rate	2%	5%	36	6%	37
Limited English Speaking Households	2%	4%	60	5%	64
Less Than High School Education	6%	8%	54	12%	42
Under Age 5	6%	6%	56	6%	56
Over Age 64	22%	16%	76	17%	74
Low Life Expectancy	16%	18%	27	20%	20

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	12
Air Pollution	0
Brownfields	0
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	5

Other environmental data:

Air Non-attainment	No
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	No
Selected location contains an EPA IRA disadvantaged community	No

Report for Tract: 53061051100

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	16%	18%	27	20%	20
Heart Disease	4.6	5.3	32	6.1	21
Asthma	10.5	10.5	47	10	69
Cancer	6.2	6.3	48	6.1	50
Persons with Disabilities	20%	13.1%	88	13.4%	86

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	2%	11%	30	12%	24
Wildfire Risk	0%	12%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	9%	9%	62	14%	42
Lack of Health Insurance	5%	6%	43	9%	35
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	No	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Report for Tract: 53061051100

Appendix B . Groundwater Monitoring Plan

FARALLON
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March 6, 2025

Vance Atkins
Toxics Cleanup Program, Northwest Regional Office
Washington State Department of Ecology
15700 Dayton Avenue North
Shoreline, Washington 98133

RE: GROUNDWATER MONITORING PLAN
TOC FACILITY NO. 01-176
24205 AND 24225 56TH AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON
FARALLON PN: 2584-001

Dear Vance Atkins:

Farallon Consulting, L.L.C. (Farallon) has prepared this Groundwater Monitoring Plan to summarize the proposed groundwater monitoring requirements for TOC Holdings Co., formerly known as Time Oil Co., (TOC) Facility No. 01-176 (Site) in Mountlake Terrace, Washington.

The Site is defined by the extent of contamination attributable to releases of petroleum hydrocarbons at or from the former Time Oil gasoline service station located at 24205 56th Avenue West in Mountlake Terrace, Washington (Source Property). The Site is identified by Facility Site ID 93355524 and Cleanup Site ID 6885. The Site encompasses portions of the Source Property, the south-adjoining property at 24225 56th Avenue West in Mountlake Terrace, Washington (Adjoining Property), the property at 24309 56th Avenue (Drake Parcel), and the adjoining 56th Avenue West right-of-way located to the west of the Source Property, Adjoining Property, and Drake Parcel (Figures 1 and 2). The Source Property and the Adjoining Property total approximately 1.16 acres of land and are collectively referred to as the "Property."

TOC operated a retail gasoline service station on the Source Property from 1968 to 1990. The service station included three underground storage tanks (USTs), six fuel dispensers, and associated product lines. In 1991, the USTs, fuel dispensers, and associated product lines were decommissioned by removal during closure of the service station.

Between 1991 and 2017, TOC performed remedial investigations to determine the extent of contamination at the Site and performed interim actions to remediate the contamination. The interim actions were performed independently and pursuant to Agreed Order No. DE

8661 (Agreed Order) that TOC and Ecology entered in 2011. The Agreed Order required TOC to prepare a remedial investigation report, complete a feasibility study, perform interim actions, and develop a cleanup action plan for the Site.

In 2017, TOC filed a Chapter 7 liquidation bankruptcy and stopped performing all remedial work at the Site. As a result of the bankruptcy, ownership of the Source Property and Adjoining Property was transferred to the trustee of the bankruptcy estate (TOC Trustee). JYK Holdings, LLC (JYK Holdings) is under contract with the TOC Trustee to acquire the Source Property and Adjoining Property. Closing of the transaction is conditioned on JYK Holdings entering into a Prospective Purchaser Consent Decree (PPCD) with Ecology that will limit its liability for the Site in exchange for it committing to implement certain remedial actions.

JYK Holdings completed a remedial investigation and feasibility study for the Site. The remedial investigation was conducted to adequately characterize contamination at the Site, including the distribution of hazardous substances and the threat they pose to human health and the environment. The results from the remedial investigation were used to conduct a feasibility study to select a cleanup action alternative for the Site. The remedial investigation and feasibility study are provided in Farallon's *Remedial Investigation Report/Feasibility Study* (RI/FS Report) [1].

A Draft Cleanup Action Plan (DCAP)[2] is being submitted concurrently with this Groundwater Monitoring Plan. The DCAP summarizes the selected cleanup action for the Site, which included the rehabilitation, expansion, and operation of the existing multi-phase extraction system to remediate the three discrete areas of petroleum-contaminated soil and groundwater within the Intermediate Water-Bearing Zone.

The scope of work and methodology for compliance groundwater monitoring are described below.

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[1] Farallon. 2024. *Remedial Investigation Report/Feasibility Study, TOC Facility No. 01-176, 24205 and 24225 56th Avenue West, Mountlake Terrace, Washington*. Prepared for JYK Holdings, LLC. December 13.

[2] Farallon. 2024. *Draft Cleanup Action Plan, TOC Facility No. 01-176, 24205 and 24225 56th Avenue West, Mountlake Terrace, Washington*. Prepared for JYK Holdings, LLC. December 13.

MONITORING WELL NETWORK

The compliance monitoring well network consists of existing monitoring wells MW09, MW10, MW20, MW25, MW32, MW57, MW69, and MW98 (Figure 3). In the event any of the monitoring wells are determined to be damaged or must be decommissioned during future property redevelopment, Ecology will be consulted to determine whether a replacement monitoring well is necessary as part of the compliance monitoring well network.

Any monitoring well decommissioned at the Site will be decommissioned in accordance with the Minimum Standards for Construction and Maintenance of Wells as established in WAC 173-160. A decommissioning report will be submitted to Ecology within 30 days after completion of decommissioning.

Any new monitoring well will be constructed in accordance with the Minimum Standards for Construction and Maintenance of Wells as established in WAC 173-160. A well installation log will be provided to Ecology within 30 days after construction of the well.

GROUNDWATER MONITORING AND LABORATORY ANALYSIS

Groundwater monitoring events will include measuring depth to groundwater, measuring thickness of light non-aqueous phase liquid (LNAPL) where detected, and collecting groundwater samples from the monitoring well network (Figure 3).

Field personnel will remove the locking well cap from each monitoring well, and groundwater levels will be allowed to equilibrate to atmospheric pressure for at least 30 minutes. The depth to groundwater and thickness of LNAPL, if present, will be measured in each monitoring well to the nearest 0.01 foot using an electronic oil/water interface meter to the top of the well casing in accordance with Farallon Standard Operating Procedure (SOP) GW-03 – Groundwater Level Measurement in Monitoring Wells and SOP GW-06 – Measurement of Viscous LNAPL Layer Thickness in Monitoring Wells, provided in Attachment A. The total depth of each monitoring well will be measured to evaluate siltation of the well-screen interval and to calculate the submerged well casing volume. Reusable equipment will be decontaminated between uses at each location in accordance with Farallon SOP EQ-01 – Equipment Decontamination Procedures (Attachment A). Field notes will be collected during each groundwater monitoring event in accordance with Farallon SOP GN-01 – Field Note Procedures (Attachment A).

Each monitoring well will be purged at a low flow rate ranging from 100 to 300 milliliters per minute using a peristaltic, bladder, or submersible pump and dedicated tubing in accordance with Farallon SOP GW-04 – Low-Flow Groundwater Sampling Procedures (Attachment A). Additionally, groundwater samples may be collected with a disposable polyethylene bailer if necessary, based on low groundwater levels and/or low yielding wells, which is consistent with historical groundwater monitoring at the Site. Temperature, pH, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential will be monitored using a YSI multiparameter meter during purging to determine when stabilization of these parameters occurs. The YSI multiparameter meter will be calibrated prior to use in accordance with Farallon SOP EQ-04 – YSI Pro DSS Equipment Calibration (Attachment A). Following stabilization of the parameters, groundwater samples will be collected directly from the low-flow pump outlet. If a monitoring well is completely dewatered during purging, samples will be collected after sufficient recharging has occurred to allow filling of all sample containers.

Laboratory-prepared sample containers will be filled directly from the pump outlet, with care taken to minimize turbulence and not handle the seal or lid of the container when the samples are placed into the containers. The groundwater samples will be placed on ice in a cooler under standard chain-of-custody protocols and submitted to an Ecology-accredited laboratory for analysis of total petroleum hydrocarbons as gasoline-range organics (GRO) by Northwest Method NWTPH-Gx and benzene, toluene, ethylbenzene, and xylenes (BTEX) by U.S. Environmental Protection Agency (EPA) Method 8021B. Samples will be shipped to the Ecology-accredited laboratory in accordance with Farallon SOP GN-03 – Sample Shipping (Attachment A).

Groundwater samples will also be collected for analysis of monitored natural attenuation parameters (nitrate, manganese, ferrous iron, sulfate, methane, and alkalinity) from up to five monitoring wells in accordance with Ecology's *Guidance on Remediation of Petroleum-Contaminated Groundwater by Natural Attenuation*[3].

Purged groundwater and other investigation-derived waste will be stored temporarily on the Source Property in labeled U.S. Department of Transportation-approved 55-gallon steel drums accordance with Farallon SOP WM-01 – Field Handling of Investigation-Derived Waste

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[3] Ecology. 2005. *Guidance on Remediation of Petroleum-Contaminated Groundwater by Natural Attenuation.* Publication No. 05-09-091. July.

(Attachment A). The analytical results from the groundwater samples will be used to develop a waste profile and to identify disposal options.

MONITORING FREQUENCY

Groundwater monitoring events will be conducted on a quarterly basis during operation of the MPE system. Compliance groundwater monitoring will consist of a minimum of four quarterly groundwater monitoring events following shutdown of the MPE systems. If MTCA Method A cleanup levels are not achieved within one year after the MPE systems are shut down, then groundwater monitoring will continue for one additional year unless cleanup levels are achieved sooner. If cleanup levels are not achieved after the two-year monitoring period, then contingency actions will be implemented, including recordation of an environmental covenant for the portions of the Site where contaminated groundwater remains. Based on the extensive cleanup that has been conducted at the Site over the past 30 years and the stable to decreasing concentrations of COCs at the Site, no additional groundwater monitoring is proposed following recordation of an environmental covenant.

REPORTING

Annual Groundwater Monitoring Reports summarizing the groundwater monitoring events will be prepared and submitted to Ecology. The Groundwater Monitoring Reports will include the following:

- Summary of groundwater monitoring events;
- Figures showing locations of relevant monitoring wells and property features, groundwater contours, and groundwater analytical results;
- Tables providing analytical results and water level elevations, including LNAPL thickness if encountered;
- Discussion of the groundwater sample analytical results and comparison to MTCA cleanup levels; and
- Laboratory analytical reports.

CLOSING

Please contact either of the undersigned at (425) 295-0800 if you have questions or need additional information.

Sincerely,

Farallon Consulting, L.L.C.

State of Washington Licensed Geologist
22008400
Sarah E. Snyder

Pete Kingston

State of Washington Licensed Geologist
2921
Peter J. Kingston

Sarah Snyder, L.G.
Senior Geologist

Pete Kingston, L.G.
Principal Geologist

Attachments: Figure 1, *Site Vicinity Map*
Figure 2, *Lateral Extent of Site*
Figure 3, *Compliance Monitoring Well Network*
Attachment A, Farallon Standard Operating Procedures

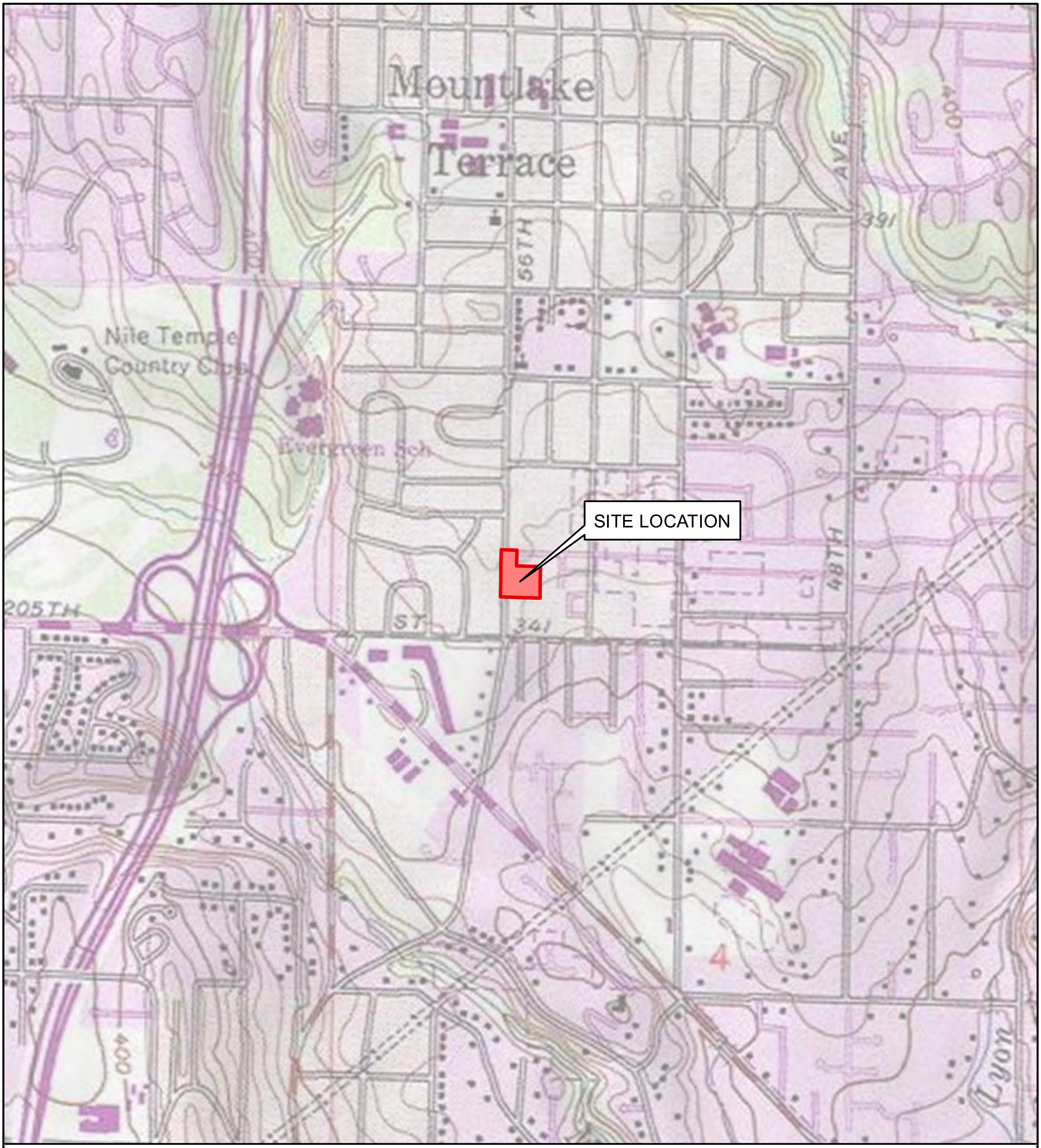
cc: JYK Holdings, LLC

SS/PK

FIGURES

GROUNDWATER MONITORING PLAN
TOC Facility No. 01-176
24205 and 24225 56th Avenue West
Mountlake Terrace, Washington

Farallon PN: 2584-001



REFERENCE: 7.5 MINUTE USGS QUADRANGLE EDMONDS EAST, WASHINGTON, DATED 2013

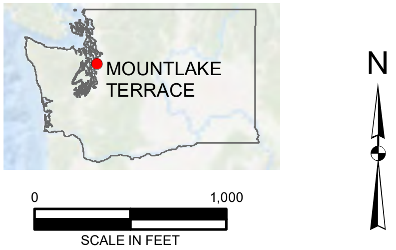


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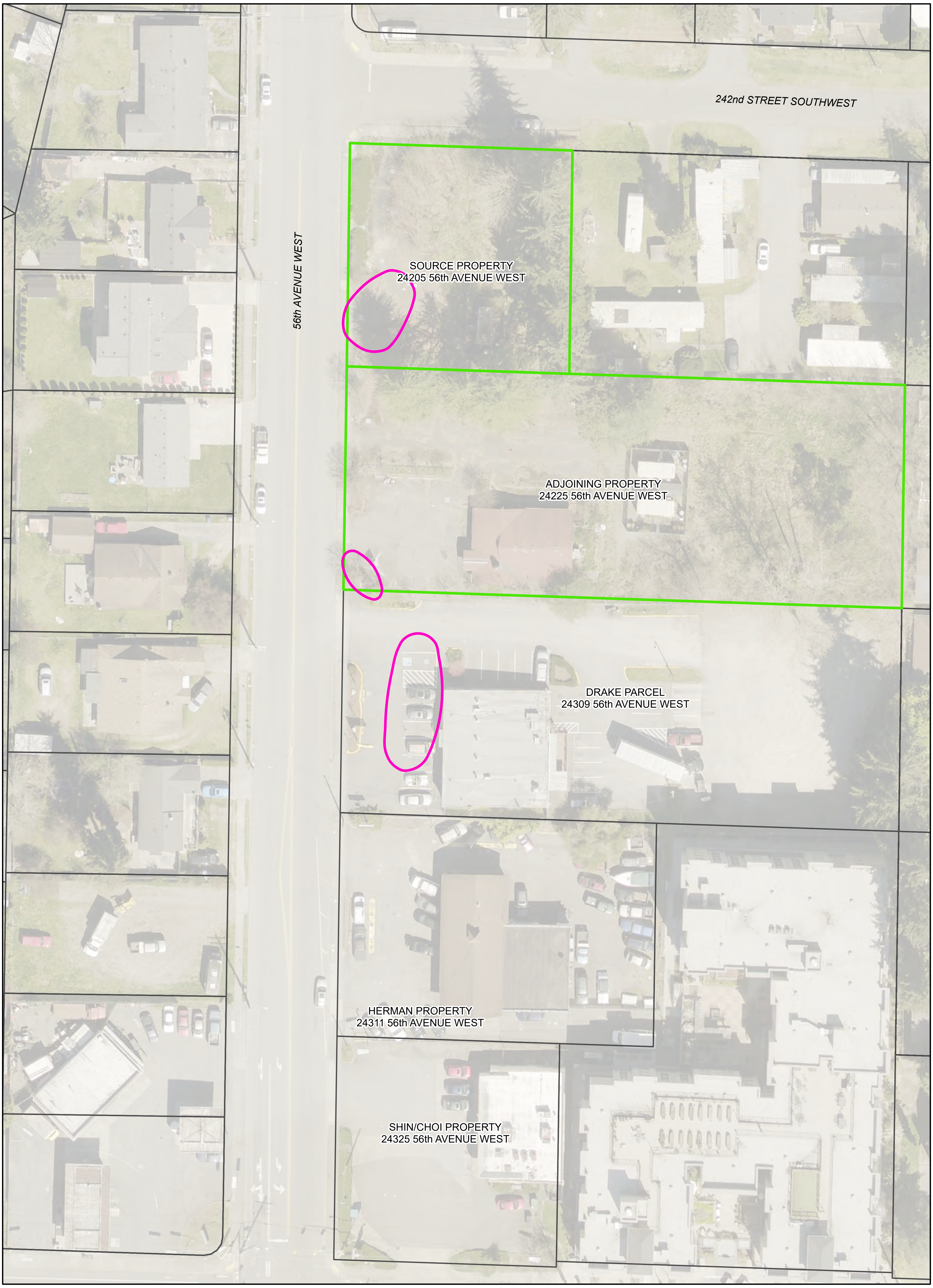
FIGURE 1

SITE VICINITY MAP
TOC FACILITY 01-176
24205 AND 24225 56th AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: lmurock Checked By: SS Date: 5/29/2024 Disc Reference:
Path: Q:\Projects\2584 AMPACC Law Group\001 Former TOC Facility 01-176\Mapfiles\013\Figure-01_SiteVicinityMap.mxd



LEGEND

- 🟩 PROPOSED PARCELS FOR PURCHASE
- 🟪 SITE
- ☐ SNOHOMISH COUNTY PARCEL BOUNDARY

N

0 50

SCALE IN FEET

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
2. FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION.

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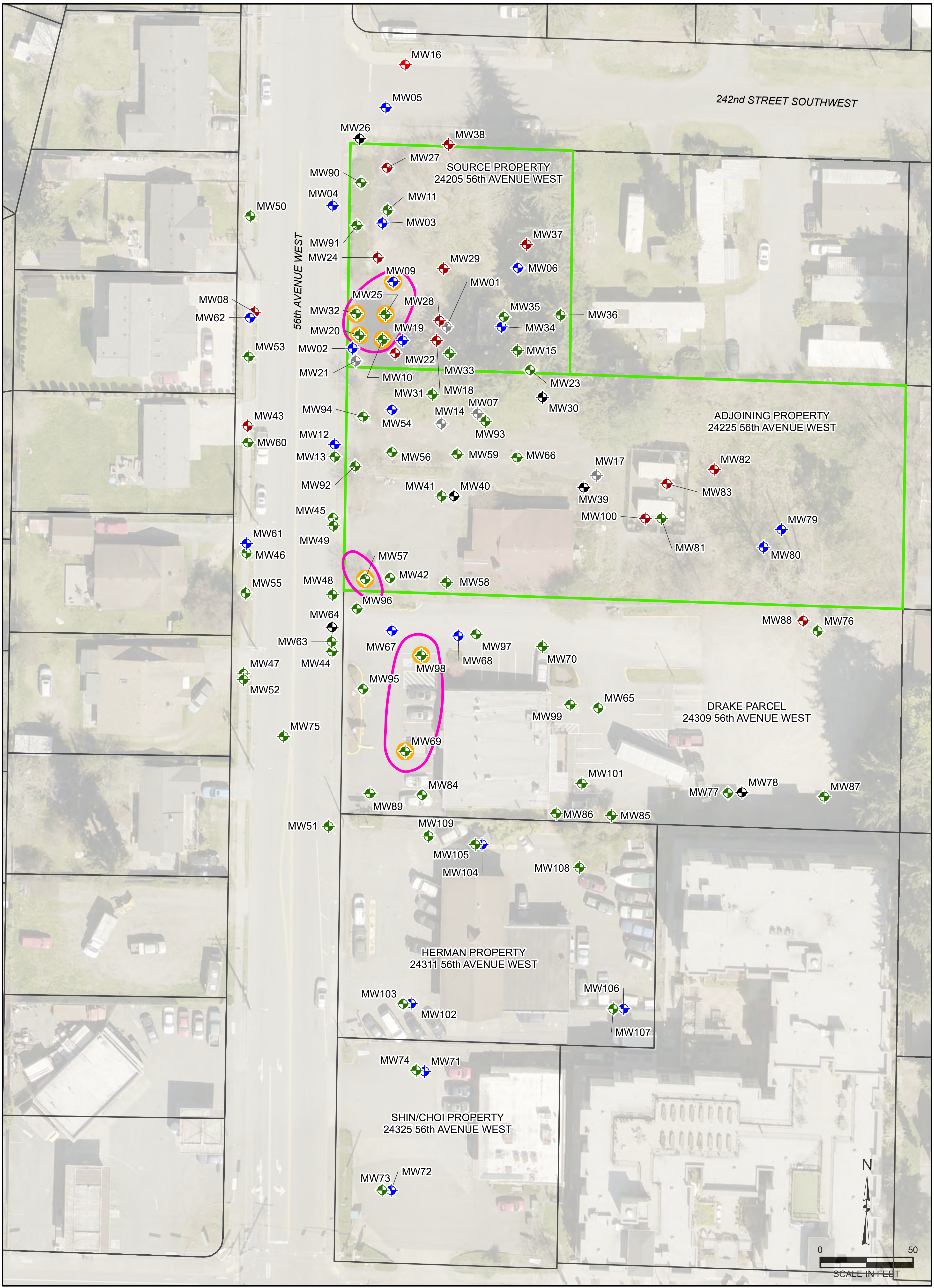
FIGURE 2

LATERAL EXTENT OF SITE
TOC FACILITY 01-176
24205 AND 24225 56th AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: lmurock
Checked By: SS
Date: 10/10/2024
Disc Reference:

Path: Q:\Projects\2584 AMPACC Law Group\001 Former TOC Facility 01-176\Mapfiles\014\2024 DCAP\Figure-02_LateralExtent.aprx



LEGEND

- ⊕ SHALLOW MONITORING WELL
- ⊕ INTERMEDIATE MONITORING WELL
- ⊕ DEEP MONITORING WELL
- ⊕ INTERMEDIATE-DEEP MONITORING WELL
- ⊕ SHALLOW-INTERMEDIATE MONITORING WELL
- ⊕ ABANDONED
- ● PROPOSED COMPLIANCE MONITORING WELL
- ▭ PROPOSED PARCELS FOR PURCHASE
- ▭ SITE
- ▭ SNOHOMISH COUNTY PARCEL BOUNDARY

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
2. FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION.

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FIGURE 3

COMPLIANCE MONITORING WELL NETWORK
TOC FACILITY 01-176
24205 AND 24225 56th AVENUE WEST
MOUNTLAKE TERRACE, WASHINGTON

FARALLON PN: 2584-001

Drawn By: lmurock | Checked By: SS | Date: 10/10/2024 | Disc Reference:

Path: Q:\Projects\2584 AMPACC Law Group\001 Former TOC Facility 01-176\Mapfiles\014\2024 DCAP\Figure-08_Compliance_GWM.aprx

ATTACHMENT A
FARALLON STANDARD OPERATING PROCEDURES

GROUNDWATER MONITORING PLAN
TOC Facility No. 01-176
24205 and 24225 56th Avenue West
Mountlake Terrace, Washington

Farallon PN: 2584-001

STANDARD OPERATING PROCEDURE EQ-01

EQUIPMENT DECONTAMINATION PROCEDURES

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for decontaminating sampling equipment during various field activities. The step-by-step guidelines provided in this SOP are to be followed by the field crew during all site visits, as applicable.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly decontaminate field equipment during various field tasks:

- Rinse water or distilled water.
- Deionized water.
- Liquinox or other phosphate-free detergent.
- Paper towels.
- Labeled squirt bottles.
- Long-handled hard-bristle brushes (for sediment and soil).
- Cotton swabs.
- Plastic sheeting, garbage bags, and aluminum foil (for sediment and soil).
- Core liner caps or plastic wrap and rubber bands (for sediment and soil).
- Extension arm for cleaning core liners (for sediment and soil).
- Plastic 5-gallon bucket.
- U.S. Department of Transportation-approved drum(s) for decontamination water unless other water-handling arrangements have been made. Separate drums are needed for liquid and solid wastes (see Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.

Dilute Liquinox with distilled water in a squirt bottle in accordance with the instructions on the Liquinox package, and label the bottle. Fill another squirt bottle with distilled water, and label the bottle.

FIELD EQUIPMENT TO BE DECONTAMINATED AFTER USE

Decontaminate the following field equipment at the conclusion of field work each day, in accordance with the procedures outlined in this SOP:

- Water-level meter.
- Horiba/YSI multiparameter probe.
- Bladder pump.
- Submersible pump.
- Sediment and soil collection and processing equipment.

WATER-LEVEL METER DECONTAMINATION

Decontaminate the water-level meter after measuring the water level at a monitoring well before moving to a new monitoring well, using the following procedures:

- Spray the bottom half of a paper towel with the diluted Liquinox solution, and the upper half with deionized water.
- Grip the measuring tape of the water-level meter with the paper towel in one hand with the Liquinox side down toward the monitoring well casing.
- Begin slowly reeling up the water-level meter while maintaining firm contact between the measuring tape and the paper towel.
- Ensure that no debris or contamination remains on the measuring tape of the water-level meter once it has been reeled up.
- Use a clean new paper towel for each successive decontamination of the measuring tape of the water-level meter.

HORIBA/YSI MULTIPARAMETER PROBE DECONTAMINATION

Decontaminate the Horiba/YSI multiparameter probe at the end of each workday or after sampling a monitoring well with high concentrations of contamination, using the following procedures:

- Remove the multiparameter probe from the flow-through cell, and thoroughly spray each component with deionized water.
- Use a cotton swab to gently clean around each sensor probe, ensuring that all contaminated water and material has been washed away.
- Refill the protective dissolved oxygen and pH probe caps with deionized water, and replace prior to storage.
- Once the multiparameter probe has been adequately cleaned, replace the protective shield, and return the probe to the case. If the device appears to be overly wet, allow it to air-dry with the case open.

- Do not use Liquinox to clean any probes on the Horiba multiparameter probe, as it may damage the device.

BLADDER PUMP DECONTAMINATION

Decontaminate the bladder pump after sampling a well and at the end of each workday, using the following procedures:

- After extracting the bladder pump from the well, break down the pump, remove and dispose of the used bladder, and spray each component with the diluted Liquinox solution, followed by deionized water.
- Wipe away any visible contamination or debris with a paper towel.
- Capture cleaning water in a liquid waste drum for proper disposal in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste.
- Ensure that all contamination and Liquinox solution is washed off all components before reassembling the device, installing a new bladder, and moving to sample a new well.

SUBMERSIBLE PUMP DECONTAMINATION

Decontaminate the submersible pump after purging water from any well, using the following procedures:

- After extracting the submersible pump from the well, thoroughly spray down the pump with the diluted Liquinox solution, followed by deionized water.
- Wipe away any visible contamination or debris with a paper towel.
- Purge clean water through the pump and tubing to ensure that contaminated water has been cleared from all lines.
- Capture cleaning water in a liquid waste drum for proper disposal in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste.

SEDIMENT AND SOIL SAMPLING AND PROCESSING EQUIPMENT DECONTAMINATION

Decontaminate sampling equipment used to collect and process sediment and soil samples, using the following procedures:

- Place contaminated equipment and decontamination tools on plastic sheeting.
- Thoroughly rinse all used equipment with distilled water in a 5-gallon bucket to remove excess sediment or soil.
- Pour one capful of Liquinox solution into a 5-gallon bucket filled with tap water or distilled water.
- Using a long-handled hard-bristle brush, thoroughly scrub the equipment with the Liquinox solution until no sediment or soil particles remain.

- Holding the equipment over a 5-gallon bucket, double-rinse the equipment with distilled water until no Liquinox solution remains. Do not allow clean equipment to come into contact with a contaminated surface.
- Drain the equipment and place it in a clean, dry place to prevent recontamination.
- If decontaminated equipment will not be re-used immediately, wrap stainless steel equipment (e.g., bowls, spoons) in aluminum foil with the dull side facing the equipment. Seal polycarbonate core liners with core caps or cellophane plastic. Rubber-band ends to ensure a proper seal.
- After decontamination has been completed, place disposable items into a garbage bag, and store decontamination water in a drum in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste.

STANDARD OPERATING PROCEDURE EQ-04

YSI PRO DSS EQUIPMENT CALIBRATION

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology to properly use, operate, and handle YSI Pro DSS Water Quality Meter.

RESPONSIBILITIES AND QUALIFICATIONS

All personnel performing these actions are required to be familiar with the procedures described herein. Personnel performing or overseeing procedures described herein must also be familiar with health and safety requirements in the project-specific Health and Safety Plan (HASP).

SUPPORTING SOPS

List of all supporting SOPs referenced within this SOP.

SOP EQ-01 Equipment Decontamination

EQUIPMENT AND SUPPLIES

The following equipment is necessary to calibrate and operate the PID:

- The YSI Water Quality Meter
- Spray Bottle with Deionized Water (DI Water)
- Calibration Solutions
    - pH: 4, 7 and 10
    - ORP
    - Conductivity
    - Turbidity (Pre-mixed or Mixed to Standard)
- Calibration Solution Waste Bucket (Collects used calibration solution throughout calibration process)

YSI CALIBRATION FREQUENCY

YSI calibration should be completed before each groundwater monitoring event and as needed if values seem uncharacteristic of the site. If a groundwater monitoring event lasts multiple days, the equipment doesn't need to be calibrated each day.

YSI CALIBRATION PROCEDURES

Verify all five calibration solutions have not expired. Each solution should be labeled with a month and a year.

Turn on the YSI by pressing the power button. Wait for the YSI to complete automatic check and bring up the low flow parameter reading display.

Loosen the low flow cup retaining nut holding the YSI and the low flow cup securely together. Pull the YSI water quality meter from the low flow cup and inspect for any obvious build up or goop on any of the sensors. Place any water from low flow cup into the calibration solution waste bucket. Rinse both the low flow cup and the YSI water quality sensors using DI water.

pH Calibration

Push the calibration [Cal] key to access the calibration menu. Fill the low flow cup to the Fill Line #1 with pH 7 solution. Place the water quality meter into the low flow cup and tighten the low flow cup retaining nut so that a seal is created. The pH probe and the temperature probe should appear submerged inside the low flow cup. Select pH/ORP from the submenu and then select pH from the 2nd submenu. The 3-point calibration will begin. The suggested calibration value should appear at the top of the screen in brackets and match the calibration solution being used. Allow the Actual Readings and Post Cal Values to stabilize by becoming parallel on the small graph at the bottom of the screen. When the lines are parallel select [Accept Calibration]. Verify that the YSI has accepted the readings and the bottom of the screen states *Ready for cal point 2*.

Loosen the low flow cup retaining nut holding the YSI and the low flow cup securely together. Pull the YSI water quality meter from the low flow cup and place the calibration solution from low flow cup into the calibration solution waste bucket. Rinse both the low flow cup and the YSI water quality sensors using DI water.

Repeat the process using the pH 4 or 10 calibration solution. Ensure the suggested calibration value at the top of the screen. Allow for the readings to stabilize before selecting [Accept Calibration]. Verify that the YSI has accepted the readings and the bottom of the screen states *Ready for cal point 3*.

Repeat the process using the last pH calibration solution. Ensure the suggested calibration value at the top of the screen. Allow for the readings to stabilize before selecting [Accept Calibration]. If calibration has been successful it will flash *Calibration successful!* at the bottom of the screen.

Loosen the low flow cup retaining nut holding the YSI and the low flow cup securely together. Pull the YSI water quality meter from the low flow cup and place the calibration solution from low flow cup into the calibration solution waste bucket. Rinse both the low flow cup and the YSI water quality sensors using DI water.

If during the calibration process the meter needs to be reset, select [Esc] and resume the calibration process.

If during the calibration process the suggested calibration value doesn't match the calibration solution select the up arrow and adjust the value accordingly. After selecting [Enter] the calibration /parameter stabilization process will start over automatically.

ORP Calibration

Push the calibration [Cal] key to access the calibration menu. Fill the low flow cup to the Fill Line #1 with ORP solution. Place the water quality meter into the low flow cup and tighten the low flow cup retaining nut so that a seal is created. The ORP probe and the temperature probe should appear submerged inside the low flow cup. Select pH/ORP from the submenu and then select ORP from the 2nd submenu. The calibration will begin. The suggested calibration value should appear at the top of the screen in brackets. Verify the suggested calibration value by reading the measured temperature of the calibration solution and the suggested value. A table should be affixed to the calibration bottle showing the logarithmic relationship between temperature and ORP values for the calibration solution being used. If the value seems appropriate, allow the Actual Readings and Post Cal Values to stabilize by becoming parallel on the small graph at the bottom of the screen. When the lines are parallel select [Accept Calibration]. Verify that the YSI has accepted the readings and the bottom of the screen states *Calibration successful!*

Loosen the low flow cup retaining nut holding the YSI and the low flow cup securely together. Pull the YSI water quality meter from the low flow cup and place the calibration solution from low flow cup into the calibration solution waste bucket. Rinse both the low flow cup and the YSI water quality sensors using DI water.

Conductivity Calibration

Push the calibration [Cal] key to access the calibration menu. Fill the low flow cup to the Fill Line #2 with Conductivity solution. Place the water quality meter into the low flow cup and tighten the low flow cup retaining nut so that a seal is created. The conductivity probe and the tprobe should appear submerged inside the low flow cup. Gently rotate the low flow cup around to remove any bubbles from the conductivity cell. Select Conductivity from the submenu and then select Spec. Cond. from the 2nd submenu. The calibration will begin. The suggested calibration value should appear at the top of the screen in brackets. If the suggested value matched the calibration standard being used, allow the Actual Readings and Post Cal Values to stabilize by becoming parallel on the small graph at the bottom of the screen. When the lines are parallel select [Accept Calibration]. Verify that the YSI has accepted the readings and the bottom of the screen states *Calibration successful!*

Loosen the low flow cup retaining nut holding the YSI and the low flow cup securely together. Pull the YSI water quality meter from the low flow cup and place the calibration solution from low flow cup into the calibration solution waste bucket. Rinse both the low flow cup and the YSI water quality sensors using DI water.

Dissolved Oxygen Calibration

Push the calibration [Cal] key to access the calibration menu. Spray a small amount of DI water into the low flow calibration cup so that the bottom of the covered. Place the water quality meter into the low flow cup and tighten the low flow cup retaining nut so that a seal is created. Allow the YSI water quality meter to sit for approximately 1 minute before selecting ODO from the submenu and then select ODO% from the 2nd submenu. The calibration will begin. The suggested calibration value of [100.0] should appear at the top of the screen in brackets. If the suggested value is +/- 1%, allow the Actual Readings and Post Cal Values to stabilize by becoming parallel on the small graph at the bottom of the screen. When the lines are parallel select [Accept Calibration]. Verify that the YSI has accepted the readings and the bottom of the screen states *Calibration successful!*

The calibration process is now complete.

If needed, Turbidity 3-Point Calibration

Follow the User's Manual Instruction for mix or using pre-mixed turbidity solutions.

Thoroughly clean the low flow cup and water quality probes to ensure proper calibration. Fill the low flow cup to the Fill Line #1 with deionized water or 0 NTU solution. Place the water quality meter into the low flow cup and tighten the low flow cup retaining nut so that a seal is created. The turbidity probe should appear submerged inside the low flow cup. Push the calibration [Cal] key to access the calibration menu. Select turbidity from the submenu. The 3-point calibration will begin. Enter 0.00 into the suggested calibration value box at the top of the screen in brackets. Allow the Actual Readings and Post Cal Values to stabilize by becoming parallel on the small graph at the bottom of the screen. When the lines are parallel select [Accept Calibration]. Verify that the YSI has accepted the readings and the bottom of the screen states *Ready for cal point 2*.

Loosen the low flow cup retaining nut holding the YSI and the low flow cup securely together. Pull the YSI water quality meter from the low flow cup and place the calibration solution from low flow cup into the calibration solution waste bucket. Rinse both the low flow cup and the YSI water quality sensors using DI water.

Repeat the process using the 2nd prepared calibration solution. Ensure the suggested calibration value at the top of the screen. Allow for the readings to stabilize before selecting [Accept Calibration]. Verify that the YSI has accepted the readings and the bottom of the screen states *Ready for cal point 3.*

Repeat the process using the last turbidity calibration solution. Ensure the suggested calibration value at the top of the screen. Allow for the readings to stabilize before selecting [Accept Calibration]. If calibration has been successful it will flash *Calibration successful!* at the bottom of the screen.

Loosen the low flow cup retaining nut holding the YSI and the low flow cup securely together. Pull the YSI water quality meter from the low flow cup and place the calibration solution from low flow cup into the calibration solution waste bucket. Rinse both the low flow cup and the YSI water quality sensors using DI water.

YSI OPERATION

The instructions below are to be followed for YSI use to measure water quality parameter and determine stabilization:

- Ensure that the YSI handheld controller is kept dry and out of direct sunlight while in use. Rain can damage the handheld controller and hot summer days can make it difficult to read.
- During hot sunny days cover the YSI and tubing from the monitoring well. Direct sun can cause the temperature in the low flow cup to rise and can result inaccurate readings.
- Ensure the O-ring seals around the water quality meter and each probe are secure. If the pressure on the bladder pump is turned up very high it can cause the o-ring seals to fail.
- The YSI Pro DSS storage box allows to the YSI water quality meter to stay assembled at all times. Do not disassemble the handheld from the probes except when performing cleaning. Keeping it assembled will prevent moisture from getting into the electronic connections.

DOCUMENTATION

Document groundwater quality readings using the Low Flow Groundwater Sampling Form.

REFERENCES

https://www.ysi.com/File%20Library/Documents/Manuals/YSI_ProDSS_User_Manual_English.pdf

Attachments: Attachment A, Figures
Attachment B, Field Forms

ATTACHMENT A
FIGURES

[NAME OF DOCUMENT]
[Site Name]
[Site Address]
[City, State]

Farallon PN: [xxxx-xxx]

ATTACHMENT B
FIELD FORMS

[NAME OF DOCUMENT]
[Site Name]
[Site Address]
[City, State]

Farallon PN: [xxxx-xxx]

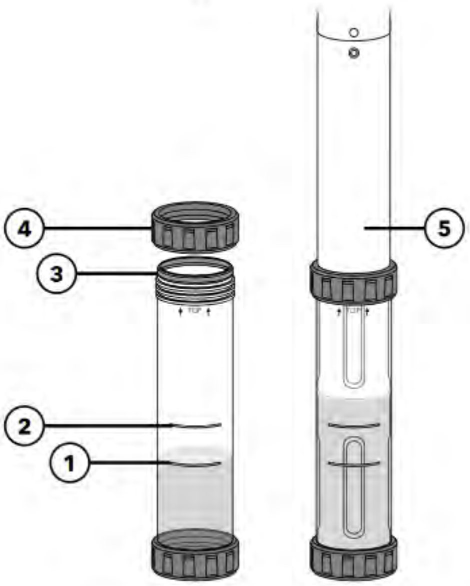

Figure 45 Calibration cup standard volume (4-port cable)

1	**Fill line one (for all calibration solutions except for conductivity)**
2	**Fill line two (for conductivity calibration solution)**
3	**Gasket**
4	**Retaining nut**
5	**Calibration cup installed**

It takes 170 mL of solution to fill the calibration cup to line 1, while it takes 225 mL to fill to line 2.

STANDARD OPERATING PROCEDURE GN-01

FIELD NOTE PROCEDURES

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the information needed to document site and sampling activities during field work. The step-by-step guidelines provided in this SOP are to be followed by the field personnel during field work.

GENERAL FIELD NOTE INSTRUCTIONS

- Use a blue or black pen.
- Always document time in military time.
- Record your full name and the names of other Farallon employees present. Initials of personnel can be used after the full names have been provided in the field notes.
- Don't leave line spaces between field note entries.
- Keep handwriting neat.
- Be concise.

ITEMS TO INCLUDE IN FIELD NOTES

At Start of Workday:

- Document when and where you started the field day and when you arrived at the site.
- Note any stops along the way to the site.

Upon Arrival at Site:

- Note the reason for the site visit/site work.
- Document the weather on page 1, and throughout the day if the weather changes.
- Document the time personnel arrive at the site and the name of the company/agency they are affiliated with.
- Document the time subcontractors arrive, the tasks they are conducting, and the time they leave the Site.
- Conduct the Health and Safety (H&S) meeting, ensure all participants sign the H&S form, and include the signed H&S form in the field notes.
- Calibrate equipment: document equipment model number/serial number, calibration method, and results. Be specific (e.g., "Calibrated Horiba for pH using 4.0 standard." "Calibrated PID using 100 ppm isobutylene span gas and ambient air as zero gas."). Note whether the instrument is Farallon's or a rental. If using a rental, include in the field notes the calibration sheet that should have come with the equipment. If using two sets of

equipment, note on the field forms which equipment was used for each location. For example, label "Horiba 1" and "Horiba 2" on the groundwater sampling sheets, and document the serial numbers of the instruments in the field notes. Make sure to document the calibration results for Farallon equipment in the Rite-in-the-Rain notebook kept in each field equipment case.

- Document when work starts at a specific task location (e.g., well or boring), and document what equipment Farallon or the subcontractors are using at that location.
- Measure out and record the sample locations (using a rolling wheel, or GPS if available), and mark utilities on a field map if applicable.
- If media samples will be collected, complete the appropriate documentation form, or record the information in the field notes. For example, record field sampling methods (e.g., grab, composite), the type of media (e.g., soil, groundwater, stormwater), the time the sample was collected, sample location and ID, analytical method(s), the laboratory conducting the analysis, the size of the sample container, the number of containers used, and the preservative included in the sample container. If a composite sample is collected, record how many composite points make up the sample, and document where the composite samples were collected.
- If multiple samples are collected using the same methods and the same type of sample containers, simply document that a sample was collected the same as previous samples.
- Document when work is complete at each location.
- If conducting groundwater monitoring, note the condition of monitoring well monuments (e.g., bolts missing, gasket needed).
- Throughout the workday, note any relevant information (e.g., QC-sampling discrepancies, unexpected conditions, abnormal sampling events).

At End of Workday:

- Decontaminate equipment and note the decontamination method (e.g., Alconox and towels).
- Review the field notes, and complete sketches of any relevant features and sample locations if necessary.
- Record whether wastes were generated. If so, record how much was generated, whether the waste was sampled, and where the waste is stored.
- Place an "Analysis Pending" label on drums of waste, and fill out the label completely.
- Complete a drum inventory sheet and note the drum/container sizes and how much waste was accumulated.
- Document when you left the site;

- Document when you returned to the office or when the field day ended.
- Note any additional work performed after returning to the office (e.g., finished field notes, downloaded field photos).

Make sure to include any of the following forms relevant for the type of field work conducted:

- Daily Field Notes
- Health and Safety Meeting form
- Water Level Summary form
- Low Flow Well Purging and Sampling Data form
- Boring and/or test pit logs
- Monitoring Well Construction Data form
- Soil Sample Data form
- SVE Monitoring form
- Any site-specific operation and maintenance or pilot test forms
- Elevation Survey Data form
- Utility Clearance Log
- Waste Inventory Tracking Sheet
- Copy of the laboratory Chain of Custody form for any samples collected
- Copies of subcontractor daily log sheets (e.g., utility locate, drilling)
- Copies of rental equipment calibration sheets
- Near Miss form (if applicable)
- Incident Report form (if applicable)

Assemble all field forms used each day, scan, save to the electronic project Field Notes folder, and give the hard copy of the forms to the Project Manager.

Refer to the Farallon Field Documentation Checklist and the *Doc Reqs by Field Task list.*

STANDARD OPERATING PROCEDURE GN-03
SAMPLE SHIPPING

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology to ensure consistent and good quality sample shipment. This SOP is a supplement to site-specific work plans.

RESPONSIBILITIES AND QUALIFICATIONS

All personnel performing these actions are required to be familiar with the procedures described herein. Personnel performing or overseeing procedures described herein also must be familiar with health and safety requirements in the project-specific Health and Safety Plan (HASP).

EQUIPMENT AND SUPPLIES

Supplies needed to ship samples:

- Coolers – appropriate number and size;
- Custody seals;
- Bubble wrap;
- 1-gallon Ziploc bags for ice and samples;
- Ice;
- Samples and COC;
- Shipping labels; and
- Heavy-duty shipping tape.

PROCEDURES

It is critical to prepare samples for shipment at the end of the day to minimize the amount of time the samples will have to spend on ice in transport. Evaluate number of samples and coolers needed to ship the samples collected. If samples are in glass containers, consider shipping additional coolers to allow more room for bubble wrapping and padding sample containers.

Remember to provide enough ice to meet preservation requirements; the general ice to cooler rule is 20 pounds of ice per cooler. Line the cooler with a clean trash bag prior to packing, double-bag all ice using 1-gallon Ziploc bags, and close the trash bag last by “goose necking” and sealing with duct tape to prevent leakage.

The following procedures (representing the minimum shipping and handling requirements) will be used for sample packaging:

- A sample label will be affixed to the corresponding sample container at the time of sample collection.
- Bubble-wrap bags or an equivalent will be used to protect sample containers.
- Sample containers will be placed into a cooler and checked against the Chain of Custody form to ensure that all samples are listed and are placed into the correct cooler.
- One copy of the Chain of Custody form will be detached and retained by the Farallon field personnel.
- Remaining paperwork will be sealed in a resealable plastic bag and taped to the inside of the cooler lid.
- One to three resealable bags will be filled with ice and/or a chemical equivalent and included in the cooler. Ice will be double-bagged in heavy-duty bags.
- The cooler will be sealed with a chain-of-custody seal and taped shut using strapping tape.
- The laboratory address will be affixed to the cooler.
- Extraneous stickers will be removed from the cooler.
- The cooler will be examined to ensure that Farallon’s return address is affixed.

Upon transfer of the samples to laboratory personnel or arrival of the samples at the laboratory facility, the laboratory will assume responsibility for custody of the samples.

Laboratory personnel will document the status of shipping and handling containers and will adhere to standard chain-of-custody procedures to track each sample through all of the stages of laboratory processing.

DOCUMENTATION

Retain a copy of the chain-of-custody to be scanned into the project files. List the project number and task number on the shipping label. Scan a copy of the receipt and send to the administrative staff.

STANDARD OPERATING PROCEDURE GW-03

GROUNDWATER LEVEL MEASUREMENT IN MONITORING WELLS

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for measuring and documenting the depth to groundwater in monitoring wells. The step-by-step guidelines provided in this SOP are to be followed by the field crew to ensure consistent and representative measurements of depth to groundwater in monitoring wells. When multiple wells are present at a site, all water-level measurements typically are taken as quickly as possible to aid in the creation of potentiometric surface maps that are representative of a “single” point in time.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly measure the depth to groundwater in monitoring wells:

- Monitoring well key, hand drill, socket set, Allen wrench, speed handle, padlock key, or other monitoring well-access equipment specific to the monitoring well monument cover plate.
- Electronic water-level meter (Solinst or equivalent) narrow enough to fit in the monitoring well, calibrated to 0.01 foot, with sufficient line to reach the bottom of the monitoring well.
- Oil-water interface probe, if light nonaqueous-phase liquid (LNAPL) is known or suspected to be present.
- Disposable bailer if LNAPL is known or suspected to be present, and the Project Manager requests that LNAPL be bailed from the well.
- Tape measure.
- Materials necessary to provide required documentation, including Groundwater Level Measurement Summary Forms and Field Report forms.
- Personal protective equipment as described in the site-specific Health and Safety Plan.
- Decontamination equipment as specified in Farallon SOP EQ-01, Equipment Decontamination Procedures.

DECONTAMINATION

Before arrival at the site, upon relocation at the site, and upon demobilization from the site, decontaminate equipment that will come into contact with groundwater, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

PROCEDURES

Follow the instructions below for measuring water levels at each monitoring well:

- Don appropriate personal protective equipment as described in the site-specific Health and Safety Plan.
- Check the operation of the water-level meter by turning on the indicator switch and pressing the test button.
- Remove soil or vegetation from the monitoring well site.
- Open the monitoring well-head enclosure, and use a bilge pump or cup to remove standing water inside the monitoring well monument before opening the monitoring well cap. Dispose of standing water to the ground surface.
- Open the monitoring well cap.
- Monitor air quality at the monitoring well-head if volatile contaminants are suspected to be present, or if it is unknown whether volatile contaminants are present.
- Repeat above procedure until all monitoring wells are open.
- Allow the water level to equilibrate with ambient atmospheric pressure for approximately 15 minutes before measuring.
- Before taking any measurements, carefully measure the length of the sonde to the nearest 0.01 foot. The additional 2 to 3 inches from the zero point of the sonde to the tip of the sonde **must be discounted** for **all** total depth measurements.
- Measure and record the depth to water using a water-level meter that has been decontaminated in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures. With the water-level meter turned on to a medium level of sensitivity, slowly lower the meter into the monitoring well casing until it reaches the groundwater table. The probe will beep when it reaches the interface of the groundwater table (when the electronic circuit is first completed). Stop lowering the probe, hold the graduated water-level cable to the notch or mark on the northern side of the top of the monitoring well casing, and note the length measurement. Repeat this process to collect a second water-level measurement. If the two readings differ by more than 0.01 foot, repeat the measurements until the readings stabilize. Repeat the process until three consecutive stabilized readings have been measured. Record the water-level measurement **only** in relation to the probe being lowered into the monitoring well, *not* as it is raised out of the monitoring well. If you cannot see the top of the monitoring well casing when the water level beeps, grasp the tape with your thumb and index finger exactly at the measuring point corresponding with the notch or mark at the top of the monitoring well casing. Slowly pull the cable out of the monitoring well and read the measurement. Repeat until readings stabilize.
- Remove the cable from the monitoring well, and record the stabilized depth-to-water measurement on the Groundwater Level Measurement Summary Form to the nearest 0.01 foot.

- Measure the total monitoring well depth. **NOTE:** If groundwater samples are to be collected, measure the total monitoring well depth **after** all groundwater samples have been collected, to avoid resuspension of settled solids in the monitoring well, impacting the samples. If the monitoring well does not have a dedicated pump, lower the water-level indicator probe to the bottom of the monitoring well to measure the total depth of the monitoring well. Gently bounce the probe on the monitoring well bottom, and pull the slack in the cord to read the total monitoring well depth. Repeat three times to ensure that the monitoring well depth measurement is reproducible, and is representative of the true depth. Note on the Groundwater Level Measurement Summary Form whether the bottom of the monitoring well is hard or soft.
- Remove the cable from the monitoring well, and record the monitoring well depth measurement on the Groundwater Level Measurement Summary Form to the nearest 0.01 foot.
- Decontaminate the water-level meter in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.
- If the presence of LNAPL is suspected or if site conditions are unknown, check for the presence of LNAPL by one of two methods:
    - Use of a bailer: Use a new 3-foot-long disposable bailer attached to a nylon rope. Slowly lower the bailer until the bottom of the bailer is approximately 2 feet below the water surface. Slowly retrieve the bailer, and measure the product thickness using a tape measure. Record the information on the Groundwater Level Measurement Summary Form. Dispose of the bailer and product or wastewater in accordance with Farallon SOP WM-01, Field Handling of Investigation-Derived Waste.
    - Use of an oil-water interface probe: Decontaminate the oil-water interface probe in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures. With the oil-water interface probe meter turned on to a medium level of sensitivity, slowly lower the probe into the monitoring well casing until it reaches the top of the LNAPL. The probe will have a steady beep when it reaches the interface of the LNAPL (when the electronic circuit is first completed). Stop lowering the probe, hold the graduated oil-water interface cable to the notch or mark on the northern side of the top of the monitoring well casing, and note the length measurement. Repeat this process to collect a second LNAPL measurement. If the two readings differ by more than 0.01 foot, repeat the measurements until the readings stabilize. Repeat the process until three consecutive stabilized readings have been measured. Record the depth to LNAPL measurement **only** in relation to the probe being lowered into the monitoring well, *not* as it is raised out of the monitoring well. If you cannot see the top of the monitoring well casing when the oil-water interface probe beeps, grasp the tape with your thumb and index finger exactly at the measuring point corresponding with the notch or mark at the top of the monitoring well casing. Slowly pull the cable out of the monitoring well and read the

measurement. Repeat until readings stabilize. Once the depth to LNAPL has been recorded, collect the water-level measurement as described above using the oil-water interface probe. Once the depth to LNAPL and the depth to the groundwater table have been determined, subtract the depth to LNAPL from the depth to the groundwater table to determine LNAPL thickness.

- Close the monitoring well as appropriate based on monitoring well-head construction. Record any concerns about monitoring well integrity on the Groundwater Level Measurement Summary Form and on the Field Report form.

DOCUMENTATION

Document monitoring well water-level measurements on the Groundwater Level Measurement Summary Form. Document any additional information on the Field Report form.

REFERENCE

U.S. Environmental Protection Agency. 1992. *RCRA Ground-Water Monitoring: Draft Technical Guidance.* Office of Solid Waste. November.

STANDARD OPERATING PROCEDURE GW-04
LOW-FLOW GROUNDWATER SAMPLING PROCEDURES

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for collecting and documenting groundwater samples from monitoring wells using U.S. Environmental Protection Agency (EPA) low-flow groundwater sampling procedures (EPA 1996, 2017) for chemical analysis to ensure consistent and representative sampling. The step-by-step guidelines provided in this SOP are to be followed by the field crew conducting groundwater sampling.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly purge and sample a monitoring well:

- Monitoring well key, hand drill, socket set, padlock key, or other monitoring well-access equipment.
- Electronic water-level meter long enough to reach the bottom of the monitoring well, calibrated to 0.01 foot. Alternatively, to measure for light nonaqueous-phase liquid thickness in addition to groundwater, use an oil-water interface probe.
- Monitoring well purging and sampling equipment:
    - Submersible pump (bladder or Grundfos): the pump, control box, and power source (typically a portable generator or a 12-volt battery); or
    - Peristaltic pump: the pump with pump head, silicone tubing, tubing connectors (as needed), and power source (typically a 12-volt battery).
- Sample tubing of project- and site-specific type and length.
- Bailer, if a pump is not used, or if light nonaqueous-phase liquid requires removal.
- Sufficient number of 55-gallon drums, including lids, gaskets, and fasteners, to contain all purge water, unless other water-handling arrangements have been made.
- Flow-through water-quality meter(s) to measure temperature, pH, specific conductivity, dissolved oxygen, oxidation-reduction potential (ORP), and turbidity.
- Air-space monitoring equipment if required (photoionization detector or multi-gas meter).
- Decontamination equipment and supplies (e.g., buckets, scrub brushes, deionized or distilled water, potable water, Liquinox detergent).
- Materials necessary to provide required documentation, (e.g., sample labels, Field Report forms, Low-Flow Well Purging and Sampling Data form, Chain of Custody form, Waste Inventory Tracking Sheet).

- Sample containers with the chemical preservatives appropriate for the samples, as described in project-specific plans, or as required by the analytical laboratory at a minimum.
- Personal protective equipment as described in the site-specific Health and Safety Plan (HASP).
- Sampling-support equipment (e.g., sample coolers, ice, bubble wrap, clear tape, duct tape, resealable plastic bags, garbage bags, paper towels, distilled water, nitrile gloves, shipping supplies).
- U.S. Department of Transportation-approved drum(s) for purge water, unless other water-handling arrangements have been made. Separate drums are needed for liquid and solid wastes (Refer to Farallon SOP WM-01, Field Handling of Investigation-Derived Waste). Liquid wastes should not be added to drums containing solid wastes.

DECONTAMINATION

Before arrival at the site, upon relocation at the site, and upon demobilization from the site, decontaminate reusable equipment that will come into contact with the monitoring well(s) and/or be used to acquire samples, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

PROCEDURES FOR LOW-FLOW GROUNDWATER SAMPLING

Low-flow groundwater sampling procedures have been developed for monitoring wells with a dedicated pump (dedicated monitoring wells) and for monitoring wells without a dedicated pump (non-dedicated monitoring wells). Setup, purging, sample collection, and post-sampling procedures for dedicated and non-dedicated monitoring wells are presented below.

Setup

Setup procedures differ slightly for dedicated versus non-dedicated monitoring wells. Follow the instructions below for the monitoring wells as indicated:

- Calibrate the water-quality meter for the field parameters specified in the project-specific plans. At a minimum, collect temperature, pH, and specific conductivity during purging and prior to sampling. Record on the Field Report form the equipment calibration and maintenance performed. Decontaminate the water-quality meter between monitoring wells by rinsing with distilled or deionized water. Manage the rinsate water used in collecting these measurements in the same manner as for purge water, as defined in project-specific plans, and in accordance with Farallon SOP WM-01, Field Handling of Investigation-Derived Waste.
- Don appropriate personal protective equipment as described in the site-specific HASP, including nitrile gloves for activities that might involve contact with groundwater or equipment. Change gloves between each monitoring well at a minimum, or when

contaminants could be introduced into a monitoring well or onto decontaminated equipment.

- Brush away soil and/or vegetation, and pump standing water away from the monitoring well opening. If necessary, place a plastic drop cloth around the monitoring well-head to prevent sampling equipment from contacting the ground surface.
- Inspect the condition of the monitoring well (e.g., locked monitoring well cap, tightness of monitoring well cap, well-marked measuring point on casing, disturbance of surface casing, straightness of monitoring well casing, condition of concrete pad). Indicate the monitoring well condition on the Low-Flow Well Purging and Sampling Data form.
- Open the monitoring well cap. If the site-specific HASP identifies organic compounds as potential contaminants of concern, screen the monitoring well headspace and the breathing zone headspace (if specified in the HASP) for organic vapors using the appropriate field monitoring instrument (e.g., photoionization detector, multi-gas meter).
- Measure and record the depth to water using a decontaminated water-level meter in accordance with Farallon SOP GW-03, Groundwater Level Measurements in Monitoring Wells.
- If light nonaqueous-phase liquid may be present (see site-specific plans), obtain a sample from the monitoring well using a bailer (if a dedicated pump is not in use), as specified in Farallon SOP GW-03, Groundwater Level Measurements in Monitoring Wells. Alternatively, measure free-floating product thickness using an oil-water interface probe.
- Calculate the monitoring well casing volume as follows:

  Monitoring well casing volume in gallons = $(\pi * r^2) * h$(7.48 gallons/cubic foot)

  Where:

  r = radius of the inside of the monitoring well casing in feet

  h = length of the water column in the monitoring well casing (i.e., the depth to the bottom of the monitoring well minus the depth to water, both measured from the mark at the top of the monitoring well casing), in feet

- **For monitoring wells with dedicated pumps and tubing**: Set up a flow-through cell in preparation for purging. Connect dedicated tubing from the monitoring well to the flow-through cell. Set tubing and/or pump to the correct water depth in accordance with the constituents being sampled for, as described in project-specific plans. **DO NOT IMMERSE water-quality probes or meters in purge water containing nonaqueous-phase liquids, which could damage the probes.** Turn the pump controller to its lowest setting, set the memory in the flow-through cell to record readings every 3 minutes, and turn on the pump. Begin purging slowly (i.e., less than 500 milliliters per minute [ml/min]) to prevent drawing down the water table.

- **For monitoring wells with non-dedicated pumps**: Connect dedicated silicon tubing to the peristaltic pump. Place the tubing intake at the midpoint of the screen, or at the depth pre-determined in the project-specific plans. If using a bladder pump, insert the bladder pump and attach the dedicated polyethylene tubing so the pump intake is at the approximate midpoint of the screened interval, or set the pump intake to the depth pre-determined in the project-specific plans.

Purging Procedures

The purging instructions below are to be followed for dedicated and non-dedicated monitoring wells:

- Begin purging, and initiate water-quality testing for temperature, pH, specific conductivity, dissolved oxygen, ORP, and turbidity. Purge monitoring wells using a peristaltic or bladder pump, and dedicated polyethylene and silicon tubing. Record water-quality parameters every 3 minutes.
- Record water levels every 3 minutes, as possible. It is imperative that the water level not drop by more than 0.33 foot during the low-flow purging process. If the water level drops more than 0.33 foot during purging, reduce the flow rate on the pump. Recommended purge rates generally are less than 500 ml/min. Actual purge rates will vary based on aquifer material and monitoring well construction. If the water level continues to drop by more than 0.33 foot during the low-flow purging at a rate less than 100 ml/min, notify and consult with the Project Manager on how to proceed.
- Record flow rates every 3 minutes. Ensure that the flow rate does not exceed 500 ml/min during the low-flow purging process.

Purging Requirements

Continue purging at a constant rate until the water-quality parameters have stabilized for three successive measurements according to the stability criteria provided in the table below. Before samples can be collected from each monitoring well, the groundwater must stabilize according to following criteria:

- Drawdown is no greater than 0.33 foot for low-flow sampling, and
- The water-quality parameters should stabilize according to the criteria specified below:

Water-Quality Parameter	Stability Criterion
Turbidity (if required)	10% for values greater than 5 NTU or three consecutive values < 5 NTU
Dissolved oxygen	10% for values greater than 0.5 mg/l, or three consecutive values <0.5 mg/l
Specific conductivity	3%
Oxidation-reduction potential	+/- 10 millivolts
pH	+/- 0.1 unit
Temperature	3%

Notes:

mg/l = milligrams per liter
NTU = nephelometric turbidity unit

Although under some circumstances, a monitoring well may not stabilize according to the above criteria, the monitoring well can still be sampled if the monitoring well does not meet stability criteria due to the instrument accuracy, or the water level drops below the minimum value using low-flow sampling procedures. For example, a fluctuation in ORP greater than 10 millivolts does not meet the stability criterion. However, because the accuracy range of the ORP instrument is ±20 millivolt, the stability criterion would be considered satisfied and within the range of instrument accuracy. Consult the manual for the instrument to determine the accuracy range.

Also, if the water level drops below the minimum value using low-flow sampling procedures (i.e., the pump intake, or the top of the screen if the aquifer is confined) during purging and one monitoring well volume of groundwater has been removed from the monitoring well, or the monitoring well runs dry during the purging procedure, sample the monitoring well as soon as the water level has recovered sufficiently to allow collection of the volume of groundwater necessary for all samples. Use the following equation to determine the minimum volume of groundwater to remove before sampling:

Minimum purge volume = 2*[500 milliliters + M*(length of tubing in feet)]

Where: M = volume (in milliliters) contained in a 1-foot length of tubing

The value of M is provided below for the inner diameters of tubing listed:

Inner Diameter (inches)	M (milliliters)
0.125	2.4
0.25	9.7
0.5	39

Record on the Field Report form and the Low-Flow Well Purging and Sampling Data form if any monitoring well did not meet the drawdown and stability criteria and explain the rationale for sampling the monitoring well at the time it was sampled. If stability criteria have not been achieved following completion of all entries in the Low-Flow Well Purging and Sampling Data form, notify and consult with the Project Manager whether to continue purging until stability criteria have been achieved or begin sample collection.

Sample Collection

During low-flow sampling, do not stop pumping once the purging requirements have been met. Turn down the flow rate on the pump so the water flow is minimal, but maintain sufficient pressure in the system to prevent water from the tubing or flow-through cell from flowing back into the monitoring well. Disconnect the pump discharge hose from the flow-through cell, or cut the tubing just before the connection to the flow-through cell. It is imperative not to lower the water table or disturb the water column. Fill pre-cleaned laboratory-supplied sample containers directly from the pump discharge tube into the proper sample container, and fill to capacity. Place a bucket beneath the sampling tube to catch any unsampled water between filling the sample jars. When collecting groundwater samples for multiple analyses, collect the samples in the order listed below per the EPA (1992) groundwater sampling technical guidance:

- Volatile organic compounds (VOCs);
- Dissolved gases and total organic carbon;
- Semivolatile organic compounds;
- Metals and cyanide;
- Major water quality cations and anions;
- Radionuclides; and
- Dissolved (filtered) inorganics (if required).

When collecting samples for VOCs, adjust the flow rate as low as possible without introducing air bubbles into the system. When filling the VOC containers, hold the cap in hand to minimize contamination, and direct the flow from the pump discharge tubing down the side of the sample container to minimize aeration. Fill all VOC sample containers to the top, ensuring a positive meniscus when the cap is screwed down on the container. Tap the filled VOC container, and invert several times to ensure no air bubbles are present in the sample container. If an air bubble is present, the VOC sample must be recollected using a fresh VOC sample container. If sampling for other analytes, the flow rate may be increased.

If dissolved inorganics are required, attach a new disposable 0.45-micrometer filter cartridge to the discharge line. Collect filtered samples last. Pre-rinse the disposable filter cartridges by running a minimum of 0.25 gallon of groundwater through them (collecting the groundwater into a waste bucket) prior to collecting the samples directly into the sample container. Alternate field filtration methods may be specified in the project-specific plans. Remove the pump and/or tubing from the monitoring well.

Post-Sampling

- Record the depth to water of well to determine whether the water level changed from the original reading.
- Close and lock the monitoring well or tap and record any monitoring well integrity concerns on the Field Report form and the Low-Flow Well Purging and Sampling Data form.
- Transfer purge, wash, and rinse water into a U.S. Department of Transportation-approved drum(s) and label. Separate drums are needed for liquid and solid wastes, in accordance with SOP WM-01, Field Handling of Investigation-Derived Waste. Do not add liquid wastes to drums containing solid wastes.

PROCEDURES FOR RECONNAISSANCE GROUNDWATER SAMPLING

Collect reconnaissance groundwater samples from borings using direct-push or hollow-stem auger drilling methods and 0.75- or 2-inch-inside-diameter temporary monitoring well casing and 0.010-inch slotted screen. In some cases, alternate well casing diameters or screen slot sizes may be appropriate based on the drilling equipment or project-specific requirements. Follow the instructions below for reconnaissance groundwater sample collection:

- Withdraw the drill casing when the desired sampling depth has been reached, so the temporary monitoring well screen is exposed to water-bearing material.
- Insert disposable polyethylene tubing to the approximate midpoint of the temporary monitoring well screen. Attach the appropriate length of pre-cleaned disposable silicon tubing from the polyethylene tubing to connect with the peristaltic or bladder pump.
- Set up the peristaltic or bladder pump in preparation for purging. Turn the pump to its lowest setting and turn on the pump. Begin purging slowly to prevent drawing down the water table.
- Purge each temporary monitoring well point using a peristaltic or bladder pump until visual turbidity is as low as possible, or until the temporary monitoring well is purged dry of water.
- Purge a minimum of 1 to 2 liters before sample collection, if possible. If the temporary monitoring well is completely dewatered during purging, collect samples when sufficient recharge has occurred to allow filling of the sample containers.
- Slow the pumping rate to less than 500 ml/min to reduce the potential for volatilization of chemicals during sample collection.
- Collect the sample as described above.
- If insufficient groundwater is available to collect a sample using a peristaltic or bladder pump (i.e., the boring pumps dry or cannot maintain a sufficient flow of less than 100 ml/min) or if the depth to groundwater exceeds the maximum practicable limit for sampling using a peristaltic or bladder pump, use a disposable polyethylene bailer lowered

into the monitoring well screen to collect a groundwater sample from the screened interval, if possible.

DOCUMENTATION

Document the monitoring well purging and sampling activities on the Low-Flow Well Purging and Sampling Data form and on the Field Report form. Track samples on a Chain of Custody form. Track waste generated during groundwater sampling on a Waste Inventory Tracking Sheet.

REFERENCES

U.S. Environmental Protection Agency (EPA). 1992. *RCRA Ground-Water Monitoring: Draft Technical Guidance*. Office of Solid Waste. November.

———. 1996. *Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures*. EPA/540/S-95/504. April.

———. 2017. *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells.* EQASOP-GW4. September.

STANDARD OPERATING PROCEDURE GW-06

MEASUREMENT OF VISCOUS LIGHT NONAQUEOUS-PHASE LIQUID LAYER THICKNESS IN MONITORING WELLS

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for measuring and documenting the thickness of an accumulated layer of viscous light nonaqueous-phase liquid (LNAPL) in a groundwater monitoring well. The step-by-step guidelines provided in this SOP are to be followed by the field crew to ensure consistent and representative measurement of viscous LNAPL layer thickness.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly measure viscous LNAPL layer thickness in a monitoring well:

- Monitoring well key, hand drill, socket set, Allen wrench, speed handle, padlock key, or other monitoring well–access equipment specific to the monitoring well monument cover plate.
- Electronic oil/water interface meter (i.e., Solinst or equivalent) calibrated to ±0.01 foot, with sufficient line to reach the top of the LNAPL layer.
- Electronic water-level meter (i.e., Solinst or equivalent) calibrated to ±0.01 foot, with sufficient line to reach the bottom of the monitoring well.
- Tape measure.
- Cooler containing dry ice.
- Either a small clean plastic cup the approximate size of a single-serving coffee creamer, or a clean bottle large enough to fully contain the water-level meter probe, depending on which method is chosen (see below).
- Deionized water.
- Materials necessary to provide required documentation, including Groundwater Level Measurement Summary Forms and Field Report forms.
- Personal protective equipment as described in the site-specific Health and Safety Plan.
- Decontamination equipment as specified in Farallon SOP EQ-01, Equipment Decontamination Procedures.

DECONTAMINATION

Before arrival at the site, upon relocation at the site, and upon demobilization from the site, decontaminate equipment that will come into contact with groundwater and/or LNAPL, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

PROCEDURES

Follow the instructions below for measuring viscous LNAPL layer thickness at each monitoring well:

- Don appropriate personal protective equipment as described in the site-specific Health and Safety Plan.
- Remove soil and/or vegetation from the monitoring well site, as needed.
- Open the monitoring well-head enclosure, and use a bilge pump or cup to remove standing water inside the monitoring well monument before opening the monitoring well cap. Dispose of standing water to the ground surface.
- Open the monitoring well cap.
- Monitor air quality at the monitoring well-head if volatile contaminants are suspected to be present, or if it is unknown whether volatile contaminants are present.
- Allow liquid levels in the well to equilibrate with ambient atmospheric pressure for approximately 15 minutes before measuring.
- Measure and record the depth to the top surface of the LNAPL layer using an oil/water interface meter that has been decontaminated in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures:
    - Check the operation of the oil/water interface meter by turning on the indicator switch and pressing the test button.
    - With the oil/water interface meter turned on to a medium level of sensitivity, slowly lower the probe into the monitoring well casing until it reaches the top of the LNAPL layer. The audio indicator on the meter will sound (steady tone) when it contacts the LNAPL. Stop lowering the probe, hold the graduated oil/water interface meter tape to the notch or mark on top of the monitoring well casing (or the northern side of the top of the casing if there is no notch or mark), and note the length measurement. Repeat this procedure to collect a second LNAPL measurement. If the two readings differ by more than 0.01 foot, repeat the measurements until the readings stabilize to within 0.01 foot. Repeat the process until three consecutive stabilized readings have been measured. Record the depth to LNAPL measurement **only** in relation to the probe being lowered into the monitoring well, *not* as it is raised out of the monitoring well. If you cannot see the top of the monitoring well casing when the audio indicator sounds, grasp the tape with your thumb and index finger exactly at the measuring point on top of the casing. Slowly pull the tape out of the monitoring well and read the measurement. Repeat until readings stabilize.
    - Remove the tape and probe from the monitoring well and record the measured depth to LNAPL on the Groundwater Level Measurement Summary Form to the nearest 0.01 foot.

  - Decontaminate the oil/water interface meter in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.
- Measure and record the depth to the water/LNAPL interface (i.e., the bottom surface of the LNAPL layer) using a water-level meter that has been decontaminated in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures:
  - Prepare the water-level meter probe using one of the following methods:

    Method 1

    - Fill the clean plastic cup with deionized water.
    - Submerge the tip of the water-level meter probe in the deionized water and place the cup and probe upright on the dry ice for 3 to 5 minutes to freeze the water. *To prevent potential brittle-failure damage to the plastic water-level meter tape, make sure the tape is not in contact with the dry ice.*

    Method 2

    - Fill the clean bottle with deionized water.
    - Place the water-level meter probe on the dry ice for 3 to 5 minutes to freeze the probe. *To prevent potential brittle-failure damage to the plastic water-level meter tape, make sure the tape is not in contact with the dry ice.*
    - Remove the probe from the dry ice and dip it into the bottle of deionized water so that a layer of ice forms around the probe.
    - Repeat the dipping and freezing process until a layer of ice approximately 0.25 inch thick forms around the probe.
  - Keep the iced-coated probe in the cooler with the dry ice until you are ready to measure the depth to the water/LNAPL interface. Make sure the tape is not in contact with the dry ice.
  - Remove the plastic cup as necessary (if Method 1 above was used).
  - Lower the ice-coated probe through the LNAPL layer and into the underlying groundwater.
  - Wait for the probe to thaw. The audio indicator on the meter will sound when the probe has thawed.
  - With the water-level meter turned on to a medium level of sensitivity, slowly raise the probe until the audio indicator stops sounding, indicating the depth of the water/LNAPL interface. Stop raising the probe, hold the graduated water-level meter tape to the notch or mark on top of the monitoring well casing (or the northern side of the top of the casing if there is no notch or mark), and note the length measurement. If you cannot see the top of the monitoring well casing when the audio indicator stops sounding, grasp the tape with your thumb and index finger

exactly at the measuring point on top of the casing. Slowly pull the tape out of the monitoring well and read the measurement.

  - Remove the tape and probe from the monitoring well and record the measured depth to the water/LNAPL interface on the Groundwater Level Measurement Summary Form to the nearest 0.01 foot.
  - Decontaminate the water-level meter in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

- Calculate the viscous LNAPL layer thickness by subtracting the depth to LNAPL from the depth to the water/LNAPL interface.
- Close the monitoring well as appropriate based on monitoring well-head construction. Record any concerns about monitoring well integrity on the Groundwater Level Measurement Summary Form and on the Field Report form.

DOCUMENTATION

Document measured depth to LNAPL and depth to the water/LNAPL interface on the Groundwater Level Measurement Summary Form. Document any additional information on the Field Report form.

REFERENCE

U.S. Environmental Protection Agency. 1992. *RCRA Ground-Water Monitoring: Draft Technical Guidance.* Office of Solid Waste. November.

STANDARD OPERATING PROCEDURE WM-01

FIELD HANDLING OF INVESTIGATION-DERIVED WASTE

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for containerizing, labeling, and tracking investigation-derived waste (IDW), and for exchanging information with the Project Manager. IDW may include soil cuttings, purge water, development water, and/or decontamination water.

This SOP has been developed in compliance with Washington State Dangerous Waste Regulations (Chapter 173-303 of the Washington Administrative Code), Oregon Hazardous Waste Management Rules (Division 100 of Chapter 340 of the Oregon Administrative Record), Environmental Health Standards for the Management of Hazardous Waste (Division 4.5 of Title 22 of the California Code of Regulations), and the U.S. Environmental Protection Agency Resource Conservation and Recovery Act (Parts 239 through 282 of Title 40 of the Code of Federal Regulations).

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly containerize, label, and track IDW:

- U.S. Department of Transportation-approved drum(s) constructed of a material that does not react with the contaminants of concern for the project. Farallon typically uses lined open-top steel drums. Use a polyethylene drum for a material suspected to be corrosive.
- Labels appropriate to the characteristics of the IDW as indicated by the Project Manager:
    - Non-Hazardous Waste Labels: For IDW known to be nonhazardous based on previous data and waste profiles.
    - Hazardous Waste or Washington State Dangerous Waste Labels: For IDW known to be hazardous/dangerous based on previous data and waste profiles.
    - On Hold Pending Analysis Labels: For waste not previously characterized, pending receipt of analytical results. On Hold Pending Analysis labels are temporary, and should be replaced with the applicable waste label once the waste has been characterized.
    - Major risk labels associated with the waste characteristics.
- Waste Inventory Tracking Sheet.
- Grease marking pencil or paint pen.
- Indelible ink pen.
- Crescent wrench, speed wrench, socket wrench, or other hand tool to seal the drum(s).

- Sampling supplies, if needed, including:
  - Stainless steel or plastic bowls and spoons for homogenizing soil and/or solids samples, depending on the analysis to be performed;
  - Glass or stainless steel container for homogenizing liquid samples, depending on the analysis to be performed; and
  - Stainless steel hand-auger or a glass tube, depending on the medium being sampled (i.e., soil/solids or liquid).

PROCEDURES

Follow the instructions below to inspect, label, and inventory IDW drums, and to containerize IDW:

- Inspect new drums brought to the site to ensure that they do not have dents or corrosion, and are in good condition. Lined or coated drums are preferred.
- Inspect drums remaining at the site from previous project work. Notify the Project Manager if a drum is leaking, damaged, or improperly labeled.
- Place soil and solids into separate drums from those containing liquids such as purge water, development water, and decontamination water. Do not add liquid IDW to drums containing soil or solids. Do not fill drums containing liquid IDW above 85 percent capacity, particularly in areas known to reach freezing temperatures.
- Discuss with the Project Manager whether chlorinated solvents or other contaminants of concern detected in areas of the site would cause IDW from that area to be characterized as hazardous/dangerous waste. Hazardous/dangerous waste should be drummed separate from nonhazardous/dangerous waste, where possible, to minimize the amount of hazardous/dangerous waste generated.
- Use a grease pencil or paint pen to clearly mark the lid and the label of each drum with a unique identifier such as a number or a letter. Verify that no two drums have the same identifier marked on the lid or label, including drums remaining from previous project work.
- Inventory each Farallon-generated drum and its contents on a Waste Inventory Tracking Sheet.
- Track any waste added to an existing drum on a Waste Inventory Tracking Sheet.
- Label each drum with a completed Non-Hazardous Waste, Hazardous Waste/Washington State Dangerous Waste, On Hold Pending Analysis, or other appropriate waste label. List the client’s name as the Shipper or Generator, and the accumulation start date as the date when waste was first placed into the drum. If waste was added to an existing drum, add that date to the accumulation dates on the drum label. If the waste in the drum has been designated as hazardous/dangerous, add a major risk label(s) pertaining to the waste characteristics associated with that designation (e.g. flammable, reactive, corrosive,

toxic). Consult the Project Manager with questions about appropriate major risk labels. All labels should be placed with the top of the label toward the top of the drum. Do not place a drum label sideways or upside down.

Use care when drumming, labeling, and tracking IDW. Mistakes in the disposal of waste can result in serious legal and financial repercussions for Farallon and the client.

DRUM SAMPLING

Sampling and analysis of wastes for hazardous/dangerous waste characterization purposes is to be conducted in accordance with U.S. Environmental Protection Agency Publication No. SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Samples collected in California for hazardous waste characterization are to adhere to the requirements specified in California Code of Regulations Sections 66261.21 to 66261.24 of Title 22, Characteristics of Hazardous Waste. Discuss with the Project Manager the specific analyses to be performed prior to sample collection. The instructions below are to be followed for drum sampling, using composite sampling techniques to sample soil, solids, and liquid wastes:

- Collect soil/solids samples from various locations and depths in the drum using a hand-auger or other decontaminated apparatus. Place all samples into a single decontaminated stainless steel bowl using decontaminated stainless steel tools, or into a plastic bowl using plastic spoons, depending on the analyses to be performed. Homogenize the samples in the bowl.
- Place samples of the homogenized soil/solids from the bowl into sample jars for analysis.
- Collect liquid samples from the drum using a glass sampling tube. Insert the tube to the base of the drum to fill the entire tube with liquid. Place the liquid into sample jars for analysis.

DRUM STORAGE

Follow the instructions below for drum storage:

- Label and store the drums in an area approved by the client.
- Store hazardous/dangerous waste drums in a secured area.

DOCUMENTATION

Document IDW drums on the Waste Inventory Tracking Sheet as described above. Provide the original Waste Inventory Tracking Sheet and the original field notes to the Project Manager.

REFERENCE

U.S. Environmental Protection Agency. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Publication No. 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).