

Remedial Investigation Work Plan

Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Ecology Cleanup Site ID: 16582

Farallon PN: 821-010

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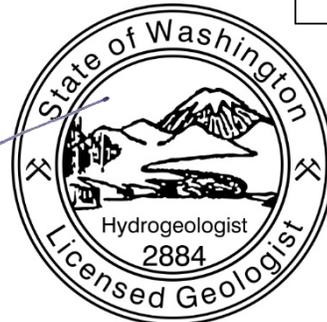


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TABLE OF CONTENTS

FIGURES	iii
TABLES	iv
APPENDICES.....	v
ACRONYMS AND ABBREVIATIONS.....	vi
EXECUTIVE SUMMARY	vii
1.0 INTRODUCTION.....	1-1
1.1 PURPOSE AND OBJECTIVE.....	1-2
1.2 KEY PROJECT PERSONNEL.....	1-2
1.3 REGULATORY INTERACTIONS.....	1-2
1.4 ABBREVIATED CLASS B AFFF BACKGROUND.....	1-4
1.5 WORK PLAN ORGANIZATION	1-5
2.0 SITE DESCRIPTION AND BACKGROUND.....	2-1
2.1 LOWER ISSAQUAH VALLEY REGIONAL SETTING	2-1
2.2 SITE DESCRIPTION	2-1
2.3 LAND USE	2-2
2.3.1 Historical Land Uses	2-2
2.3.2 Current Land Use	2-3
2.3.3 Adjacent and Surrounding Land Use	2-3
2.4 GEOLOGY AND HYDROGEOLOGY	2-3
2.4.1 Geology	2-3
2.4.2 Hydrogeology	2-4
2.4.3 Municipal Water Supply.....	2-5
3.0 PREVIOUS INVESTIGATIONS.....	3-1
3.1 2015 – 2016 MUNICIPAL WATER SUPPLY SAMPLING	3-1
3.2 2016 HYDROGEOLOGICAL CHARACTERIZATION AND SOIL SAMPLING	3-1
3.3 PFAS INVESTIGATIONS AND MONITORING 2018 THROUGH 2023.....	3-3
4.0 CONCEPTUAL SITE MODEL	4-1
4.1 PREMISE OF RELEASES.....	4-1
4.2 CONTAMINANTS OF POTENTIAL CONCERN	4-1
4.3 MEDIA OF CONCERN.....	4-2
4.3.1 Soil	4-2
4.3.2 Groundwater.....	4-2
4.3.3 Surface Water	4-2
4.3.4 Sediment	4-3
4.4 SCREENING LEVELS.....	4-4
4.4.1 Soil Screening Levels.....	4-4
4.4.2 Groundwater Screening Levels	4-4



4.4.3	Surface Water Screening Levels	4-5
4.4.4	Sediment Screening Levels	4-5
4.5	NATURE AND EXTENT OF CONTAMINATION	4-5
4.5.1	Confirmed and Suspected Source Areas	4-5
4.5.2	Extent of Contamination in Soil	4-6
4.5.3	Extent of Contamination in Groundwater	4-6
4.6	FATE AND TRANSPORT	4-7
4.6.1	Soil to Groundwater	4-8
4.6.2	Groundwater to Surface Water and Sediment	4-8
4.7	POTENTIAL RECEPTORS AND EXPOSURE PATHWAYS	4-8
4.7.1	Soil – Direct Contact, Soil to Groundwater	4-8
4.7.2	Groundwater Ingestion	4-8
4.7.3	Groundwater to Surface Water and Sediment	4-9
4.7.4	Vapor Inhalation	4-9
5.0	DATA GAPS	5-1
5.1	SUSPECTED SOURCE AREAS	5-1
5.2	CONFIRMED SOURCE AREAS - SOIL	5-1
5.2.1	Memorial Field Source Area	5-1
5.2.2	Rainier Trail Source Area	5-1
5.3	SITE GROUNDWATER IMPACTS	5-2
6.0	SCOPE OF WORK	6-1
6.1	OBJECTIVES	6-1
6.2	INVESTIGATION ACTIVITIES	6-1
6.2.1	Environmental Information Management System	6-1
6.2.2	Memorial Field Source Area - Soil	6-1
6.2.3	Rainier Trail Source Area - Soil	6-2
6.2.4	Site Groundwater	6-3
6.3	SAMPLING AND ANALYSIS PLAN	6-3
6.4	QUALITY ASSURANCE PROJECT PLAN	6-3
6.5	HEALTH AND SAFETY PLAN	6-3
6.6	INVESTIGATION PERMITTING REQUIREMENTS	6-4
6.7	INADVERTENT DISCOVERIES	6-4
6.8	CLIMATE CHANGE CONSIDERATIONS	6-4
6.9	MANAGEMENT OF INVESTIGATION-DERIVED WASTE	6-4
7.0	SCHEDULE AND REPORTING	7-1
7.1	EIM DATA SUBMITTALS	7-1
7.2	INVESTIGATION SCHEDULE AND KEY MILESTONES	7-1
7.3	REMEDIAL INVESTIGATION REPORT	7-1
8.0	REFERENCES	8-1
9.0	LIMITATIONS	9-1
9.1	GENERAL LIMITATIONS	9-1
9.2	LIMITATION ON RELIANCE BY THIRD PARTIES	9-1



FIGURES

- Figure 1 *Lower Issaquah Valley Vicinity Map*
- Figure 2 *MFRT Site Plan*
- Figure 3 *Cross Section A-A'*
- Figure 4 *Cross Section B-B'*
- Figure 5 *MFRT Site Groundwater Elevations – Shallow Zone*
- Figure 6 *MFRT Site Groundwater Elevations – Intermediate and Deep Zone*
- Figure 7 *MFRT Site Soil PFAS Concentrations*
- Figure 8 *MFRT Site Soil Total PFAS Concentrations 0-5 feet bgs*
- Figure 9 *MFRT Site Soil Total PFAS Concentrations >15 feet bgs*
- Figure 10 *MFRT Site Groundwater PFAS Concentrations*
- Figure 11 *Conceptual Site Model*
- Figure 12 *Proposed Boring and Monitoring Well Locations*



TABLES

Table 1	<i>Soil Screening Levels</i>
Table 2	<i>Groundwater Screening Levels</i>
Table 3	<i>Monitoring Well Construction Details</i>
Table 4	<i>Summary of Groundwater Elevation Data</i>
Table 5	<i>Soil Analytical Results for PFAS</i>
Table 6	<i>Groundwater Analytical Results for PFAS</i>
Table 7	<i>Summary of Data Gaps and Scope of Work</i>



APPENDICES

- Appendix A Agreed Order No. DE23251
- Appendix B Sampling and Analysis Plan
- Appendix C Quality Assurance Project Plan
- Appendix D Health and Safety Plan
- Appendix E Inadvertent Discovery Plan
- Appendix F Preliminary Project Schedule



ACRONYMS AND ABBREVIATIONS

AFFF	aqueous film-forming foam
AFFF Training Areas	collectively, the Memorial Field AFFF Training Area and Rainier Trail AFFF Training Area
AO	Agreed Order No. DE 23521
bgs	below ground surface
COPCs	constituents of potential concern
CSM	conceptual site model
Draft RI Report	Draft Remedial Investigation Report
EAGL	Ecology's Administration of Grants and Loans
Ecology	Washington State Department of Ecology
EFR	Eastside Fire and Rescue
EFR HQ IVES Site	Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary Site, CSID No. 16581, FSID No. 87761647
EFR HQ Source Area	Eastside Fire and Rescue Headquarters Source Area at 175 Newport Way Northwest in Issaquah, Washington
EPA	U.S. Environmental Protection Agency
Farallon	Farallon Consulting, L.L.C.
FTOHs	fluorotelomer alcohols
6:2 FTS	6:2 fluorotelomer sulfonic acid
GenX	hexafluoropropylene oxide dimer acid
HASP	Health and Safety Plan
IAA	Interagency Agreement
IDP	Inadvertent Discovery Plan
IDW	Investigation-derived waste
MCLs	Maximum Contaminant Levels
Memorial Field Source Area	Memorial Field Source Area at 105 2 nd Avenue Northeast in Issaquah, Washington



MFRT Site	Memorial Field and Rainier Trail Site
MTCA	Model Toxics Control Act Cleanup Regulation
NAVD88	North American Vertical Datum of 1988
PFAS	per- and poly-fluorinated alkyl substances
PFCs	perfluorinated compounds
PFHxA	perfluoro-hexanoic acid
PFHxS	perfluorohexane sulfonic acid
PFOA	perfluoro-octanoic acid
PFOS	perfluorooctane sulfonate
PFDA	perfluoro-decanoic acid
PFNA	perfluoro-nonanoic acid
PLP	potentially liable person
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
Rainier Trail Source Area	Rainier Trail Source Area identified as King County parcel No. 3424069043 with no formal address in Issaquah, Washington
RI/FS	Remedial Investigation and Feasibility Study
RIWP	Remedial Investigation Work Plan
SAP	Sampling and Analysis Plan
Site	Memorial Field and Rainier Trail Site, CSID No. 16582, FSID No. 57044
Source Areas	collectively, the Memorial Field Source Area and Rainier Trail Source Area
the City	City of Issaquah
WAC	Washington Administrative Code



EXECUTIVE SUMMARY

Farallon Consulting, L.L.C. (Farallon) has prepared this Remedial Investigation Work Plan (RIWP) on behalf of the City of Issaquah (the City) for the Memorial Field and Rainier Trail Site (the Site). The City was identified as the potentially liable person for the Site.

This RIWP documents the work elements required to sufficiently characterize the nature and extent of contamination at the Site in accordance with the requirements of Agreed Order No. DE 23521 (AO) between the Washington State Department of Ecology (Ecology) and the City.

As described in the AO, local firefighting entities historically conducted firefighting training exercises at the Site, which included lawful deployment of aqueous film-forming foam containing perfluorooctane sulfonate (PFOS) and additional per- and poly-fluorinated alkyl substances (PFAS). The historical training activities are considered releases to the environment. The confirmed releases have impacted vadose zone soil at two source areas, the Memorial Field Source Area at 105 2nd Avenue Northeast and the Rainier Trail Source Area at Parcel 3424069043 in Issaquah, Washington (collectively referred to as the Source Areas). The confirmed releases have impacted shallow groundwater at the Source Areas. A completed exposure pathway for groundwater at the Site has not been confirmed; however, the City and Darigold both withdraw groundwater from production wells at locations down-gradient of the Site. Ecology believes the actions required by the AO are in the public's interest. This RIWP has been prepared to document the planned remedial investigation activities at the Site.

The purpose of this work plan is to document the work elements required to adequately characterize the nature and extent of contamination at the Site in accordance with Chapter 173-340-350 of the Washington Administrative Code (WAC 173-340-350). The planned remedial investigation activities were developed with Ecology to adequately characterize the nature and extent of impacts to vadose zone soil and groundwater at the Site to develop and evaluate cleanup action alternatives in accordance with WAC 173-340-351.



1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Remedial Investigation Work Plan (RIWP) on behalf of the City of Issaquah (the City) for the Memorial Field and Rainier Trail (MFRT) Site (the Site) (Figure 1). The City was identified as the potentially liable person (PLP) for the Site.

This RIWP documents the work elements required to sufficiently characterize the nature and extent of contamination at the Site in accordance with the requirements of Agreed Order No. DE 23521 (AO) between the Washington State Department of Ecology (Ecology) and the City. The AO is included in Appendix A.

As described in the AO, local firefighting entities historically conducted firefighting training exercises at the Site, which included lawful deployment of aqueous film-forming foam (AFFF) containing perfluorooctane sulfonate (PFOS) and additional per- and poly-fluorinated alkyl substances (PFAS). The historical training activities are considered releases to the environment. The confirmed releases have impacted vadose zone soil at two source areas, the Memorial Field Source Area at 105 2nd Avenue Northeast and the Rainier Trail Source Area at Parcel 3424069043 in Issaquah, Washington (collectively referred to as the Source Areas). The confirmed releases have impacted shallow groundwater at the Source Areas. A completed exposure pathway for groundwater at the Site has not been confirmed; however, the City and Darigold both withdraw groundwater from production wells at locations down-gradient of the Site. Ecology believes the actions required by the AO are in the public's interest. This RIWP has been prepared to document the planned remedial investigation activities at the Site.

AFFF training was performed at two locations at the Site (Figure 2):

- An area that currently is covered with lawn on the southeastern portion of the Memorial Field Source Area (Memorial Field AFFF Training Area); and
- An area that currently is covered with lawn and trees along the central portion of the Rainier Trail Source Area (Rainier Trail AFFF Training Area).

The Memorial Field AFFF Training Area and Rainier Trail AFFF Training Area are collectively referred to as the AFFF Training Areas. The Source Areas are depicted on Figure 2.

Screening levels for soil and groundwater are presented on Tables 1 and 2, respectively.



1.1 PURPOSE AND OBJECTIVE

The purpose of this work plan is to document the work elements required to adequately characterize the nature and extent of contamination at the Site in accordance with Chapter 173-340-350 of the Washington Administrative Code (WAC 173-340-350).

The objectives of the scope of work presented herein were developed with Ecology and include:

- Adequately characterize the nature and extent of impacts to vadose zone soil at the known source areas to develop and evaluate cleanup action alternatives in accordance with WAC 173-340-351.
- Adequately characterize the nature and extent of impacts to groundwater from the known source areas to develop and evaluate cleanup action alternatives in accordance with WAC 173-340-351.

1.2 KEY PROJECT PERSONNEL

Key Project Personnel include the following:

- The City's PLP Representative – Julie Wartes, Senior Environmental and Regulatory Program Administrator, Public Works Department, City of Issaquah;
- Project Coordinator for the PLPs – Sarah Snyder, L.G., Senior Geologist, Farallon; and
- Project Coordinator for Ecology – Vance Atkins, L.G., L.H.G., Hydrogeologist, Ecology

1.3 REGULATORY INTERACTIONS

Concentrations of PFOS and PFAS were initially detected in a water sample collected from the City of Issaquah drinking water production well COI-PW04 in 2015. Ecology initially received a report about potential contamination from PFAS at the Memorial Field Source Area in January 2016; PFAS were not listed as hazardous substances at the time. PFAS and PFOS, were confirmed to be hazardous substances under the Washington State Model Toxics Control Act (MTCA) in October 2021, at which time additional investigation commenced.

Lawful training activities associated with AFFF deployment were identified as a potential source of the impacts to the drinking water aquifer in the Lower Issaquah Valley. Ecology



provided funding for investigation activities under three previous interagency agreements (IAAs), including:

- \$350,000 to EFR under IAA C2200169 to further evaluate the soil and groundwater impacts at the known training locations in the Lower Issaquah Valley, including the Memorial Field and Rainier Trail Source Areas.
- \$50,000 to the City under IAA C2000069 to perform groundwater modeling to better understand the fate and transport of PFAS in the Lower Issaquah Valley.
- \$400,000 to the City under IAA C2200183 to perform additional groundwater modeling for the Lower Issaquah Valley.

The previous investigations are documented in the Draft Remedial Investigation Report (Draft RI Report) prepared by Farallon dated October 13, 2023 (Farallon 2023). The Draft RI Report included data from the following prior key reports and additional reports referenced in Section 8:

- *Summary of PFCs Results for Creek Samples Collected September 29, 2016* prepared by Corona Environmental Consulting on behalf of Sammamish Plateau Water and Sewer District dated October 20, 2016;
- *Hydrogeological Characterization Report – Issaquah, Washington* prepared by Geosyntec Consultants, Inc. on behalf of the City dated November 16, 2016 (Geosyntec 2016);
- *Per- and Poly-Fluoroalkyl Substances Characterization Study Summary Report – Lower Issaquah Valley, Issaquah, Washington* prepared by Farallon on behalf of EFR dated March 27, 2019; and
- *Per- and Poly-Fluoroalkyl Substances Additional Characterization Study Summary Report – Lower Issaquah Valley, Issaquah, Washington* prepared by Farallon on behalf of EFR dated April 14, 2021.

Based on the results of prior investigation activities, the City engaged in negotiations with Ecology to enter into an AO to perform remedial actions at the Site in accordance with the requirements of MTCA and supervision from Ecology.

Ecology and the City held an open public comment period for the AO in May 2024. AO No. DE 23521 was signed by the City and Ecology with an effective date of February 24, 2025. The AO requires the City, as PLP, to conduct a remedial investigation and feasibility study (RI/FS)



for the Site. The AO establishes that Ecology will not take additional enforcement action against the PLP to require those remedial actions specified in the AO so long as the PLP complies with the provisions of the order.

1.4 ABBREVIATED CLASS B AFFF BACKGROUND

Since approximately 1966, Class B AFFF has been used to fight hydrocarbon and other fires with flammable vapors (Place and Field 2012). Class B AFFF forms a film or blanket of suds across the surface of flammable liquids that denies fuel vapors contact with the ambient atmosphere. Without sufficient oxygen, the fuel fire is extinguished. Class B AFFF offers additional benefits spreading across liquid fuel and remaining in place to prevent re-ignition. The effectiveness of Class B AFFF using fluorochemicals (i.e., PFAS) at “knocking down” and smothering hydrocarbon fuel fires resulted in widespread use by civilian and military fire departments.

The largest purchaser of AFFF in the United States was the U.S. military, which also established a specification (MIL-F-24385) that included requirements for short term toxicity, chemical and biological oxygen demand, and total fluorine content. Many facilities, including Federal Aviation Administration airports, petroleum fuel tank farms, and military bases, relied on, or were required to comply with, the MIL-F-24385 standard for purchasing Class B AFFF. The specification was updated in 2023 to require AFFF formulations be PFAS free. EFR transitioned to PFAS-free AFFF formulations in 2017.

In general, training exercises conducted by local firefighting entities at the Source Areas involved setting up AFFF application systems and practice by participants to produce an effective AFFF mixture at the hose nozzle. Farallon’s understanding based on interviews with Eastside Fire and Rescue (EFR) firefighting personnel (Farallon 2016, 2018) is that the foam mixtures were typically 3 percent solutions prior to 2002, after which reformulation of the AFFF concentrate allowed for more-diluted 1 percent solutions to be used. Typical volumes of AFFF concentrate used for training were on the order of one to three 5-gallon buckets per event, requiring between approximately 1,500 to 4,500 gallons of water; the resulting foam volume would have been considerably larger.

During training exercises, AFFF was sprayed on the ground, vegetation, and adjacent buildings and then was washed down with service water from fire hydrants at each training area. Equipment on fire trucks and hoses in contact with AFFF typically was washed off in the field at the end of the training event, and foam remaining in the training area was dispersed to the extent possible by spraying additional water on the area (Farallon 2019).



1.5 WORK PLAN ORGANIZATION

This RIWP has been organized into the following sections:

- **Section 2, Site Description and Background**, presents descriptions of the Site, Source Areas, and AFFF Training Areas, including a description of the Lower Issaquah Valley regional setting, geology and hydrogeology, historical uses of the Source Areas, including adjacent and surrounding land uses.
- **Section 3, Previous Investigations**, summarizes prior investigations for the Site.
- **Section 4, Conceptual Site Model**, presents the conceptual site model for the Site, including the premise of releases, contaminants of potential concern, media of concern, screening levels, nature and extent of contamination, fate and transport, and potential receptors and exposure pathways.
- **Section 5, Data Gaps**, presents the identified data gaps for the confirmed source areas and Site groundwater impacts.
- **Section 6, Scope of Work**, presents the objectives, technical elements, inadvertent discoveries, climate change considerations, and management of investigation-derived waste (IDW) for the planned remedial investigation activities.
- **Section 7, Schedule and Reporting**, details the EIM data submittals, interim action schedule and key milestones, and interim action reporting requirements.
- **Section 8, References**, provides a list of the source materials used in preparing this work plan.
- **Section 9, Limitations**, presents Farallon's standard limitations associated with conducting the work reported herein and preparing this report.



2.0 SITE DESCRIPTION AND BACKGROUND

This section presents descriptions of the Site, Source Areas, and AFFF Training Areas, including a description of the Lower Issaquah Valley regional setting, geology and hydrogeology, historical uses of the Source Areas, including adjacent and surrounding land uses.

2.1 LOWER ISSAQUAH VALLEY REGIONAL SETTING

The Lower Issaquah Valley is approximately 14 miles east of Seattle and extends from the south end of Lake Sammamish approximately 2.5 miles to the southeast where the Issaquah Valley begins to constrict south of East Sunset Way (Figure 1). Lower Issaquah Valley floor elevations range from approximately 40 to 160 feet North American Vertical Datum of 1988 (NAVD88). The Lower Issaquah Valley is bisected by Issaquah Creek, which runs longitudinally along the valley floor and flows to the north into Lake Sammamish. The City is in the northern portion of the Lower Issaquah Valley. Drinking water for the City is pumped from a system of four wells (COI-PW01, COI-PW02, COI-PW04, and COI-PW05, Figure 2) and purchased through service water delivery by the Cascade Water Alliance.

According to the Western Regional Climate Center (2018), the climate of the greater Seattle area, including Puget Sound and the Lower Issaquah Valley, is maritime and characterized by cool summers and mild winters influenced by ocean air. Based on data published for the Snoqualmie Falls, Washington meteorological station (Identification No. 457773), the average annual minimum temperature for the Lower Issaquah Valley is 32 degrees Fahrenheit, and the average annual maximum temperature is 76 degrees Fahrenheit. The average annual precipitation ranges from 33 to 81 inches, with an average of 5 to 8 inches per month from October through March (Western Regional Climate Center 2018).

2.2 SITE DESCRIPTION

Based on existing data, the Site comprises the two Source Areas, including the Memorial Field Source Area at 105 2nd Avenue Northeast and Rainier Trail Source Area identified as King County parcel No. 3424069043 with no formal address in Issaquah, Washington (Figure 2).

As described in the AO, local firefighting entities historically conducted firefighting training exercises at the Site, which included lawful deployment of AFFF containing PFOS and PFAS. The historical AFFF training activities are considered releases to the environment. The known releases have impacted vadose zone soil at two Source Areas, including the



Memorial Field Source Area and Rainier Trail Source Area; and impacted groundwater, which is a source for the City's drinking water.

AFFF training was performed at two locations at the Site (Figure 2):

- An area that currently is covered with lawn on the southeastern portion of the Memorial Field Source Area (Memorial Field AFFF Training Area); and
- An area that currently is covered with lawn and trees along the central portion of the Rainier Trail Source Area (Rainier Trail AFFF Training Area).

2.3 LAND USE

A description of the historical and current land uses of the Source Areas and adjacent and surrounding properties is provided below.

2.3.1 Historical Land Uses

The following sections present historical uses of the Source Areas as they relate to AFFF training exercises.

2.3.1.1 Memorial Field Source Area

Historical AFFF training was performed north of the fire station at 190 East Sunset Way on the southeastern portion of the Memorial Field Source Area during the period from approximately the early 1980s through the mid-1990s at a frequency of approximately once or twice per year (Figure 2). Training exercises included setting up AFFF application systems and practice producing an effective AFFF mixture at the end of a 100- to 150-foot fire hose. AFFF was sprayed on the ground during exercises and then was washed down with service water from the fire hydrant on the southeastern corner of Memorial Field. Typically, one to three 5-gallon buckets of AFFF concentrate was expended during each training event.

2.3.1.2 Rainier Trail Source Area

Historical AFFF training was performed along the central portion of the Rainier Trail Source Area during the period from approximately the early 1970s through the early 1980s at a frequency of approximately once per year (Figure 2). Typically, one to three 5-gallon buckets of AFFF concentrate was expended during each training event. Service water was provided by a fire hydrant on the northeastern corner of the parking lot. During the period that training occurred, the Rainier Trail Source Area was an abandoned rail grade with a gravel surface. This area was later redeveloped as parking with an irregular-shaped landscaped median strip



along the orientation (north-northwest to south-southeast) of the former railroad tracks and east-adjacent parking lot.

2.3.2 Current Land Use

The Memorial Field Source Area is currently used as a public park including a baseball field, basketball court, and playground. The Rainier Trail Source Area is currently used as a public trail and parking lot.

2.3.3 Adjacent and Surrounding Land Use

Land adjacent to and surrounding the Site consists of mixed use commercial and residential properties. Properties to the north and east of the Site are generally developed with single family residences. Issaquah City Hall and EFR Fire Station 71 are located south-adjacent to the Memorial Field Source Area, between the Memorial Field and Rainier Trail Source Areas. Properties to the west of the Site are primarily commercial in use and include a museum, Issaquah Senior Center, restaurants, and other small businesses.

2.4 GEOLOGY AND HYDROGEOLOGY

A description of the Site geology and hydrogeology, including groundwater potability, is provided below.

2.4.1 Geology

The geology of the Lower Issaquah Valley comprises a series of interbedded sand-gravel and silt-clay layers overlying the bedrock units that form the adjacent foothills to the east and west of the Lower Issaquah Valley. Shallow Site-specific geology and hydrogeology descriptions are provided below for the Memorial Field and Rainier Trail Source Areas.

Prior drilling investigations indicate that the Rainier Trail and Memorial Field Source Areas are underlain by silty sand and silt to depths of approximately 8 feet below ground surface (bgs). Gravel and sand with variable silt content was encountered beneath the silty sand and silt to the maximum depths explored of 40 and 50 feet bgs within the Rainier Trail and Memorial Field Source Areas, respectively. Silt was encountered at depths greater than 37 feet bgs in boring RT-R01 and monitoring well RT-MW04 within the Rainier Trail Source Area.

Geologic cross-sections for the Memorial Field and Rainier Trail Source Areas are provided on Figures 3 and 4, respectively. Boring and monitoring well locations are presented on Figures 2 and 7.



2.4.2 Hydrogeology

For clarity of discussion, water-bearing zones identified in the Lower Issaquah Valley were previously divided into shallow, intermediate, and deep intervals, as summarized below:

- The shallow groundwater interval is defined as depths between approximately 5 and 60 feet bgs;
- The intermediate groundwater interval is defined as depths between approximately 60 and 120 feet bgs; and
- The deep groundwater interval is defined as depths greater than 120 feet bgs.

The shallow, intermediate, and deep groundwater divisions were established for the purpose of evaluating migration of surficial releases of PFAS into the deeper subsurface and provide a convenient nomenclature when discussing groundwater within selected depth intervals. Shallow, intermediate, and deep groundwater labels are not specific to a single production aquifer or specific lithologic unit.

2.4.2.1 Site Shallow Groundwater

Groundwater within the shallow interval at the Site flows approximately to the north-northeast (Figure 5). A horizontal groundwater gradient within the shallow groundwater interval of 0.008 feet/foot was observed during the December 2022 and May 2023 monitoring events. An anomalously high groundwater gradient of 0.022 feet/foot was observed in the shallow groundwater interval during the February 2023 groundwater monitoring event. Horizontal flow direction was consistent between monitoring events, with groundwater elevations fluctuating by up to 12 feet between low- and high- groundwater conditions.

Typical shallow to intermediate vertical groundwater gradients at the Site range from 0.001 to 0.002 feet/foot and fluctuate from downward to upward at monitoring well pair MF-MW02 and MF-MW04. An anomalously high upward vertical groundwater gradient of 0.2 feet/foot was observed at this well pair during the February 2023 groundwater monitoring event.

Surface water elevations in the vicinity of the Source Areas at stations STR-03 and STR-04 in the East and Main forks of Issaquah Creek, respectively, are approximately 10 to 20 feet higher than nearby groundwater elevations in the shallow groundwater interval (Figure 5). Relative elevations of groundwater and surface water indicate that both the East and Main



forks of Issaquah Creek are losing streams in the vicinity of the Memorial Field and Rainier Trail Source Areas. Losing streams lose water as they flow downstream due to infiltration of water from the stream into the ground, which recharges to the unconfined shallow interval aquifer.

Surface water elevations at station STR-01 located approximately 800 feet downstream of the confluence of the East and Main forks of Issaquah Creek are lower than shallow groundwater elevations in the vicinity, indicating that Issaquah Creek transitions to a gaining stream downstream of the confluence of the East and Main forks. In a gaining stream scenario, groundwater discharges to surface water in the stream.

Surface water and groundwater elevations and shallow interval groundwater elevation contours are presented on Figure 5. Monitoring well construction details and groundwater elevation data are summarized in Tables 3 and 4.

2.4.2.2 Site Intermediate Groundwater

Groundwater within the intermediate interval flows to the north-northeast (Figure 6). Horizontal groundwater gradients within the intermediate groundwater interval range from approximately 0.0004 to 0.0009 feet/foot. Horizontal flow direction was consistent between monitoring events, with groundwater elevations fluctuating by up to 6 feet between low- and high- groundwater conditions.

Intermediate interval groundwater elevation contours are presented on Figure 6. Monitoring well construction details and groundwater elevation data are summarized in Tables 3 and 4.

2.4.2.3 Site Deep Groundwater

No monitoring wells located at the Site are screened within the deep groundwater interval.

2.4.3 Municipal Water Supply

A description of the municipal water supply production aquifers and beneficial use is provided below.

2.4.3.1 Production Aquifers

An investigation performed in 1993 as part of the Lower Issaquah Valley Wellhead Protection Plan reported multiple water-bearing zones totaling approximately 300 feet in thickness. Both the A-Zone and B-Zone Aquifers may exhibit confined or semi-confined conditions locally due to silt beds or other aquitards. Previous investigations have not been



able to establish whether any confining unit is laterally continuous (Golder 1993); on a regional scale the aquifers behave as a single unconfined aquifer.

City production well COI-PW04 extracts intermediate groundwater from the A-Zone Aquifer between depths of 77 and 102 feet bgs. City production well COI-PW05 extracts deep groundwater from the B-Zone Aquifer between depths of 323 to 405 feet bgs (Table 3). Descriptions of the production wells are provided below (Geosyntec Consultants, Inc. [Geosyntec] 2023):

- City wells COI-PW01, -PW02, and -PW04, and Darigold production well DG-PW01 are screened in the A-Zone Aquifer, comprising brown to grayish brown loosely consolidated sands and gravels and gray loosely consolidated fine to coarse sand with silt. The A-Zone Aquifer is approximately 65 feet thick based on drilling observations at monitoring well COI-MW08. The A-Zone Aquifer is first encountered at a depth of approximately 75 feet bgs between elevations 20 and 0 NAVD88 and was identified in intermediate and deep wells drilled as part of the remedial investigation.
- City well COI-PW05 is screened in the B-Zone Aquifer, comprising primarily gray fine to coarse sand with silt and gravel beds. The B-Zone Aquifer is approximately 100 feet thick based on drilling observations at production well COI-MW05 and monitoring well COI-MW08. The B-Zone Aquifer was encountered at 144 feet bgs at elevation -74 feet NAVD88 during drilling at COI-MW08.

The A-Zone Aquifer and B-Zone Aquifer are separated by an aquitard comprising interbedded firm gray clay, dense gray sand, and firm gray silt at COI-MW08 approximately 26 feet in thickness between 134 to 160 feet bgs (Geosyntec 2023). Previous resistivity studies estimated the aquitard thickness between 30 and 50 feet (Golder 2000).

2.4.3.2 Beneficial Use

Farallon performed an evaluation of beneficial use in the Lower Issaquah Valley as presented in the 2023 Draft RI Report using publicly available information provided through the Ecology Water Rights Search tool.¹ This search produced the following records within the

¹ <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-rights-search>



Lower Issaquah Valley with water right certificates for groundwater, confirmed withdrawals, and pumping rates:

- City of Issaquah – Record No. G1-08632CWRIS – COI-PW01 is a public supply well that pumps at a maximum rate of 630 gallons per minute and is allocated a maximum withdrawal of 1,000 acre-feet per year.
- City of Issaquah – Record No. G1-10071CWRIS – COI-PW02 is a public supply well that pumps at a maximum rate of 1,200 gallons per minute and is allocated a maximum withdrawal of 1,600 acre-feet per year.
- City of Issaquah – Record No. G1-24633CWRIS – COI-PW04 is a public supply well that pumps at a maximum rate of 1,000 gallons per minute and is allocated a maximum withdrawal of 1,600 acre-feet per year.
- City of Issaquah – Record No. G1-24809CWRIS – COI-PW05 is a public supply well that pumps at a maximum rate of 250 gallons per minute and is allocated a maximum withdrawal of 200 acre-feet per year.
- Darigold – Record No. G1-21648C – DG-PW01 is a private supply well that pumps a maximum rate of 1,100 gallons per minute and is allocated a maximum withdrawal of 1,232 acre feet per year.

Farallon reviewed Washington State Department of Health’s Source Water Assessment Program Mapping tool² for the vicinity of the Site, which identified the following records within the Site vicinity:

- Darigold – Water System ID AC581 (Inactive);
- Lakeside Gravel Co – Water System ID 45280 (Inactive);
- Sammamish Valley Water Association – Water System ID 75697 (Inactive); and
- Leland and Fine – Water System ID 46715 (Inactive).

Additional groundwater withdrawal locations for Sammamish Plateau Water & Sewer District and Lake Sammamish State Park are located north of Interstate-90; a migration pathway, if

² <https://experience.arcgis.com/experience/9dc3fd45206d450f828ebd7ed9cdf7be>



any, to these locations from the Site has not been confirmed but may require further evaluation in the future.

Four additional groundwater water claims were identified within the Site vicinity:

- Pickering Bros. – Record No. G1-143524CL;
- John E. George – Record No. G1-157977CL;
- Clement D. Janus – Record No. G1-129065CL; and
- David L. Wilson – Record No. G1-111033CL.

All four of the additional claims remain at the active claim phase; no withdrawal of groundwater was allocated in Ecology's records and no verification of groundwater use has been performed. Based on prior communications with Ecology, withdrawal of groundwater associated with the additional claims is unlikely and additional investigation is not warranted at this time.



3.0 PREVIOUS INVESTIGATIONS

The following section presents a summary of previous investigations conducted at the Site from 2015 through 2023.

3.1 2015 – 2016 MUNICIPAL WATER SUPPLY SAMPLING

An Initial Hydrogeologic Assessment was performed for City municipal supply wells COI-PW04 and COI-PW05 located northwest of the Site, west of the Main fork of Issaquah Creek and South of I-90 (Figure 5, Geosyntec 2016a). Wells COI-PW04 and COI-PW05 are located northwest of the Site across I-90 and are screened within the intermediate and deep groundwater intervals, respectively. PFAS were detected in drinking water samples collected from COI-PW04 in 2015. PFAS were not detected at the laboratory practical quantitation limits in drinking water samples collected from COI-PW05. The impacts are suspected to be associated with the EFR HQ IVES Site located west of the Site.

Sammamish Plateau Water performed additional sampling of municipal supply wells, a water supply line, and surface water in North Issaquah Creek in 2016. PFOS was detected at concentrations exceeding current MTCA Method B cleanup levels in drinking water samples collected from municipal supply wells SP-PW07 and SP-PW08 located north I-90 (Corona 2016). Concentrations of PFOS and perfluoro-octanoic Acid (PFOA) were detected in the samples collected from North Issaquah Creek at concentrations less than current surface water screening levels protective of ecological receptors in surface waters (Corona 2016 and Ecology 2023). The surface water samples were collected from North Issaquah Creek near I-90 and near SP-PW07. Detections of PFAS in surface water at these locations are likely unrelated to the Site based on their location relative to the Source Areas and observed groundwater flow directions.

3.2 2016 HYDROGEOLOGICAL CHARACTERIZATION AND SOIL SAMPLING

Geosyntec performed environmental investigation of the Lower Issaquah Valley in the vicinity of municipal supply Wells 4 (COI-PW04), 5 (COI-PW05), and 6 (COI-PW06) (Geosyntec 2016b). The investigation included:



Installation of seven groundwater monitoring wells (COI-MW-01 through COI-MW-07) throughout Lower Issaquah Valley. Based on existing data, these monitoring wells are likely located outside of the groundwater plume attributed to the Site:

- Collection and analysis of groundwater samples from the newly installed wells and several existing wells in the vicinity;
- Video logging of an existing City well near Well 5;
- Continuous monitoring of groundwater levels;
- Soil sampling west of Issaquah Creek at the EFR Headquarters³ property located at 175 Newport Way Northwest (EFR HQ Source Area); and
- Surface water sampling in Issaquah Creek.

PFAS were detected at concentrations exceeding the current MTCA Method B cleanup levels for groundwater in municipal supply Well 4 and newly installed monitoring wells COI-MW-01, COI-MW-03, COI-MW-04, COI-MW-05, COI-MW-06, and COI-MW-07. PFAS were also detected at concentrations exceeding current MTCA Method B cleanup levels for soil samples collected from the EFR Headquarters property, confirming AFFF training was a source of PFAS to vadose zone soil. PFAS were not detected at the laboratory practical quantitation limits in the surface water samples collected from Issaquah Creek.

Based on the results of soil samples collected from the EFR HQ Source Area, Geosyntec performed additional soil sampling on behalf of the City at the Memorial Field and Rainier Trail Source Areas in December 2016. Soil sampling locations (COI-135SUNW, COI-135SUNE, COI-180SUNS, and composite sample COI-180SUNN/COI-180SUNE) were selected based on areas of reported AFFF training based on interviews conducted with fire-fighting personnel (City 2017). The December 2016 soil sample locations are shown on Figures 7 and 8. Results of the December 2016 soil sample are summarized below.

- Soil analytical results for samples collected from the Rainier Trail Source Area identified a single exceedance of PFOA exceeding current MTCA Method B cleanup levels for soil (Figures 7 and 8; Table 5). The remainder of the results from the two

³ The EFR Headquarters property is one of two source areas for the EFR Headquarters and Issaquah Valley Elementary School (EFR HQ IVES) Site, which is separate and distinct from the MFRT Site. AFFF training was performed at two locations on the EFR Headquarters property, which are considered releases to the environment. Based on existing data, groundwater contamination from the two sites do not co-mingle.



soil samples collected from the Rainier Trail Source Area were not detected at the laboratory practical quantitation limit.

- Soil analytical results for samples collected from the Memorial Field Source Area identified concentrations of perfluoro-nonanoic acid (PFNA) and perfluoro-decanoic acid (PFDA) exceeding current MTCA Method B cleanup levels for soil in one out of two soil samples collected from the Memorial Field Source Area (Figures 7 and 8; Table 5). The remainder of the results from the two soil samples collected from the Memorial Field Source Area were not detected at the laboratory practical quantitation limit.

The location of soil samples collected from the Memorial Field and Rainier Trail Source Areas are depicted on Figures 7 and 8. Analytical results are summarized in Table 5.

3.3 PFAS INVESTIGATIONS AND MONITORING 2018 THROUGH 2023

This section presents a summary of additional investigation activities at the Site performed by Farallon between 2018 and 2023. Results of the investigation activities summarized in this section are presented in Section 4. The following investigation activities were performed by Farallon between 2018 and 2023:

- Collection of groundwater samples from monitoring wells RT-MW01 and RT-MW03 within the Rainier Trail Source Area in August 2018 (Farallon 2018);
- Advancement of five borings (MF-R01 through MF-R04 and RT-R01) for soil and/or reconnaissance groundwater sampling; completion of multi-incremental soil sampling within the Memorial Field and Rainier Trail AFFF Training Areas (decision units DU-03 and DU-04); installation of four shallow groundwater monitoring wells (MF-MW01, MF-MW02, MF-MW03, RT-MW04); and sampling of the installed monitoring wells and existing monitoring wells RT-MW01 through RT-MW03 (Farallon 2019);
- Installation of one intermediate groundwater monitoring well (MF-MW04) and completion of four groundwater and surface water gauging and monitoring events (Farallon 2021a); and
- Evaluation of potential up-gradient sources of PFAS (Farallon 2021b).



4.0 CONCEPTUAL SITE MODEL

This section presents a preliminary conceptual site model (CSM) based on data collected at the Site to date. The CSM includes discussion of the Source Areas and premise of the releases, constituents of potential concern (COPCs), media of concern, screening levels, nature and extent of contamination based on existing data, contaminant fate and transport, and potential exposure pathways and receptors. Figure 11 illustrates the preliminary CSM for the Site.

4.1 PREMISE OF RELEASES

Local firefighting entities historically conducted firefighting training exercises at the Source Areas, which included lawful deployment of AFFF containing PFOS and PFAS. The historical AFFF training activities impacted vadose zone soil and groundwater at the Site and are considered releases to the environment. The release has impacted shallow groundwater beneath and down-gradient of the Source Areas. The releases and migration of hazardous substances were first confirmed by investigation performed jointly by the City and Eastside Fire and Rescue in 2018 (Farallon 2019). Contaminant fate and transport from vadose zone soil to groundwater is discussed further in Section 4.6.

4.2 CONTAMINANTS OF POTENTIAL CONCERN

The following constituents were detected in soil at concentrations exceeding applicable screening levels and are retained as COPCs at the MFRT Site (Table 1):

- Perfluorohexanoic Acid (PFHxA);
- Perfluorohexane Sulfonic Acid (PFHxS);
- PFOA;
- PFOS;
- PFNA;
- PFDA;
- 6:2 Fluorotelomer Sulfonic Acid (6:2 FTS); and
- Hexafluoropropylene Oxide Dimer Acid (HFPO-DA/GenX).⁴

⁴ GenX was not analyzed for during the prior soil sampling at the MFRT Site but was detected at concentrations exceeding screening levels in soil samples collected at the EFR HQ IVES Site. Therefore, GenX is retained as a COPC for soil at the MFRT Site.



The following constituents were detected in groundwater at concentrations exceeding applicable screening levels and are retained as COPCs at the MFRT Site (Table 2):

- Perfluorobutane Sulfonic Acid (PFBS);
- PFHxS;
- PFOA;
- PFOS;
- PFNA; and
- PFDA.

4.3 MEDIA OF CONCERN

This section presents a summary of the media of concern at the Site based on the results of remedial investigation activities completed to date.

4.3.1 Soil

PFAS have been detected in soil at concentrations that exceed MTCA Method B cleanup levels within both Source Areas. Therefore, soil is a medium of concern at the Site.

4.3.2 Groundwater

PFAS have been detected in groundwater at concentrations that exceed MTCA Method B cleanup levels within both Source Areas. Therefore, groundwater is a medium of concern at the Site.

4.3.3 Surface Water

The closest surface water bodies to the Memorial Field and Rainier Trail Source Areas are the East and Main forks of Issaquah Creek located approximately 500 feet northeast and 600 feet west of the Source Areas, respectively. Surface water in the East and Main forks of Issaquah Creek in the vicinity of the Source Areas has not been sampled.

Groundwater does not discharge to surface water down-gradient of the Source Areas. Monitoring of groundwater and surface water elevations indicates that both forks of Issaquah Creek adjacent to the Source Areas are losing streams in the reaches that could potentially be affected by the Site.



Downward vertical gradients from surface water to the shallow groundwater interval were measured consistently throughout monitoring from 2018 to 2023, and showed no seasonal variability or reversal of flow directions due to fluctuations in groundwater and/or surface water elevations. The consistent downward vertical gradients observed in the vicinity of the Source Areas result in the downward migration of surface water from the streams through the vadose zone to the underlying water table. Based on downward gradients and a lack of discharge of groundwater to surface water, the groundwater to surface water pathway at the Site is incomplete.

The ground surfaces of the Memorial Field Source Area and portions of the Rainier Trail Source Area are pervious, allowing infiltration of stormwater. Infiltration of stormwater through these pervious surfaces prevents the runoff of stormwater from the Site, which may have been in contact with contaminated soil. The remainder of the ground surface in the Rainier Trail Source Area is covered by impervious surfaces, preventing contact of stormwater with contaminated soil. Based on Site topography and ground surfaces, there is no mechanism for stormwater that has been in contact with contaminated soil at the Site to migrate to surface water. As such, the soil to surface water pathway at the Site is incomplete.

The soil to surface water and groundwater to surface water pathways have been established as incomplete at the Site. Therefore, surface water is not retained as a medium of concern at the Site.

Should results of the remedial investigation conclude that shallow groundwater contaminated with PFAS extends down-gradient of the Source Areas beyond the confluence of the Main and East forks of Issaquah Creek where the creek transitions to a gaining stream, further evaluation of impacts to surface water may be warranted. However, the available data do not indicate that surface water sampling is warranted for the MFRT Site.

4.3.4 Sediment

As described above, the soil to surface water and groundwater to surface water pathways are incomplete. Without transport of contaminants from soil or groundwater to surface water, there is no transport mechanism for contaminants in the Source Areas to migrate to sediment. Based on the available Site data, sediment is not retained as a medium of concern.



Should results of the remedial investigation conclude that the groundwater to surface water is complete, further evaluation of impacts to sediment may be warranted. However, the available data do not indicate sediment sampling is warranted for the MFRT Site.

4.4 SCREENING LEVELS

In accordance with WAC 173-340-350(3)(a), cleanup standards will not be established and a cleanup action will not be selected until completion of the remedial investigation. This subsection presents screening levels for the purpose of conducting the remedial investigation.

4.4.1 Soil Screening Levels

Cleanup levels evaluated as screening levels for COPCs at the Site include MTCA Method B direct contact cleanup levels for soil, MTCA cleanup levels for vadose zone soil protective of groundwater, MTCA cleanup levels for saturated soil protective of groundwater, and analytical method reporting limits.

The most stringent value of the MTCA cleanup level for vadose zone soil protective of groundwater or MTCA cleanup level for saturated soil protective of groundwater was selected as the screening level for a given COPC. Because vadose zone and saturated soil are both present at the Site, screening levels for both vadose zone and saturated soil protective of groundwater are established as soil screening levels for vadose zone and saturated soil, respectively.

In accordance with WAC 173-340-700(6)(d), in the case that cleanup levels are less than natural background levels or levels that can be reliably measured, the cleanup level will be established at a concentration equal to the practical quantitation limit or natural background concentration, whichever is higher. As such, the analytical method reporting limit is selected as the screening level for select COPCs (Table 1).

Soil cleanup levels evaluated for use as soil screening levels and selected screening levels by COPC are presented in Tables 1 and 5.

4.4.2 Groundwater Screening Levels

Cleanup levels evaluated as screening levels for COPCs at the Site include MTCA Method B groundwater cleanup levels and U.S. Environmental Protection Agency (EPA) Maximum Contaminant Levels (MCLs). If both a Method B equation value and an MCL are established for a COPC that is a carcinogen, the MCL is used as the screening level when the ratio of the



MCL to the Method B equation value does not exceed 10; in these cases the MCL represents an acceptable risk threshold of no more than 1×10^{-5} cancer risk.⁵ If the ratio of the MCL to the equation value is greater than 10, the MCL is adjusted down to the 10 times the equation value and this becomes the screening level. If both a Method B cleanup level and an MCL are established for a COPC that is not carcinogenic, the minimum of the two values is the screening level.

Groundwater cleanup levels and MCLs evaluated for use as groundwater screening levels and selected screening levels by COPC are presented in Tables 2 and 6.

4.4.3 Surface Water Screening Levels

Surface water is not a medium of concern at the Site. Should evidence of impacts to surface water be discovered during the remedial investigation, screening levels for surface water will be established.

4.4.4 Sediment Screening Levels

Sediment is not a media of concern at the Site. Should evidence of impacts to sediment be discovered during the remedial investigation, screening levels for sediment will be established.

4.5 NATURE AND EXTENT OF CONTAMINATION

The following section presents a summary of the current understanding of the nature and extent of contamination at the Site based on existing data.

4.5.1 Confirmed and Suspected Source Areas

The following sections describe confirmed source areas where COPCs have been identified associated with historical AFFF training exercises and other suspected source areas that were evaluated as part of preparation of the RIWP.

4.5.1.1 Confirmed Source Areas

Confirmed source areas at the Site include the Memorial Field and Rainier Trail Source Areas where AFFF is known to have been used lawfully for the purpose of training for fire-

⁵ Per WAC 173-340-720(7)(a) cleanups must attain a Site hazard index of 1 and an excess cancer risk of one in 100,000.



fighting personnel. The use of AFFF at these locations has resulted in the release of PFAS to soil and groundwater as confirmed by previous environmental investigation activities.

4.5.1.2 Suspected Source Areas

No data gaps relating to suspected source areas were identified based on existing data. Therefore, no additional investigation is warranted to investigate suspect source areas. If future data indicates the potential for an unknown source, additional investigation will be performed to evaluate the potential unknown source in collaboration with Ecology, as warranted.

4.5.2 Extent of Contamination in Soil

Analytical results of soil samples collected within the two Source Areas indicate that soil within the former AFFF training areas, as previously estimated and sampled in 2018, exceed applicable soil screening levels for protection of groundwater (Figures 7 through 9).

Soil analytical results are summarized in Table 5. Cross-sections presenting the estimated vertical extent of soil contamination at the Rainier Trail and Memorial Field Source Areas, respectively, are included on Figures 3 and 4. The current understanding of the lateral extent of soil contamination within the two Source Areas is depicted on Figure 7. Figure 8 presents the lateral extent of shallow soil contamination in the upper 0 to 5 feet bgs beneath the Source Areas. Figure 9 presents the lateral extent of soil contamination at depths greater than 15 feet bgs. No soil samples have been collected and analyzed from the 5 to 10 foot bgs interval to date. Locations proposed for soil boring installation and soil sample collection by hand auger are illustrated on Figure 12.

4.5.3 Extent of Contamination in Groundwater

The following sections summarize the current understanding of the nature and extent of contamination in groundwater based on existing data. Groundwater analytical results are summarized in Table 6. The lateral extent of groundwater contamination at the Site is illustrated on Figure 10. Locations proposed for installation of additional monitoring wells to address data gaps in the understanding of the nature and extent of contamination in groundwater are presented on Figure 12.

4.5.3.1 Shallow Groundwater Interval

Analytical results of groundwater samples collected from permanent monitoring wells screened within the shallow groundwater interval at the Site indicate that shallow



groundwater beneath and down-gradient of the Rainier Trail Source Area, and beneath, cross-, and down-gradient of the Memorial Field Source Area is contaminated with PFAS constituents (including PFHxS, PFOA, PFOS, PFNA, and PFDA) at concentrations exceeding applicable screening levels (Figure 10; Table 6).

4.5.3.2 Intermediate Groundwater Interval

PFOS was detected at concentrations exceeding the applicable screening level for PFOS only in the April 2020 groundwater monitoring event at monitoring wells MF-MW04 and RBN-MW01. Subsequent samples collected from both monitoring wells were less than applicable screening levels (Figure 10; Table 6). RBN-MW01 is approximately 3,300 feet northwest of the Site and the migration pathway to this location has not been fully evaluated or confirmed.

PFOS was detected at concentrations exceeding the applicable screening level in groundwater samples collected from monitoring well RBN-MW02 and Darigold production well DG-PW01 screened within the intermediate groundwater interval (Figure 10; Table 6). Additionally, PFOA was also detected at concentrations exceeding the applicable screening level in RBN-MW02 in two out of three quarterly monitoring events (Figure 10; Table 6).

4.5.3.3 Deep Groundwater Interval

No monitoring wells at the Site are screened in the deep groundwater interval. Results of the investigation completed to date do not indicate that the deep groundwater interval has been impacted by the release of PFAS due to AFFF training exercises at the Source Areas. PFAS impacts at intermediate monitoring well MF-MW04 have been limited to one detection of PFOS that exceeded the applicable screening level by 0.0004 micrograms per liter suggesting intermediate groundwater impacts may be limited and localized.

Additional data for the shallow and intermediate groundwater will be collected during the proposed remedial investigation and used to evaluate whether further evaluation of deep groundwater is warranted.

4.6 FATE AND TRANSPORT

A summary of the contaminant fate and transport at the Site is provided below.



4.6.1 Soil to Groundwater

The presence of soil contaminated with PFAS at concentrations exceeding applicable screening levels has been confirmed within both Source Areas. PFAS have been detected in shallow groundwater beneath and down-gradient of the Source Areas. Based on these data, the migration of PFAS from soil to groundwater has been confirmed to be complete at the Memorial Field and Rainier Trail Source Areas.

4.6.2 Groundwater to Surface Water and Sediment

Monitoring of groundwater and surface water elevations at the Site has demonstrated both the Main and East fork of Issaquah Creek to be losing streams in the potentially affected reaches. Seasonal variations in vertical flow directions have not been observed. Based on the lack of discharge of groundwater to surface water, the groundwater to surface water and sediment pathways are incomplete.

4.7 POTENTIAL RECEPTORS AND EXPOSURE PATHWAYS

A summary of the potential receptors and exposure pathways at the Site is provided below.

4.7.1 Soil – Direct Contact, Soil to Groundwater

Multi-incremental soil sampling within both Source Areas confirmed the presence of soil contaminated with PFAS at concentrations exceeding applicable screening levels at depths as shallow as 0 to 0.5 foot bgs (Figure 8; Table 5). These soil samples were collected from pervious surfaces within both Source Areas. Based on the presence of exposed contaminated soils at the ground surface and currently unrestricted access to the Source Areas, the soil direct contact exposure pathway is complete.

As summarized in Section 4.6.1, the soil to groundwater migration pathway has been confirmed to be complete.

4.7.2 Groundwater Ingestion

A confirmed migration pathway to the City's production wells from the Site has not been identified. However, based on the presence of drinking water supply wells proximate to (COI-PW01 and PW02) and further down-gradient from the Source Areas (COI-PW04, COI-PW05, DG-PW01), the groundwater ingestion and direct contact exposure pathways are potentially complete.



4.7.3 Groundwater to Surface Water and Sediment

Based on the lack of discharge of groundwater to surface water as summarized in Section 4.6.2, the groundwater to surface water and sediment exposure pathways are incomplete.

4.7.4 Vapor Inhalation

The EPA defines volatile chemicals as compounds having a Henry's Law constant greater than 0.00001 atmosphere cubic meter per mole or a vapor pressure greater than 1 millimeter of mercury and a molecular weight less than 200 (EPA 2023). At least four PFAS, including 4:2, 6:2, 8:2, and 10:2 fluorotelomer alcohols (FTOHs), have sufficient vapor pressure to be designated as vapor-forming chemicals. These compounds do not have established cleanup levels, and were not included in analysis of soil or groundwater samples collected from the Site to date by EPA Method 527 Modified.

A study performed collaboratively by the Oregon State University Department of Chemistry and Department of Environmental and Molecular Biology did not identify 4:2, 6:2, 8:2, or 10:2 FTOHs as fluorochemicals present in AFFF. The study included analysis of 40 common AFFF mixtures used by the U.S. military, including those manufactured by 3M, National Foam, Ansul, Angus, Chemguard, Buckeye, and Fireade (Place and Field 2012).

Based on the limited number of PFAS that may potentially pose a vapor intrusion risk and that those same chemicals have not been documented as part of most commercially available AFFF formulations, the vapor intrusion and vapor inhalation pathways at the Site are incomplete.



5.0 DATA GAPS

The following section presents data gaps identified for the Site.

5.1 SUSPECTED SOURCE AREAS

No data gaps relating to suspected source areas were identified based on existing data. Therefore, no additional investigation is warranted to investigate suspected source areas. If future data indicates the potential for an unknown source, additional investigation will be performed to evaluate the potential unknown source in collaboration with Ecology, as warranted.

5.2 CONFIRMED SOURCE AREAS - SOIL

A summary of the soil data gaps identified for the confirmed source areas is presented below. Groundwater data gaps are summarized in Section 5.3.

5.2.1 Memorial Field Source Area

The following soil data gaps were identified for the Memorial Field Source Area and require additional investigation:

- The lateral and vertical extents of soil contaminated with PFAS at concentrations exceeding applicable screening levels has not been fully identified.
- The range of potential concentrations of PFAS in soil has not been fully evaluated.

Table 7 presents a summary of data gaps and proposed scope of work to address the identified data gaps for the Memorial Field Source Area. Figure 12 depicts proposed locations for additional investigation of soil.

5.2.2 Rainier Trail Source Area

The following soil data gaps were identified for the Rainier Trail Source Area and require additional investigation:

- The lateral extent of soil contaminated with PFAS at concentrations exceeding applicable screening levels has not been fully identified.
- The range of potential concentrations of PFAS in exposed soil has not been fully evaluated.



Table 7 presents a summary of data gaps and proposed scope of work to address the identified data gaps for the Rainier Trail Source Area. Figure 12 depicts proposed locations for additional investigation of soil.

5.3 SITE GROUNDWATER IMPACTS

The following data gaps were identified for groundwater at the Site:

- The lateral extent of shallow groundwater contaminated with PFAS at concentrations exceeding applicable screening levels has not been fully identified;
- The lateral extent of intermediate groundwater contaminated with PFAS at concentrations exceeding applicable screening levels has not been fully identified; and
- Impacts to deep groundwater have not been evaluated; however, existing data does not indicate Site groundwater impacts extend to deep groundwater.

The groundwater data gap investigation will comprise expanding the shallow groundwater monitoring well network to laterally bound the extent of groundwater contamination and further monitor the expanded shallow groundwater network with the existing intermediate groundwater monitoring wells.

Table 7 presents a summary of data gaps and proposed scope of work to address the identified groundwater data gaps. Figure 12 depicts proposed locations for additional investigation of groundwater.



6.0 SCOPE OF WORK

This section presents the objectives, technical elements, inadvertent discoveries, climate change considerations, and management of IDW for the planned remedial investigation activities.

6.1 OBJECTIVES

The objectives of the remedial investigation were developed with Ecology and include:

- Uploading previous analytical and environmental data for the Site to Ecology's Environmental Information Management (EIM) database;
- Addressing the data gaps identified in Section 5; and
- Preparing a Remedial Investigation Report summarizing the results of the remedial investigation.

6.2 INVESTIGATION ACTIVITIES

Details of the investigation activities are summarized below.

6.2.1 Environmental Information Management System

Farallon uploaded the existing data to Ecology's EIM database concurrently with this RIWP. Ecology's EIM Coordinator and Project Coordinator have reviewed and approved the EIM upload.

6.2.2 Memorial Field Source Area - Soil

The following activities are proposed to investigate data gaps in soil at the Memorial Field Source Area (Figure 12; Table 7):

- Hand auger at up to nine locations to a depth of approximately 1.5 feet bgs within the Memorial Field AFFF Training Area on an approximately 75- by 75-foot grid (Figure 12). Collect two soil samples at each location, including one sample near surface level beneath the grass and root system (approximately 0.5 foot bgs) and one sample at approximately 1.5 feet bgs. The samples collected at 1.5 feet bgs will be released for laboratory analysis of PFAS. The samples collected at 0.5 foot bgs from the following locations will be released for laboratory analysis of PFAS: three locations within the Memorial Field AFFF Training Area and two locations within Memorial Field most likely to be used by children during play and/or exposed soil. The remaining samples collected at 0.5 foot bgs will be submitted on hold at the laboratory and may



be released for analysis to further investigate the direct contact pathway, if needed, based on the results of the samples collected at 1.5 feet bgs, subsequent analysis will be coordinated with Ecology. Quality assurance/quality control (QA/QC) samples will include one trip blank, one duplicate sample, and one equipment blank. Analyze samples for PFAS by EPA Method 1633.

- Drill up to four sonic borings to 15 feet bgs within the Memorial Field AFFF Training Area. Boring locations will be coordinated with Ecology and selected based on the results of the hand auger sampling. Collect three soil samples per boring at depths of 5, 10, and 15 feet bgs. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank. Analyze samples for PFAS by EPA Method 1633.

6.2.3 Rainier Trail Source Area - Soil

The following activities are proposed to investigate data gaps in soil at the Rainier Trail Source Area (Figure 12; Table 7):

- Hand auger at up to four locations to a depth of approximately 1.5 feet bgs within the Rainier Trail AFFF Training Area on an approximately 75- by 75-foot grid (Figure 12). Collect two soil samples at each location, including one sample near surface level beneath the grass and root system (approximately 0.5 foot bgs) and one sample at approximately 1.5 feet bgs. The samples collected at 1.5 feet bgs will be released for laboratory analysis of PFAS. The samples collected at 0.5 foot bgs from the following locations will be released for laboratory analysis of PFAS: two locations within the Rainier Trail AFFF Training Area. The remaining samples collected at 0.5 foot bgs will be submitted on hold at the laboratory and may be released for analysis to further investigate the direct contact pathway, if needed, based on the results of the samples collected at 1.5 feet bgs, subsequent analysis will be coordinated with Ecology. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank. Analyze samples for PFAS by EPA Method 1633.
- Drill up to one sonic boring to 15 feet bgs within the Rainier Trail AFFF Training Area. The boring location will be coordinated with Ecology and selected based on the results of the hand auger soil sampling. Collect three soil samples at depths of 5, 10, and 15 feet bgs. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank. Analyze samples for PFAS by EPA Method 1633.



6.2.4 Site Groundwater

The following activities are proposed to investigate data gaps in groundwater at the Site (Figure 12; Table 7):

- Install up to eight shallow groundwater monitoring wells to depths of approximately 20 to 30 feet bgs in the vicinity of the Site, including one up-gradient well location (Figure 12). Collect three soil samples at each location at depths of 5, 10, and 15 feet bgs. Four of the soil samples collected from 5 feet bgs at locations proximate to the AFFF training areas will be released for laboratory analysis of PFAS by EPA Method 1633. The remaining soil samples will be held for potential laboratory analysis, if needed, based on the results of the samples collected at 5 feet bgs, subsequent analysis will be coordinated with Ecology. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank.
- Perform up to two semi-annual groundwater monitoring events following installation of the new wells. Groundwater monitoring events will consist of gauging and sampling Site wells MF-MW01, MF-MW02, MF-MW03, MF-MW04, RT-MW01, RT-MW03, RT-MW04, RBN-MW02, and the eight newly installed shallow interval wells (Figure 12). QA/QC samples will include three trip blanks, two duplicate samples, and two equipment blanks per event.

6.3 SAMPLING AND ANALYSIS PLAN

A Sampling and Analysis Plan (SAP) was prepared for the Site to present the specific requirements for sample collection and analytical activities for the remedial investigation to ensure that activities are conducted in accordance with technically acceptable protocols and that the results meet the data quality objectives. The SAP is included in Appendix B.

6.4 QUALITY ASSURANCE PROJECT PLAN

A Quality Assurance Project Plan (QAPP) was prepared for the Site to identify the data quality objectives to be implemented in accordance with this RIWP. The QAPP documents specific requirements for sample collection and analysis for the remedial investigation activities to be completed in accordance with the requirements of the AO. The QAPP is included in Appendix C.

6.5 HEALTH AND SAFETY PLAN

A Site-specific Health and Safety Plan (HASP) was prepared for the Site. The HASP identifies hazards associated with the Site and scope of work and establishes procedures for



implementation of the scope of work as they relate to Site hazards. The HASP is included in Appendix D.

6.6 INVESTIGATION PERMITTING REQUIREMENTS

Farallon will obtain Special Event Permits from the City Development Services Department for the installation of groundwater monitoring wells in public right-of-way, as necessary. No other permits are anticipated to be required for implementation of the remedial investigation scope of work.

6.7 INADVERTENT DISCOVERIES

An Inadvertent Discovery Plan (IDP) was prepared for the Site to outline the procedures to perform in the event of a discovery of archaeological materials or human remains. The IDP is included in Appendix E.

6.8 CLIMATE CHANGE CONSIDERATIONS

Sufficient information will be collected on current and projected local and regional climatological characteristics during the remedial investigation to evaluate climate change impacts that could affect the migration of hazardous substances at the Site or the resilience of cleanup action alternatives in accordance with WAC 173-340-350(6)(f). The information will be used in the evaluation of potential cleanup alternatives during the feasibility study. Data will be collected relating to flooding, wildfires, landslides and erosion, and drought information.

6.9 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

IDW in the form of soil cuttings from boring and monitoring well installation and development and purge water generated during monitoring well development and sampling will be containerized in Department of Transportation-approved steel drums. Drums will be appropriately labeled, sealed, and stored on-Site pending completion of waste profiling for disposal. Upon completion of waste profiling, the drums will be removed from the Site for off-site disposal in accordance with local, state, and federal regulations based on the contents of the IDW.

Disposable consumables in the form of plastic gloves, disposable sampling devices and equipment, plastic sheeting used for containment during drilling, and similar wastes will be disposed of as municipal solid waste.



IDW will be removed and waste manifests will be uploaded to Ecology's Administration of Grants and Loans (EAGL) database at least 30 days prior to expiration of the One-Time Grant Agreement No. OTGP-2025-Issaqu-00085.



7.0 SCHEDULE AND REPORTING

7.1 EIM DATA SUBMITTALS

Existing analytical data has been uploaded to Ecology's EIM database and approved by Ecology's EIM Coordinator and Project Coordinator. Data collected during the remedial investigation will be uploaded to Ecology's EIM database within 30 days of the final Remedial Investigation Report.

7.2 INVESTIGATION SCHEDULE AND KEY MILESTONES

A preliminary project schedule outlining key milestones for the remedial investigation in accordance with the AO and One-Time Grant Agreement No. OTGP-2025-Issaqu-00085 is presented in Appendix F.

7.3 REMEDIAL INVESTIGATION REPORT

As outlined in the project schedule included in Appendix F, a draft outline of the Remedial Investigation Report will be uploaded to the EAGL database for Ecology review within 7 days following approval of this RIWP. A draft annotated outline of the Remedial Investigation Report, including graphics and tables, will be uploaded to the EAGL database for Ecology review upon 50-percent completion of the remedial investigation field activities.

The Remedial Investigation Report will be uploaded to the EAGL database as draft for agency review (DFAR) within 45 days following completion of the remedial investigation field activities, including completion of the second semi-annual groundwater monitoring event. Following receipt and incorporation of Ecology's comments to DFAR Remedial Investigation Report, a draft for public review (DPR) of the Remedial Investigation Report will be uploaded to the EAGL database within 45 days of Ecology approval of the DFAR Remedial Investigation Report.

A final Remedial Investigation Report, including Ecology's comments to the DFAR Remedial Investigation Report will be uploaded to the EAGL database within 45 days following receipt of final comments to the DPR Remedial Investigation Report.



8.0 REFERENCES

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9.0 LIMITATIONS

9.1 GENERAL LIMITATIONS

The conclusions contained in this report/assessment are based on professional opinions with regard to the subject matter. These opinions have been arrived at in accordance with currently accepted hydrogeologic and engineering standards and practices applicable to this location. The conclusions contained herein are subject to the following inherent limitations:

- **Accuracy of Information.** Farallon obtained, reviewed, and evaluated certain information used in this report/assessment from sources that were believed to be reliable. Farallon's conclusions, opinions, and recommendations are based in part on such information. Farallon's services did not include verification of its accuracy or authenticity. Should the information upon which Farallon relied prove to be inaccurate or unreliable, Farallon reserves the right to amend or revise its conclusions, opinions, and/or recommendations.
- **Reconnaissance and/or Characterization.** Farallon performed a reconnaissance and/or characterization of the Site that is the subject of this report/assessment to document current conditions. Farallon focused on areas deemed more likely to exhibit hazardous materials conditions. Contamination may exist in other areas of the Site that were not investigated or were inaccessible. Site activities beyond Farallon's control could change at any time after the completion of this report/assessment.

For the foregoing reasons, Farallon cannot and does not warrant or guarantee that the Site is free of hazardous or potentially hazardous substances or conditions, or that latent or undiscovered conditions will not become evident in the future. Farallon's observations, findings, and opinions can be considered valid only as of the date of the report.

This report/assessment has been prepared in accordance with the contract for services between Farallon and the City of Issaquah, and currently accepted industry standards. No other warranties, representations, or certifications are made.

9.2 LIMITATION ON RELIANCE BY THIRD PARTIES

Reliance by third parties is prohibited. This report/assessment has been prepared for the exclusive use of the City of Issaquah to address the unique needs of the City of Issaquah at the MFRT Site at a specific point in time.

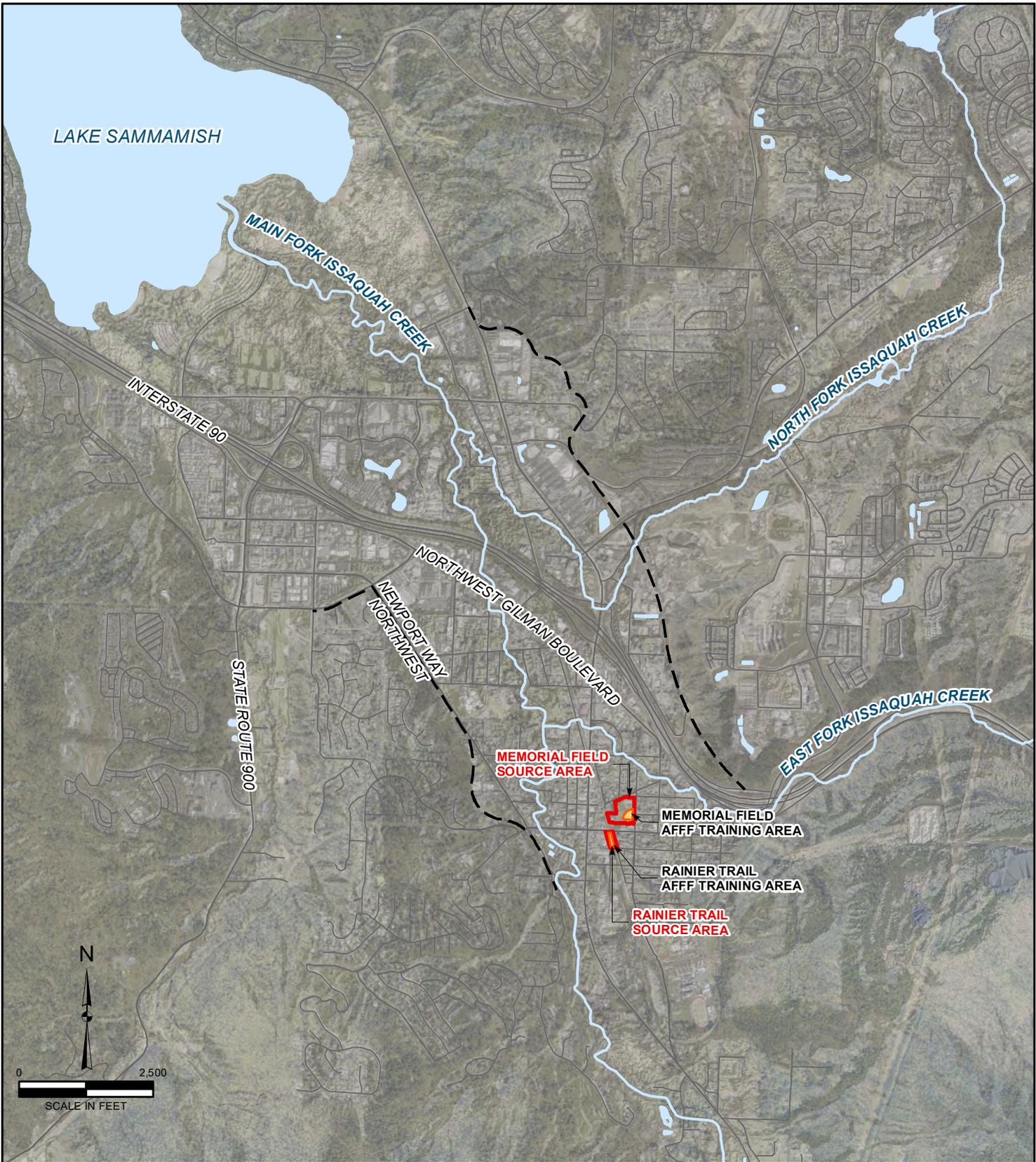


This is not a general grant of reliance. No one other than the City of Issaquah may rely on this report unless Farallon agrees in advance to such reliance in writing. Any unauthorized use, interpretation, or reliance on this report/assessment is at the sole risk of that party and Farallon will have no liability for such unauthorized use, interpretation, or reliance.

FIGURES

REMEDIAL INVESTIGATION WORK PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010



LEGEND

- CREEK
- - LOWER ISSAQUAH VALLEY
- SOURCE AREA
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA

MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE

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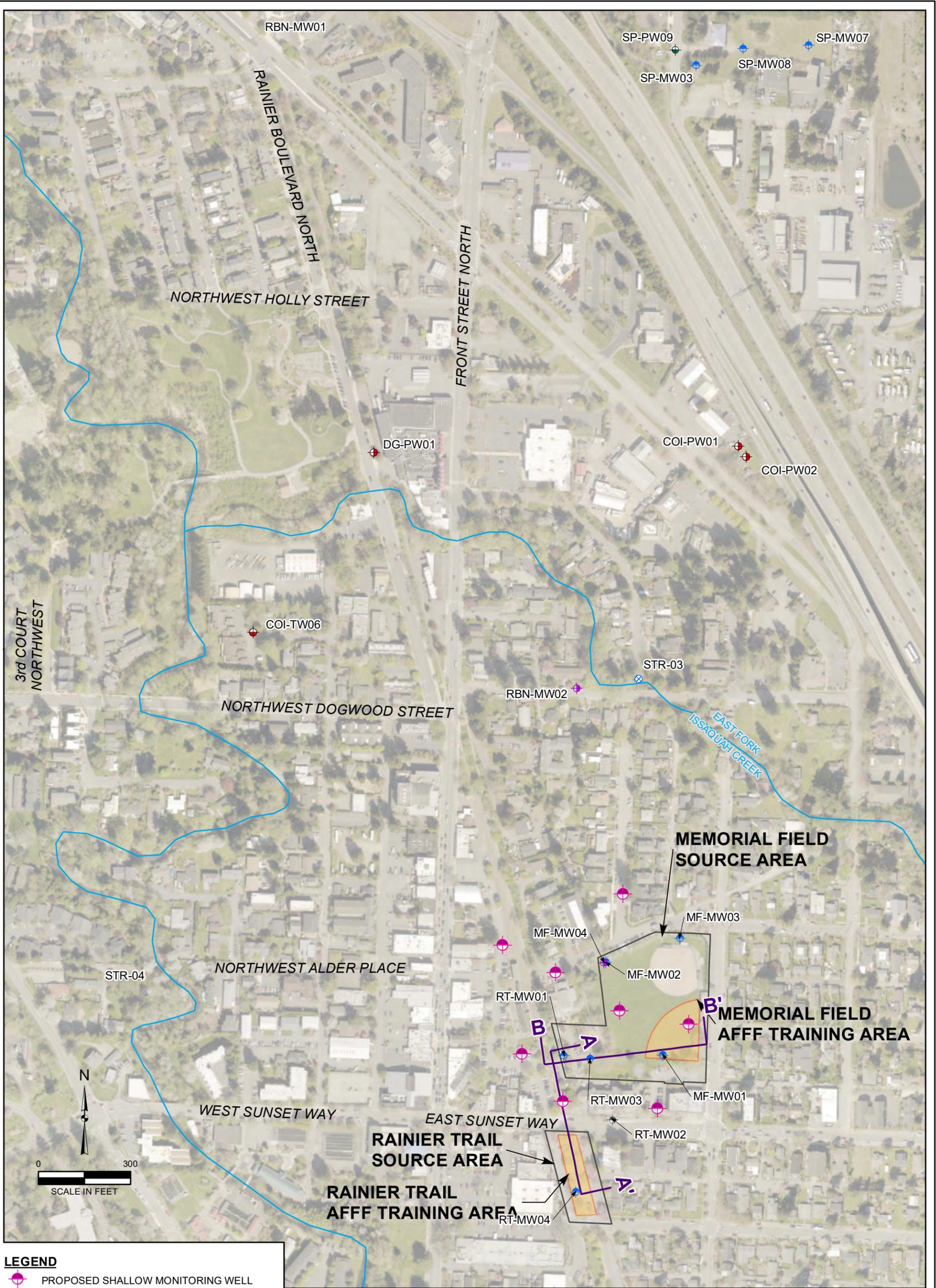
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FIGURE 1

LOWER ISSAQUAH VALLEY VICINITY MAP
MFRT SITE
105 2nd AVENUE NORTHEAST AND
PARCEL NUMBER 3424066043
ISSAQUAH, WASHINGTON

FARALLON PN: 821-010



LEGEND

- PROPOSED SHALLOW MONITORING WELL
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- STREAM GAUGING STATION
- INTERMEDIATE PRODUCTION WELL
- DEEP PRODUCTION WELL
- SHALLOW MONITORING WELL - DECOMMISSIONED
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFF) TRAINING AREA

LINE OF CROSS-SECTION

MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE

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
MFRT SITE PLAN
MFRT SITE
105 2nd AVENUE NORTHEAST AND
PARCEL NUMBER 3424066043
ISSAQUAH, WASHINGTON

FARALLON PN: 821-010

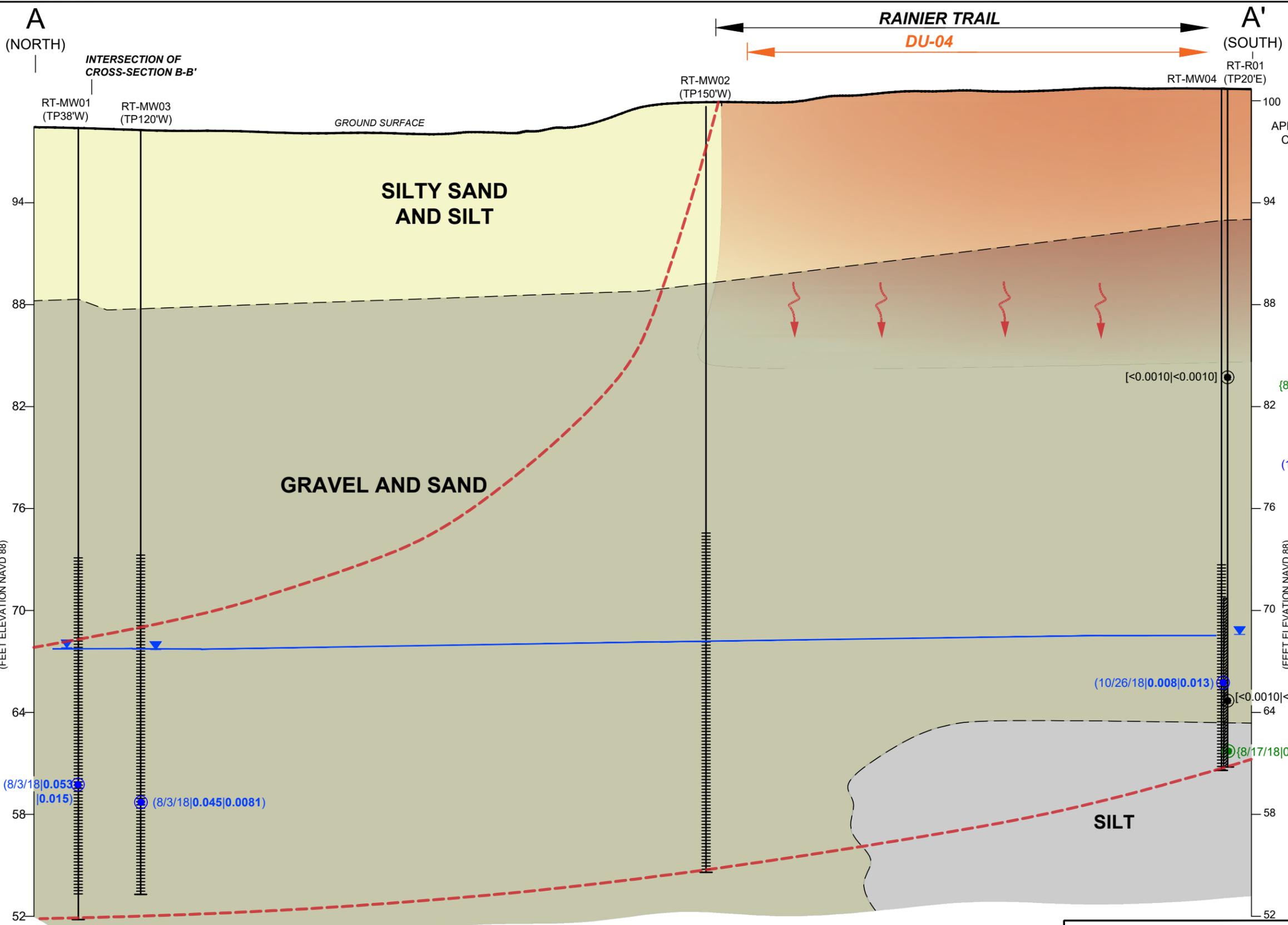
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LEGEND:

BORING, MONITORING WELL LOCATION
TRANPOSED (TP) EAST (E), OR WEST (W) TO CROSS-SECTION LINE

RT-MW02 (TP152'W)

STRATIGRAPHIC CONTACT, DASHED WHERE APPROXIMATE

APPROXIMATE EXTENT OF GROUNDWATER WITH PFAS CONCENTRATIONS THAT EXCEED SCREENING LEVEL

[SOIL SAMPLE]

(GROUNDWATER SAMPLE)

(RECONNAISSANCE GROUNDWATER SAMPLE)

GROUNDWATER ELEVATION

BLANK CASING

RECONNAISSANCE WELL SCREEN INTERVAL

WELL SCREEN INTERVAL

[<0.0010|<0.0010] SOIL ANALYTICAL RESULT [PFOS|PFOA] SOIL ANALYTICAL RESULTS IN MILLIGRAMS PER KILOGRAM (mg/kg)

{8/17/18|0.010|0.0098} RECONNAISSANCE GROUNDWATER SAMPLE DATE AND ANALYTICAL RESULT (DATE|PFOS|PFOA) GROUNDWATER ANALYTICAL RESULTS IN MICROGRAMS PER LITER (µg/l)

(10/26/18|0.008|0.013) GROUNDWATER SAMPLE DATE AND ANALYTICAL RESULT (DATE|PFOS|PFOA) GROUNDWATER ANALYTICAL RESULTS IN µg/l

< = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED

PFOS = PERFLUOROOCANE SULFONIC ACID
PFOA = PERFLUOROOCANOIC ACID
NAVD 88 = NORTH AMERICAN VERTICAL DATUM 1988
DU-04 = MULTI-INCREMENTAL SOIL SAMPLE DECISION UNIT

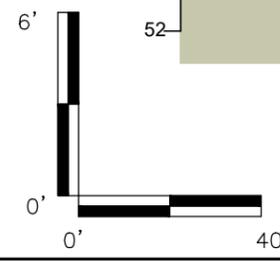
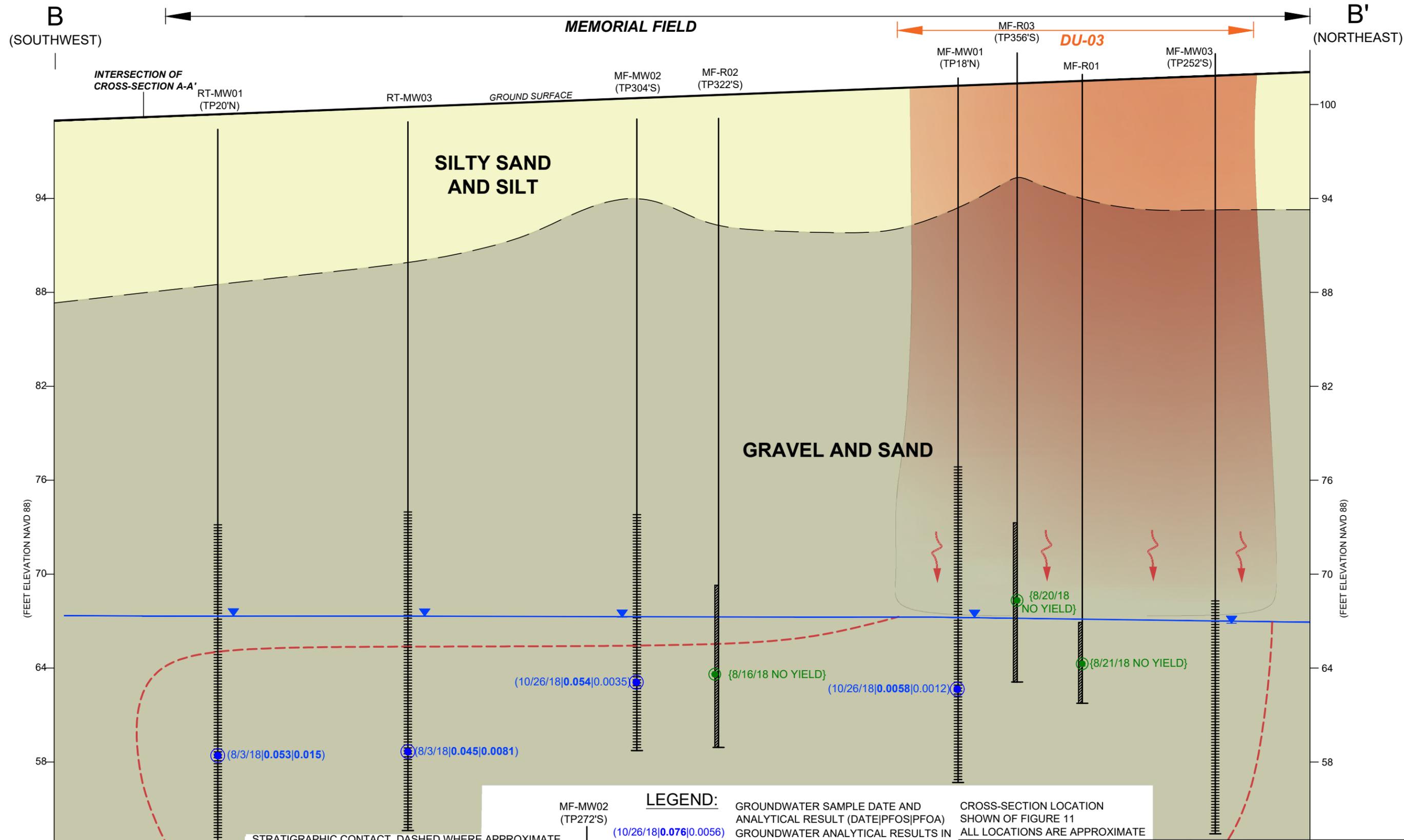
CROSS-SECTION LOCATION SHOWN OF FIGURE 11



FIGURE 3

CROSS-SECTION A-A'
MFRT SITE
105 2ND AVE NE AND PARCEL NO. 3424069043
ISSAQUAH, WASHINGTON

FARALLON PN: 821-010



BORING, MONITORING WELL LOCATION TRANSPOSED (TP) NORTH (N), OR SOUTH (S) TO CROSS-SECTION LINE

STRATIGRAPHIC CONTACT, DASHED WHERE APPROXIMATE APPROXIMATE EXTENT OF GROUNDWATER WITH PFAS CONCENTRATIONS THAT EXCEED SCREENING LEVEL

GROUNDWATER ELEVATION

BLANK CASING

(GROUNDWATER SAMPLE)

(RECONNAISSANCE GROUNDWATER SAMPLE)

RECONNAISSANCE WELL SCREEN INTERVAL

WELL SCREEN INTERVAL

LEGEND:

GROUNDWATER SAMPLE DATE AND ANALYTICAL RESULT (DATE|PFOS|PFOA)

GROUNDWATER ANALYTICAL RESULTS IN MICROGRAMS PER LITER (µg/l)

< = DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED

PFOS = PERFLUOROCTANE SULFONIC ACID

PFOA = PERFLUOROCTANOIC ACID

NAVD 88 = NORTH AMERICAN VERTICAL DATUM 1988

DU-03 = MULTI-INCREMENTAL SOIL SAMPLE DECISION UNIT

CROSS-SECTION LOCATION SHOWN OF FIGURE 11 ALL LOCATIONS ARE APPROXIMATE

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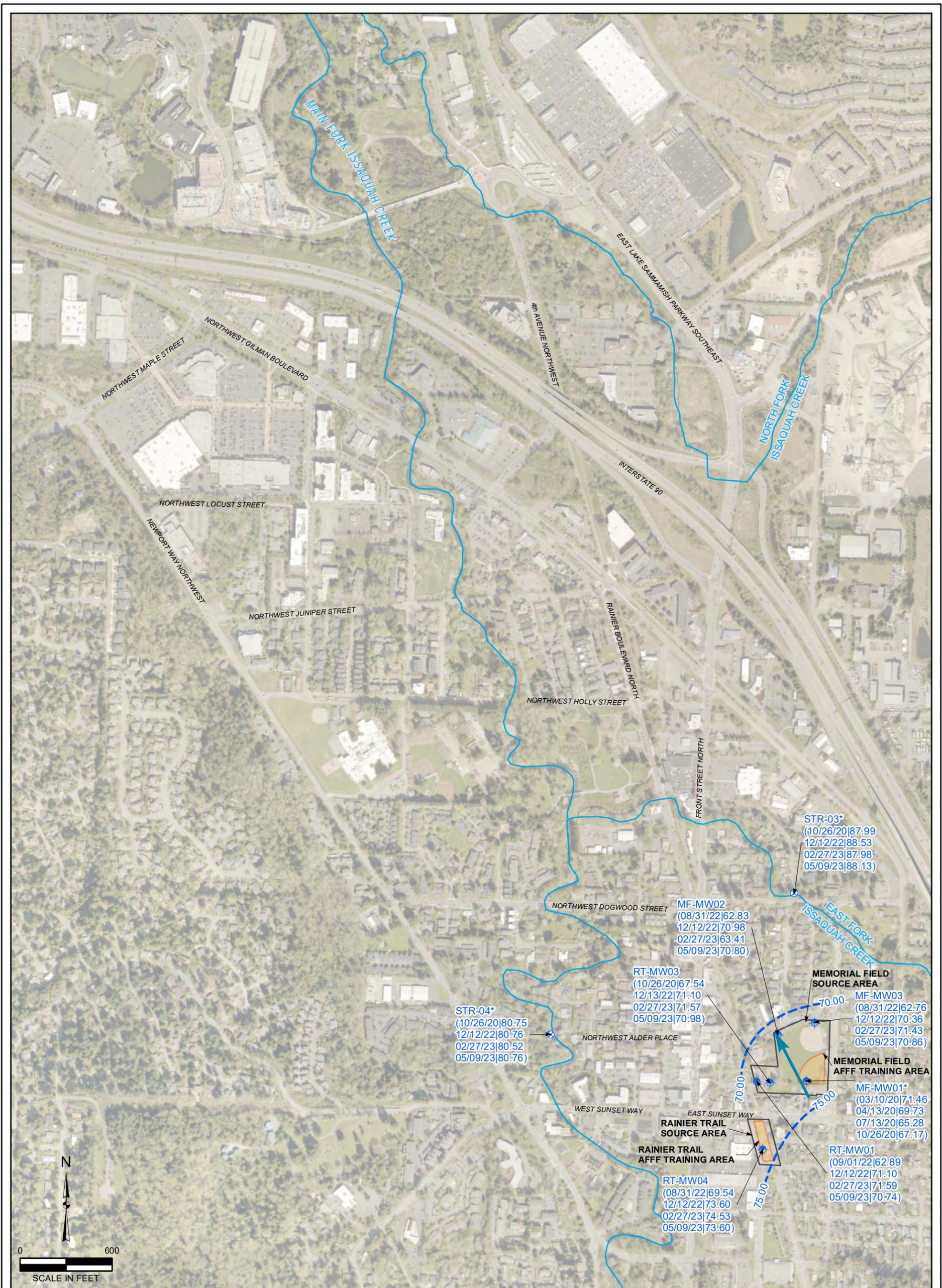
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FIGURE 4

CROSS-SECTION B-B'
MFRT SITE
105 2ND AVE NE AND PARCEL NO. 3424069043
ISSAQUAH, WASHINGTON

FARALLON PN: 821-010

Date: 8/19/2025 Disk Reference: 821-010_X-SEC



LEGEND

- SHALLOW MONITORING WELL
- STREAM GAUGING STATION
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFF) TRAINING AREA
- (10/26/20 | 80.75) GROUNDWATER ELEVATION SAMPLE DATE AND ELEVATION MEASURED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM 1988
- * GROUNDWATER ELEVATION NOT USED IN CONTOUR GENERATION
- GROUNDWATER ELEVATION CONTOUR (05/09/2023)
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- MFRT MEMORIAL FIELD AND RAINIER TRAIL SITE

NOTES:
 1. ALL LOCATIONS ARE APPROXIMATE.
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FIGURE 5

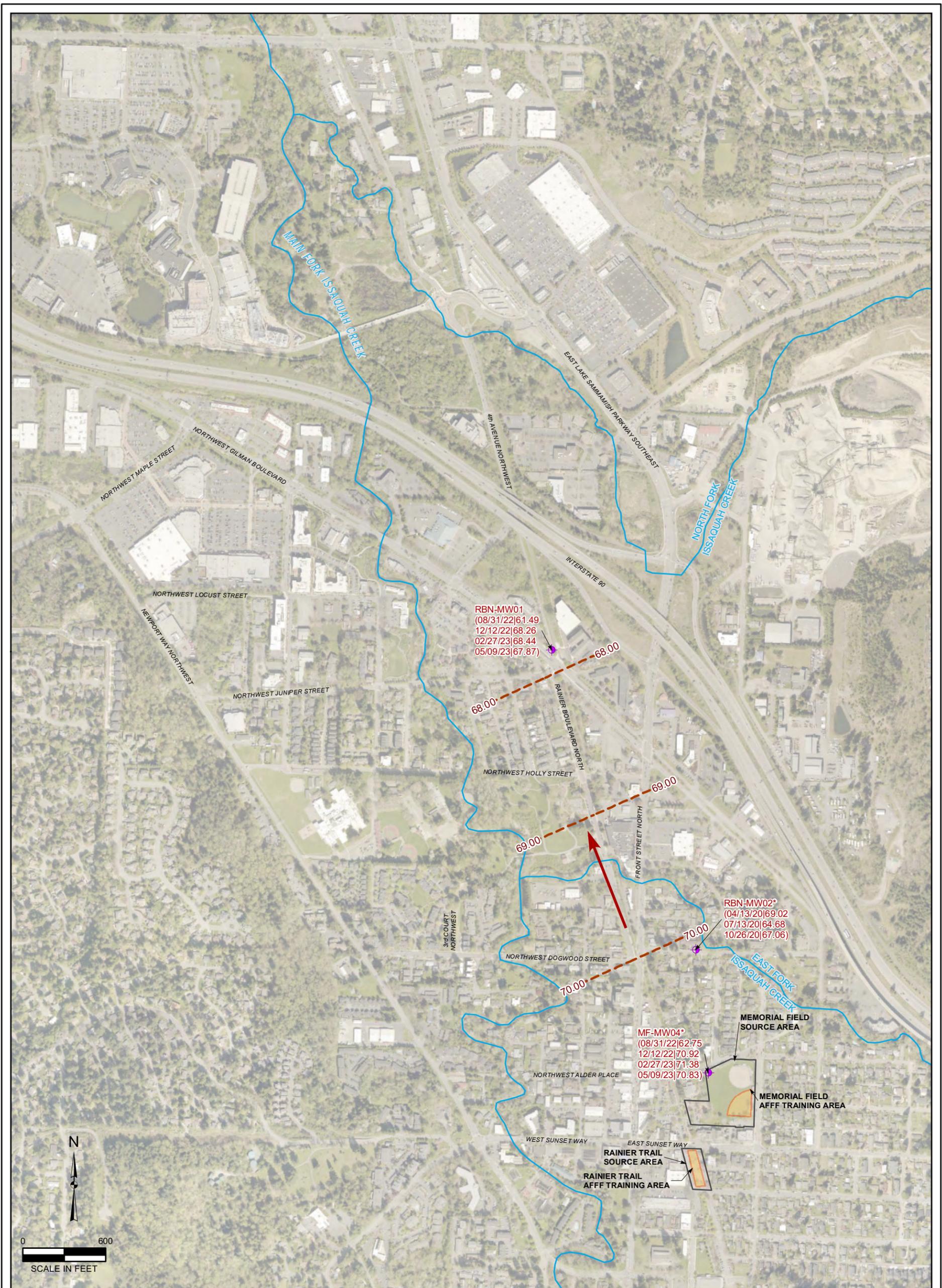
MFRT SITE GROUNDWATER ELEVATIONS - SHALLOW ZONE

MFRT SITE

105 2nd AVENUE NORTHEAST AND PARCEL NUMBER 3424066043

ISSAQUAH, WASHINGTON

FARALLON PN: 1754-006



LEGEND

-  INTERMEDIATE MONITORING WELL
-  LISTED SITE
-  AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- (8/31/22 | 62.75) GROUNDWATER ELEVATION SAMPLE DATE AND ELEVATION MEASURED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM 1988
- * GROUNDWATER ELEVATION NOT USED IN CONTOUR GENERATION
-  GROUNDWATER ELEVATION CONTOUR (05/09/2023)
-  APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- MFRT** MEMORIAL FIELD AND RAINIER TRAIL SITE

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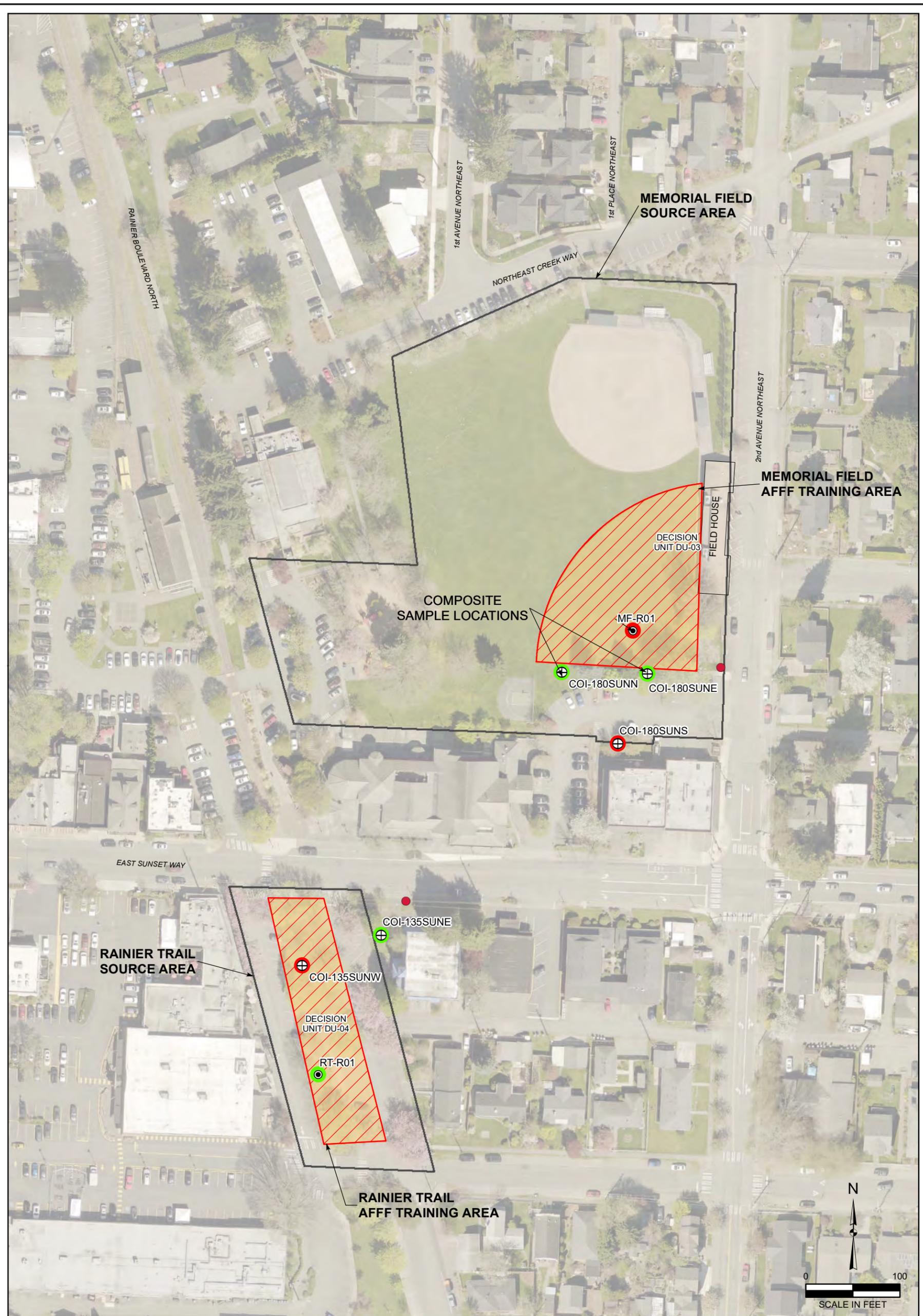
FIGURE 6

MFRT SITE GROUNDWATER ELEVATIONS - INTERMEDIATE AND DEEP ZONE MFRT SITE

105 2nd AVENUE NORTHEAST AND PARCEL NUMBER 3424066043 ISSAQUAH, WASHINGTON

FARALLON PN: 1754-006

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LEGEND

- ⊕ HAND AUGER SAMPLE LOCATION
- BORING
- DENOTES ALL PFAS REPORTED AS NOT DETECTED AT OR EXCEEDING THE LABORATORY REPORTING LIMIT
- DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS
- ▨ DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS WITHIN DECISION UNIT
- FIRE HYDRANT
- AQUEOUS FIREFIGHTING FOAM TRAINING AREA
- ▭ LISTED SITE
- MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE
- PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

NOTES:
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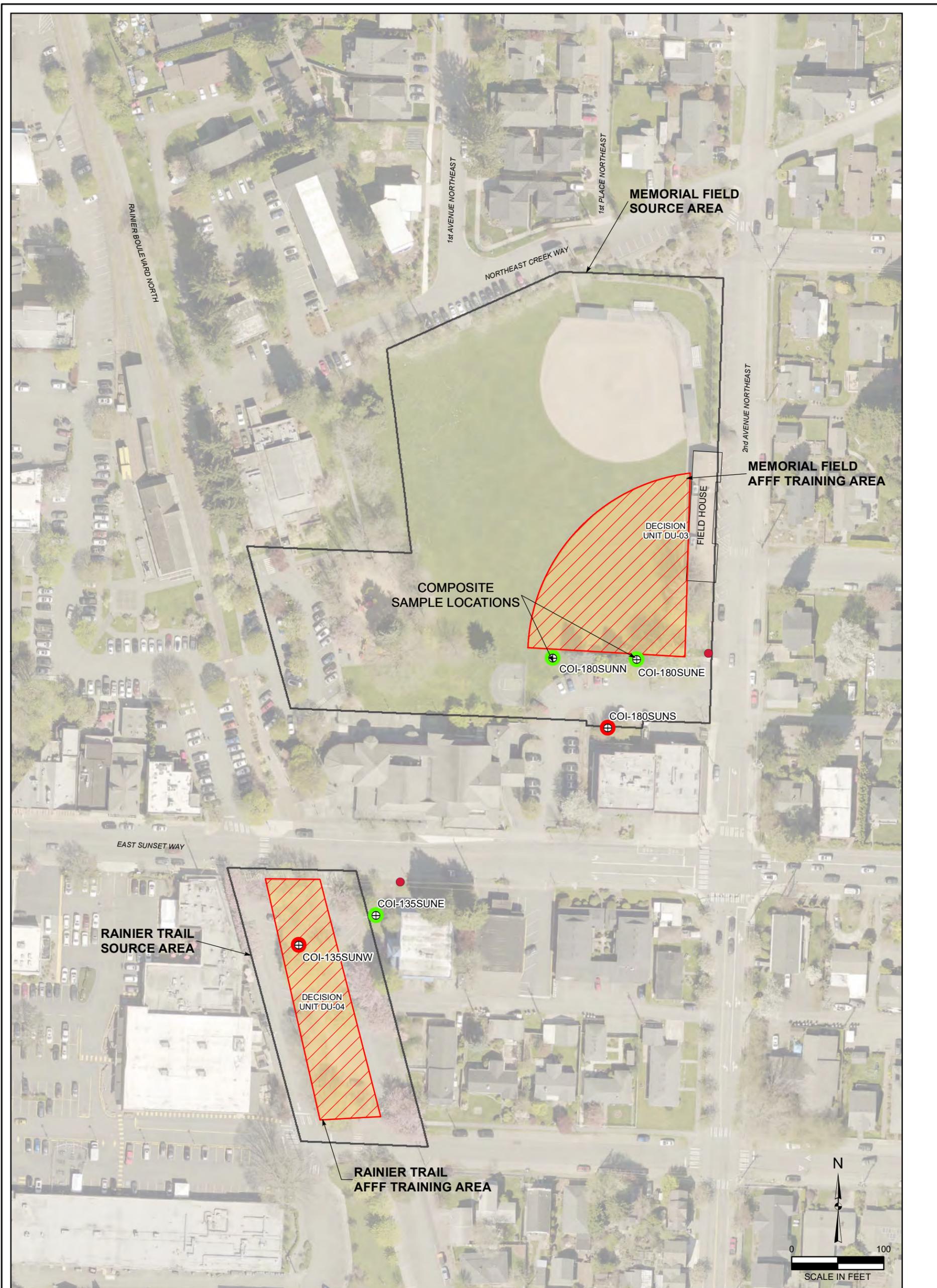
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FIGURE 7

MFRT SITE SOIL PFAS CONCENTRATIONS
 MFRT SITE
 105 2nd AVENUE NORTHEAST AND
 PARCEL NUMBER 3424066043
 ISSAQUAH, WASHINGTON

FARALLON PN: 821-010



LEGEND

- ⊕ HAND AUGER SAMPLE
- DENOTES ALL PFAS REPORTED AS NOT DETECTED AT OR EXCEEDING THE LABORATORY REPORTING LIMIT
- DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS
- ▨ DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS WITHIN DECISION UNIT
- FIRE HYDRANT
- AQUEOUS FIREFIGHTING FOAM TRAINING
- ▭ LISTED SITE
- BGS = BELOW GROUND SURFACE
- MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE
- PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

NOTES:
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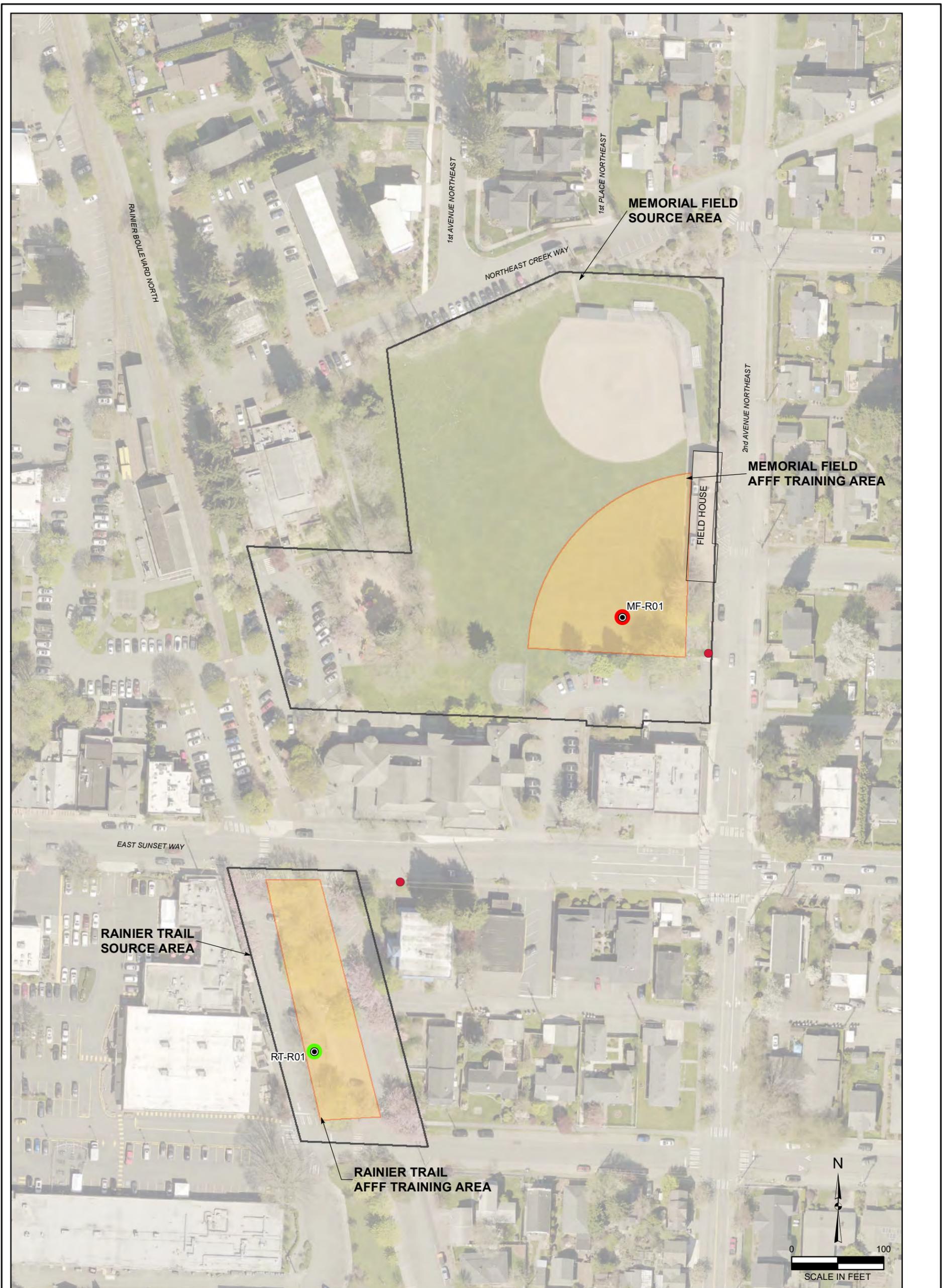
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FIGURE 8

MFRT SITE SOIL PFAS CONCENTRATIONS
 0-5 FEET BGS
 MFRT SITE
 105 2nd AVENUE NORTHEAST AND
 PARCEL NUMBER 3424066043
 ISSAQUAH, WASHINGTON

FARALLON PN: 821-010



LEGEND

- BORING
 - DENOTES ALL PFAS REPORTED AS NOT DETECTED AT OR EXCEEDING THE LABORATORY REPORTING LIMIT
 - DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS
 - FIRE HYDRANT
 - AQUEOUS FIREFIGHTING FOAM TRAINING
 - LISTED SITE
- BGS = BELOW GROUND SURFACE
 MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE
 PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

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FIGURE 9

MFRT SITE SOIL PFAS CONCENTRATIONS
 >15 FEET BGS
 MFRT SITE
 105 2nd AVENUE NORTHEAST AND
 PARCEL NUMBER 3424066043
 ISSAQUAH, WASHINGTON

FARALLON PN: 821-010

Drawn By: jjones

Checked By: SS

Date: 3/13/2025

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LEGEND

- DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS
- BORING
- ⊕ SHALLOW MONITORING WELL
- ⊕ INTERMEDIATE MONITORING WELL
- ⊕ INTERMEDIATE PRODUCTION WELL
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING

MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE
 PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

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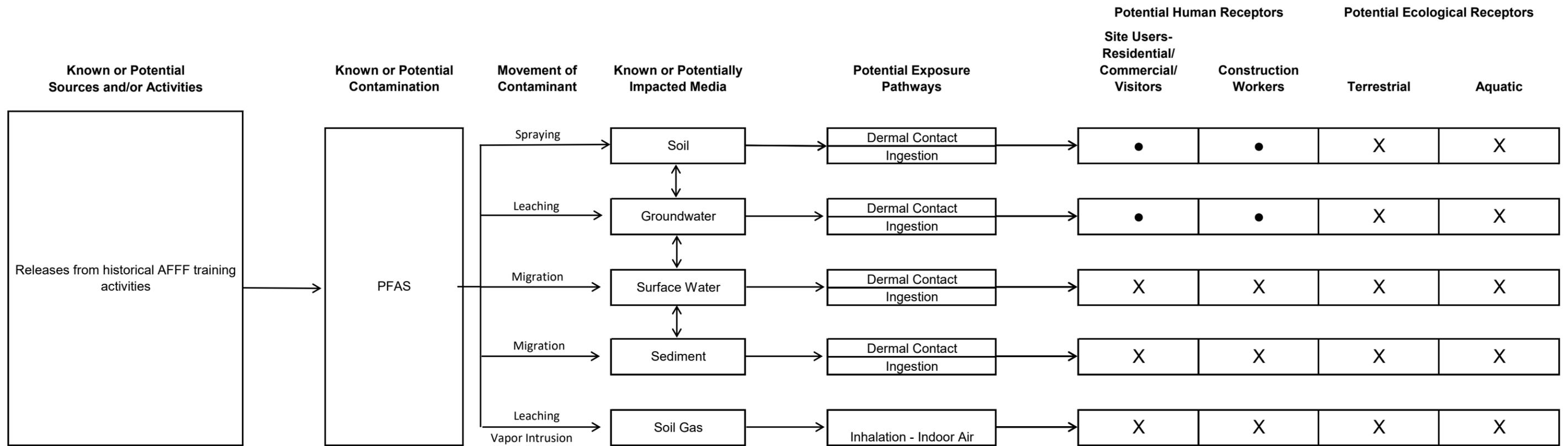
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FIGURE 10
 MFRT SITE PFAS
 GROUNDWATER CONCENTRATIONS
 MFRT SITE
 105 2nd AVENUE NORTHEAST AND
 PARCEL NUMBER 3424066043
 ISSAQUAH, WASHINGTON

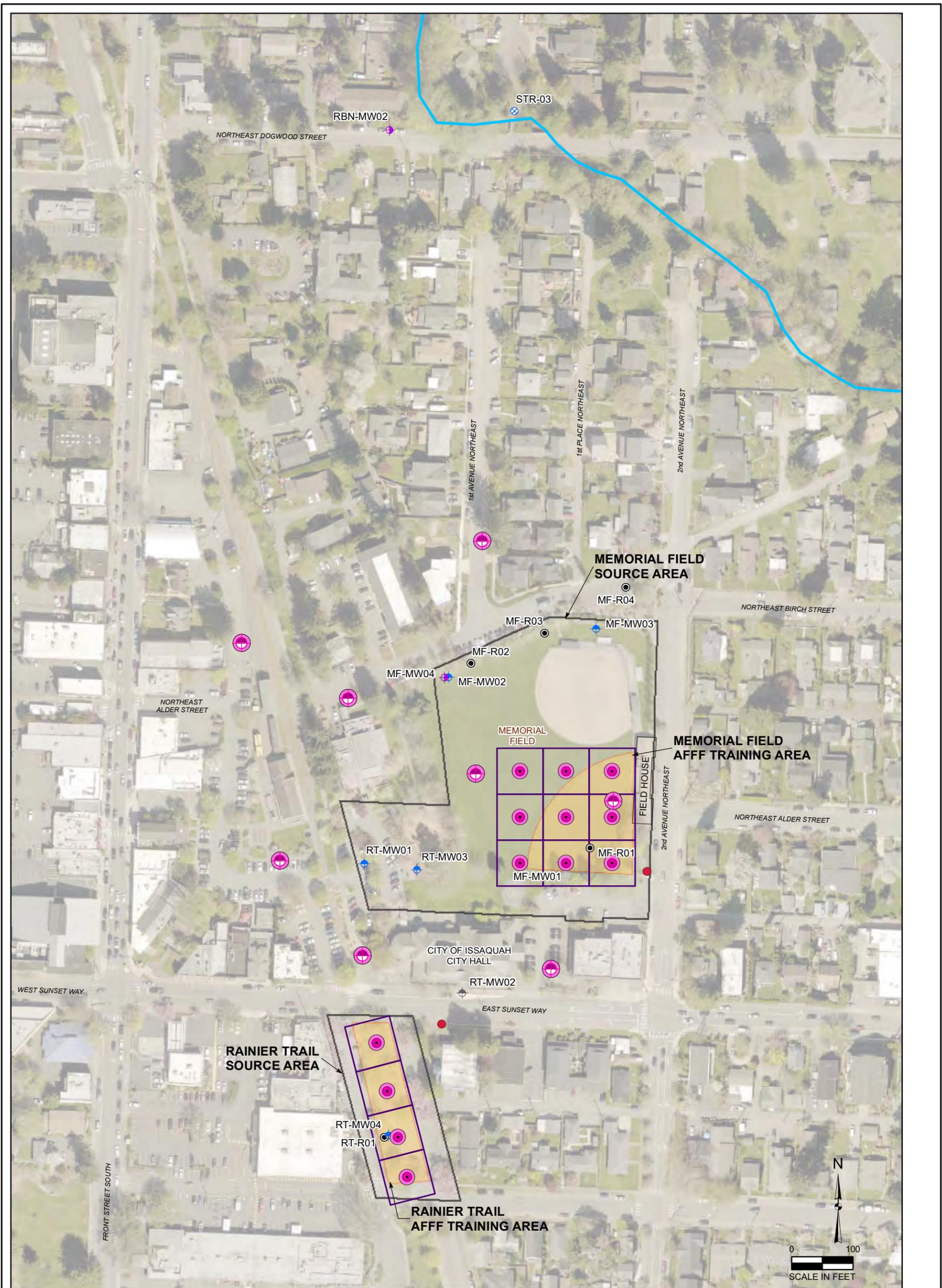
FARALLON PN: 821-010

Figure 11
Conceptual Site Model: MFRT Site



LEGEND:

X	Pathway is not complete. No evaluation required
Δ	Pathway is or may be complete off-site, but not on-site. No evaluation required.
○	Pathway is or may be complete, but is judged to be minor or unlikely. Quantitative data collection not required.
●	Pathway is or may be complete, collect quantitative data.



LEGEND

- PROPOSED HAND AUGER LOCATION
- ⊕ PROPOSED SHALLOW MONITORING WELL
- BORING
- ⊕ SHALLOW MONITORING WELL
- ⊕ INTERMEDIATE MONITORING WELL
- ⊗ STREAM GAUGING STATION
- ⊕ SHALLOW MONITORING WELL - DECOMMISSIONED
- FIRE HYDRANT
- SAMPLING GRID (75'x75')
- AQUEOUS FIREFIGHTING FOAM TRAINING AREA
- LISTED SITE

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



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Drawn By: Imurock Checked By: SS Date: 9/3/2025 Disc Reference:

FIGURE 12

**PROPOSED BORING AND MONITORING WELL LOCATIONS
 MFRT SITE
 105 2nd AVENUE NORTHEAST AND
 PARCEL NUMBER 3424066043
 ISSAQUAH, WASHINGTON**

FARALLON PN: 821-010

TABLES

**REMEDIAL INVESTIGATION WORK PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington**

Farallon PN: 821-010

**Table 1
Soil Screening Levels
MFRT Site
Issaquah, Washington
Farallon PN: 821-010**

Constituent of Potential Concern	Soil Screening Levels									
	Method B Direct Contact (mg/kg) ¹	Protection of Groundwater (mg/kg) ¹		Adjustment Factors	Proposed Soil Screening Level (mg/kg)		Maximum Reported Value (mg/kg)	Property	Sample Identification	Retained as Soil COPC
		Vadose Zone Protection of Groundwater	Saturated Zone Protection of Groundwater	Laboratory Method Reporting Limit (mg/kg)	Vadose Zone	Saturated Zone				
Per- and Polyfluoroalkyl Substances										
Perfluorobutanoic Acid (PFBA)	80	0.044	0.0029	0.00010	0.044	0.0029	0.010	Eastside Fire & Rescue	NWN-R10-200320-3.0	No
Perfluorobutane Sulfonic Acid (PFBS)	24	0.025	0.0017	0.00010	0.025	0.0017	0.025	Eastside Fire & Rescue	NWN-MW12-3	No
Perfluorohexanoic Acid (PFHxA)	40	0.035	0.0025	0.00010	0.035	0.0025	0.066	Eastside Fire & Rescue	NWN-R10-200320-3.0	Yes
Perfluorohexane Sulfonic Acid (PFHxS)	0.000032	0.00000004	0.000000026	0.00010	0.0001	0.0001	0.21	Eastside Fire & Rescue	NWN-MW12-3	Yes
Perfluorooctanoic Acid (PFOA)	0.000034	0.000025	0.0000016	0.00010	0.0001	0.0001	0.094	Eastside Fire & Rescue	NWN-MW10-3	Yes
Perfluorooctane Sulfonic Acid (PFOS)	0.008	0.000046	0.0000026	0.00010	0.0001	0.0001	3.6	Eastside Fire & Rescue	NWN-R19-3	Yes
Perfluorononanoic Acid (PFNA)	0.20	0.000089	0.0000053	0.00010	0.0001	0.0001	1.4	Eastside Fire & Rescue	NWN-R15-200319-5.0	Yes
Perfluorodecanoic Acid (PFDA)	0.00016	0.00000038	0.00000022	0.00010	0.0001	0.0001	0.013	Eastside Fire & Rescue	NWN-MW12-3	Yes
6:2 Fluorotelomer Sulfonic Acid (6:2 FTS)	16	0.074	0.004	0.00010	0.074	0.004	0.48	Eastside Fire & Rescue	NWN-R09-200320-3.0	Yes
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA/GenX)	0.24	0.00012	0.0000069	0.00010	0.00012	0.0001	0.0014	Eastside Fire & Rescue	NWN-R15-200319-10.0	Yes

NOTES:

Values highlighted in mint green are selected soil screening level.

Bold values exceed proposed screening level

¹Washington State Cleanup Levels and Risk Calculations (CLARC) under Washington State MTCA, Standard Method B and C Values for Soil from CLARC Master spreadsheet, <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC>.

COPC = constituent of potential concern

mg/kg = milligrams per kilogram

**Table 2
Groundwater Screening Levels
MFRT Site
Issaquah, Washington
Farallon PN: 821-010**

Constituent of Potential Concern	Groundwater Screening Levels							
	Method B Groundwater (µg/l) ¹	Federal Maximum Contaminant Levels (MCLs) (µg/l) ²	Adjustment Factors	Proposed Groundwater Screening Level (µg/l)	Reported Maximum Value (µg/l)	Property	Sample Identification	Retained as Groundwater COPC
			Laboratory Method Reporting Limit (µg/l)					
Per- and Polyfluoroalkyl Substances								
Perfluorobutanoic Acid (PFBA)	8.0	NE	0.0020	8.0	0.46	Eastside Fire & Rescue	NWN-MW44-102920	No
Perfluorobutane Sulfonic Acid (PFBS)	4.8	Note 2	0.0020	4.8	0.49	Eastside Fire & Rescue	NWN-MW07-121422	Yes
Perfluorohexanoic Acid (PFHxA)	8.0	NE	0.0020	8.0	1.6	Eastside Fire & Rescue	NWN-MW14-20220118	No
Perfluorohexane Sulfonic Acid (PFHxS)	0.0000064	0.01	0.0020	0.0020	2.0	Eastside Fire & Rescue	NWN-MW06-200417	Yes
Perfluorooctanoic Acid (PFOA)	0.000003	0.004	0.001	0.004	1.0	Eastside Fire & Rescue	NWN-MW12-20220118	Yes
Perfluorooctane Sulfonic Acid (PFOS)	0.0016	0.004	0.001	0.004	8.6	Eastside Fire & Rescue	NWN-MW06-200417	Yes
Perfluorononanoic Acid (PFNA)	0.04	0.01	0.0020	0.01	0.64	Eastside Fire & Rescue	NWN-MW07-20220118	Yes
Perfluorodecanoic Acid (PFDA)	0.000032	NE	0.0020	0.0050	0.14	Eastside Fire & Rescue	NWN-R06-200320-10.0W	Yes
6:2 Fluorotelomer Sulfonic Acid (6:2 FTS)	3.2	NE	0.0020	3.2	2.4	Eastside Fire & Rescue	NWN-MW12-20220118	No
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA/GenX)	0.024	0.01	0.0020	0.01	ND	---	---	No

NOTES:

Values highlighted in mint green are selected groundwater screening level.

Bold values exceed proposed screening level

--- denotes criteria is not applicable

NE = Not established

ND = reported non-detect at the laboratory method reporting limit

¹Washington State Cleanup Levels and Risk Calculations (CLARC) under Washington State MTCA, Standard Method B Values for Groundwater from CLARC Master spreadsheet, <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC>, unless otherwise noted.

²U.S. Environmental Protection Agency (EPA) National Primary Drinking Water Regulations, 40 Code of Federal Regulations Part 141. The EPA set a Hazard Index MCL of 1 for PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS to account for the combined and co-occurring levels of these PFAS in drinking water.

**Table 3
Monitoring Well Construction Details
MFRT Site
Issaquah, Washington
Farallon PN: 821-010**

Well ID	Previous Monitoring Well ID	Well Owner	Ground Surface Elevation (feet NAVD88)	Top of Casing Elevation (feet NAVD88)	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Screened Length (feet)	Screen Top Elevation (feet NAVD88)	Screen Bottom Elevation (feet NAVD88)
Water Production Wells									
COI-PW01	Well 1	City of Issaquah	NM	92.57	90	106	16	2.57	-13.43
COI-PW02	Well 2	City of Issaquah	NM	93.06	82	97	15	11.06	-3.94
COI-PW03	Well 3	City of Issaquah	NM	NM	77	102	25	---	---
COI-PW04	Well 4	City of Issaquah	NM	66.19	77	102	25	-10.81	-35.81
COI-PW05	Well 5	City of Issaquah	NM	67.16	323	405	82	-255.84	-337.84
COI-PW06	Well 6	City of Issaquah	NM	NM	323	405	82	---	---
SP-PW07	SPWSD Well 7	Sammamish Plateau	NM	70.19	82.6	146.9	64.3	-12.41	-76.71
SP-PW08	SPWSD Well 8	Sammamish Plateau	NM	73.94	105	179	74	-31.06	-105.06
SP-PW09	SPWSD Well 9	Sammamish Plateau	NM	77.65	194	219	25	-116.35	-141.35
DG-PW01	ABY249	Darigold	NM	85.29	81	96	15	4.29	-10.71
Resource Protection Monitoring Wells									
Rainier Trail Source Area									
RT-MW01	MW-01	City of Issaquah	99.13	98.67	25	45	20	73.67	53.67
RT-MW03	MW-02	City of Issaquah	99.39	99.06	25	45	20	74.06	54.06
RT-MW04	---	Eastside Fire & Rescue	101.00	100.76	28	38	10	72.76	62.76
Memorial Field Source Area									
MF-MW01	---	Eastside Fire & Rescue	102.88	102.57	25	45	20	77.57	57.57
MF-MW02	---	Eastside Fire & Rescue	100.16	99.51	25	40	15	74.51	59.51
MF-MW03	---	Eastside Fire & Rescue	104.36	104.17	35	50	15	69.17	54.17
MF-MW04	---	Eastside Fire & Rescue	100.32	99.94	65	75	10	34.94	24.94
Lower Issaquah Valley Regional Wells									
RBN-MW01	---	Eastside Fire & Rescue	74.5	74.24	70	80	10	4.24	-5.76
RBN-MW02	---	Eastside Fire & Rescue	99.56	99.01	70	80	10	29.01	19.01
SP-MW01-1	SPVT1-1	Sammamish Plateau	73.16	NM	28	38	10	45.16	35.16
SP-MW01-2	SPVT1-2	Sammamish Plateau	73.16	NM	70	80	10	3.16	-6.84
SP-MW01-3	SPVT1-3	Sammamish Plateau	73.16	NM	150	160	10	-76.84	-86.84
SP-MW02-1	SPVT2-1	Sammamish Plateau	59.35	59.4	19	24	5	40.35	35.35
SP-MW02-2	SPVT2-2	Sammamish Plateau	61.87	61.8	34	39	5	27.87	22.87
SP-MW02-3	SPVT2-3	Sammamish Plateau	62.14	62.0	74	79	5	-11.86	-16.86
SP-MW07-1	SP7-1	Sammamish Plateau	72.3	NM	35	58	23	37.3	14.3
SP-MW07-2	SP7-2	Sammamish Plateau	72.3	NM	135	220	85	-62.7	-147.7
SP-MW07-3	SP7-3	Sammamish Plateau	70.1	72.1	85	150	65	-14.9	-79.9

NOTES:

— denotes not applicable.

bgs = below ground surface
NAVD88 = North American Vertical Datum of 1988
NM = not measured

Table 4
Summary of Groundwater Elevation Data
MFRT Site
Issaquah, Washington
Farallon PN: 821-010

Location	Zone	Date Measured	Well Head Elevation (feet) ¹	Depth to Water (feet) ²	Groundwater Elevation (feet) ¹
Memorial Field Source Area					
MF-MW01	Shallow	10/26/2018	102.57	35.04	67.53
		3/10/2020		31.11	71.46
		4/13/2020		32.84	69.73
		7/13/2020		37.29	65.28
		10/26/2020		35.40	67.17
		8/31/2022		NM	---
		12/12/2022		NM	---
		2/27/2023		NM	---
MF-MW02	Shallow	10/26/2018	99.51	32.06	67.45
		3/10/2020		28.29	71.22
		4/13/2020		29.95	69.56
		7/13/2020		34.30	65.21
		10/26/2020		32.50	67.01
		8/31/2022		36.68	62.83
		12/12/2022		28.53	70.98
		2/27/2023		36.10	63.41
		5/9/2023		28.71	70.80
MF-MW03	Shallow	10/25/2018	104.17	36.80	67.37
		3/10/2020		32.95	71.22
		4/13/2020		34.62	69.55
		7/13/2020		39.03	65.14
		10/26/2020		36.71	67.46
		8/31/2022		41.41	62.76
		12/12/2022		33.81	70.36
		2/27/2023		32.74	71.43
		5/9/2023		33.31	70.86
MF-MW04	Intermediate	4/13/2020	99.94	30.43	69.51
		7/13/2020		34.81	65.13
		10/26/2020		32.55	67.39
		8/31/2022		37.19	62.75
		12/12/2022		29.02	70.92
		2/27/2023		28.56	71.38
		5/9/2023		29.11	70.83

Table 4
Summary of Groundwater Elevation Data
MFRT Site
Issaquah, Washington
Farallon PN: 821-010

Location	Zone	Date Measured	Well Head Elevation (feet) ¹	Depth to Water (feet) ²	Groundwater Elevation (feet) ¹
Rainier Trail Source Area					
RT-MW01	Shallow	8/3/2018	98.67	35.58	63.09
		10/26/2018		31.08	67.59
		3/10/2020		27.20	71.47
		4/13/2020		28.97	69.70
		7/13/2020		33.32	65.35
		10/27/2020		31.02	67.65
		9/1/2022		35.78	62.89
		12/12/2022		27.57	71.10
		2/27/2023		27.08	71.59
		5/9/2023		27.93	70.74
RT-MW03	Shallow	8/3/2018	99.06	36.02	63.04
		10/26/2018		31.47	67.59
		3/10/2020		27.65	71.41
		4/13/2020		29.35	69.71
		7/13/2020		39.72	59.34
		10/26/2020		31.52	67.54
		8/31/2022		NM	---
		12/13/2022		27.96	71.10
		2/27/2023		27.49	71.57
		5/9/2023		28.08	70.98
RT-MW04	Shallow	10/26/2018	100.76	31.45	69.31
		3/10/2020		26.03	74.73
		4/13/2020		28.17	72.59
		7/13/2020		32.53	72.59
		10/26/2020		31.22	68.23
		8/31/2022		35.65	69.54
		12/12/2022		27.16	73.60
		2/27/2023		26.23	74.53
		5/9/2023		27.16	73.60

Table 4
Summary of Groundwater Elevation Data
MFRT Site
Issaquah, Washington
Farallon PN: 821-010

Location	Zone	Date Measured	Well Head Elevation (feet) ¹	Depth to Water (feet) ²	Groundwater Elevation (feet) ¹
Lower Issaquah Valley Regional Wells					
RBN-MW01	Intermediate	4/13/2020	74.24	7.43	66.81
		7/13/2020		10.90	63.34
		10/26/2020		8.75	65.49
		8/31/2022		12.75	61.49
		12/12/2022		5.98	68.26
		2/27/2023		5.80	68.44
		5/9/2023		6.37	67.87
RBN-MW02	Intermediate	4/13/2020	99.01	29.99	69.02
		7/13/2020		34.33	64.68
		10/26/2020		31.95	67.06
		12/12/2022		NM	---
		2/27/2023		NM	---
Lower Issaquah Valley Creek Monitoring Stations³					
STR-03	Creek	4/13/2020	95.53	7.41	88.12
		7/13/2020		7.63	87.90
		10/26/2020		7.54	87.99
		8/31/2022		NM	---
		12/12/2022		7.00	88.53
		2/27/2023		7.55	87.98
		5/9/2023		7.40	88.13
STR-04	Creek	4/13/2020	81.25	0.86	80.39
		7/13/2020		1.05	80.20
		10/26/2020		0.5	80.75
		8/31/2022	90.3	NM	---
		12/12/2022		9.54	80.76
		2/27/2023		9.78	80.52
		5/9/2023		9.54	80.76

NOTES:

--- denotes not available

¹ Elevations reported in North American Vertical Datum of 1988.

² In feet below top of well casing.

Farallon = Farallon Consulting, L.L.C.

NM = not measured

**Table 5
Soil Analytical Results for PFAS
MFRT Site
Issaquah, Washington
Farallon PN: 821-010**

Sample Location	Sampled By	Sample Date	Sample Identification	Sample Type	Zone	Sample Depth (feet) ¹	Analytical Results (milligrams per kilogram) ²									
							Perfluoro-butanoic Acid (PFBA)	Perfluorobutane Sulfonic Acid (PFBS)	Perfluoro-hexanoic Acid (PFHxA)	Perfluorohexane Sulfonic Acid (PFHxS)	Perfluoro-octanoic Acid (PFOA)	Perfluorooctane Sulfonic Acid (PFOS)	Perfluoro-nonanoic Acid (PFNA)	Perfluoro-decanoic Acid (PFDA)	6:2 Fluorotelomer Sulfonic Acid (6:2 FTS)	Hexafluoro-propylene Oxide Dimer Acid (HFPO-DA/GenX)
Rainier Trail Source Area																
COI-135SUNW	Geosyntec	12/15/2016	COI-135SUNW-20161215 (Soil Sample 1)	Discrete	Unsaturated	2.75	---	< 0.0022	< 0.00054	< 0.0022	0.00091	< 0.0022	< 0.00054	< 0.00054	---	---
COI-135SUNE	Geosyntec	12/15/2016	COI-135SUNE-20161215 (Soil Sample 2)	Discrete	Unsaturated	2.5	---	< 0.0022	< 0.00055	< 0.0022	< 0.00083	< 0.0022	< 0.00055	< 0.00055	---	---
DU-04	Farallon	8/13/2018	DU-04-COMPOSITE	MI	Unsaturated	0.0 - 0.5	0.00038 J	< 0.0010	0.00026 J	0.00024 J	0.00045 J	0.0018	< 0.0010	0.00076	< 0.0010	---
RT-R01	Farallon	8/17/2018	RT-01-180817-17	Discrete	Unsaturated	17.0	< 0.0010	< 0.0010	< 0.001	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	---
	Farallon	8/17/2018	RT-01-180817-36	Discrete	Saturated	36.0	< 0.0010	< 0.0010	< 0.001	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	---
Memorial Field Source Area																
COI-180SUNS	Geosyntec	12/15/2016	COI-180SUNS-20161215 (Soil Sample 3)	Discrete	Unsaturated	2.25	---	< 0.0024	< 0.00059	< 0.0024	< 0.00089	< 0.0024	0.018	0.0023	---	---
COI-180SUNN & 180SUNE	Geosyntec	12/15/2016	COI-180SUNN & COI-180SUNE (Soil Sample 4)	MI	Unsaturated	2.1 - 2.4	---	< 0.002	< 0.00049	< 0.002	< 0.00073	< 0.002	< 0.00049	< 0.00049	---	---
DU-03	Farallon	8/10/2018	DU-03-COMPOSITE	MI	Unsaturated	0.0 - 0.5	0.00093 J	< 0.0010	0.00052 J	0.0020	0.0010	0.014	0.0018	0.00076	< 0.0010	---
MF-R01	Farallon	8/21/2018	MF-R01-180821-17.0	Discrete	Unsaturated	17.0	< 0.00097	< 0.00097	< 0.00097	0.00017 J	< 0.00097	0.0017	0.00033 J	< 0.00097	< 0.00097	---
	Farallon	8/21/2018	MF-R01-180821-29.0	Discrete	Unsaturated	29.0	< 0.00097	< 0.00097	0.0005 J	0.00033 J	< 0.00097	0.0011	< 0.00097	< 0.00097	< 0.00097	---
MTCA Method B Direct Contact Cleanup Levels for Soil³							80	24	40	0.000032	0.000034	0.008	0.20	0.00016	16	0.24
MTCA Method C Industrial Direct Contact Cleanup Levels for Soil³							3,500	1,100	1,800	0.0014	0.0045	0.35	8.8	0.0070	700	11
MTCA Cleanup Levels for Soil Protective of Groundwater Vadose @ 13 Degrees Celsius³							0.044	0.025	0.035	0.00000004	0.000025	0.000046	0.000089	0.00000038	0.074	0.00012
MTCA Cleanup Levels for Soil Protective of Groundwater Saturated³							0.0029	0.0017	0.0025	0.0000000026	0.0000016	0.0000026	0.0000053	0.000000022	0.004	0.0000069
Analytical Method Reporting Limit							0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001

NOTES:

Values **bolded** and highlighted in goldenrod exceed their applicable screening level.

Values highlighted in mint green are selected screening levels.

< denotes analyte not detected at or exceeding the reporting limit listed.

— denotes sample not analyzed.

¹Depth in feet below ground surface.

²Analyzed by EPA Method 537 Modified.

³Washington State Cleanup Levels and Risk Calculations (CLARC) under Washington State MTCA, Standard Method B and C Values for Soil from CLARC Master spreadsheet, <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC>, dated January 2025.

Farallon = Farallon Consulting, L.L.C.

Geosyntec = Geosyntec Consultants

J = result is an estimate

MI = multi-incremental

NE = not established

PFAS = per- and poly-fluoroalkyl substances

**Table 6
Groundwater Analytical Results for PFAS
MFRT Site
Issaquah, Washington
Farallon PN: 821-010**

Sample Location	Sampled By	Sample Date	Sample Identification	Sample Depth (feet) ¹	Analytical Results (micrograms per liter) ²									
					Perfluoro-butanoic Acid (PFBA)	Perfluorobutane Sulfonic Acid (PFBS)	Perfluoro-hexanoic Acid (PFHxA)	Perfluorohexane Sulfonic Acid (PFHxS)	Perfluoro-octanoic Acid (PFOA)	Perfluorooctane Sulfonic Acid (PFOS)	Perfluoro-nonanoic Acid (PFNA)	Perfluoro-decanoic Acid (PFDA)	6:2 Fluorotelomer Sulfonic Acid (6:2 FTS)	Hexafluoropropylene Oxide Dimer Acid (GenX)
Reconnaissance Groundwater Samples														
Memorial Field Source Area														
MF-MW04	Farallon	3/27/2020	MF-MW04-200327-58	58.0	0.0014 J	0.0031 J	< 0.0092	0.0031 J	0.0021	0.012	< 0.0044	< 0.0044	< 0.0044	< 0.0044
Rainier Trail Source Area														
RT-R01	Farallon	8/17/2018	RT-01-180817-39	39.0	0.0033 J	0.0026 J	0.0046	0.0030 J	0.0098	0.010	0.0021 J	< 0.0043	< 0.0043	---
Shallow Groundwater Monitoring Well Samples														
Memorial Field Source Area														
MF-MW01	Farallon	10/26/2018	MF-MW01-181026	39.0	< 0.0081	0.0031 J	< 0.0040	0.0052	0.0012 J	0.0058	0.0036 J	< 0.0040	< 0.0040	---
MF-MW02	Farallon	10/26/2018	MF-MW02-181026	36.0	< 0.0082	0.0091	0.0031 J	0.032	0.0035	0.054	0.026	0.00059 J	0.0092	---
	Farallon	4/14/2020	MF-MW02-200414	38.0	0.0017 J	0.014	< 0.0092	0.037	0.0052	0.12	0.063	< 0.0041	0.0099	< 0.0041
	Farallon	10/28/2020	MF-MW02-102820	40.0	0.0028 J	0.013	< 0.0092	0.043	0.0041	0.096	0.026	< 0.004	0.0039 J	< 0.0040
MF-MW03	Farallon	10/25/2018	MF-MW03-181025	43.0	< 0.0083	< 0.0042	0.0012 J	0.0015 J	0.0022	0.0039 J	< 0.0042	< 0.0042	0.0019 J	---
Rainier Trail Source Area														
RT-MW01	Farallon	8/3/2018	RT-MW01-180803	40.0	0.0076 J	0.013	0.014	0.032	0.015	0.053	0.0045	0.0065	< 0.0044	---
	Farallon	10/28/2020	RT-MW01-102820		0.0066	0.0084	0.0090 J	0.014	0.0097	0.026	0.0021 J	0.0027 J	0.00061 J	< 0.0042
RT-MW03	Farallon	8/3/2018	RT-MW03-180803	40.0	< 0.0082	0.0082	0.0059	0.029	0.0081	0.045	0.0015 J	< 0.0041	0.0099	---
RT-MW04	Farallon	10/26/2018	RT-MW04-181026	35.0	0.0035 J	0.0024 J	0.0061	0.0026 J	0.013	0.0080	0.0019 J	< 0.0042	< 0.0042	---
	Farallon	4/14/2020	RT-MW04-200414	33.0	0.0066	0.0035 J	< 0.0092	0.0032 J	0.0086	0.0087	0.0013 J	< 0.004	< 0.004	< 0.0040
Intermediate and Deep Groundwater Monitoring Well Samples														
Lower Issaquah Valley Regional Wells														
DG-PW01	Geosyntec	5/4/2016	DARIGOLD-ABY249-050416	81-96	---	0.0032	< 0.0025	0.0088	< 0.0025	0.0064	< 0.0025	< 0.0025	---	---
	Geosyntec	5/4/2016	DARIGOLD-ABY249-050416-DUP		---	0.0032	< 0.0025	0.0085	< 0.0025	0.007	< 0.0025	< 0.0025	---	---
RBN-MW01	Farallon	4/14/2020	RBN-MW01-200414	75.0	0.00043 J	0.0044	< 0.0092	0.0076	0.0016	0.014	0.0039 J	< 0.0040	0.00067 J	< 0.0040
	Farallon	7/14/2020	RBN-MW01-200714	74.0	< 0.0042	0.0042 J	< 0.0092	0.0045	< 0.0017	0.0020 J	< 0.0042	< 0.0042	< 0.0042	< 0.0042
	Farallon	10/28/2020	RBN-MW01-102820		< 0.0045	0.0052	< 0.0092	0.0038 J	0.00052 J	0.0016 J	< 0.0045	< 0.0045	< 0.0045	< 0.0045
Memorial Field Source Area														
MF-MW04	Farallon	4/14/2020	MF-MW04-200414	70.0	0.0012 J	0.0028 J	< 0.0092	0.0023 J	0.0018	0.0046	< 0.0040	< 0.0040	0.0021 J	< 0.0040
	Farallon	7/14/2020	MF-MW04-200714		0.00075 J	0.0015 J	< 0.0092	< 0.0039	0.0010 J	0.0014 J	< 0.0039	< 0.0039	< 0.0039	< 0.0039
	Farallon	10/28/2020	MF-MW04-102820		0.0016 J	0.0039 J	< 0.0092	0.0034 J	0.0012 J	0.0031 J	< 0.0042	< 0.0042	< 0.0042	< 0.0042
Rainier Trail Source Area														
RBN-MW02	Farallon	4/14/2020	RBN-MW02-200414	75.0	0.0010 J	0.0038 J	< 0.0092	0.0026 J	0.0031	0.0054	< 0.0041	< 0.0041	< 0.0041	< 0.0041
	Farallon	7/14/2020	RBN-MW02-200714		0.0018 J	0.0043	< 0.0092	0.0034 J	0.0046	0.0049	< 0.0042	< 0.0042	< 0.0042	< 0.0042
	Farallon	10/28/2020	RBN-MW02-102820		0.003 J	0.0043 J	< 0.0092	0.0058	0.0064	0.0063	< 0.0043	< 0.0043	< 0.0043	< 0.0043
MTCA Method B Groundwater Cleanup Levels³					8.0	4.8	8.0	0.0000064	0.000003	0.0016	0.04	0.000032	3.2	0.024
Federal Maximum Contaminant Levels (MCLs)⁴					NE	Note 4	NE	0.01	0.004	0.004	0.01	NE	NE	0.01

NOTES:

Results in **bold** denote concentrations exceeding applicable MCLs and/or Cleanup Levels.

< denotes analyte not detected at or above the reporting limit listed.

— denotes sample not analyzed or information unknown.

¹Depth in feet below ground surface.

²Analyzed by U.S. Environmental Protection Agency (EPA) Method 537 Modified.

³Washington State Cleanup Levels and Risk Calculations (CLARC) under Washington State Model Toxics Control Act Cleanup Regulation (MTCA), Standard Method B Values for Groundwater from CLARC Master spreadsheet, <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC>, dated January 2025.

⁴U.S. Environmental Protection Agency (EPA) National Primary Drinking Water Regulations, 40 Code of Federal Regulations Part 141. The EPA set a Hazard Index MCL of 1 for PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS to account for the combined and co-occurring levels of these PFAS in drinking water.

Farallon = Farallon Consulting, L.L.C.

J = result is an estimate

NE = not established

PFAS = per- and poly-fluoroalkyl substances

Table 7
Summary of Data Gaps and Scope of Work
MFRT Site
Issaquah, Washington
Farallon PN: 821-010

Location	Location Details	Task Element	Representative Sample		QA/QC Samples			Total Samples
			Sample Type	Sample Count	Trip Blanks	Equipment Blanks	Duplicates	
Memorial Field Source Area - Soil	Memorial Field AFFF Training Area	75x75' grid shallow hand auger sampling	Soil	14	1	1	1	17
		4 borings to 15ft bgs	Soil	12	1	1	1	15
Rainier Trail Source Area - Soil	Rainier Trail AFFF Training Area	75x75' grid shallow hand auger sampling	Soil	6	1	1	1	9
		1 boring to 15ft bgs	Soil	3	1	1	1	6
MFRT Site Groundwater Plume	Car Fire Locations	Investigation not warranted	--	--	--	--	--	--
	Memorial Field Source Area	2 Shallow Monitoring Wells (25-30ft bgs)	--	2	--	--	--	2
	Down-gradient of Rainier Trail Source Area	Shallow Monitoring Well (25-30ft bgs)	--	1	--	--	--	1
	Up-gradient of Memorial Field Source Area	Shallow Monitoring Well (25-30ft bgs)	--	1	--	--	--	1
	Four locations down- and cross-gradient of existing monitoring wells containing exceedances of PFAS	4 Shallow Monitoring Wells (25-30ft bgs)	--	--	--	--	--	--
	MFRT Site monitoring wells	2 semi-annual groundwater monitoring events at 9 existing monitoring wells and 8 proposed monitoring wells	Groundwater	34	6	4	4	48

APPENDIX A
AGREED ORDER NO. DE23251

REMEDIAL INVESTIGATION WORK PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010

State of Washington
Department of Ecology

In the Matter of Remedial Action by:
City of Issaquah
Agreed Order
No. DE 23521

To: Mary Lou Pauly
Mayor
P.O. Box 1307
Issaquah, WA 98027

1. Introduction	2
2. Jurisdiction	2
3. Parties Bound	2
4. Definitions	2
5. Findings of Fact	3
6. Ecology Determinations	4
7. Work to be Performed	5
8. Terms and Conditions	8
8.1 Payment of Remedial Action Costs	8
8.2 Designated Project Coordinators	8
8.3 Performance	9
8.4 Access	9
8.5 Sampling, Data Submittal, and Availability	10
8.6 Public Participation	11
8.7 Access to Information	12
8.8 Retention of Records	12
8.9 Resolution of Disputes	13
8.10 Extension of Schedule	14
8.11 Amendment of Order	15
8.12 Endangerment	16
8.13 Reservation of Rights	16
8.14 Transfer of Interest in Property	17
8.15 Compliance with Applicable Laws	17
8.16 Periodic Review	Error! Bookmark not defined.
8.17 Indemnification	19
9. Satisfaction of Order	19
10. Enforcement	19

Exhibit A Location Diagram

Exhibit B Scope of Work

1. Introduction

The mutual objective of the State of Washington, Department of Ecology (Ecology), and City of Issaquah (the City) under this Agreed Order (Order) is to provide for remedial action at facilities where there have been releases or threatened releases of hazardous substances. This Order the City (referred to as the PLP) to conduct a remedial investigation (RI) and feasibility study (FS) per WAC 173-340-350, WAC 173-340-351, and WAC 173-204-550. Ecology believes the actions required by this Order are in the public interest.

2. Jurisdiction

This Order is issued pursuant to the Model Toxics Control Act (MTCA), RCW 70A.305

3. Parties Bound

This Agreed Order shall apply to and be binding upon the Parties to this Order, their successors and assigns. The undersigned representative of each Party hereby certifies that he or she is fully authorized to enter into this Order and to execute and legally bind such Party to comply with this Order. The PLP agrees to undertake all actions required by the terms and conditions of this Order. No change in ownership or corporate status shall alter a PLP's responsibility under this Order. The PLP shall provide a copy of this Order to all agents, contractors, and subcontractors retained to perform work required by this Order, and shall ensure that all work undertaken by such agents, contractors, and subcontractors complies with this Order.

4. Definitions

Unless otherwise specified herein, the definitions set forth in RCW 70A.305, WAC 173-204 and WAC 173-340 shall control the meanings of the terms in this Order.

4.1 Site

The Site is referred to as Rainier Trail and Memorial Field (MFRT). The Site constitutes a facility under RCW 70A.305.020(8). The Site is defined by where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located. Based upon factors currently known to Ecology, the Site comprises source areas on two properties Memorial Field located at 105 2nd Avenue NE, Issaquah and Rainier Trail identified as Parcel 3424069043 with no address. Both locations are shown in Exhibit A.

4.2 Parties

Refers to the State of Washington, Department of Ecology and the City of Issaquah (the City).

4.3 Potentially Liable Person (PLP)

Refers to the City.

4.4 Agreed Order or Order

Refers to this Order and each of the exhibits to this Order. All exhibits are integral and enforceable parts of this Order.

5. Findings of Fact

Ecology makes the following findings of fact, without any express or implied admissions of such facts by the PLP:

5.1

Based upon factors currently known to Ecology, the Site is generally located in the vicinities of the following addresses:

- Memorial Field: 105 2nd Avenue NE, Issaquah (parcel 5279100070 at latitude 47.53106, longitude -122.03394).
- Rainier Trail: Parcel 3424069043 with no address, as shown in Exhibit A, approximately between E Sunset Way and SE Andrews Street.

5.2

The City conducted firefighting training exercises with aqueous film-forming foam containing perfluorooctane sulfonate (PFOS) and additional per- and poly-fluorinated alkyl substances (PFAS) at Memorial Field and Rainier Trail.

5.3

Between 2018 and the present, the City, in consultation with Eastside Fire & Rescue (EFR) and Ecology has conducted site characterization sampling of soil and groundwater at the Site. The following reports describe this work:

- Per- and Poly-Fluoroalkyl Substances Characterization Study Summary Report, Lower Issaquah Valley, Issaquah, Washington. Farallon Consulting. March 27, 2019.
- Per- and Poly-Fluoroalkyl Substances Additional Characterization Study Summary Report, Lower Issaquah Valley, Issaquah, Washington. Farallon Consulting. April 14, 2021.

5.4

Between 2020 and the present, the City has conducted groundwater modeling of the transport of PFAS in the Lower Issaquah Valley. The following reports describe this work:

- Groundwater Flow and PFAS Transport Modeling Report, Issaquah, Washington. Geosyntec Consultants. September 13, 2021.
- Preliminary Groundwater Flow Model Calibration, Lower Issaquah Valley. Geosyntec Consultants. December 30, 2022.
- Regional Conceptual Hydrogeological Model. Geosyntec Consultants. December 30, 2022.
- Groundwater Flow and Fate and Transport Model Calibration Report, Lower Issaquah Valley. Geosyntec Consultants. August 2023.

5.5

PFOS and additional PFAS have been detected at the Site in soil and in groundwater at concentrations exceeding MTCA cleanup levels. The groundwater plume has not yet been delineated.

6. Ecology Determinations

Ecology makes the following determinations, without any express or implied admissions of such determinations (and underlying facts) by the PLP.

6.1

The City is an “owner or operator” as defined in RCW 70A.305.020(22) of a “facility” as defined in RCW 70A.305.020(8).

6.2

Based upon all factors known to Ecology, a “release” or “threatened release” of “hazardous substance(s)” as defined in RCW 70A.305.020(32), (13), respectively, has occurred at the Site.

6.3

Based upon credible evidence, Ecology issued a PLP status letter to the City dated January 11, 2023, pursuant to RCW 70A.305.040, .020(26), and WAC 173-340-500. By letter dated March 27, 2023, the City voluntarily waived its rights to notice and comment and accepted Ecology’s determination that the City is a PLP under RCW 70A.305.040.

Ecology issued a PLP determination letter on November 14, 2023, naming the City as a PLP for the Site.

6.4

Pursuant to RCW 70A.305.030(1), .050(1), Ecology may require PLP to investigate or conduct other remedial actions with respect to any release or threatened release of hazardous substances, whenever it believes such action to be in the public interest. Based on the foregoing facts, Ecology believes the remedial actions required by this Order are in the public interest.

7. Work to be Performed

Based on the Findings of Fact and Ecology Determinations, it is hereby ordered that the PLP take the following remedial actions at the Site. These remedial actions must be conducted in accordance with WAC 173-340 and 173-204:

7.1

The PLP will complete a Remedial Investigation and Feasibility Study in accordance with the schedule and terms of the Scope of Work and Schedule, Exhibit B, and all other requirements of this Order. The following naming conventions shall be used for documents: Agency Review Draft (designation for the first time Ecology receives a document); Public Review Draft (designates a document ready for public comment); and Final (designation for a document after public comment and Ecology approval).

7.2

If the PLP learns of a significant change in conditions at the Site, including but not limited to a statistically significant increase in contaminant and/or chemical concentrations in any media, the PLP, within seven (7) days of learning of the change in condition, shall notify Ecology in writing of said change and provide Ecology with any reports or records (including laboratory analyses, sampling results) relating to the change in conditions.

7.3

The PLP shall submit to Ecology written monthly Progress Reports that describe the actions taken during the previous month to implement the requirements of this Order. All Progress Reports shall be submitted by the fifteenth (15th) day of the month in which they are due after the effective date of this Order. Unless otherwise specified by Ecology, Progress Reports and any other documents submitted pursuant to this Order shall be sent by email to Ecology's project coordinator. The Progress Reports shall include the following:

7.3.1

A list of on-site activities that have taken place during the month.

7.3.2

Detailed description of any deviations from required tasks not otherwise documented in project plans or amendment requests.

7.3.3

Description of all deviations from the Scope of Work and Schedule (Exhibit B) during the current month and any planned deviations in the upcoming month.

7.3.4

For any deviations in schedule, a plan for recovering lost time and maintaining compliance with the schedule.

7.3.5

All raw data (including laboratory analyses) received during the previous quarter (if not previously submitted to Ecology), together with a detailed description of the underlying samples collected.

7.3.6

A list of deliverables for the upcoming month.

7.4

All plans or other deliverables submitted by the PLP for Ecology's review and approval under the Scope of Work and Schedule (Exhibit B) shall, upon Ecology's approval, become integral and enforceable parts of this Order. The PLP shall take any action required by such deliverable.

7.5

Under WAC 173-340-430, an interim action is a remedial action that is technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance, that corrects a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed, or that is needed to provide for completion of a site hazard assessment, remedial investigation/feasibility study, or design of a cleanup action plan.

Any Party may propose an interim action under this Order. If the Parties are in agreement concerning an interim action, the PLP shall prepare and submit to Ecology an Interim Action Work Plan (IAWP), including a scope of work and schedule, by the date

determined by Ecology. Ecology will provide public notice and opportunity to comment on the Interim Action Work Plan in accordance with WAC 173-340-600(16).

The PLP shall not conduct an interim action until Ecology approves a IAWP. Upon approval by Ecology, the IAWP becomes an integral and enforceable part of this Order, and the PLP is required to conduct the interim action in accordance with the approved IAWP. If the Parties are not in agreement, Ecology reserves its authority to require interim action(s) under a separate order or other enforcement action under RCW 70A.305, or to undertake interim action(s) itself.

7.6

If Ecology determines that the PLP has failed to make sufficient progress or failed to implement the remedial action, in whole or in part, Ecology may, after notice to the PLP, perform any or all portions of the remedial action or at Ecology's discretion allow the PLP opportunity to correct. In an emergency, Ecology is not required to provide notice to the PLP, or an opportunity for dispute resolution. The PLP shall reimburse Ecology for the costs of doing such work in accordance with Section 8.1 (Payment of Remedial Action Costs). Ecology reserves the right to enforce the requirements of this Order under Section 10 (Enforcement).

7.7

Except where necessary to abate an emergency situation or where required by law, the PLP shall not perform any remedial actions at the Sites outside those remedial actions required by this Order to address the contamination that is the subject of this Order, unless Ecology concurs, in writing, with such additional remedial actions pursuant to Section 8.11 (Amendment of Order). In the event of an emergency, or where actions are taken as required by law, the PLP must notify Ecology in writing of the event and remedial action(s) planned or taken as soon as practical but no later than within twenty-four (24) hours of the discovery of the event.

7.8

Ecology hereby incorporates into this Order the previous remedial actions described in Section 5 (Findings of Fact). Reimbursement for specific project tasks under a grant agreement with Ecology is contingent upon a determination by Ecology's Toxics Cleanup Program that the retroactive costs are eligible under WAC 173-332A-320(6), the work performed complies with the substantive requirements of WAC 173-340, and the work is consistent with the remedial actions required under this Order. The costs associated with Ecology's determination on the past independent remedial actions described in Section 5 (Findings of Fact), are recoverable under this Order.

8. Terms and Conditions

8.1 Payment of Remedial Action Costs

The PLP shall pay to Ecology costs incurred by Ecology pursuant to this Order and consistent with WAC 173-340-550(2). These costs shall include work performed by Ecology or its contractors for, or on, the Site under RCW 70A.305, including remedial actions and Order preparation, negotiation, oversight, and administration. These costs shall include work performed both prior to and subsequent to the issuance of this Order. Ecology's costs shall include costs of direct activities and support costs of direct activities as defined in WAC 173 340 550(2).

Ecology has accumulated a total of \$40,517.09 in remedial action costs related to this Site as of 10/31/2024. For all Ecology costs incurred, the PLP shall pay the required amount within thirty (30) days of receiving from Ecology an itemized statement of costs that includes a summary of costs incurred, an identification of involved staff, the amount of time spent by involved staff members on the project, and a description of the activities conducted by involved staff including attorneys. Itemized statements shall be prepared quarterly. Pursuant to WAC 173-340-550(4), failure to pay Ecology's costs within ninety (90) days of receipt of the itemized statement of costs will result in interest charges at the rate of twelve percent (12%) per annum, compounded monthly.

In addition to other available relief, pursuant to RCW 19.16.500, Ecology may utilize a collection agency and/or, pursuant to RCW 70A.305.060, file a lien against real property subject to the remedial actions to recover unreimbursed remedial action costs.

8.2 Designated Project Coordinators

The project coordinator for Ecology is:

Brett T. Carp, Aquatics Unit Supervisor
P.O. Box 330316
Shoreline, WA 98133
(206) 594-0094
brett.carp@ECY.WA.GOV

The project coordinator for the PLP is:

Eric Buer, Principal Hydrogeologist
Farallon Consulting, L.L.C.
1809 7th Avenue, Suite 1111
Seattle, WA 98103
(206) 661-3536
ebuer@farallonconsulting.com

Each project coordinator shall be responsible for overseeing the implementation of this Order. Ecology's project coordinator will be Ecology's designated representative for the Site. To the maximum extent possible, communications between Ecology and the PLP, and all documents, including reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order shall be directed through the project coordinators. The project coordinators may designate, in writing, working level staff contacts for all or portions of the implementation of the work to be performed required by this Order.

Any Party may change its respective project coordinator. Written notification shall be given to the other Parties at least ten (10) calendar days prior to the change.

8.3 Performance

All geologic and hydrogeologic work performed pursuant to this Order shall be under the supervision and direction of a geologist or hydrogeologist licensed by the State of Washington or under the direct supervision of an engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43 and 18.220.

All engineering work performed pursuant to this Order shall be under the direct supervision of a professional engineer registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

All construction work performed pursuant to this Order shall be under the direct supervision of a professional engineer or a qualified technician under the direct supervision of a professional engineer. The professional engineer must be registered by the State of Washington, except as otherwise provided for by RCW 18.43.130.

Any documents submitted containing geologic, hydrogeologic, or engineering work shall be under the seal of an appropriately licensed professional as required by RCW 18.43 and 18.220.

The PLP shall notify Ecology in writing of the identity of any engineer(s) and geologist(s), contractor(s), subcontractor(s), and other key personnel to be used in carrying out the terms of this Order, in advance of their involvement at the Site.

8.4 Access

Ecology or any Ecology authorized representative shall have access to enter and freely move about all property at the Site that the PLP either own, control, or have access rights to at all reasonable times for the purposes of, inter alia: inspecting records, operation logs, and contracts related to the work being performed pursuant to this Order; reviewing the PLP's progress in carrying out the terms of this Order; conducting such tests or collecting such samples as Ecology may deem necessary; using a camera,

sound recording, or other documentary type equipment to record work done pursuant to this Order; and verifying the data submitted to Ecology by the PLP. Ecology or any Ecology authorized representative shall give reasonable notice before entering any Site property owned or controlled by the PLP unless an emergency prevents such notice. All persons who access the Sites pursuant to this section shall comply with any applicable health and safety plan(s). Ecology employees and their representatives shall not be required to sign any liability release or waiver as a condition of Site property access.

The PLP shall make best efforts to secure access rights for those properties within the Site not owned or controlled by the PLP where remedial activities or investigations will be performed pursuant to this Order. As used in this Section, "best efforts" means the efforts that a reasonable person in the position of the PLP would use so as to achieve the goal in a timely manner, including the cost of employing professional assistance and the payment of reasonable sums of money to secure access and/or use restriction agreements, as required by this Section. If, within 45 days after the effective date of this Order, the PLP are unable to accomplish what is required through "best efforts," they shall notify Ecology, and include a description of the steps taken to comply with the requirements. If Ecology deems it appropriate, it may assist the PLP, or take independent action, in obtaining such access and/or use restrictions. Ecology reserves the right to seek payment from the PLP for all costs, including cost of attorneys' time, incurred by Ecology in obtaining such access or agreements to restrict land, water, or other resource use.

8.5 Sampling, Data Submittal, and Availability

With respect to the implementation of this Order, the PLP shall make the results of all sampling, laboratory reports, and/or test results generated by them or on their behalf available to Ecology. Pursuant to WAC 173-340-840(5), all sampling data shall be submitted to Ecology in both printed and electronic formats in accordance with Section 7 (Work to be Performed), Ecology's Toxics Cleanup Program Policy 840 (Data Submittal Requirements), and/or any subsequent procedures specified by Ecology for data submittal.

If requested by Ecology, the PLP shall allow Ecology and/or its authorized representative to take split or duplicate samples of any samples collected by the PLP pursuant to implementation of this Order. The PLP shall notify Ecology seven (7) days in advance of any sample collection or work activity at the Site. Ecology shall, upon request, allow the PLP and/or their authorized representative to take split or duplicate samples of any samples collected by Ecology pursuant to the implementation of this Order, provided that doing so does not interfere with Ecology's sampling. Without limitation on Ecology's rights under Section 8.4 (Access), Ecology shall notify the PLP prior to any sample collection activity unless an emergency prevents such notice.

In accordance with WAC 173-340-830(4)(a), all hazardous substance analyses shall be conducted by a laboratory accredited under WAC 173-50 for the specific analyses to be conducted, unless otherwise approved by Ecology.

8.6 Public Participation

Ecology shall maintain the responsibility for public participation at the Site. However, the PLP shall cooperate with Ecology, and shall:

8.6.1

If agreed to by Ecology, develop appropriate mailing lists and prepare drafts of public notices and fact sheets at important stages of the remedial action, such as the submission of work plans, remedial investigation/feasibility study reports, cleanup action plans, and engineering design reports. As appropriate, Ecology will edit, finalize, and distribute such fact sheets and prepare and distribute public notices of Ecology's presentations and meetings.

8.6.2

Notify Ecology's project coordinator prior to the preparation of all press releases and fact sheets, and before meetings related to remedial action work to be performed at the Site with the interested public and/or local governments. Likewise, Ecology shall notify the PLP prior to the issuance of all press releases and fact sheets related to the Site, and before meetings related to the Site with the interested public and local governments. For all press releases, fact sheets, meetings, and other outreach efforts by the PLP that do not receive prior Ecology approval, the PLP shall clearly indicate to their audience that the press release, fact sheet, meeting, or other outreach effort was not sponsored or endorsed by Ecology.

8.6.3

When requested by Ecology, participate in public presentations on the progress of the remedial action at the Site. Participation may be through attendance at public meetings to assist in answering questions or as a presenter.

8.6.4

When requested by Ecology, arrange and maintain a repository to be located at:

Issaquah Library
10 W Sunset Way
Issaquah, WA 98027

At a minimum, copies of all public notices, fact sheets, and documents relating to public comment periods shall be promptly placed in these repositories. A copy of all documents related to this Site shall be maintained in the repository at Ecology's Northwest Regional Office in Shoreline, Washington.

8.7 Access to Information

The PLP shall provide to Ecology, upon request, copies of all records, reports, documents, and other information (including records, reports, documents, and other information in electronic form) (hereinafter referred to as "Records") within the PLP's possession or control or that of their contractors or agents relating to activities at the Site or to the implementation of this Order, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information regarding the work. The PLP shall also make available to Ecology, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the work.

Nothing in this Order is intended to waive any right the PLP may have under applicable law to limit disclosure of Records protected by the attorney work-product privilege and/or the attorney-client privilege. If the PLP withholds any requested Records based on an assertion of privilege, the PLP shall provide Ecology with a privilege log specifying the Records withheld and the applicable privilege. No Site-related data collected pursuant to this Order shall be considered privileged, including: (1) any data regarding the Site, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, radiological, biological, or engineering data, or the portion of any other record that evidences conditions at or around the Site; or (2) the portion of any Record that Respondents are required to create or generate pursuant to this Order.

Notwithstanding any provision of this Order, Ecology retains all of its information gathering and inspection authorities and rights, including enforcement actions related thereto, under any other applicable statutes or regulations.

8.8 Retention of Records

During the pendency of this Order, and for ten (10) years from the date of completion of the work performed pursuant to this Order, the PLP shall preserve all records, reports, documents, and underlying data in their possession relevant to the implementation of this Order and shall insert a similar record retention requirement into all contracts with project contractors and subcontractors.

8.9 Resolution of Disputes

8.9.1

In the event that the PLP elects to invoke dispute resolution the PLP must utilize the procedure set forth below.

- 8.9.1.1 Upon the triggering event (receipt of Ecology's project coordinator's written decision or an itemized billing statement), the PLP have fourteen (14) calendar days within which to notify Ecology's project coordinator in writing of their dispute (Informal Dispute Notice).
- 8.9.1.2 The Parties' project coordinators shall then confer in an effort to resolve the dispute informally. The Parties shall informally confer for up to fourteen (14) calendar days from receipt of the Informal Dispute Notice. If the project coordinators cannot resolve the dispute within those fourteen (14) calendar days, then within seven (7) calendar days Ecology's project coordinator shall issue a written decision (Informal Dispute Decision) stating: the nature of the dispute; the PLP' position with regards to the dispute; Ecology's position with regards to the dispute; and the extent of resolution reached by informal discussion.
- 8.9.1.3 The PLP may then request regional management review of the dispute. The PLP must submit this request (Formal Dispute Notice) in writing to the Northwest Region Toxics Cleanup Section Manager within seven (7) calendar days of receipt of Ecology's Informal Dispute Decision. The Formal Dispute Notice shall include a written statement of dispute setting forth: the nature of the dispute; the PLP' position with respect to the dispute; and the information relied upon to support its position.
- 8.9.1.4 The Section Manager shall conduct a review of the dispute and shall endeavor to issue a written decision regarding the dispute (Decision on Dispute) within thirty (30) calendar days of receipt of the Formal Dispute Notice. The Decision on Dispute shall be Ecology's final decision on the disputed matter.

8.9.2

The Parties agree to only utilize the dispute resolution process in good faith and agree to expedite, to the extent possible, the dispute resolution process whenever it is used.

8.9.3

Implementation of these dispute resolution procedures shall not provide a basis for delay of any activities required in this Order, unless Ecology agrees in writing to a schedule extension.

8.9.4

In case of a dispute, failure to either proceed with the work required by this Order or timely invoke dispute resolution may result in Ecology's determination that insufficient progress is being made in preparation of a deliverable, and may result in Ecology undertaking the work under Section 7 (Work to be Performed) or initiating enforcement under Section 10 (Enforcement).

8.10 Extension of Schedule

8.10.1

The PLP' request for an extension of schedule shall be granted only when a request for an extension is submitted in a timely fashion, generally at least thirty (30) days prior to expiration of the deadline for which the extension is requested, and good cause exists for granting the extension. All extensions shall be requested in writing. The request shall specify:

8.10.1.1 The deadline that is sought to be extended.

8.10.1.2 The length of the extension sought.

8.10.1.3 The reason(s) for the extension.

8.10.1.4 Any related deadline or schedule that would be affected if the extension were granted.

8.10.2

The burden shall be on the PLP to demonstrate to the satisfaction of Ecology that the request for such an extension has been submitted in a timely fashion and that good cause exists for granting the extension. Good cause may include, but may not be limited to:

8.10.2.1 Circumstances beyond the reasonable control and despite the due diligence of the PLP including delays caused by unrelated third parties or Ecology, such as (but not limited to) delays by Ecology in reviewing, approving, or modifying documents submitted by the PLP.

8.10.2.2 Required review and approval by PLP governing councils (e.g. City Council) beyond the control of the PLPs.

8.10.2.3 A shelter in place or work stoppage mandated by state or local government order due to public health and safety emergencies.

8.10.2.4 Acts of God, including fire, flood, blizzard, extreme temperatures, storm, or other unavoidable casualty.

8.10.2.5 Endangerment as described in Section 8.12 (Endangerment).

However, neither increased costs of performance of the terms of this Order nor changed economic circumstances shall be considered circumstances beyond the reasonable control of the PLP.

8.10.3

Ecology shall act upon the PLP's written request for extension in a timely fashion. Ecology shall give the PLP written notification of any extensions granted pursuant to this Order. A requested extension shall not be effective until approved by Ecology. Unless the extension is a substantial change, it shall not be necessary to amend this Order pursuant to Section 8.11 (Amendment of Order) when a schedule extension is granted.

8.10.4

At the PLP's request, an extension shall only be granted for such period of time as Ecology determines is reasonable under the circumstances. Ecology may grant schedule extensions exceeding ninety (90) days only as a result of one of the following:

8.10.4.1 Delays in the issuance of a necessary permit which was applied for in a timely manner.

8.10.4.2 Other circumstances deemed exceptional or extraordinary by Ecology.

8.10.4.3 Endangerment as described in Section 8.12 (Endangerment).

8.11 Amendment of Order

The project coordinators may verbally agree to minor changes to the work to be performed without formally amending this Order. Minor changes will be documented in writing by Ecology within seven (7) days of verbal agreement.

Except as provided in Section 8.13 (Reservation of Rights), substantial changes to the work to be performed shall require formal amendment of this Order. This Order may only be formally amended by the written consent of both Ecology and the PLP. Ecology

will provide its written consent to a formal amendment only after public notice and opportunity to comment on the formal amendment.

When requesting a change to the Order, the PLP shall submit a written request to Ecology for approval. Ecology shall indicate its approval or disapproval in writing and in a timely manner after the written request is received. If Ecology determines that the change is substantial, then the Order must be formally amended. Reasons for the disapproval of a proposed change to this Order shall be stated in writing. If Ecology does not agree to a proposed change, the disagreement may be addressed through the dispute resolution procedures described in Section 8.9 (Resolution of Disputes).

8.12 Endangerment

In the event Ecology determines that any activity being performed at the Site under this Order is creating or has the potential to create a danger to human health or the environment on or surrounding the Site, Ecology may direct the PLP to cease such activities for such period of time as it deems necessary to abate the danger. The PLP shall immediately comply with such direction.

In the event the PLP determines that any activity being performed at the Site under this Order is creating or has the potential to create a danger to human health or the environment, the PLP may cease such activities. The PLP shall notify Ecology's project coordinator as soon as possible, but no later than twenty-four (24) hours after making such determination or ceasing such activities. Upon Ecology's direction, the PLP shall provide Ecology with documentation of the basis for the determination or cessation of such activities. If Ecology disagrees with the PLP's cessation of activities, it may direct the PLP to resume such activities.

If Ecology concurs with or orders a work stoppage pursuant to this section, the PLP's obligations with respect to the ceased activities shall be suspended until Ecology determines the danger is abated, and the time for performance of such activities, as well as the time for any other work dependent upon such activities, shall be extended in accordance with Section 8.10 (Extension of Schedule) for such period of time as Ecology determines is reasonable under the circumstances.

Nothing in this Order shall limit the authority of Ecology, its employees, agents, or contractors to take or require appropriate action in the event of an emergency.

8.13 Reservation of Rights

This Order is not a settlement under RCW 70A.305. Ecology's signature on this Order in no way constitutes a covenant not to sue or a compromise of any of Ecology's rights or authority. Ecology will not, however, bring an action against the PLP to recover remedial action costs paid to and received by Ecology under this Order. In addition, Ecology will

not take additional enforcement actions against the PLP regarding remedial actions required by this Order, provided the PLP complies with this Order.

Ecology nevertheless reserves its rights under RCW70A.305, including the right to require additional or different remedial actions at the Site should it deem such actions necessary to protect human health or the environment, and to issue orders requiring such remedial actions. Ecology also reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances at the Site.

By entering into this Order, the PLP do not admit to any liability for the Site. Although the PLP are committing to conducting the work required by this Order under the terms of this Order, the PLP expressly reserve all rights available under law, including but not limited to the right to seek cost recovery or contribution against third parties, and the right to assert any defenses to liability in the event of enforcement.

8.14 Transfer of Interest in Property

No voluntary conveyance or relinquishment of title, easement, leasehold, or other interest in any portion of the Site shall be consummated by the PLP without provision for continued implementation of all requirements of this Order and implementation of any remedial actions found to be necessary as a result of this Order.

Prior to the PLP's transfer of any interest in all or any portion of the Site, and during the effective period of this Order, the PLP shall provide a copy of this Order to any prospective purchaser, lessee, transferee, assignee, or other successor in said interest; and, at least thirty (30) days prior to any transfer, the PLP shall notify Ecology of said transfer. Upon transfer of any interest, the PLP shall notify all transferees of the restrictions on the activities and uses of the property under this Order and incorporate any such use restrictions into the transfer documents.

8.15 Compliance with Applicable Laws

8.15.1 Applicable Laws

All actions carried out by the PLP pursuant to this Order shall be done in accordance with all applicable federal, state, and local requirements, including requirements to obtain necessary permits or approvals, except as provided in RCW 70A.305.090. At this time, no federal, state, or local requirements have been identified as being applicable to the actions required by this Order. The PLP has a continuing obligation to identify additional applicable federal, state, and local requirements which apply to actions carried out pursuant to this Order, and to comply with those requirements. As additional federal, state, and local requirements are identified by Ecology or the PLP, Ecology will document in

writing if they are applicable to actions carried out pursuant to this Order, and the PLP must implement those requirements.

8.15.2 Relevant and Appropriate Requirements.

All actions carried out by the PLP pursuant to this Order shall be done in accordance with relevant and appropriate requirements identified by Ecology. At this time, no relevant and appropriate requirements have been identified as applicable to the actions required by this Order. If relevant and appropriate requirements are identified by Ecology or the PLP, Ecology will document in writing if they are applicable to actions carried out pursuant to this Order and the PLP must implement those requirements.

8.15.3

Pursuant to RCW 70A.305.090(1), the PLP may be exempt from the procedural requirements of RCW 70A.15, 70A.205, 70A.300, 77.55, 90.48, and 90.58 and of any laws requiring or authorizing local government permits or approvals. However, the PLP shall comply with the substantive requirements of such permits or approvals. For permits and approvals covered under RCW 70A.305.090(1) that have been issued by local government, the Parties agree that Ecology has the non-exclusive ability under this Order to enforce those local government permits and/or approvals. At this time, no state or local permits or approvals have been identified as being applicable but procedurally exempt under this section.

8.15.4

The PLP has a continuing obligation to determine whether additional permits or approvals addressed in RCW 70A.305.090(1) would otherwise be required for the remedial action under this Order. In the event either Ecology or the PLP determine that additional permits or approvals addressed in RCW 70A.305.090(1) would otherwise be required for the remedial action under this Order, they shall promptly notify the other Parties of their determination. Ecology shall determine whether Ecology or the PLP shall be responsible to contact the appropriate state and/or local agencies. If Ecology so requires, the PLP shall promptly consult with the appropriate state and/or local agencies and provide Ecology with written documentation from those agencies of the substantive requirements those agencies believe are applicable to the remedial action. Ecology shall make the final determination on the additional substantive requirements that must be met by the PLP and on how the PLP must meet those requirements. Ecology shall inform the PLP in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable

requirements of this Order. The PLP shall not begin or continue the remedial action potentially subject to the additional requirements until Ecology makes its final determination.

Pursuant to RCW 70A.305.090(2), in the event Ecology determines that the exemption from complying with the procedural requirements of the laws referenced in RCW 70A.305.090(1) would result in the loss of approval from a federal agency that is necessary for the state to administer any federal law, the exemption shall not apply and the PLP shall comply with both the procedural and substantive requirements of the laws referenced in RCW 70A.305.090(1), including any requirements to obtain permits or approvals.

8.16 Indemnification

To the extent permitted by law, the PLP agrees to indemnify and save and hold the State of Washington, its employees, and agents harmless from any and all claims or causes of action (1) for death or injuries to persons, or (2) for loss or damage to property, to the extent arising from or on account of acts or omissions of the PLP, their officers, employees, agents, or contractors in entering into and implementing this Order. However, the PLP shall not indemnify the State of Washington nor save nor hold its employees and agents harmless from any claims or causes of action to the extent arising out of the negligent acts or omissions of the State of Washington, or the employees or agents of the State, in entering into or implementing this Order.

9. Satisfaction of Order

The provisions of this Order shall be deemed satisfied upon the PLP' receipt of written notification from Ecology that the PLP has completed the remedial activity required by this Order, as amended by any modifications, and that the PLP has complied with all other provisions of this Agreed Order.

10. Enforcement

Pursuant to RCW 70A.305.050, this Order may be enforced as follows:

10.1

The Attorney General may bring an action to enforce this Order in a state or federal court.

10.2

The Attorney General may seek, by filing an action, if necessary, to recover amounts spent by Ecology for investigative and remedial actions and orders related to the Sites.

10.3

A liable party who refuses, without sufficient cause, to comply with any term of this Order will be liable for:

10.3.1

Up to three (3) times the amount of any costs incurred by the State of Washington as a result of its refusal to comply.

10.3.2

Civil penalties of up to twenty-five thousand dollars (\$25,000) per day for each day it refuses to comply.

10.4

This Order is not appealable to the Washington Pollution Control Hearings Board. This Order may be reviewed only as provided under RCW 70A.305.070.

Effective date of this Order: February 24, 2025

Effective date of this Order: February 24, 2025

City of Issaquah

State of Washington
Department of Ecology

DocuSigned by:
Mary Lou Pauly
Mary Lou Pauly
Mayor
P.O. Box 1307
Issaquah, WA 98027
(425) 539-3654

Kimberly Wooten, PhD
Dr. Kimberly Wooten
Section Manager
Toxics Cleanup Program
Northwest Regional Office
206-594-0093

City Clerk Attestation:

DocuSigned by:
Jisha Lieser
FE989FA7135144C...

Exhibit A —Site Location

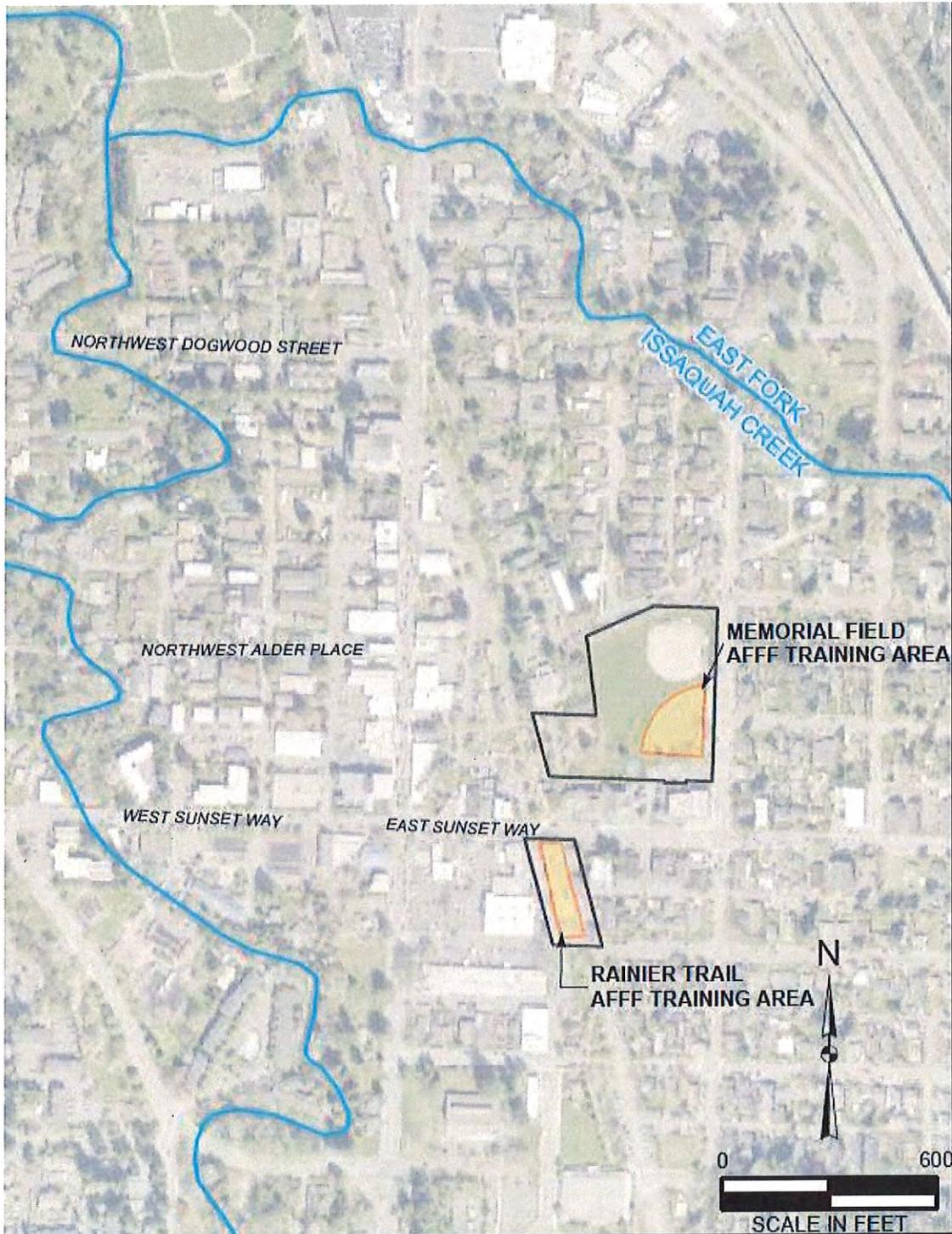


Exhibit B — Scope of Work and Schedule

Scope of Work

Purpose

The work under this Agreed Order (AO) involves conducting an Remedial Investigation (RI) and Feasibility Study (FS), and conducting an interim action if required or agreed to by Ecology. The purpose of the RI and FS and any interim action for the Site is to provide sufficient data, analysis, and evaluations to enable Ecology to select cleanup alternatives for the Site.

The PLP shall coordinate with Ecology throughout the cleanup process and shall keep Ecology informed of changes to any Work Plan or other project plans for the Site, and of any issues or problems as they develop.

The Scope of Work (SOW) for the Site is divided into seven major tasks as follows:

- Task 1. Remedial Investigation Work Plan
- Task 2. Remedial Investigation
- Task 3. Feasibility Study
- Task 4. Groundwater Modeling
- Task 5. SEPA Compliance
- Task 6. Public Participation
- Task 7. Interim Action(s) (if required)

Task 1. MFRT RI Work Plan

The PLP shall prepare a Remedial Investigation Work Plan (Work Plan). The purpose of the Work Plan is to present the scope and schedule to complete the RI activities. The Work Plan shall describe the project management strategy for implementing and documenting the RI activities. The Work Plan shall present the personnel involved in conducting the RI.

Prior to drafting the Work Plan, Parties will meet to review requirements for the Work Plan, scope further characterization activities, discuss the preliminary Conceptual Site Model, and identify project data needs and possible interim actions.

The Work Plan shall describe facility information; site history and conditions; including previous operations; past field investigations, including any data collection and analysis of soils, air, groundwater, surface water, and sediments; a conceptual site model showing contaminants, migration pathways in all environmental media, and potential receptors; geology and groundwater system characteristics; past, current, and future land use; identification of natural resources and ecological receptors; hazardous substances and their sources, etc., in compliance with WAC 173-340-350 and WAC 173-204-550.

The Work Plan will compile, evaluate, and present all existing environmental data on site soil and groundwater to identify data gaps. If necessary, additional investigation to address essential data gaps may be recommended. The Work Plan will include specific data collection procedures in a separate Sampling and Analysis Plan (SAP) and a Quality Assurance Project Plan (QAPP) as attachments to the Work Plan in compliance with WAC 173-340-820 and WAC 173-204-600 for defining the nature and extent of contamination. The PLP will also submit a copy of the Health and Safety Plan (HASP) for the project as an attachment to the Work Plan.

The SAP will identify the proposed number and location of all environmental samples and methods, including soil borings, groundwater monitoring wells, soil, groundwater, stormwater, seep, and catch basin and sediment samples, approximate depths. The SAP will describe the sampling objectives, the rationale for the sampling approach (based upon the identified data gaps), and plans for data use, and shall provide a detailed description of sampling tasks. The SAP shall describe specifications for sample identifiers; sampling equipment; the type, number, and location of samples to be collected; the analyses to be performed; descriptions of sampling equipment and methods to be used; sample documentation; sample containers, collection, and handling; data and records management; and schedule.

The QAPP will be prepared in accordance with the Guidance for Preparation of Quality Assurance Project Plans, EPA Region 10, Quality Data Management Program, QA/R-5 and requirements of the EPA Contract Laboratory Program. The QAPP will also follow Ecology's Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies (July 2004) and Analysis Plan Appendix (February 2008). Laboratories must meet the accreditation standards established in WAC 173-50. Data quality objectives will reflect the criteria or threshold values used for the source control evaluation.

The SAP and QAPP attachments may be submitted to Ecology separately for initial review and approval. As with all environmental work at the site, work may not begin without written approval from Ecology. The plan shall provide seven (7) days notice to Ecology prior to beginning sampling. Ecology may obtain split samples.

The PLP or their contractors shall submit all new sampling data generated under the Work Plan and any other recently collected data to Ecology for entry into the Environmental Information Management System (EIM) in accordance with WAC 173-340-840(5) and Ecology's Toxics Cleanup Program Policy 840: Data Submittal Requirements. Only validated data will be entered into the EIM database. Existing data will be submitted within 30 days of submittal of the Agency Draft Work Plan.

Work Plan tasks and subtasks will include the following, but are not limited to:

- A detailed scope and schedule of actions needed to complete the RI;

- Sampling and analysis of soil and groundwater;
- Compile, evaluate, and present all existing environmental data on site soil and groundwater to identify data gaps.
 - If necessary, additional investigations to address essential data gaps.
 - Validated Data be entered into the EIM database.
- Develop a SAP and QAPP in compliance with WAC 173-340-820 and WAC 173-204-600 for defining the nature and extent of contamination.
 - The SAP and QAPP will be submitted to Ecology separately for initial review and approval.

The PLP will provide Ecology with an Agency Review Draft Work Plan. Once Ecology reviews and approves the Work Plan, it will be considered the Final Work Plan. The Work Plan shall not be implemented until approved by Ecology. Once approved by Ecology, the PLP will implement the Final Work Plan according to the schedule contained in this Exhibit.

The PLP shall prepare two (2) copies of the Agency Review Draft RI Work Plan, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology for review and comment. After incorporating Ecology's comments on the Agency Review Draft Work Plan and after Ecology approval, the PLP shall prepare two (2) copies of the Final Work Plan, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology.

Task 2. MFRT Remedial Investigation

The PLP shall conduct an RI that meets the requirements of WAC 173-340-and WAC 173-204-550 according to the Work Plan as approved by Ecology. The RI will determine the nature and extent of contamination exceeding preliminary Model Toxics Control Act (MTCA) cleanup levels, and other regulatory requirements at the Site. The RI must provide sufficient data and information to define the nature and extent of contamination.

Field sampling and analysis will be completed in general accordance with the SAP and QAPP. Deviation(s) from the field sampling and/or analysis presented in the approved SAP and QAPP must be communicated to Ecology immediately and documented as required by Ecology.

The PLP shall provide interim data reports and updates to Ecology as new site data and information become available as part of monthly progress reporting. Laboratory analysis data shall also be provided in electronic format when it has been validated. Raw laboratory data will be provided to Ecology upon request.

Prior to submittal of the Agency Review Draft RI Report, a Key Project Meeting will be held. During the Key Project Meeting, Ecology and the PLPs will review available data and an updated conceptual site model and discuss the content and organization of the Draft RI Report.

The PLP shall compile the results of the Site investigation into an Agency Review Draft RI Report. The PLP shall prepare two (2) copies of the Agency Review Draft RI Report, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology for review and comment.

After incorporating Ecology's comments on the Agency Review Draft RI Report, the PLP shall combine the RI report with the FS report (Task 3). The remainder of the report preparation process is described in Task 3.

If the data collected during this investigation is insufficient to define the nature and extent of contamination, and/or to select a cleanup action plan, an additional phase of investigation shall be conducted to define the extent of contamination.

Task 3. Feasibility Study

The PLP shall use the information obtained in the RI to prepare an Agency Review Draft Feasibility Study (FS) for the Site that meets the applicable requirements of WAC 173-340 according to the Schedule in this exhibit. The Agency Review Draft FS will evaluate remedial alternatives for site cleanup, consistent with MTCA and SMS requirements to ensure protection of human health and the environment by eliminating, reducing, or otherwise controlling risk posed through each exposure pathway and migration route.

Prior to beginning the FS, a Key Project Meeting will be held to review ARARs, potential remedial alternatives and establish points of compliance.

The Agency Review Draft FS must include a detailed analysis of each remedial alternative according to the applicable requirements of WAC 173-340-351 and 173-204-550. The remedial alternatives will be evaluated for compliance with the applicable requirements of WAC 173-340-360 and 173-204-570.

The remedial alternative that is judged to best satisfy the evaluation criteria will be identified. Justification for the selection will be provided, and the recommended remedial alternative further developed, in the FS Report.

The PLP shall prepare two (2) copies of the Agency Review Draft FS, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology for review. After addressing Ecology's comments on the Agency Review Draft FS, the PLP shall combine the RI (Task 2) and FS and prepare four (4) copies of the Public Review Draft RI/FS, including one

electronic copy each in Word (.doc) and Adobe (.pdf) formats and two hard copies, and submit them to Ecology for distribution and public comment.

Electronic survey data for monitoring locations, electronic lab data, and GIS maps of contaminant distribution shall also be provided for the Public Review Draft RI/FS Report either in the report or as attachments. After incorporating public comments on the Public Review Draft RI/FS Report and receiving Ecology approval, the PLP shall prepare two (2) copies of the Final RI/FS Report, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology. The RI/FS Report will not be considered final until after Ecology's approval.

Task 4. Groundwater Modeling

The PLP shall be responsible for evaluating groundwater fate and transport of PFAS from the Site using three-dimensional groundwater modeling as requested by Ecology. Groundwater modeling may be used to evaluate how remedial actions and modifications to pumping rates in water supply wells impact transport of PFAS in groundwater. If Ecology requests groundwater modeling work be conducted, that request will include a schedule for the work.

Task 5. SEPA Compliance

The PLP shall be responsible for complying with the State Environmental Policy Act (SEPA) Rules including preparing and submitting an environmental checklist. If the result of the threshold determination is a determination of significance (DS), the PLP shall be responsible for the preparation of Draft and Final Environmental Impact Statements. The PLP shall assist Ecology with coordinating SEPA public involvement requirements with MTCA public involvement requirements whenever possible, such that public comment periods and meetings or hearings can be held concurrently.

Task 6. Public Participation

The PLP shall support Ecology in presenting the Public Review Draft RI Report and the Public Review Draft FS Reports and SEPA evaluations at a public meeting. The PLP will assist Ecology with presentations at any additional meetings or hearings that might be necessary for SEPA compliance or as part of the Public Participation Plan.

After the public comment periods are completed, the PLP shall prepare an Agency Review Draft Responsiveness Summary that addresses public comments. The PLP shall prepare two (2) copies of the Agency Review Draft Responsiveness Summary, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology for review and approval.

After addressing Ecology's comments and after Ecology approval, the PLP shall prepare two (2) copies of the Final Responsiveness Summary, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology for distribution.

Task 7. Interim Actions (if required)

Remedial actions implemented prior to completion of the RI/FS, including those that:

- are technically necessary to reduce a threat to human health or the environment by eliminating or substantially reducing one or more pathways for exposure to a hazardous substance;
- correct a problem that may become substantially worse or cost substantially more to address if the remedial action is delayed; or
- are needed to provide for completion of the remedial investigation/feasibility study or design of the cleanup action

will be considered interim actions, will be implemented in accordance with WAC 173-340-430 and the AO, and will be designed in a manner that will not foreclose reasonable alternatives for any final cleanup action that may be required.

As detailed in the AO, if required by Ecology, or if proposed by the PLP and approved by Ecology, the PLP will implement an interim action. Based upon information in the Agency Review Draft RI Report, interim action(s) may be needed to expedite control of releases to environmental media pursuant to WAC 173-340-430.

The scope of the interim actions may include, but not be limited to, typical source control or containment elements such as:

- Soil removal;
- Groundwater remediation;
- Repair, slip lining, replacement, or closure of stormwater conveyances or other structures such as conduit, vaults, catch basins, etc.;
- Removal of underground storage tanks and pipes;
- Removal of old drain fields or former surface impoundments;
- Proper abandonment of old wells;
- Removal of contaminated building or other structural material;
- Construction of a treatment facility; and/or
- Shoreline stabilization such as bulkhead repair, erosion or seepage control, and grading or clearing.

If an interim action is to be performed, the PLP will prepare and submit for Ecology approval an Agency Review Draft Interim Action Work Plan (IAWP) with detail commensurate with the work to be performed. The Agency Review Draft IAWP shall include, as appropriate:

- Description of the interim action including its purpose, general requirements, and relationship to the (final) cleanup action (to the extent known);
- Summary of relevant RI/FS information, including at a minimum existing site conditions and alternative interim actions considered;
- Information regarding design and construction requirements, including a proposed schedule and personnel roles and responsibilities;
- Compliance Monitoring Plan;
- SAP/QAPP
- Permits required.

The PLP will also submit a copy of the Health and Safety Plan for the project. The PLP will be responsible for complying with the State Environmental Policy Act (SEPA) Rules including preparing and submitting an environmental checklist for the interim action and will assist Ecology with presentations at any additional meetings or hearings that might be necessary for SEPA compliance or as part of the Public Participation Plan.

The PLP shall prepare two (2) copies of the Agency Review Draft Interim Action Work Plan, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology for review. The PLP shall incorporate Ecology's comments and then prepare four (4) copies of the Public Review Draft Interim Action Work Plan, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats and two hard copies, and submit them to Ecology. After a public notice and comment period for the Public Review Draft IAWP (and SEPA determination), Ecology will approve the IAWP (if appropriate) and the document will be considered Final. The PLP shall prepare two (2) copies of the Final Interim Action Work Plan, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology. Once approved by Ecology, the PLP will implement the interim action according with the approved schedule.

Upon successful completion of the work, an Agency Review Draft Interim Action Report will be prepared as a separate deliverable. The PLP shall prepare two (2) copies of the Agency Review Draft Interim Action Report, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology for review and approval. After incorporating Ecology's comments on the Agency Review Draft Interim Action Report and after Ecology approval, the PLP shall prepare two (2) copies of the Final Interim Action Report, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology. The Interim Action Report will not be considered final until after Ecology's approval.

Schedule of Deliverables

The schedule for deliverables described in the Agreed Order and the Scope of Work is presented below. If the date for submission of any item or notification required by this Schedule of Deliverables occurs on a weekend, state or federal holiday, the date for submission of that item or notification is extended to the next business day following the weekend or holiday.

Where a deliverable due date is triggered by Ecology notification, comments or approval, the starting date for the period shown is the date the PLP received such notification, comments or approval by certified mail, return receipt requested, or by email unless otherwise noted below. Where triggered by Ecology receipt of a deliverable, the starting date for the period shown is the date Ecology receives the deliverable by certified mail, return receipt requested, or the date of Ecology signature on a hand-delivery form, or the date of the email to Ecology.

Deliverable	Completion Time
Progress Reports	15 th day of the month beginning after effective date of Agreed Order
Remedial Investigation	
Agency Review Draft RI Work Plan	60 days following effective date of Agreed Order
Final RI Work Plan	30 days following receipt of final Ecology comments on Agency Review Draft RI WP
Completion of RI Field Work	12 months following completion of Final RI Work Plan
Agency Review Draft RI Report	45 days following receipt of final laboratory data
Feasibility Study	
Agency Review Draft FS Report	60 days following receipt of final Ecology comments on Agency Review Draft RI Report
Public Review Draft RI/FS Report	45 days following receipt of Ecology's comments on Agency Review Draft FS Report
Final RI/FS Report	45 days following receipt of public comments on Public Review Draft RI/FS Report

Notes:

Schedule is in calendar days.

Certificate Of Completion

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**APPENDIX B
SAMPLING AND ANALYSIS PLAN**

REMEDIAL INVESTIGATION WORK PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010



Sampling and Analysis Plan

Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010

September 5, 2025

Prepared by:

A handwritten signature in blue ink, appearing to read "S. Snyder", written over a light blue horizontal line.

Sarah Snyder
Senior Geologist

Reviewed by:

A handwritten signature in blue ink, appearing to read "Eric F. Buer", written over a light blue horizontal line.

Eric Buer
Principal Hydrogeologist

Prepared for:
City of Issaquah

Submitted by:
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1809 7th Avenue, Suite 1111
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TABLE OF CONTENTS

1.0	INTRODUCTION.....	1-1
1.1	PURPOSE AND OBJECTIVES	1-2
2.0	PROJECT DESCRIPTION.....	2-1
2.1	SCOPE OF WORK.....	2-1
	2.1.1 Memorial Field Source Area - Soil.....	2-1
	2.1.2 Rainier Trail Source Area - Soil.....	2-2
	2.1.3 Site Groundwater	2-2
2.2	PROJECT ORGANIZATION AND RESPONSIBILITIES	2-3
2.3	PROJECT SCHEDULE.....	2-4
3.0	SAMPLING EQUIPMENT AND PROCEDURES	3-1
3.1	SAMPLING EQUIPMENT	3-1
3.2	SAMPLING PROCEDURES.....	3-1
	3.2.1 Soil Sampling.....	3-1
	3.2.2 Groundwater Sampling at Monitoring Wells	3-2
3.3	MONITORING WELL INSTALLATION	3-2
3.4	SAMPLE DESIGNATION	3-3
	3.4.1 Soil Sampling.....	3-3
	3.4.2 Groundwater Sampling.....	3-4
4.0	LABORATORY ANALYSIS	4-1
4.1	LABORATORY ANALYSES	4-1
5.0	SAMPLE HANDLING.....	5-1
5.1	SAMPLE CONTAINERS, PRESERVATION PROCEDURES, AND HOLD TIMES	5-1
5.2	SAMPLE PACKAGING AND SHIPMENT	5-2
5.3	SAMPLE DOCUMENTATION	5-2
5.4	FIELD QUALITY ASSURANCE/QUALITY CONTROL SAMPLES	5-3
6.0	MANAGEMENT OF INVESTIGATION-DERIVED WASTE	6-1
6.1	SOIL CUTTINGS.....	6-1
6.2	WASTEWATER.....	6-1
6.3	DISPOSABLES.....	6-1
7.0	FIELD DOCUMENTATION	7-1
7.1	FIELD REPORT FORM.....	7-1
7.2	LOG OF BORING FORM	7-1
7.3	LOW-FLOW WELL PURGING AND SAMPLING DATA FORM	7-1
7.4	SOIL SAMPLE DATA LOG.....	7-2
7.5	SAMPLE LABEL.....	7-2
7.6	WASTE MATERIAL LABEL.....	7-2
7.7	WASTE INVENTORY FORM.....	7-2
7.8	CHAIN OF CUSTODY FORM	7-2
8.0	REFERENCES.....	8-1



FIGURES

- Figure 1 *Lower Issaquah Valley Vicinity Map*
- Figure 2 *MFRT Site Plan*
- Figure 6 *Proposed Boring and Monitoring Well Locations MFRT Site*

TABLES

- Table 1 *Soil Screening Levels*
- Table 2 *Groundwater Screening Levels*
- Table 3 *Summary of Data Gaps and Scope of Work*

ATTACHMENTS

- Attachment A *Standard Operating Procedures*
- Attachment B *Field Forms*



ACRONYMS AND ABBREVIATIONS

AO	Agreed Order No. DE 23521
AFFF	aqueous film-forming foam
AFFF Training Areas	collectively, the Memorial Field AFFF Training Area and Rainier Trail AFFF Training Area
ALS	ALS Environmental
bgs	below ground surface
°C	degrees Celsius
City	City of Issaquah
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
EQuls database	EQuls environmental data management system database
Farallon	Farallon Consulting, L.L.C.
µg/l	micrograms per liter
Memorial Field Source Area	Memorial Field Source Area at 105 2 nd Avenue Northeast in Issaquah, Washington
MFRT Site	Memorial Field and Rainier Trail Site
MTCA	Washington State Model Toxics Control Act Cleanup Regulation
PFAS	per- and poly-fluorinated alkyl substances
PFOS	perfluorooctane sulfonate
PLPs	potentially liable persons
QA/QC	quality assurance/quality control
Rainier Trail Source Area	Rainier Trail Source Area identified as King County Parcel No. 3424069043 with no formal address in Issaquah, Washington
RCW	Revised Code of Washington
RIWP	Remedial Investigation Work Plan
SAP	Sampling and Analysis Plan
SOPs	standard operating procedures



Source Areas	collectively, the Memorial Field Source Area and Rainier Trail Source Area
The City	City of Issaquah
USCS	Unified Soil Classification System
WAC	Washington Administrative Code



1.0 INTRODUCTION

Farallon Consulting, L.L.C. (Farallon) has prepared this Sampling and Analysis Plan (SAP) on behalf of the City of Issaquah (the City) for the Memorial Field and Rainier Trail (MFRT) Site (Site) (Figure 1). The City was identified as the potentially liable person (PLP) for the Site.

This SAP documents the specific requirements for sample collection and analysis for the remedial investigation activities to be completed in accordance with the requirements of Agreed Order No. DE 23521 (AO) between the Washington State Department of Ecology (Ecology) and the City.

As described in the AO, local firefighting entities historically conducted firefighting training exercises at the Site, which included lawful deployment of aqueous film-forming foam (AFFF) containing perfluorooctane sulfonate (PFOS) and additional per- and poly-fluorinated alkyl substances (PFAS). The historical training activities are considered releases to the environment. The known releases have impacted vadose zone soil at two source areas, the Memorial Field Source Area at 105 2nd Avenue Northeast and Rainier Trail Source Area at Parcel 3424069043 in Issaquah, Washington (collectively referred to as the Source Areas); and impacted groundwater, which is a source for the City's drinking water. Ecology believes the actions required by the AO are in the public's interest.

AFFF training was performed at two locations at the Site (Figure 2):

- An area that currently is covered with lawn on the southeastern portion of the Memorial Field Source Area (Memorial Field AFFF Training Area); and
- An area that currently is covered with lawn and trees along the central portion of the Rainier Trail Source Area (Rainier Trail AFFF Training Area).

The Memorial Field AFFF Training Area and Rainier Trail AFFF Training Area are collectively referred to as the AFFF Training Areas. The Source Areas are depicted on Figure 2.

Screening levels for soil and groundwater are presented on Tables 1 and 2, respectively.

This SAP has been prepared in accordance with the Washington State Model Toxics Control Act, Chapter 70A.305 of the Revised Code of Washington (RCW), and its implementing regulations, Chapter 173-340 of the Washington Administrative Code (WAC) (collectively, MTCA), and the *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies* revised December 2016, prepared by the Washington State Department of Ecology (Ecology) (2004). Additionally, this SAP was prepared in accordance with the *Guidance for*



Investigating and Remediating PFAS Contamination in Washington State dated June 2023, prepared by Ecology (2022).

1.1 PURPOSE AND OBJECTIVES

The purposes of this SAP are to:

- Summarize the scope of work for the remedial investigation being performed under the AO between Ecology and the City;
- Identify sample locations and media, sample quantities, analytical methods, and documentation protocols for the sampling program;
- Describe standard operating procedures (SOPs) for field activities that will be conducted as part of the remedial investigation; and
- Provide quality assurance (QA) and quality control (QC) protocols for field activities and laboratory analysis to ensure collection of representative and useable data.

The objectives of the scope of work presented herein were developed with Ecology and include:

- Adequately characterize the nature and extent of impacts to vadose zone soil at the known source areas to develop and evaluate cleanup action alternatives in accordance with WAC 173-340-351.
- Adequately characterize the nature and extent of impacts to groundwater from the known source areas to develop and evaluate cleanup action alternatives in accordance with WAC 173-340-351.



2.0 PROJECT DESCRIPTION

This section provides a summary of the scope of work and Farallon's project organization and schedule.

2.1 SCOPE OF WORK

A detailed description of the scope of work for the remedial investigation at the Site is provided in the Remedial Investigation Work Plan (RIWP). The proposed sample locations are shown on Figure 3. The proposed screening levels for soil and groundwater are shown on Tables 1 and 2. The scope of work for the remedial investigation, as detailed in the RIWP, is summarized below.

2.1.1 Memorial Field Source Area - Soil

The following activities are proposed to investigate data gaps in soil at the Memorial Field Source Area (Table 3; Figure 3):

- Hand auger at up to nine locations to a depth of approximately 1.5 feet bgs within the Memorial Field AFFF Training Area on an approximately 75- by 75-foot grid (Figure 12). Collect two soil samples at each location, including one sample near surface level beneath the grass and root system (approximately 0.5 foot bgs) and one sample at approximately 1.5 feet bgs. The samples collected at 1.5 feet bgs will be released for laboratory analysis of PFAS. The samples collected at 0.5 foot bgs from the following locations will be released for analysis of PFAS: three locations within the Memorial Field AFFF Training Area and two locations within Memorial Field most likely to be used by children during play and/or exposed soil. The remaining samples collected at 0.5 foot bgs will be submitted on hold at the laboratory and may be released for analysis to further investigate the direct contact pathway, if needed, based on the results of the samples collected at 1.5 feet bgs, subsequent analysis will be coordinated with Ecology. Quality assurance/quality control (QA/QC) samples will include one trip blank, one duplicate sample, and one equipment blank. Analyze samples for PFAS by U.S. Environmental Protection Agency (EPA) Method 1633.
- Drill up to four sonic borings to 15 feet bgs within the Memorial Field AFFF Training Area. Boring locations will be coordinated with Ecology and selected based on the results of the hand auger sampling. Collect three soil samples per boring at depths of 5, 10, and 15 feet bgs. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank. Analyze samples for PFAS by EPA Method 1633.



2.1.2 Rainier Trail Source Area - Soil

The following activities are proposed to investigate data gaps in soil at the Rainier Trail Source Area (Table 3, Figure 3):

- Hand auger at up to four locations to a depth of approximately 1.5 feet bgs within the Rainier Trail AFFF Training Area on an approximately 75x75-foot grid (Figure 12). Collect two soil samples at each location, including one sample near surface level beneath the grass and root system (approximately 0.5 foot bgs) and one sample at approximately 1.5 feet bgs. The samples collected at 1.5 feet bgs will be released for laboratory analysis of PFAS. The samples collected at 0.5 foot bgs from the following locations will be released for laboratory analysis of PFAS: two locations within the Rainier Trail AFFF Training Area. The remaining samples collected at 0.5 foot bgs will be submitted on hold at the laboratory and may be released for analysis to further investigate the direct contact pathway, if needed, based on the results of the samples collected at 1.5 feet bgs, subsequent analysis will be coordinated with Ecology. Quality assurance/quality control (QA/QC) samples will include one trip blank, one duplicate sample, and one equipment blank. Analyze samples for PFAS by EPA Method 1633.
- Drill up to one sonic boring to 15 feet bgs within the Rainier Trail AFFF Training Area. The boring location will be coordinated with Ecology and selected based on the results of the hand auger soil sampling. Collect three soil samples at depths of 5, 10, and 15 feet bgs. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank. Analyze samples for PFAS by EPA Method 1633.

2.1.3 Site Groundwater

The following activities are proposed to investigate data gaps in groundwater at the Site (Table 3, Figure 3):

- Install up to eight shallow groundwater monitoring wells to depths of approximately 20 to 30 feet bgs in the vicinity of the Site, including one up-gradient well location (Figure 12). Collect three soil samples at each location at depths of 5, 10, and 15 feet bgs. Four of the soil samples collected from 5 feet bgs at locations proximate to the AFFF training areas will be released for laboratory analysis of PFAS by EPA Method 1633. The remaining soil samples will be held for potential laboratory analysis, if needed, based on the results from the samples collected at 5 feet bgs,



subsequent analysis will be coordinated with Ecology. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank.

- Perform up to two semi-annual groundwater monitoring events following installation of the new wells. Groundwater monitoring events will consist of gauging and sampling Site wells MF-MW01, MF-MW02, MF-MW03, MF-MW04, RT-MW01, RT-MW03, RT-MW04, RBN-MW02, and the eight newly installed shallow interval wells (Figure 12). QA/QC samples will include three trip blanks, two duplicate samples, and two equipment blanks per event.

2.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organization for conducting the scope of work described in the SAP, including identification of key personnel and their responsibilities, is presented below.

Project Coordinator for Ecology. Ecology is the lead regulatory agency for the Site. Ecology's Project Coordinator for the Site is:

Vance Atkins, L.G., L.H.G.
Washington State Department of Ecology
Northwest Regional Office
15700 Dayton Avenue North
PO Box 330316
Shoreline, Washington 98133-9716
Telephone: 206-594-0000
Email: VATK461@ECY.WA.GOV

Project Coordinator for the PLPs. Farallon has been contracted by the PLP to plan and implement the remedial investigation for the Site. Farallon's Project Coordinator for the Site is:

Sarah Snyder, L.G.
Farallon Consulting, L.L.C.
1809 7th Avenue, Suite 1111
Seattle, Washington 98101
Telephone: 425-295-0800
Email: ssnyder@farallonconsulting.com



The City's PLP Representative. The City's PLP Representative for the Site is:

Julie Wartes
City of Issaquah
670 First Avenue Northeast
Issaquah, Washington 98027
Telephone: 425-837-3418
Email: Juliew@issaquahwa.gov

Project Data Manager. The Project Data Manager manages data as it is received from the laboratory and is responsible for data validation. Data validation responsibilities include reviewing laboratory reports, advising on data corrective action procedures, and performing QA/QC on analytical data reports. Additionally, the Project Data Manager will directly transfer laboratory data into an EQUS environmental data management system database (EQUS database) and the Ecology Environmental Information Management System. The Project Data Manger for Farallon is:

Jeanette Mullin, L.G.
Farallon Consulting, L.L.C.
13555 SE 36th Street, Suite 320
Bellevue, Washington 98006
Telephone: 425-295-0800
Email: jmullin@farallonconsulting.com

Field Staff. Members of the field staff supervise contractor procedures, manage collection of samples, coordinate sample deliveries to the laboratory, and document field sampling activities. Field staff also will communications progress updates to the Farallon Project Coordinator, including deviations from the SAP.

Laboratory. ALS Environmental (ALS) in Everett, Washington will perform analytical services in support of the remedial investigation and will be responsible for implementing specific QA/QC requirements.

2.3 PROJECT SCHEDULE

The remedial investigation field activities will be initiated following Ecology's approval of the RIWP and in accordance with the AO schedule.



3.0 SAMPLING EQUIPMENT AND PROCEDURES

This section summarizes the protocols and procedures that will be followed for the field data collection. Farallon SOPs for fieldwork, including detailed step-by-step protocols, are provided in Attachment A.

3.1 SAMPLING EQUIPMENT

Every effort will be made to use sampling equipment free of PFAS. The following materials will not be allowed to come into contact with sample media:

- Teflon (polytetrafluoroethylene);
- Gore-Tex and other waterproof coatings, unless shown to be free of PFAS;
- Waterproof paper, unless shown to be free of PFAS (“Rite in the Rain” paper is acceptable);
- Coated Tyvek (plain Tyvek is acceptable);
- Fluorinated ethylene propylene;
- Ethylene tetrafluoroethylene;
- Polyvinylidene fluoride; and
- Any other fluorinated materials.

Equipment blanks will be periodically collected from low-density polyethylene sampling equipment such as drop tubing to confirm they are PFAS-free, described in Section 5.4, Field Quality Assurance/Quality Control Samples, and the Quality Assurance Project Plan (QAPP). Sample containers will be certified by the laboratory as PFAS-free.

3.2 SAMPLING PROCEDURES

The field sampling procedures for collecting soil and groundwater samples are discussed below. Field sampling data will be documented on Field Report forms (Attachment B).

3.2.1 Soil Sampling

Soil samples will be collected from discrete depth intervals during hand auger or boring advancement. Proposed sample locations are shown on Figure 3. Final locations may be adjusted as necessary based on access and utilities. Farallon will use the one-call and private utility location services to confirm the location of subsurface utilities in accordance with Farallon SOP GN-02 (Attachment A).



Hand auger, boring, and monitoring wells will be advanced to the target depths specified in Section 2.1 (Scope of Work). The upper 5 feet of each drilling location will be cleared either by hand or with an air knife. Borings will be advanced using a sonic drill rig.

Soil samples will be collected in accordance with Section 2.1 (Scope of Work). Soil samples will be collected and handled in accordance with the requirements of SOP SL-01 (Attachment A), and as described in Section 5 (Sample Handling) and Section 7 (Field Documentation). Soil samples will be analyzed in accordance with Section 4 (Laboratory Analysis).

Laboratory QA/QC samples will be submitted as described in Section 5.4, Field Quality Assurance/Quality Control Samples.

3.2.2 Groundwater Sampling at Monitoring Wells

Groundwater monitoring events will include collecting depth to groundwater measurements at all Site monitoring wells and recording water level measurements from the existing stream gauging location on the East fork of Issaquah Creek (Figure 2). Groundwater and water level measurements will be used to prepare groundwater contour maps for both semi-annual groundwater monitoring events. Additionally, pressure and temperature data from existing transducers already installed at select monitoring wells will be downloaded during both events.

Groundwater purging and sampling will be performed using a PFAS-free submersible pump. Procedures for measuring the depth to groundwater and low-flow groundwater sampling are provided in Farallon SOPs GW-03 and GW-04 (Attachment A).

Groundwater samples will be collected in accordance with Section 2.1 (Scope of Work). Groundwater samples will be collected and handled in accordance with the requirements of SOP GW-04 (Attachment A), and as described in Section 5 (Sample Handling) and Section 7 (Field Documentation). Groundwater samples will be analyzed in accordance with Section 4 (Laboratory Analysis).

- Laboratory QA/QC samples will be submitted as described in Section 5.4, Field Quality Assurance/Quality Control Samples.

3.3 MONITORING WELL INSTALLATION

Farallon field staff will observe the monitoring well drilling and installation, and will document observations. Monitoring wells will be constructed in accordance with WAC 173-



160-400. Monitoring well screen intervals will be set across the target water-bearing zone, as specified in Section 2.1 (Scope of Work). Each monitoring well will be constructed with a 10 foot screen across the target water-bearing zone. Monitoring well construction will be performed in accordance with SOP GW-01 (Attachment A).

The new monitoring wells will be developed using a submersible pump. Each monitoring well will be developed until the majority of fine-grained sediment has been removed from the well screen and adjacent sand pack. Monitoring well development will be performed in accordance with SOP GW-02 (Attachment A).

The new wells will be surveyed using the Washington State Plane North coordinates system and measuring the top of casing elevations in North American Vertical Datum of 1988 by a Washington State Professionally Licensed Land Surveyor.

3.4 SAMPLE DESIGNATION

Each sample collected during the remedial investigation will be assigned a unique sample identifier and number. The sample identifier and number will be filled out in indelible ink and affixed to appropriate containers immediately prior to sample collection. In addition to the sample identifier and number, the sample labels will include the client name, project name and number, date and time of sample collection, sampler's initials, analytical method, and analyte preservative(s), if any. A Soil Sample Data Log (Attachment B) will be maintained as each sample is collected, which will include the sample location and depth, sample number and identifier, and other observations regarding the sample. The sample designation procedures for samples collected during the remedial investigation are detailed below.

3.4.1 Soil Sampling

Soil samples collected from the hand auger sample locations and borings will be assigned a unique sample identifier that will include the components listed below:

- The boring identification or location (e.g., MF-B01, MF-MW01, or RT-HA01);
- The sample date (e.g., 090125); and
- The depth of the sample interval stated in feet bgs (e.g., 1.5).

For example, a soil sample collected from Memorial Field Source Area boring B01 at a depth of 5 feet bgs on September 1, 2025 would be assigned the identifier MF-B01-090125-5.0. The sample identifier will be placed on the sample label, Field Report form, Soil Sample Data Log, and Chain of Custody form. Field forms are provided in Attachment B.



3.4.2 Groundwater Sampling

The groundwater samples collected from monitoring wells will be assigned a unique sample identifier that will include the well identification (e.g., MF-MW11) and the sample date (e.g., 090125).

For example, the groundwater sample collected from Memorial Field Source Area monitoring well MW11 during a groundwater monitoring event on September 1, 2025 would be numbered MF-MW11-090125. The sample identifier will be placed on the sample label, Field Report form, Soil Sample Data Log, and Chain of Custody form. Field forms are provided in Attachment B.



4.0 LABORATORY ANALYSIS

This section presents the details for the laboratory analysis associated with the soil and groundwater samples that will be collected during the remedial investigation activities. Laboratory analyses will be conducted by ALS, which is accredited by Ecology, and meets the QA/QC requirements of Ecology and EPA.

QA/QC samples will be collected for data validation as detailed in the Quality Assurance Project Plan. Details pertaining to the types and frequencies of QA/QC samples are provided in Section 5.4, Field Quality Assurance/Quality Control Samples.

4.1 LABORATORY ANALYSES

Samples will be analyzed for PFAS using EPA Method 1633.



5.0 SAMPLE HANDLING

This section discusses the sample handling methods to be used for the remedial investigation. The protocols discussed include sample containers, preservation procedures, and hold times; sample packaging and shipment; sample documentation; and collection of QA/QC samples.

Upon transferring 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.

5.1 SAMPLE CONTAINERS, PRESERVATION PROCEDURES, AND HOLD TIMES

Sample containers, preservation procedures, and hold times for each medium are described below:

- **Soil Samples:** Solid samples will be placed into a wide-mouth non-preserved 8-ounce laboratory-supplied PFAS-free high-density polyethylene container with liner-less high-density polyethylene or polypropylene lid. Containers will be filled no more than three quarters full. Once sealed, the container will be stored in a cooler at approximately 4 degrees Celsius (°C). The samples will be submitted to the laboratory for analysis for PFAS by EPA Method 1633 in accordance with this SAP. Samples will be analyzed within the selected analytical method's holding time. The typical hold time for this type of sample chilled at 0 to 6°C and protected from light or chilled at -20°C is 90 days. Samples will be analyzed within the selected analytical methods' holding time.
- **Groundwater Samples:** Aqueous samples will be collected directly into two non-preserved 500 milliliter laboratory-supplied PFAS-free high-density polyethylene containers with liner-less high-density polyethylene or polypropylene lids. Containers will not be filled past the shoulder. Once sealed, the containers will be stored in a cooler at approximately 4°C. The samples will be submitted to the laboratory for analysis for PFAS by EPA Method 1633 in accordance with this SAP. The typical hold time for this type of sample chilled at 0 to 6°C is 28 days or chilled at -20°C and protected from light is 90 days. Samples will be analyzed within the selected analytical methods' holding time.



5.2 SAMPLE PACKAGING AND SHIPMENT

The samples shipped for laboratory analysis will be packaged according to applicable regulations and the recommendations of the laboratory performing the analysis. Samples will be expeditiously transported to the analytical laboratory after being sealed in coolers. 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 glass 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 Staff.
- 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 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.
- The cooler will be 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.

5.3 SAMPLE DOCUMENTATION

Sample containers will be identified with a durable label, and the sample identifier (Section 3.4) will be recorded in the Soil Sample Data Log and the Field Report forms (Attachment B). Other sample documentation to be maintained by field personnel includes Purging and Sampling forms, Chain of Custody forms and seals, sample labels, and shipment bills. Examples of these forms are provided in Attachment B.



Sample containers will be labeled with the client name, project name and number, date and time sampled, sample identifier, sampler's initials, analysis, and analyte preservative(s), if any.

At the time of sampling, the appropriate sample containers will be selected, and the sample number for each sample will be recorded on the Soil Sample Data Log and on the Field Report form. A chain-of-custody seal will be used to seal the cooler shut before shipping. The chain of-custody seal is used to show that no tampering occurred between the time the cooler was relinquished by field personnel and the time it arrived at the laboratory. The chain of custody seal will be attached so that it must be broken in order to open the shipping container. Information recorded on the seals will be checked against sample summary log entries, and the samples will be recounted before leaving the Site to verify that no samples were misplaced. Entries for all samples will be made on the Chain of Custody form prior to the transfer of the samples off the Site.

Each Chain of Custody form will contain the medium, date, time sampled, sample identification and number, project name, project number, sampler's initials, and analyte preservative(s) if any.

5.4 FIELD QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

QA/QC samples will include field duplicate samples, equipment rinsate blanks, and trip blanks. Field duplicate samples will be used to evaluate the accuracy and precision of the field sampling techniques.

Field duplicate samples will be collected in the same manner and at the same location as the original sample. Equipment rinsate blanks will be collected by rinsing non-dedicated sampling equipment with laboratory-supplied certified PFAS-free water following decontamination, and collecting the rinsate for analysis to evaluate the efficacy of the decontamination procedures.

Laboratory-prepared trip blanks will be included in each sample cooler. Analysis of the trip blanks may be performed to evaluate potential contamination or exposure of samples to PFAS during transit if the reported concentrations of PFAS or field observations suggest this analysis is warranted. Field duplicate samples will be collected at a rate of one field duplicate per 10 samples collected. Equipment rinsate samples will be collected as needed to ensure sampling equipment is PFAS-free.



6.0 MANAGEMENT OF INVESTIGATION-DERIVED WASTE

Waste soil, water, and other products generated during the cleanup action may be contaminated and will be containerized and stored on the Site pending receipt of analytical results for selection of a disposal method. The specific criteria for tracking the sampling and analysis of the wastes to identify appropriate disposal options for each of the expected waste streams are discussed below.

6.1 SOIL CUTTINGS

Waste soil will be generated during drilling to collect soil samples and install proposed monitoring wells. Soil cuttings will be temporarily stored in 55-gallon drums or similar U.S. Department of Transportation–approved containers pending receipt of analytical results and profiling. The waste soil will be segregated based on its generation location(s).

Soil cuttings drums used for waste storage will be labeled with content, date, and origin. Soil cuttings drums and locations will be tracked using a Waste Inventory Tracking Sheet (Attachment B). Soil analytical results will be used to generate waste disposal profiles. Once the profiles have been approved for a licensed permanent disposal facility, the drums will be removed by a contractor.

6.2 WASTEWATER

Wastewater will be generated during monitoring well purging and equipment decontamination. Wastewater will be temporarily stored in 55-gallon drums or similar U.S. Department of Transportation–approved containers at the same location as the waste soil drums.

Wastewater drums will be labeled with content, date, and origin and/or generating activity. Wastewater drums will be tracked using a Waste Inventory Tracking Sheet (Attachment B). Analytical results will be used to generate a profile for disposal. Once the profiles have been approved for a licensed permanent disposal facility, the drums will be removed by a contractor.

6.3 DISPOSABLES

Disposable personal protective clothing (e.g., Tyvek suits, rubber gloves, boot covers) and disposable sampling devices (e.g., plastic scoops and bailers) will be cleaned, placed into plastic garbage bags, and disposed of as nonhazardous waste.



7.0 FIELD DOCUMENTATION

Documentation of field activities will be provided on Field Report forms, Log of Boring forms, Low Flow Well Purging and Sampling Data forms, Soil Sample Data logs, sample and waste material labels, Waste Inventory forms, and Chain of Custody forms. Documentation generated during the field program will be retained in the project file and included in the reports generated, as appropriate.

7.1 FIELD REPORT FORM

Field personnel will be required to keep a daily field log on a Field Report form. Field notes will be as descriptive and inclusive as possible, enabling independent parties to reconstruct the sampling situation from the recorded information. Language will be objective, factual, and free of inappropriate terminology.

A summary of each day's events will be provided on the Field Report form. At a minimum, field documentation will include the date, job number, project identification and location, weather conditions, sample collection data, personnel present and responsibilities, field equipment used, and any activities performed in a manner other than as specified in the SAP. In addition, if other forms or documents such as well-head surveys or maps are completed or used, they will be cited in and attached to the Field Report form. Field personnel will sign the completed Field Report form.

7.2 LOG OF BORING FORM

A Log of Boring form will be prepared by Farallon Field Staff for each boring drilled during the remedial investigation activities. The log includes hydrologic conditions, lithologic descriptions using the Unified Soil Classification System (USCS), information on the potential presence of contamination, and well construction details, if applicable.

7.3 LOW-FLOW WELL PURGING AND SAMPLING DATA FORM

A Low-Flow Well Purging and Sampling Data form will be used to record the depth to groundwater, well purging information, and other pertinent hydrologic measurements and supplementary information collected during groundwater sampling at each monitoring well during the groundwater sampling event. The form will be completed by Field Staff at the time of sample collection. These forms will be maintained in the project files.



7.4 SOIL SAMPLE DATA LOG

A Soil Sample Data Log will be used by the Field Staff during soil sampling activities to record information pertaining to the soil samples being collected. This form includes entries for the sample location, identification, and depth; the time sampled; field-screening results; the types and number of containers collected; and a brief lithologic description. These forms will be maintained in the project files.

7.5 SAMPLE LABEL

A sample label is filled out and affixed to appropriate sample containers immediately prior to sample collection. The label is filled out in indelible ink and includes the medium, date, time sampled, sample identification and number, project name, project number, sampler's initials, and analyte preservative(s) if any.

7.6 WASTE MATERIAL LABEL

A waste material label is filled out and affixed to the appropriate waste container immediately upon filling. The label is filled out in indelible ink and includes the job number and name, the address where the waste was generated, container contents, date, consultant's name and phone number, and sampler's initials.

7.7 WASTE INVENTORY FORM

A Waste Inventory form will be used to document and track the wastes generated during the cleanup action. The form will include information on the waste container, the origin of the waste, the type of waste, the date generated, the date removed from the Site, the transporter, and the disposal location.

7.8 CHAIN OF CUSTODY FORM

The written procedures that are followed whenever samples are collected, transferred, stored, analyzed, or destroyed are designed to create an accurate written record that can be used to trace the possession and handling of the sample from the moment of its collection through analysis and reporting of analytical values. This written record, the Chain of Custody form, will be filled out by field sampling personnel at the time a sample is obtained.

The samples submitted to the laboratory are accompanied by the Chain of Custody form. This form is checked for accuracy and completeness, signed, and dated by the laboratory sample custodian accepting the sample. At the laboratory, each sample is assigned a



unique, sequential laboratory identification number that is stamped or written on the Chain of Custody form.

Samples are held under internal chain of custody in the Sample Control room under the appropriate storage conditions (e.g., ambient, refrigeration, frozen). The laboratory Project Manager assigned to a particular client is responsible for tracking the status of the samples throughout the laboratory. Samples are signed out of the Sample Control room in a sample control logbook by the analyst who will prepare the samples for analysis.

The Chain of Custody form includes the client name, project name and number, date and time sampled, sample identifier, sampler's initials, analysis, and analyte preservative(s), if any.



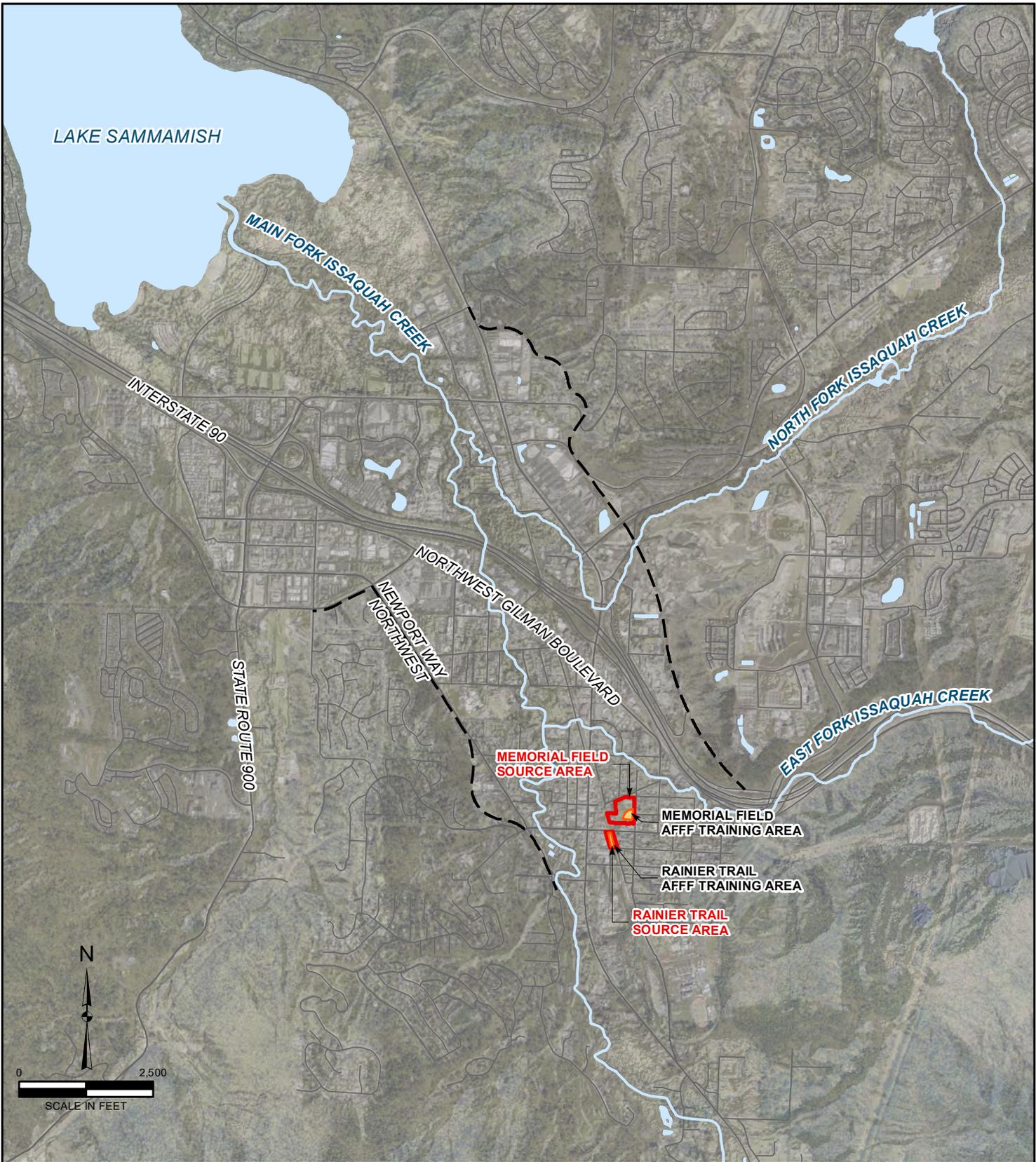
8.0 REFERENCES

- U.S. Environmental Protection Agency (EPA) Region 4 Laboratory Services & Applied Science Division. 2023. *Porewater Sampling*, < <https://www.epa.gov/quality/pore-water-sampling> >, (May 20, 2025.)
- . 2024. *Method 1633, Revision A. Analysis of Per- and Polyfluoroalkyl Substances (PFAS) in Aqueous, Solid, Biosolids, and Tissue Samples by LC-MS/MS*. EPA 820-R-24-007. December.
- Washington State Department of Ecology (Ecology). 2004. *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies*. Publication No. 04-03-030. Revised December 2016. July.
- . 2022. *Guidance for Investigating and Remediating PFAS Contamination in Washington State*. Publication No. 22-09-058. Revised June 2023. December.

FIGURES

SAMPLING AND ANALYSIS PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010



LEGEND

- CREEK
- - LOWER ISSAQUAH VALLEY
- SOURCE AREA
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA

MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE

Washington
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Oregon
Portland | Baker City

California
Oakland | Irvine

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Drawn By: jjones

Checked By: SS

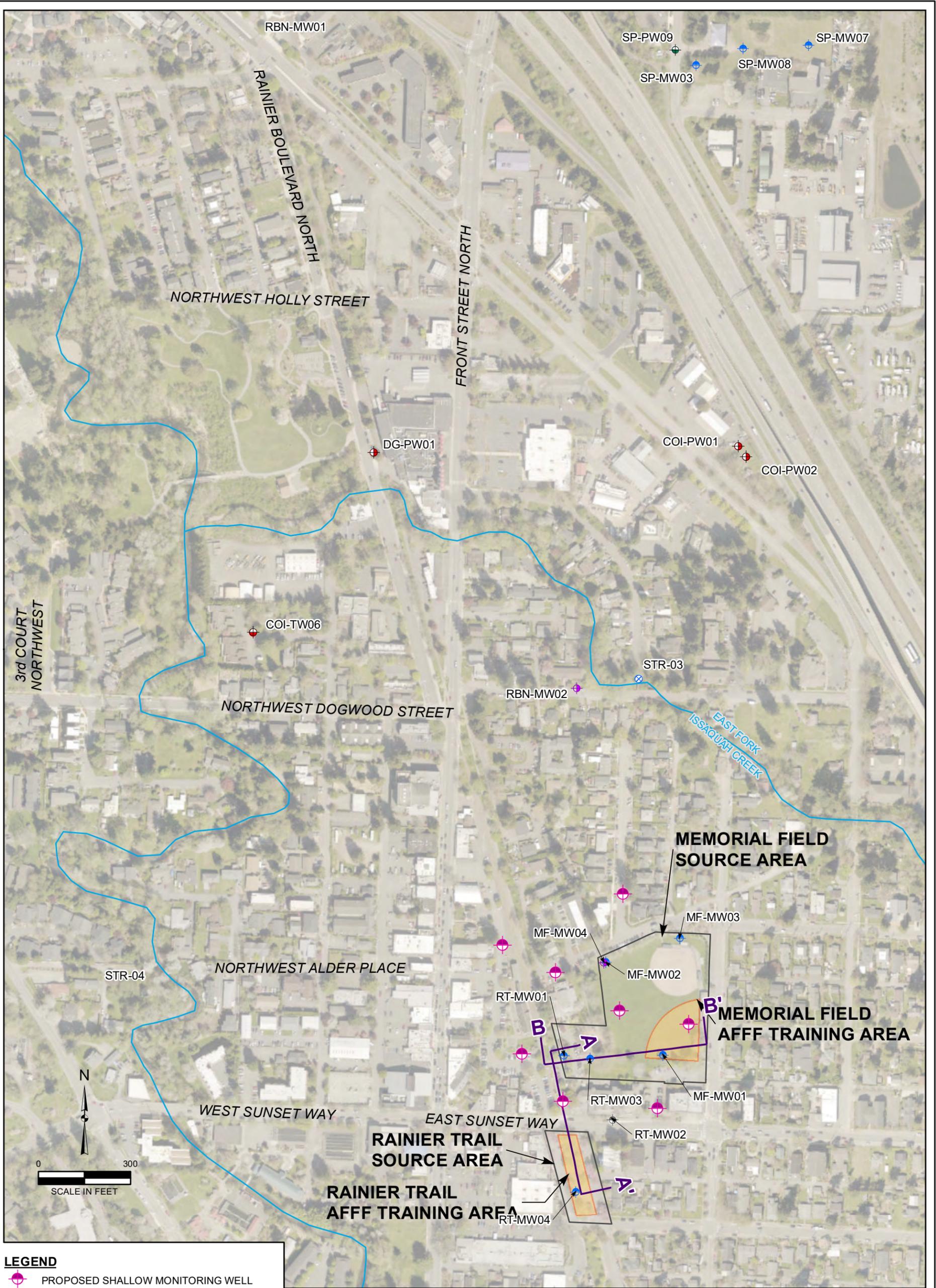
Date: 6/4/2025

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FIGURE 1

LOWER ISSAQUAH VALLEY VICINITY MAP
MFRT SITE
105 2nd AVENUE NORTHEAST AND
PARCEL NUMBER 3424066043
ISSAQUAH, WASHINGTON

FARALLON PN: 821-010



LEGEND

- PROPOSED SHALLOW MONITORING WELL
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- STREAM GAUGING STATION
- INTERMEDIATE PRODUCTION WELL
- DEEP PRODUCTION WELL
- SHALLOW MONITORING WELL - DECOMMISSIONED
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFF) TRAINING AREA

LINE OF CROSS-SECTION

MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE

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
MFRT SITE PLAN
MFRT SITE
105 2nd AVENUE NORTHEAST AND
PARCEL NUMBER 3424066043
ISSAQUAH, WASHINGTON

FARALLON PN: 821-010

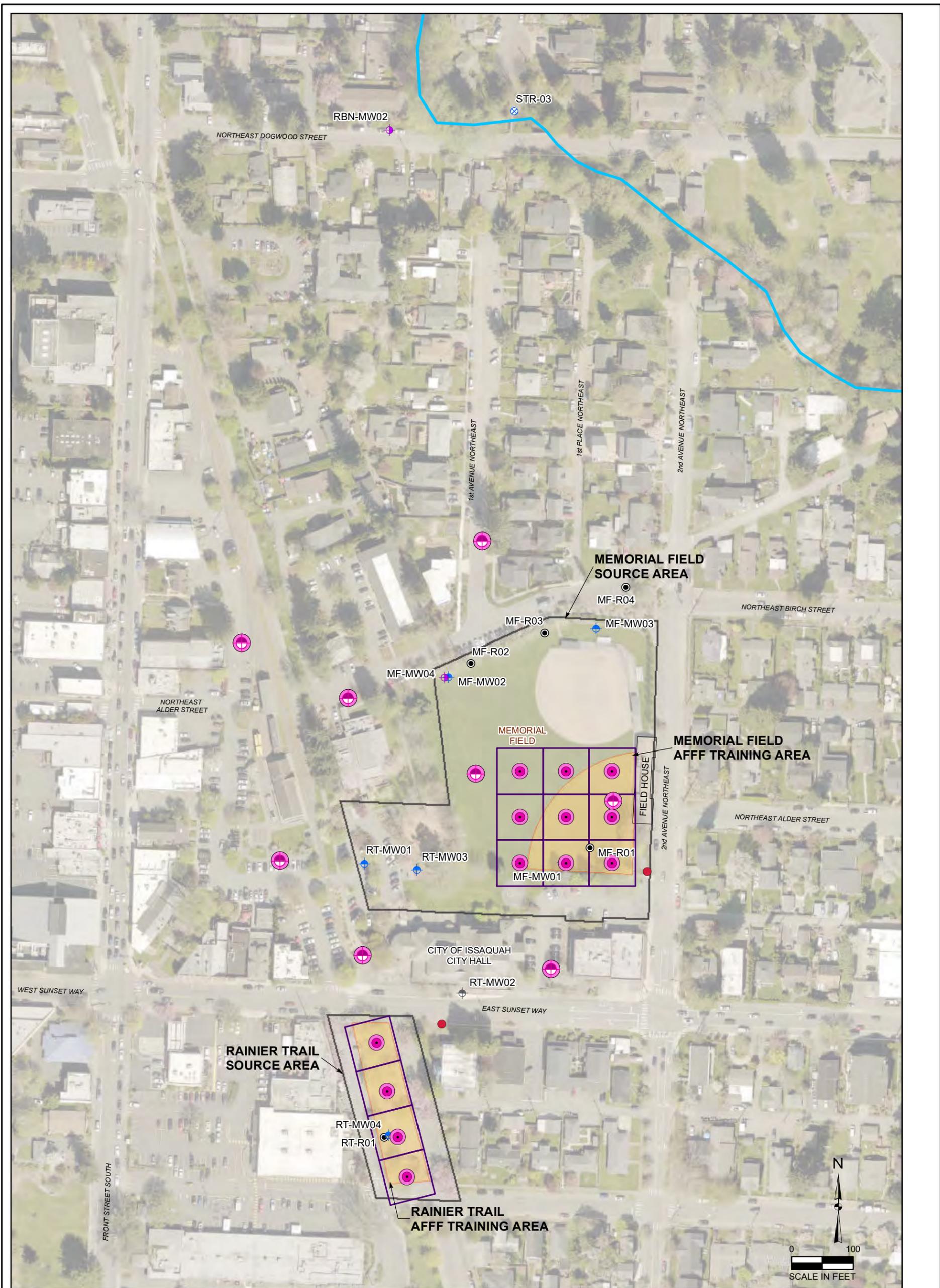
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Date: 8/19/2025

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LEGEND

- PROPOSED HAND AUGER LOCATION
- ⊕ PROPOSED SHALLOW MONITORING WELL
- BORING
- ⊕ SHALLOW MONITORING WELL
- ⊕ INTERMEDIATE MONITORING WELL
- ⊗ STREAM GAUGING STATION
- ⊕ SHALLOW MONITORING WELL - DECOMMISSIONED
- FIRE HYDRANT
- SAMPLING GRID (75'x75')
- AQUEOUS FIREFIGHTING FOAM TRAINING AREA
- LISTED SITE

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

PROPOSED BORING AND MONITORING WELL LOCATIONS
 MFRT SITE
 105 2nd AVENUE NORTHEAST AND
 PARCEL NUMBER 3424066043
 ISSAQUAH, WASHINGTON

FARALLON PN: 821-010

TABLES

SAMPLING AND ANALYSIS PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010

**Table 1
Soil Screening Levels
MFRT Site
Issaquah, Washington
Farallon PN: 821-010**

Constituent of Potential Concern	Soil Screening Levels									
	Method B Direct Contact (mg/kg) ¹	Protection of Groundwater (mg/kg) ¹		Adjustment Factors	Proposed Soil Screening Level (mg/kg)		Maximum Reported Value (mg/kg)	Property	Sample Identification	Retained as Soil COPC
		Vadose Zone Protection of Groundwater	Saturated Zone Protection of Groundwater	Laboratory Method Reporting Limit (mg/kg)	Vadose Zone	Saturated Zone				
Per- and Polyfluoroalkyl Substances										
Perfluorobutanoic Acid (PFBA)	80	0.044	0.0029	0.00010	0.044	0.0029	0.010	Eastside Fire & Rescue	NWN-R10-200320-3.0	No
Perfluorobutane Sulfonic Acid (PFBS)	24	0.025	0.0017	0.00010	0.025	0.0017	0.025	Eastside Fire & Rescue	NWN-MW12-3	No
Perfluorohexanoic Acid (PFHxA)	40	0.035	0.0025	0.00010	0.035	0.0025	0.066	Eastside Fire & Rescue	NWN-R10-200320-3.0	Yes
Perfluorohexane Sulfonic Acid (PFHxS)	0.000032	0.00000004	0.000000026	0.00010	0.0001	0.0001	0.21	Eastside Fire & Rescue	NWN-MW12-3	Yes
Perfluorooctanoic Acid (PFOA)	0.000034	0.000025	0.0000016	0.00010	0.0001	0.0001	0.094	Eastside Fire & Rescue	NWN-MW10-3	Yes
Perfluorooctane Sulfonic Acid (PFOS)	0.008	0.000046	0.0000026	0.00010	0.0001	0.0001	3.6	Eastside Fire & Rescue	NWN-R19-3	Yes
Perfluorononanoic Acid (PFNA)	0.20	0.000089	0.0000053	0.00010	0.0001	0.0001	1.4	Eastside Fire & Rescue	NWN-R15-200319-5.0	Yes
Perfluorodecanoic Acid (PFDA)	0.00016	0.00000038	0.00000022	0.00010	0.0001	0.0001	0.013	Eastside Fire & Rescue	NWN-MW12-3	Yes
6:2 Fluorotelomer Sulfonic Acid (6:2 FTS)	16	0.074	0.004	0.00010	0.074	0.004	0.48	Eastside Fire & Rescue	NWN-R09-200320-3.0	Yes
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA/GenX)	0.24	0.00012	0.0000069	0.00010	0.00012	0.0001	0.0014	Eastside Fire & Rescue	NWN-R15-200319-10.0	Yes

NOTES:

Values highlighted in mint green are selected soil screening level.

Bold values exceed proposed screening level

¹Washington State Cleanup Levels and Risk Calculations (CLARC) under Washington State MTCA, Standard Method B and C Values for Soil from CLARC Master spreadsheet, <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC>.

COPC = constituent of potential concern

mg/kg = milligrams per kilogram

**Table 2
Groundwater Screening Levels
MFRT Site
Issaquah, Washington
Farallon PN: 821-010**

Constituent of Potential Concern	Groundwater Screening Levels							
	Method B Groundwater (µg/l) ¹	Federal Maximum Contaminant Levels (MCLs) (µg/l) ²	Adjustment Factors	Proposed Groundwater Screening Level (µg/l)	Reported Maximum Value (µg/l)	Property	Sample Identification	Retained as Groundwater COPC
			Laboratory Method Reporting Limit (µg/l)					
Per- and Polyfluoroalkyl Substances								
Perfluorobutanoic Acid (PFBA)	8.0	NE	0.0020	8.0	0.46	Eastside Fire & Rescue	NWN-MW44-102920	No
Perfluorobutane Sulfonic Acid (PFBS)	4.8	Note 2	0.0020	4.8	0.49	Eastside Fire & Rescue	NWN-MW07-121422	Yes
Perfluorohexanoic Acid (PFHxA)	8.0	NE	0.0020	8.0	1.6	Eastside Fire & Rescue	NWN-MW14-20220118	No
Perfluorohexane Sulfonic Acid (PFHxS)	0.0000064	0.01	0.0020	0.0020	2.0	Eastside Fire & Rescue	NWN-MW06-200417	Yes
Perfluorooctanoic Acid (PFOA)	0.000003	0.004	0.001	0.004	1.0	Eastside Fire & Rescue	NWN-MW12-20220118	Yes
Perfluorooctane Sulfonic Acid (PFOS)	0.0016	0.004	0.001	0.004	8.6	Eastside Fire & Rescue	NWN-MW06-200417	Yes
Perfluorononanoic Acid (PFNA)	0.04	0.01	0.0020	0.01	0.64	Eastside Fire & Rescue	NWN-MW07-20220118	Yes
Perfluorodecanoic Acid (PFDA)	0.000032	NE	0.0020	0.0050	0.14	Eastside Fire & Rescue	NWN-R06-200320-10.0W	Yes
6:2 Fluorotelomer Sulfonic Acid (6:2 FTS)	3.2	NE	0.0020	3.2	2.4	Eastside Fire & Rescue	NWN-MW12-20220118	No
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA/GenX)	0.024	0.01	0.0020	0.01	ND	---	---	No

NOTES:

Values highlighted in mint green are selected groundwater screening level.

Bold values exceed proposed screening level

--- denotes criteria is not applicable

NE = Not established

ND = reported non-detect at the laboratory method reporting limit

¹Washington State Cleanup Levels and Risk Calculations (CLARC) under Washington State MTCA, Standard Method B Values for Groundwater from CLARC Master spreadsheet, <https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Contamination-clean-up-tools/CLARC>, unless otherwise noted.

²U.S. Environmental Protection Agency (EPA) National Primary Drinking Water Regulations, 40 Code of Federal Regulations Part 141. The EPA set a Hazard Index MCL of 1 for PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS to account for the combined and co-occurring levels of these PFAS in drinking water.

Table 3
Summary of Data Gaps and Scope of Work
MFRT Site
Issaquah, Washington
Farallon PN: 821-010

Location	Location Details	Task Element	Representative Sample		QA/QC Samples			Total Samples
			Sample Type	Sample Count	Trip Blanks	Equipment Blanks	Duplicates	
Memorial Field Source Area - Soil	Memorial Field AFFF Training Area	75x75' grid shallow hand auger sampling	Soil	14	1	1	1	17
		4 borings to 15ft bgs	Soil	12	1	1	1	15
Rainier Trail Source Area - Soil	Rainier Trail AFFF Training Area	75x75' grid shallow hand auger sampling	Soil	6	1	1	1	9
		1 boring to 15ft bgs	Soil	3	1	1	1	6
MFRT Site Groundwater Plume	Car Fire Locations	Investigation not warranted	--	--	--	--	--	--
	Memorial Field Source Area	2 Shallow Monitoring Wells (25-30ft bgs)	--	2	--	--	--	2
	Down-gradient of Rainier Trail Source Area	Shallow Monitoring Well (25-30ft bgs)	--	1	--	--	--	1
	Up-gradient of Memorial Field Source Area	Shallow Monitoring Well (25-30ft bgs)	--	1	--	--	--	1
	Four locations down- and cross-gradient of existing monitoring wells containing exceedances of PFAS	4 Shallow Monitoring Wells (25-30ft bgs)	--	--	--	--	--	--
	MFRT Site monitoring wells	2 semi-annual groundwater monitoring events at 9 existing monitoring wells and 8 proposed monitoring wells	Groundwater	34	6	4	4	48

**ATTACHMENT A
STANDARD OPERATING PROCEDURES**

**SAMPLING AND ANALYSIS PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington**

Farallon PN: 821-010

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 in 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**

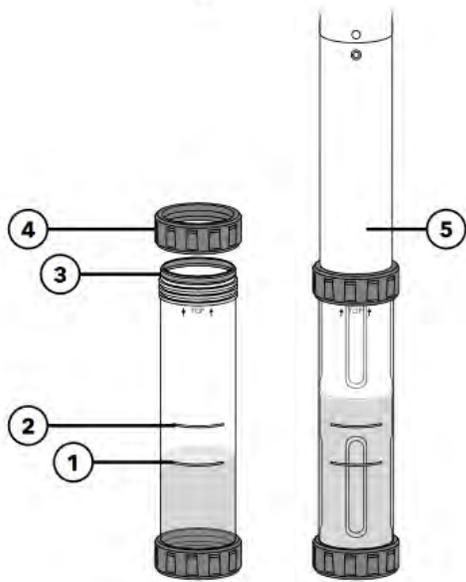
[NAME OF DOCUMENT]

[Site Name]

[Site Address]

[City, State]

Farallon PN: [xxxx-xxx]



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.

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

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 (SOP) GENERAL-02 UTILITY LOCATE

PURPOSE AND APPLICATION

The purpose of this SOP is to provide Farallon Consulting, L.L.C. (Farallon) personnel with the specific information needed to identify and locate utilities on sites where drilling or excavation activities will occur. Excavation is defined by Section 20 of Chapter 19.122 of the Revised Code of Washington (RCW 19.122.020) as “any operation, including the installation of signs, in which earth, rock, or other material on or below the ground is moved or otherwise displaced by any means.” For the purposes of this SOP, the excavation area refers to the area of an excavation or a perimeter around all proposed borings, test pits, soil gas sampling locations, and subslab soil gas sampling locations. Identifying utilities within the boundaries of a proposed excavation area prior to any digging is required by law and is necessary for the safety of Farallon personnel and contractors.

The guidelines provided in this SOP are to be followed by Farallon personnel who coordinate utility locating, mark locate boundaries, and/or observe field work that involves any type of excavation.

EQUIPMENT AND SUPPLIES

The following equipment and supplies are necessary to arrange and conduct utility locating:

- A map of the site with the proposed excavation area(s);
- Readable side sewer card figures, if applicable;
- Geographic information system (GIS) utility figures, if applicable;
- Readable American Land Title Association (ALTA) survey figures, if applicable;
- Any previous utility figures associated with the site;
- White marking products (e.g., paint, flags, stakes, grease marking pen, tape, chalk);
- Materials necessary to provide required documentation (e.g., Field Report form, camera, measuring wheel, global positioning system); and
- Personal protective equipment (PPE) as described in the site-specific Health and Safety Plan, or Level D PPE at a minimum.

PROCEDURES

The following utility locating procedures have been developed for use before excavation occurs on a site. The procedures are divided into the following four parts:

- Call Before You Dig System;



- Private Utility Locating Services;
- Hand-Clearing Proposed Excavation Areas; and
- Maintaining Public Utility Locate Marks.

The Project Manager should discuss the scope of work, details of the project location, and any essential information with the project field team before any of the procedures described below commence. When practicable, an on-site kickoff meeting involving a member of the field team and the Project Manager should be conducted to discuss the work to be performed, mark the boundaries of the excavation area, and mark potential boring locations, if applicable.

Call Before You Dig System

According to RCW 19.122.030, excavators are required to mark the boundary of a proposed excavation area using white marking products. Marking products include paint, flags, and stakes. Boundary marks should conform to the following guidelines:

- A continuous line, hashed line, dots, or corner marks with arrows are acceptable ways to mark the boundary.
- Flags and stakes can be used if paint is not adequate.

The location(s) of the proposed excavation area(s) must be reviewed to verify that no visible utilities that would interfere with the proposed excavation area(s) are present. If utilities are present, the Project Manager and field personnel should communicate the changes to the excavation that are area necessary before the boundaries are marked with white paint.

After marking the boundaries of the proposed excavation area, Farallon personnel must provide notice of the scheduled excavation to the owner/operators of buried utilities at least 2 but no more than 10 business days in advance by calling 811 or 1-800-424-5555, or using the online tool at www.callbeforeyoudig.org. Use of the online tool is preferred.

A map with the excavation area boundaries depicted and/or photos of the white paint marks is helpful in conveying the scope of work to the Call Before You Dig service.

The following information should be available to provide the Call Before You Dig service at the time of initial contact:

- Scope of work, including the start date and time.
- Contact information for the Project Manager and a field person able to answer questions from public utility locators regarding project details.
- Site address, township/range/section quarter, and name of property owner.



Once the Call Before You Dig system has been notified of the upcoming work, the system provides a ticket number, which

- Should be referenced whenever the Call Before You Dig service is contacted about the job.
- Provides proof that the Call Before You Dig system was notified prior to excavation. Public utility locators, inspectors, and law enforcement personnel may ask for the ticket number.
- Should be supplied to any subcontractors doing work on the site for reference when contacting the system for their own ticket number.

Call Before You Dig personnel will provide a list of public utilities present on the site, and will notify public utility operators of the planned work.

Public utility operators have 2 full business days after the day notification was received to locate and mark their lines, or to provide reasonable information on lines that they are not able to locate. The day notice is given is not included as 1 of these 2 days. Therefore, if excavation work is planned to start on a Monday, for example, the Call Before You Dig system must be notified by Wednesday the week before.

Two full business days must elapse between Call Before You Dig notification and the start of excavation. No excavation is to take place until all known utilities are marked or otherwise accounted for with information provided by the facility operator.

Locators mark their lines with colored hash marks. The American Public Works Association determines the colors to be used to denote different kinds of lines:

Red: Power Lines and Cable	Yellow: Gas, Oil, Petroleum
Orange: Telephone and Cable	Blue: Drinking Water
Green: Sewer (Storm and Sanitary)	Purple: Non-Potable Water
Pink: Survey Marks	White: Excavator Marks

Public utility operators are required to mark their lines only to the meter. Utility lines located beyond the meter are the responsibility of the property owner. Public utility operators should indicate by marking if no public utilities are present.

Public utility locators are required to mark their lines with reasonable accuracy. According to RCW 19.122.020, “reasonable accuracy means location within twenty-four inches of the outside dimensions of both sides of an underground facility.”

At this time, public utility companies are not required to mark abandoned or deactivated lines in Washington.



An individual not following the protocols established by the Call Before You Dig system can be held liable for up to three times the cost to repair a utility line damaged during excavation.

Records of ticket numbers and communications with the Call Before You Dig service should be stored in the project folder and supplied to on-site project personnel.

Before any excavation work is started, Farallon personnel should verify that all public utility marks are present on the site. The public utility company (companies) listed on the Call Before You Dig system ticket should be contacted if marks for that utility (utilities) are not present.

Private Utility Locating Services

After the public utility companies have marked their lines and before excavation begins, it is standard practice to have a private utility locating service clear areas that will be excavated.

Private locates generally are scheduled for the day before or the morning of the start of excavation.

Areas where excavation will occur must be cleared for conductible utilities by a private locator. Depending on the nature of the site and the proximity of utility lines, the private locator may also mark non-conductible utilities.

If possible, the excavation contractor should be on the site during the private utility locating to verify with the private locator that all proposed excavation areas are accessible.

When working with private utility locators, Farallon personnel should:

- Study existing figures of the site, noting the locations of known utilities.
- Use available side sewer cards or geographic information system utility figures to verify utility locations at the site.
- Verify that all public utilities have been marked by physically verifying that colored paint marks are present for all of the public utility companies listed on the One Call Before You Dig ticket. If any public utilities have not been marked, the utility company must be contacted and requested to mark the area, or to provide confirmation that the area is clear of their utility.
- Discuss the scope of work/excavation areas with the private locator.
- Document the name of the locating company and the name of the locator.
- Observe the locator clear the excavation area(s).
- Document the locate marks with photos, and note any uncertainties in the Field Report form.
- Identify the locations of shut-off valves for utilities such as water and natural gas.



- Contact the Project Manager or Principal to discuss relocating the excavation area if a proposed excavation area is in conflict with a utility identified by the private locator.
- Sign the locator's paperwork, if necessary, and depart the site if no additional field work is to be performed that day.

Private location of conductible utilities should sweep the excavation area in two perpendicular directions.

Private location of non-conductible utilities (typically storm and sanitary sewer) can use either a probe or a camera for accessible lines. Appropriately colored paint marks are applied by the private locator based on a signal sent from the probe or camera. For inaccessible lines, a ground-penetrating radar or magnetometer can be used to approximate the line locations. Marks based on this method should be considered approximate.

Hand-Clearing Excavation Areas

Prior to conducting certain excavation activities, excavators will clear the proposed excavation area to verify that no utilities are present. This can be accomplished through use of an air knife/vacuum truck, post-hole digging, hand-augering, or use of other hand tools that allow the excavation location to be explored sufficiently to verify that no utilities are present. Farallon Project Managers will confirm the method of clearing and depths with the field team before the excavation work is performed. Farallon Project Managers also need to discuss shallow soil sampling needs with the field team if clearing activities are being performed. Clearing activities should be conducted according to the following guidelines:

- **Hollow-Stem Auger Drilling:** Hand-clear to a minimum depth of 5 feet below ground surface (bgs) using an air knife/vacuum truck whenever possible. Alternative methods such as post-hole digging or hand-augering also may be used.
- **Sonic Drilling:** Hand-clear to a minimum depth of 5 feet bgs using an air knife/vacuum truck whenever possible. Alternative methods such as post-hole digging or hand-augering also may be used.
- **Geoprobe Drilling:** Clearing activity requirements are dependent on known utilities and results of the public and private utility location procedures completed above. Hand-clear using a post-hole digger or hand-auger to a maximum depth of 5 feet bgs is necessary. An air knife/vacuum truck may be used to hand clear each boring location to a maximum depth of 5 feet bgs, if available.
- **Test Pit Excavation:** No hand-clearing is necessary. Excavation contractors should be directed to dig cautiously in the upper 5 feet bgs in the event an unknown utility is present. A test pit excavation or regular excavation using machinery (e.g., track hoe, backhoe) should include using a spotter to watch for unidentified utility lines. Ideally, the spotter should be provided by the excavation contractor.
- **Rotary Hammer for Soil Gas Sampling:** No hand-clearing is necessary.



- Rotary Hammer for Subslab Soil Gas Sampling: No-hand clearing is necessary.

Some drilling contractors require that a utility line be exposed prior to drilling if the proposed drilling location is within a certain distance of the utility line. Farallon personnel should confirm drilling contractor requirements prior to conducting drilling activities.

If a utility line is encountered during clearing, excavators should verify that the utility has not been damaged, and Farallon personnel should document the encounter on the Field Report form with photos and details. RCW 19.122.020 states that “damage” includes the substantial weakening of structural or lateral support of an underground facility, penetration, impairment, or destruction of any underground protective coating, housing, or other protective device, or the severance, partial or complete, of any underground facility to the extent that the owner of the affected facility determines that repairs are required. The Project Manager or Principal should be notified immediately if a utility line is encountered during hand-clearing, and an alternate location will be proposed. A hand-cleared area having an exposed utility line should be backfilled with a bentonite seal and finished to match existing grade.

Maintaining Public Utility Locate Marks

According to RCW 19.122.030, “public utility locate marks expire 45 days from the date the excavator provides notice,” and “it is the responsibility of the excavator to maintain the public utility marks for 45 days, or for the length of the project—whichever is shortest. In any case, the public utility locate marks expire after 45 days.”

Locate marks can be maintained digitally through both photos and figures drawn to scale.

Locate marks can be maintained in the field using white paint. White paint can be applied between original hash marks, on either side of the hash marks, or on both ends. Offset paint or staking can be used if placed a uniform distance from the original marks with a clear indication of the direction and distance from the original marks. The original marks should not be painted over, and white paint should never be applied over colored paint. White marks should include a letter identifying the type of buried line.

UTILITY LINE DAMAGE

A utility line does not need to be ruptured or severed to be considered damaged. Scratching or denting a utility line or its protective tape also is considered damage, as the integrity of the line may have damaged even if the damage does not appear to be significant. Before excavation work begins, shut-off valve locations for applicable utilities should be documented. If a utility is believed to be damaged, the utility should be shut down if practicable and safe to do so. According to RCW 19.122.053, “all facility operators and excavators who observe or cause damage to an underground facility must report the damage event to the Washington State Utilities and Transportation Commission.”



If a utility line is hit and public safety is a concern, 911 should be the first call made after the immediate area has been evacuated. If a utility line is hit and the public is not at risk, the field team should notify the Project Manager, who will notify the Principal and the corporate Health and Safety Coordinator immediately. The Project Manager should then contact the utility that owns the damaged line, and report to the field team any instructions issued by the utility owner, and an expected timeframe for arrival of a utility owner representative at the site. Repairs to a utility line will not be attempted by Farallon personnel or contractors.

Damage must be reported through the Common Ground Alliance Damage Information Reporting Tool website, hosted by the Washington State Utilities and Transportation Commission: <http://www.utc.wa.gov/publicSafety/pipelineSafety/Pages/Damagereportingrequirements.aspx>

Access to damaged utility lines should be maintained to allow inspection by the utility company. An exposed utility should not be backfilled or patched until instruction to do so has been provided by the Project Manager or Principal.

DOCUMENTATION

Farallon personnel should document in the Field Report form the work performed and methods used by private utility locators, and photos from multiple angles with good reference points for each utility line in the excavation area(s).

REFERENCES

Washington Utilities Coordinating Council. 2014. *Guide to Safe Digging, Washington State Law and Industry Best Practices.*

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-01

MONITORING WELL CONSTRUCTION

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for monitoring well construction and installation. Monitoring well construction ultimately is at the discretion of the Project Manager, and is based on the geology at the site and the use of the monitoring well. Groundwater monitoring wells in the Puget Sound region, for example, typically are constructed using 2-inch-diameter Schedule 40 polyvinyl chloride well casing with 0.010-inch slotted screens because of the finer-grained materials prevalent in the region. Slot and sand sizes may be increased at the discretion of the Project Manager, depending on local geology. Monitoring wells must be installed and decommissioned by a licensed well driller, and constructed in general accordance with Chapter 173-360, Minimum Standards for Construction and Maintenance of Wells, of the Washington Administrative Code in Washington; with Rule 0410 of Division 240 of Chapter 690, Well Construction Standards – General, of the Oregon Administrative Rules in Oregon; with Bulletins 74-81 and 74-90, California Well Standards, from the California Department of Water Resources in California; and with the federal and/or state standards established for well construction specified in the project-specific field sampling plan in other states.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary for the construction and installation of monitoring wells:

- Monitoring well construction equipment (e.g., water-level meter, photoionization detector, tape measure, camera, plastic sheeting), as applicable.
- Monitoring well construction materials (e.g., well casing [screened and blank], filter pack sand, bentonite and/or Volclay Grout annular seal material, concrete, locking casing cap, well-head monument [flush-mounted or stove-pipe monument, as appropriate] complete with locking top, bollards for placement around well-head monument as applicable), provided by the driller.
- Materials necessary to provide required documentation, including Boring Log, Monitoring Well Construction Data form, and Field Report form.
- 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.
- U.S. Department of Transportation-approved drum(s) for decontamination wastewater and excess soil cuttings. 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 equipment that will come into contact with potentially contaminated soil and groundwater, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

PROCEDURES

Follow the instructions below for monitoring well construction and installation:

- Don appropriate personal protective equipment as described in the site-specific Health and Safety Plan.
- Before installing the casing, discuss the geology and groundwater conditions at the site with the Project Manager to confirm the depth the monitoring well screen should be placed at, and the length of screen to be used.
- Measure the depth to the bottom of the borehole to calculate the appropriate placement and length of the screened interval, filter pack, annular seal, and concrete surface seal. Calculate the approximate volumes of the filter pack and the seal material required for the specific monitoring well bore annulus and monitoring well casing diameter. Ensure that the filter pack extends from the bottom of the monitoring well intake to approximately 2 to 5 feet above the top of the monitoring well intake, and is approximately 2 to 4 inches thick. The monitoring well casing should be centered in the borehole. Ensure that the annular seal is a minimum of 2 feet thick above the top of the filter pack, and that the concrete seal is a minimum of 2 feet in depth from the surface.
- Prior to installation, measure and check the lengths of the monitoring well screen and the blank casing, and confirm the slot size and the sand filter pack size, the type of bentonite seal and/or Volclay Grout seal, and the monitoring well-head monument. For boreholes completed to depths deeper than the planned installation depth of the monitoring well casing, backfill the borehole with bentonite, sand, or pea gravel. Record the type and brand of the monitoring well construction materials used on a Monitoring Well Construction Data form.
- Record on a Field Report form the start and completion times for the various stages of monitoring well construction such as installation of the monitoring well casing into the borehole, filter pack and seal emplacement, and well-head monument placement.
- Record on a Monitoring Well Construction Data form the volumes of filter pack, the bentonite seal, and the concrete used to construct the monitoring well, and check against calculated volumes to confirm proper placement and amount. During the construction process, record any irregularities such as bridging of the filter pack or seal material that could indicate construction problems.
- Upon completion of monitoring well installation, measure the total monitoring well depth and the depth to groundwater, and record the measurements on the Monitoring Well Construction Data form.



- Place a mark or notch on the northern side of the top of the monitoring well casing to provide a monument for the measurement of water levels.

DOCUMENTATION

Document monitoring well construction activities on the Monitoring Well Construction Data form and the Field Report form.

REFERENCES

U.S. Environmental Protection Agency. 1991. *Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells*. EPA160014-891034. March.

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

MONITORING WELL CONSTRUCTION DATA

WELL/BORING NO: _____

PROJECT NO: _____

PROJECT NAME: _____

PERMIT NO: _____

DATE: _____

SITE ADDRESS: _____

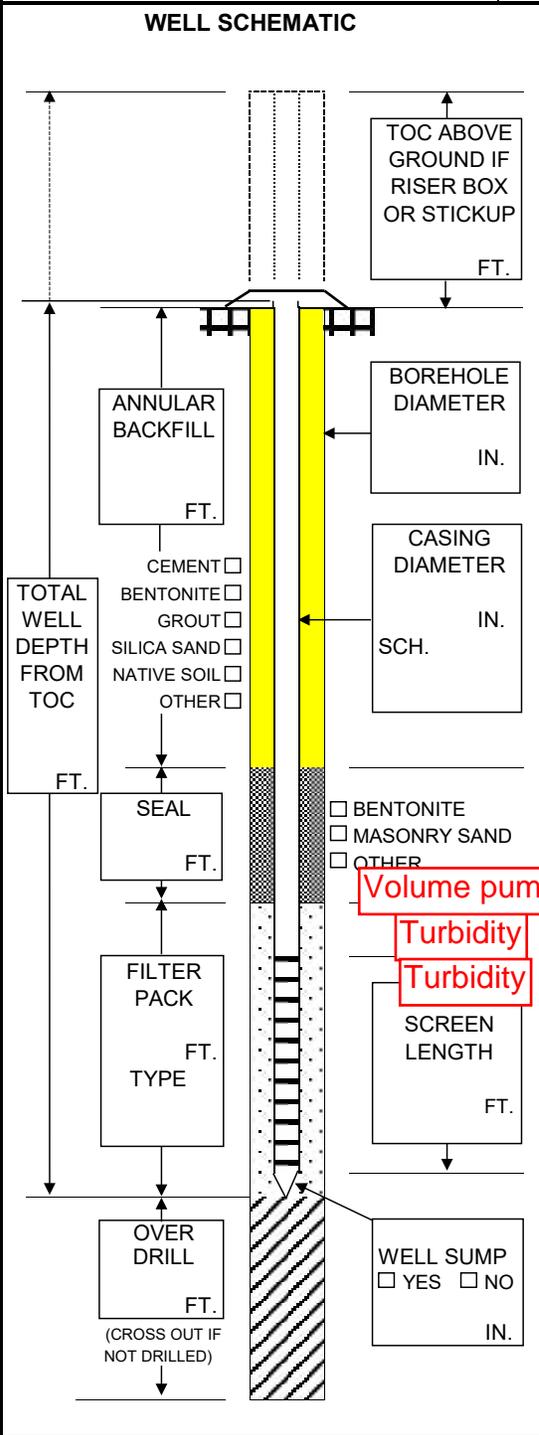
WELL SITE LOCATION PLAN:

SEC: _____ TWN: _____ RGE: _____ LAT: _____ LONG: _____

DRILLING CO: _____

DRILL CREW: _____

WELL TYPE: SHALLOW SINGLE CASED MONITORING
 PERMANENT INTERMEDIATE DOUBLE CASED RECOVERY
 TEMPORARY DEEP OTHER OTHER



INSTALLATION DATA

DECON. STEAM CLEAN HIGH PRESSURE WASH
 SOAP WASH OTHER _____

CASING TYPE: PVC STAINLESS TEFLON OTHER
 JOINTS: THREADED WELDED COUPLED
 SCREWED OTHER _____

PIT CASING: YES NO DESCRIBE _____

WELL SCREEN: PVC STAINLESS TEFLON OTHER
 DIAMETER: 2" 4" 6" OTHER _____ IN
 SLOT: 0.010 0.020 OTHER _____ IN

DRILLING METHOD: SOLID STEM HOLLOW STEM MUD ROTARY
 AIR ROTARY DIRECT PUSH HAND AUGER
 OTHER _____

BIT SIZE: 2" 4" 6" 8" 12" OTHER _____ IN
 DRILLING MUD: NONE WATER BENTONITE
 OTHER _____

CENTRALIZER: YES NO

COMPLETION: FLUSH MOUNT STICKUP RISER BOX
 LOCK TYPE: DOLPHIN MASTER KEY NO. _____
 OTHER _____

PAD: 2'X2' 4'X4' OTHER _____

CUTTINGS: DRUMMED NUMBER OF DRUMS _____
 SPREAD OTHER _____

DEVELOPMENT METHOD: NONE BAILING PUMPING AIR LIFT
 SURGE & BLOCK OTHER _____

TIME: 10 MIN 20 MIN OTHER _____ MIN
 5 GAL 10 GAL OTHER _____ GAL

WATER BEFORE: SILTY TURBID OPAQUE CLEAR
 WATER AFTER: SILTY TURBID OPAQUE CLEAR

EVIDENT ODOR: YES NO TYPE _____

DEVELOPMENT WATER: DRUMMED NUMBER OF DRUMS _____
 SPREAD TREATED POTW OTHER _____

Volume pumped

Turbidity

Turbidity

Well Screen Surge Interval ___ FT
 Number of times total well screen was Surged ___
 Total amount of time well screen was Surged ___ Mins
 Water Level: Initial ___ FT BTOC Date and Time ___
 Water Level: Final ___ FT BTOC Date and Time ___

PREPARED BY: _____

STANDARD OPERATING PROCEDURE GW-02

MONITORING WELL DEVELOPMENT

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for monitoring well development. All monitoring wells should be developed to create an effective filter pack around the monitoring well screen, rectify damage to the formation caused by drilling, remove fine particulates from the formation near the borehole, and assist in restoring the natural water quality of the aquifer in the vicinity of the monitoring well. The step-by-step guidelines provided in this SOP are to be followed by the field crew performing or overseeing monitoring well development.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly develop a groundwater monitoring well:

- Monitoring well key, socket wrench or speed wrench, socket set, padlock key, or other monitoring well-access equipment.
- Electric water-level meter long enough to reach the bottom of the monitoring well, calibrated to 0.01 foot.
- Two-inch-diameter (or appropriately sized) surge block.
- Monitoring well-purging equipment (e.g., silicone line, polyvinyl chloride pipe, plug, submersible or non-submersible pump, tubing, power supply, extension cord), as applicable.
- U.S. Department of Transportation-approved drum(s) for decontamination wastewater 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.
- Materials necessary to provide required documentation (e.g., Field Report form, Monitoring Well Construction Data form, and Waste Inventory Tracking Sheet).
- 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 SOP EQ-01, Equipment Decontamination Procedures.



PROCEDURES

Follow the instructions below for each monitoring well:

- Don appropriate personal protective equipment as described in the site-specific Health and Safety Plan.
- Brush away soil and vegetation, and pump standing water away from the monitoring well opening.
- Open the monitoring well cap.
- Measure the depth to water and the total depth of the monitoring well to the nearest 0.01 foot using a decontaminated water-level meter in accordance with Farallon SOP GW-03, Groundwater Level Measurements in Monitoring Wells. Record the measurements on the Monitoring Well Construction Data form.
- Calculate the unit purge volume using the formula and the input values from the table below:

$$V = [X(\text{monitoring well depth} - \text{water level})] + [Y(\text{monitoring well depth} - \text{bottom of seal or water level, whichever is lowest in depth})]$$

Where:

V = monitoring well volume, including annular space

X = internal casing volume per unit length (gallons per linear foot)

Y = annular volume per unit length (gallons per linear foot)

Borehole Diameter (inches)	Casing Diameter (inches)	Volume _{casing} (X) (gallons per linear foot)	Volume _{annulus} (Y) (gallons per linear foot)
7	2	0.17	0.68
8	2	0.17	0.98
10	4	0.65	1.34
12	4	0.65	2.07
12	6	1.47	1.70
14	8	2.61	1.98

Development Procedures – Existing and New Monitoring Wells

Existing wells in a monitoring well network may require redevelopment if an excessive amount of fines are present in the monitoring well casing that could interfere with stabilization of water-quality parameters or collection of representative water-quality samples.



The instructions below are to be followed for development of existing and new monitoring wells:

For existing monitoring wells only:

- Remove the pump and/or any dedicated tubing from the monitoring well.

For existing and new monitoring wells:

- Attach one length of twine to the decontaminated surge block (or use a drill rig or tripod) and lower the surge block to within 0.25 foot of the bottom of the monitoring well.
- Surge the monitoring well by vigorously moving the surge block up and down from 0.25 foot from the bottom of the monitoring well to 1 foot above the top of the screened interval for a minimum of 5 minutes to create a surging action across the screened interval, which will bring finer-grained material into suspension. Move the surge block up and down in 3-foot sections until the entire monitoring well screen length has been surged. Record on the Monitoring Well Construction Data form the number of times the surge block is raised and lowered, and total surge time.
- Remove the surge block.
- If a submersible pump is to be used for monitoring well development, gently lower the pump into the monitoring well to within 1 foot of the bottom of the screened interval. If a non-submersible pump is to be used, lower the tubing to within 1 foot of the bottom of the screened interval.
- Begin purging the monitoring well at a rate sufficient to remove fines without pumping the monitoring well dry. Record on the Monitoring Well Construction Data form the volume of water pumped from the monitoring well.
- Surge and pump the monitoring well, including saturated annular space, a minimum of three and a maximum of five monitoring well volumes. If the monitoring well runs dry, let the monitoring well recharge. Then commence purging until a minimum of three monitoring well volumes have been purged. If this event is the first time the monitoring well has been developed and water was added during the drilling process, remove the volume of water introduced during drilling and monitoring well construction. Purging has been completed when *one* of the following has occurred:
 - The minimum purge volume has been removed; OR
 - Five purge volumes and the drilling process water volume have been removed.
- Measure the total depth of the monitoring well after development, and record on the Monitoring Well Construction Data form the total volume of water pumped from the monitoring well.
- Record on the Monitoring Well Construction Data form a description of the suspended particle content, and additional information such as unique odor or water color.



- Containerize the purge water in a U.S. Department of Transportation-approved drum(s) 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.
- Upon completion of monitoring well development, properly seal, secure, and label the drums in accordance with Farallon SOP WM-01, Field-Handling of Investigation-Derived Waste. Record the number and contents of the drums on a Waste Inventory Tracking Sheet. At a minimum, the drum label(s) should include:
 - Boring/monitoring well ID.
 - Facility name.
 - Drum contents.
 - Date.
 - Drum number.
- Close the monitoring well and record any monitoring well-integrity concerns on the Field Report form and the Monitoring Well Construction Data form.
- Decontaminate all equipment in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

DOCUMENTATION

Document monitoring well development activities on the Monitoring Well Construction Data form. Record the number and contents of the drums on a Waste Inventory Tracking Sheet.

REFERENCE

U.S. Environmental Protection Agency. 1991. *Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells*. Document No. 160014-891034. March.

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 = $(\pi * r^2) * h (7.48 \text{ gallons/cubic foot})$

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:

$$\text{Minimum purge volume} = 2 * [500 \text{ milliliters} + M * (\text{length of tubing in feet})]$$

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 SL-01

SOIL CORE SAMPLING

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field personnel with the methodology for collecting and documenting soil core samples collected during environmental drilling. All drilling operations will be conducted by a licensed drilling subcontractor. This SOP presents the procedures that will be performed by Farallon field staff once the soil core or sampler has been collected by the drilling subcontractor. The step-by-step guidelines provided in this SOP are to be followed by the field crew conducting subsurface soil sampling.

EQUIPMENT AND SUPPLIES/REAGENTS

The following equipment is necessary to properly collect soil samples from borings:

- Personal protective equipment (PPE) as described in the site-specific Health and Safety Plan.
- Differential global positioning system, if required in project-specific plans. Discuss the methodology for recording the location of the sample point with the Project Manager before conducting the field work.
- Photoionization detector (PID) to monitor and record soil headspace readings.
- Appropriate soil sampling equipment, including:
 - Stainless steel hand-auger.
 - Wooden or steel stakes to stabilize cores on table while sampling.
 - Folding table.
 - Utility knife.
 - Stainless steel spoons or scoops.
 - Six-mil plastic sheeting.
 - Resealable plastic bags.
 - Duct tape.
 - Tape measure.
 - Laboratory-provided certified pre-cleaned sample containers.
 - Soil sample plunger and syringes for sampling volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 5035A.
- Materials necessary to provide required documentation including sample labels, field report forms, boring logs, and laboratory chain-of-custody forms.



- U.S. Department of Transportation-approved drum(s) for decontamination wastewater and excess soil cuttings. Wastewater and soil cuttings should be handled in accordance with Farallon SOP WM-01.
- Decontamination equipment as specified in Farallon SOP EQ-01, Equipment Decontamination Procedures.
- Sampling support equipment (e.g., sample coolers, ice, bubble wrap, clear packing tape, heavy resealable plastic bags, garbage bags, paper towels, distilled water, nitrile gloves).

DECONTAMINATION

Reusable equipment that will come into contact with soil boring samples or will be used to acquire soil samples is to be decontaminated before arrival at the site, between soil samples collected, upon relocation at the site, and upon demobilization from the site, in accordance with Farallon SOP EQ-01, Equipment Decontamination Procedures.

PROCEDURES

Prior to drilling, all underground utilities must be located, and cleared with an air-knife or other method approved by the Farallon Health and Safety Coordinator.

Collect soil samples from areas known or suspected to have the lowest concentrations of constituents of concern first, with areas of higher concentrations of constituents of concern sampled last, unless the Project Manager indicates a different project-specific sampling protocol. **At a minimum, soil samples should be collected and retained in laboratory-supplied glassware every 5 vertical feet. Additional samples should be collected at observed major changes in lithology, such as sand-silt contacts, or where odor, staining, or high PID readings are observed.**

The procedures listed below may be modified as appropriate with approval from the field team lead and/or the Project Manager. Any modifications must be identified in the project-specific sampling plans or, at a minimum, details must be noted on the Field Report form.

Soil core collection methods differ for hollow-stem-auger, direct-push, and sonic drilling techniques, each summarized below:

- Hollow-stem-auger: Collect soil core samples using a standard 18-inch-length (6-inch waste barrel) Dames & Moore split-spoon sampler with a 2.5-inch inner diameter that can be used with or without brass or stainless steel liners.
- Direct-push: Collect soil core samples using 5-foot macrocore samplers with acetate sample liners.
- Sonic: Collect soil core samples using a standard 6-inch-diameter stainless steel sampling rod. Use a 2.5-, 5.0-, or 10-foot polyethylene liner inside the sampling rod for soil sample collection.



Record the specific drilling and soil sampling equipment used on the Boring Log form and on the Field Report form.

Setup

The instructions below are to be followed at each boring site:

- Don appropriate PPE as described in the site-specific Health and Safety Plan.
- Ensure that each borehole has been cleared to a minimum depth of 5 feet below ground surface using an air knife, per the Farallon health and safety policy.
- Set up a temporary sampling table adjacent to the drill rig to log and collect soil samples from the soil cores as they are recovered during drilling. Lay plastic sheeting over the table to keep the surface clean and to prevent potential cross-contamination between borings and soil samples. Designate clean areas for decontaminated sampling equipment and laboratory-provided certified pre-cleaned soil sample containers.
- Set up a separate decontamination area if appropriate (Refer to Farallon SOP EQ-01, Equipment Decontamination Procedures.)
- Calibrate the PID to monitor headspace for selected soil core samples in accordance with the equipment manual.

Sample Collection and Processing

The instructions listed below are to be followed for collecting samples using lined and unlined split-spoon and tube samplers:

- Don a new pair of nitrile sampling gloves for each individual soil sample collected, and prior to decontaminating sampling equipment to avoid potential cross-contamination.
- Ensure that the drillers have properly decontaminated all drill shoes and caps prior to initiating drilling operations. At a minimum drill shoes and caps must be decontaminated between sampling locations in accordance with Farallon SOP EQ-01. If highly contaminated media is encountered, decontamination between sampling intervals may be required. Replace dirty or ineffective decontamination water as needed throughout the workday.
- Report subsurface and drilling conditions on Boring Logs. Include the number of blow counts (if applicable) or any resistance encountered during drilling operations.
- Place the core tube, core liner, or split spoon on a new piece of aluminum foil on the sample logging/processing table. If necessary, use wood or metal stakes as shims to stabilize the tube, liner, or split spoon on the sample logging/processing table.
- If a core liner is used, split the liner open with a decontaminated utility knife, taking care not to penetrate the soil in the liner with the blade or knife.



- Briefly examine the soil sample visually for obvious signs of contamination, and take PID readings.
- Take care to:
 - **Always** collect soil from the center of the sampler or liner; not from sidewalls.
 - **Always** use decontaminated stainless-steel spoons or scoops to handle the soil within a given sample interval.
 - **Always** don a new pair of nitrile gloves before processing each sample interval in each soil core to prevent cross-contamination in the soil core.
- When sampling for VOCs, collect them immediately after opening the core tube, split spoon, or core liner. Use a decontaminated stainless steel spoon to collect the VOC samples directly into the laboratory-provided VOC sample container with no headspace, and seal it tightly. Follow the sample collection guidelines provided by the manufacturer or the analytical laboratory when using a plunger-type sampling device in accordance with EPA Method 5035A.
- Perform a headspace test using a PID:
 - Retain approximately 100 grams of the soil sample in a heavy resealable plastic bag or glass sample container, shake the sealed bag to volatilize the contaminants in the soil;
 - Wait approximately 5 minutes before measuring for headspace analysis using the PID (Washington State Department of Ecology 2011);
 - Insert the PID probe tip into a small opening in the top of the bag and record the PID units on the Boring Log form. **Do not puncture the resealable plastic bag to obtain headspace readings.**
 - Reseal the bag after taking the headspace reading in case further assessment of the sample is needed.
- If specified in the project-specific plans, photograph each section of the boring, including in the photograph notations on a white board documenting sample location identifier, date, orientation, depth, and site markers.
- Describe the soil samples in accordance with ASTM International Standard D-2488-00, *Standard Practice for Description and Identification of Soils*.
- Record on the Field Report form any deviations from the project-specified sampling procedures or from this SOP, or any obstacle encountered.
- Record the observed lithology on the Boring Log form using the Unified Soil Classification System and reported depths below ground surface using a tape measure.



- Discard excess soil cuttings in a labeled waste drum or a soil bin in accordance with Farallon SOP WM-01, Field Handling of Investigation-Derived Waste. Do not add soil to a liquid waste drum.
- Backfill the borehole, as appropriate.
- Record the boring location using a differential global positioning system or offset measurements from a permanent hard point on the Site.
- Decontaminate the soil sampling equipment, and don a new pair of sampling gloves before collecting each new soil sample.

DOCUMENTATION

Document the soil sampling activities on the Boring Log form, the Chain of Custody form, and the Field Report form.

REFERENCE

American Society for Testing Materials. 1989. *Standard Method for Penetration Test and Split-Barrel Sampling of Soils*. Method D-1586-11.

U.S. Environmental Protection Agency. 1987. *A Compendium of Superfund Field Operation Methods*. EPA Document No. 540-P-87-001. December 1.

Washington State Department of Ecology. 2011. *Guidance for Remediation of Petroleum Contaminated Sites*. Ecology Publication No. 10-09-057. Toxics Cleanup Program. September.

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).

**ATTACHMENT B
FIELD FORMS**

SAMPLING AND ANALYSIS PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010

MONITORING WELL CONSTRUCTION DATA

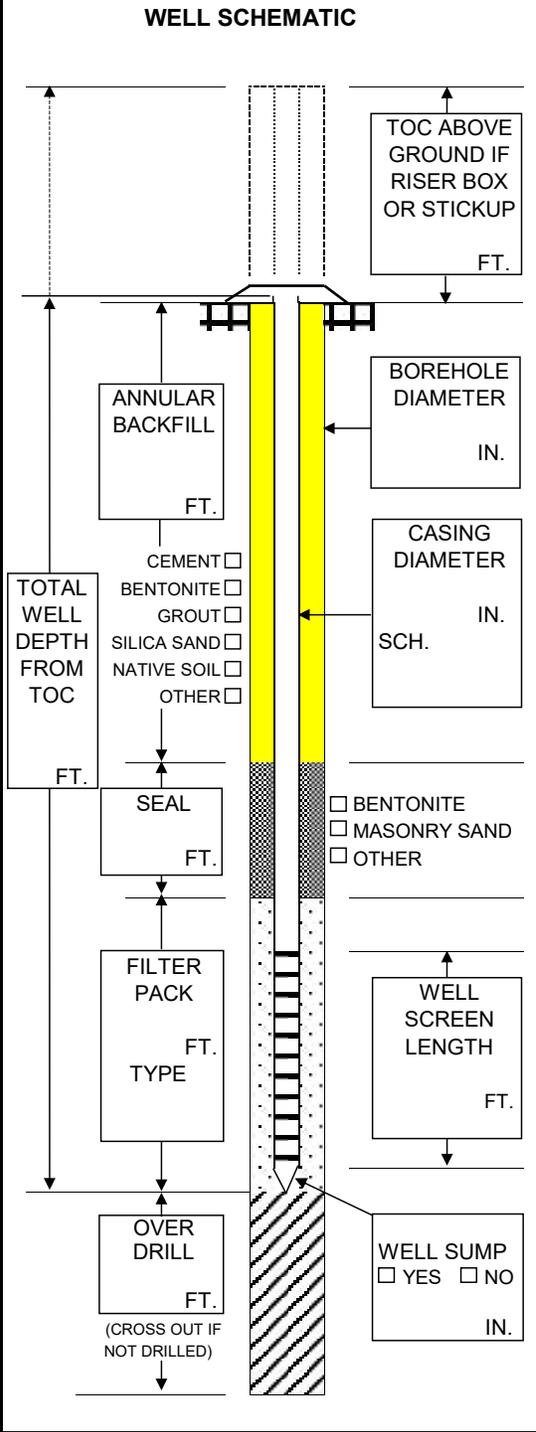
WELL/BORING NO: _____
 PERMIT NO: _____

PROJECT NO: _____
 DATE: _____

PROJECT NAME: _____
 SITE ADDRESS: _____

WELL SITE LOCATION PLAN:
 DRILLING CO:
 DRILL CREW:

SEC: _____ TWN: _____ RGE: _____ LAT: _____ LONG: _____
 WELL TYPE: SHALLOW SINGLE CASED MONITORING
 PERMANENT INTERMEDIATE DOUBLE CASED RECOVERY
 TEMPORARY DEEP OTHER OTHER



INSTALLATION DATA

DECON. STEAM CLEAN HIGH PRESSURE WASH
 SOAP WASH OTHER _____

CASING TYPE: PVC STAINLESS TEFLON OTHER
 JOINTS: THREADED WELDED COUPLED
 SCREWED OTHER _____

PIT CASING: YES NO DESCRIBE _____

WELL SCREEN: PVC STAINLESS TEFLON OTHER
 DIAMETER: 2" 4" 6" OTHER _____ IN
 SLOT: 0.010 0.020 OTHER _____ IN

DRILLING METHOD: SOLID STEM HOLLOW STEM MUD ROTARY
 AIR ROTARY DIRECT PUSH HAND AUGER
 OTHER _____

BIT SIZE: 2" 4" 6" 8" 12" OTHER _____ IN

DRILLING MUD: NONE WATER BENTONITE
 OTHER _____

CENTRALIZER: YES NO

COMPLETION: FLUSH MOUNT STICKUP RISER BOX
 LOCK TYPE: DOLPHIN MASTER KEY NO. _____
 OTHER _____

PAD: 2'X2' 4'X4' OTHER _____

CUTTINGS: DRUMMED NUMBER OF DRUMS _____
 SPREAD OTHER _____

DEVELOPMENT METHOD: NONE BAILING PUMPING AIR LIFT
 SURGE & BLOCK OTHER _____

TIME: 10 MIN 20 MIN OTHER _____ MIN
 AMOUNT: 5 GAL 10 GAL OTHER _____ GAL

WATER BEFORE: SILTY TURBID OPAQUE CLEAR
 WATER AFTER: SILTY TURBID OPAQUE CLEAR
 EVIDENT ODOR: YES NO TYPE _____

DEVELOPMENT WATER: DRUMMED NUMBER OF DRUMS _____
 SPREAD TREATED POTW OTHER _____

WATER LEVEL: INITIAL _____ FT. BTOC BLS

DATE: _____ FT BELOW TOC
 DATE: _____ FT BELOW TOC

NOTES: (DESCRIBE ALL NON-STANDARD METHODS & MATERIALS)

PREPARED BY: _____

UTILITY CLEARANCE LOG

Project Name: _____ **Project Number:** _____

Location: _____ **Date of Work:** _____

Instructions. This log must be completed by a Farallon staff member **before** any Farallon-directed excavation (e.g., test pit excavation) or drilling operation.

**DRILLING OR EXCAVATION WORK MAY NOT COMMENCE
UNTIL UTILITY LOCATES HAVE BEEN COMPLETED**

(See the One-Call Utility Locate Request Procedure on reverse side of this form)

Farallon is responsible for having underground utilities and structures located and marked when drilling or directing test pit excavation operations. Any drilling or excavation within 2 feet of a marked utility must be done with hand tools.

Owners of underground utilities are required by law to mark underground facilities on public and private property. Owners of underground utilities are **not required** to mark existing service laterals or appurtenances. Utility owners in Washington are required to subscribe to the One-Call service.

Private utility locate services must be hired to locate service laterals and other buried utilities (e.g., on-site electric distribution lines, irrigation pipes) on private property.

Re-mark after 10 days or maintain as appropriate.

Utility Locate Checklist

- Attach map showing drilling and/or excavation sites and known utilities
- Attach copy of One-Call Utility Notification Ticket (<http://www.searchandstatus.com/>)
One-Call Utility Notification Ticket Number: _____
- Attach copy of Side Sewer Card (available for City of Seattle; check municipality for availability)
- Attach copy of Private Locate Receipt
- Photograph all excavation and/or drilling locations and download to project file
- Review utilities with Site Contact:
Name: _____ Phone: _____

Utilities and Structures

Utility Type	Utility Name	Public Utilities Marked (Y/N)	Private Utilities/Laterals Marked (Y/N)	Marking Method (Flags, paint on pavement, wooden stakes, etc.)
Petroleum product lines				
Natural gas line				
Water line				
Sewer line				
Storm drain				
Telephone cable				
Electric power line				
Product tank				
Septic tank/drain field				
Other				

Farallon Consulting, L.L.C.

Field Team Leader: _____ Date: _____



ONE-CALL UTILITY LOCATE REQUEST PROCEDURE
THE ONE-CALL UTILITY NOTIFICATION CENTER REQUIRES 48 HOURS
NOTICE TO MARK UTILITIES BEFORE YOU CAN DIG OR DRILL

Washington: 1-800-424-5555

Oregon: 1-800-332-2344

Washington state law states that “before commencing **any** excavation,” the excavator or driller must provide notice to all owners of underground utilities by use of the One-Call locator service, and that the excavator or driller shall not dig or drill until all known utilities are marked. To fully comply with the law, you **must** take the following steps:

1. **Call before you dig or drill:** Notify the One-Call Utility Notification Center (OCUNC) a minimum of 48 hours (two full business days) before digging or drilling. Provide the following **required** information:
 - a. Your name and phone number, company name and mailing address, and Farallon Account Number 25999.
 - b. The type of work being done.
 - c. Who the work is being done for.
 - d. The county and city where the work is being done.
 - e. The address or street where the work is being done.
 - f. Marking Instructions: “Generally locate entire site including rights-of-way and easements”

Provide the following information if applicable or requested:

- a. The name and phone number of an alternate contact person.
 - b. If the work is being done within 10 feet of any overhead power lines.
 - c. The nearest cross street.
 - d. The distance and direction of the work site from the intersection.
 - e. Township, range, section, and quarter section of the work site.
2. **Record the utilities that will be notified:** OCUNC will tell you the utilities that are on or adjacent to the site, based on their database. Record the name(s) of the utility on the reverse side of this form.
3. **After the 48-hour waiting period, confirm that the utility locations have been marked:** Before digging or drilling, walk the site and confirm that the utility companies have marked the utility locations in the field.
4. **If a locate appears to be missing:** If a utility locate appears to be missing and the utility company has not notified you that there are no utilities in the area, call OCUNC and:
 - a. **Provide the OCUNC locate number.**
 - b. **Clearly state which utility has not been marked. The call is being recorded.**
 - c. **Ask for a contact person at that utility.**
 - d. **Call the contact person for the missing utility locate:** Determine why there is no utility locate in the field.
 - e. **Record the reason(s) for the missing locate(s):** There are valid reasons that locates do not appear in the field (e.g., there are no utilities located on the site or the utility has been abandoned). However, **IF THEY ARE LATE, YOU MUST WAIT TO DRILL OR DIG.** If the utility fails to mark a locate within the required 48 hours (two full business days), the utility is liable for delay costs.
5. **Hand dig within 2 feet of a marked utility:** When digging or drilling within 2 feet of any marked utility, the utility must be exposed first by using hand tools.

Electric = RED	Gas-Oil-Steam = YELLOW	Comm-CATV = ORANGE	Water = BLUE/PURPLE	Sewer = GREEN	Temp Survey = PINK
--------------------------	----------------------------------	------------------------------	-------------------------------	-------------------------	------------------------------

APPENDIX C
QUALITY ASSURANCE PROJECT PLAN

REMEDIAL INVESTIGATION WORK PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010



QUALITY ASSURANCE PROJECT PLAN

Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010

September 5, 2025

Prepared by:

A handwritten signature in blue ink, appearing to read "S. Snyder", written over a light blue horizontal line.

Sarah Snyder, L.G.
Senior Geologist

Reviewed by:

A handwritten signature in blue ink, appearing to read "Eric Buer", written over a light blue horizontal line.

Eric Buer, L.G., L.H.G.
Principal Geologist

For:
City of Issaquah

Submitted by:
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TABLE OF CONTENTS

1.0	INTRODUCTION.....	1-1
2.0	DATA QUALITY OBJECTIVES.....	2-1
2.1	PRECISION.....	2-1
2.2	ACCURACY.....	2-2
2.3	COMPLETENESS.....	2-3
2.4	COMPARABILITY.....	2-3
2.5	REPRESENTATIVENESS.....	2-4
3.0	SAMPLING PROCEDURES.....	3-1
4.0	ANALYTICAL PROCEDURES.....	4-1
5.0	DATA MANAGEMENT, REDUCTION, REVIEW, AND REPORTING.....	5-1
5.1	DATA TYPES.....	5-1
5.2	DATA TRANSFER.....	5-1
5.2.1	Receipt of Data and Reports.....	5-1
5.2.2	Outgoing Data and Reports.....	5-2
5.3	DATA INVENTORY.....	5-2
5.3.1	Document Filing and Storage.....	5-2
5.3.2	Access to Project Files.....	5-2
5.4	DATA REDUCTION AND ANALYSIS.....	5-3
5.4.1	Summary Tables.....	5-3
5.4.2	Figures.....	5-3
5.4.3	Environmental Information System.....	5-3
5.4.4	Meeting, Telephone, and Field Notes.....	5-4
5.4.5	Electronic Mailings.....	5-4
6.0	QUALITY CONTROL PROCEDURES.....	6-1
6.1	FIELD QUALITY CONTROL.....	6-1
6.2	LABORATORY QUALITY CONTROL.....	6-1
6.3	DATA QUALITY CONTROL.....	6-1
7.0	PERFORMANCE AND SYSTEM AUDITS.....	7-1
8.0	DATA ASSESSMENT PROCEDURES.....	8-1
9.0	CORRECTIVE ACTION.....	9-1
10.0	QUALITY ASSURANCE REPORTS.....	10-1

FIGURES

Figure 1 *Lower Issaquah Valley Vicinity Map*

Figure 2 *MFRT Site Plan*



1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) identifies the data quality objectives (DQOs) to be implemented in accordance with the Remedial Investigation Work Plan (RIWP) prepared for the Memorial Field and Rainier Trail (MFRT) Site (Site) (Figure 1). The City of Issaquah (the City) was identified as the potentially liable person (PLP) for the Site.

This QAPP documents the specific requirements for sample collection and analysis for the remedial investigation activities to be completed in accordance with the requirements of Agreed Order No. DE 23521 (AO) between the Washington State Department of Ecology (Ecology) and the City.

As described in the AO, local firefighting entities historically conducted firefighting training exercises at the Site which included lawful deployment of aqueous film-forming foam (AFFF) containing perfluorooctane sulfonate (PFOS) and additional per- and poly-fluorinated alkyl substances (PFAS). The historical training activities are considered releases to the environment. The known releases have impacted vadose zone soil at two source areas, the Memorial Field Source Area at 105 2nd Avenue Northeast and Rainier Trail Source Area at Parcel 3424069043 in Issaquah, Washington (collectively referred to as the Source Areas); and impacted groundwater which is a source for the City's drinking water. Ecology believes the actions required by the AO are in the public's interest.

AFFF training was performed at two locations at the Site (Figure 2):

- An area that currently is covered with lawn on the southeastern portion of the Memorial Field Source Area (Memorial Field AFFF Training Area); and
- An area that currently is covered with lawn and trees along the central portion of the Rainier Trail Source Area (Rainier Trail AFFF Training Area).

The Memorial Field AFFF Training Area and Rainier Trail AFFF Training Area are collectively referred to as the AFFF Training Areas.

Work performed during the remedial investigation at the Site will be conducted in accordance with the Washington State Model Toxics Control Act Cleanup Regulation (MTCA), as established in Section 810 of Chapter 173-340 of the Washington Administrative Code. As set forth in the Washington State Department of Ecology (Ecology) *Guidelines for*



Preparing Quality Assurance Project Plans for Environmental Studies dated July 2004, the purpose of a QAPP is to:

- Help the project manager and project team focus on the factors affecting data quality during the planning stage of the project;
- Facilitate communication among field, laboratory, and management staff as the project progresses; and
- Provide a record of the project to facilitate final report preparation.

The QAPP provides the specifications for sample collection procedures, analytical methods, quality assurance/quality control (QA/QC) procedures, and data quality reviews. The QAPP describes both quantitative and qualitative measures of data quality to ensure that the DQOs are achieved.



2.0 DATA QUALITY OBJECTIVES

The DQOs for PFAS characterization work will be used to develop and implement procedures to ensure that project data are of sufficient quality to be scientifically defensible based on the current state of knowledge regarding PFAS. Observations and measurements will be made and recorded in a manner that will yield results representative of the media of interest.

The quality of the field sampling methods and laboratory data will be assessed using the parameters of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). QC procedures for PARCCS are described in the following sections. Quantitative DQOs for applicable parameters (i.e., precision, accuracy, and completeness) are provided following their definition. Laboratory DQOs have been established by the analytical laboratories and are specified in the individual analytical laboratory Quality Assurance Manuals. The applicable analytical laboratory Quality Assurance Manual for samples analyzed under the RIWP and this QAPP will be kept on file at the Farallon corporate office in Issaquah, Washington.

2.1 PRECISION

Precision measures the reproducibility of measurements under a given set of conditions. Specifically, precision is a quantitative measure of the variability of two or more measurements compared to their average values. Precision is calculated from the results of duplicate sample analysis and is quantitatively expressed as the relative percent difference (RPD). Precision is calculated as follows:

$$RPD = \frac{(C_1 - C_2)}{(C_1 + C_2)/2} \times 100$$

Where:

RPD = relative percent difference

C₁ = the larger of the two duplicate results (i.e., the higher detected concentration)

C₂ = the smaller of the two duplicate results (i.e., the lower detected concentration)

Quantitative RPD criteria for laboratory duplicate results have been developed by the U.S. Environmental Protection Agency (EPA) for analysis of inorganic compounds. The criteria are



±20 percent for water samples and ±35 percent for soil. Because there are no specific RPD criteria for analysis of organic compounds, precision will be evaluated using the criteria for analysis of inorganic compounds.

2.2 ACCURACY

Accuracy is a measure of the closeness (bias) of the measured value to the true value. The accuracy of chemical analytical results is assessed by “spiking” samples in the laboratory with known standards (i.e., surrogates or matrix spikes of known concentration) and determining the percent recovery. Accuracy is measured as the percent recovery (%R) and is calculated as follows:

$$\% R = \frac{(M_{sa} - M_{ua})}{C_{sa}} \times 100$$

Where:

%R	=	percent recovery
M _{sa}	=	measured concentration in spiked aliquot
M _{ua}	=	measured concentration in unspiked aliquot
C _{sa}	=	actual concentration of spike added

Analysis of laboratory matrix spikes and surrogates will be performed by the analytical laboratory in accordance with the requirements for organic analysis set forth in EPA publication SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*. Quantitative percent recovery criteria have been developed by EPA for laboratory matrix spikes for analysis of inorganic compounds. The criteria are 75 to 125 percent when the sample concentration exceeds the spike concentration by a factor of four or more. There are no specific accuracy criteria for analysis of organic compounds. Laboratory-derived control limits will be used to assess surrogate recovery and matrix spike results where EPA and Ecology have not provided data validation guidelines.

The accuracy of sample results can be affected by sample contamination (which can occur because of improperly cleaned sampling equipment), exposure of the samples to chemical concentrations in the field or during transport to the laboratory, or the presence of chemical concentrations in the laboratory. To confirm that the samples collected are not contaminated, several types of blank samples will be analyzed. The laboratory will run method blanks at a minimum frequency of one per batch (or 5 percent) to assess sample contamination in the laboratory.



Trip blanks will be used to check for procedural contamination, cross-contamination, and contamination during shipment and storage of solid and aqueous samples collected for volatile organic compound analysis. One trip blank will be submitted to the project laboratory for each cooler containing soil samples for analysis of volatile compounds. A trip blank filled with analyte-free deionized water and preserved with hydrochloric acid will be included when a cooler contains water or soil samples collected for analysis. After their preparation, the sample containers are not to be opened until they have been returned to the laboratory.

In addition, one field equipment rinsate blank will be used to evaluate whether the decontamination procedures were adequate to prevent cross-contamination between samples or introduction of PFAS into samples from the materials in the sampling equipment. One rinsate blank will be collected for each type of sampling equipment that comes into contact with sample material (e.g., hand-coring device, drill bit, hollow-stem-auger flight, peristaltic pump tubing, protective gloves).

2.3 COMPLETENESS

Completeness is defined as the percentage of measurements judged to be valid. Results are considered valid if they are not rejected during data validation (see Section 5, Data Management, Reduction, Review, and Reporting). Completeness is calculated as presented below.

The target completeness goal for the work at the Site will be 90 percent for a given analysis.

$$\text{Completeness} = \frac{(\text{Number of Valid Measurements})}{(\text{Total Number of Measurements})} \times 100$$

2.4 COMPARABILITY

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. The use of standard EPA and Ecology methods and procedures for both sample collection and laboratory analysis will make the data collected comparable to internal and other data generated.

Prior samples collected at the Site were analyzed by Modified EPA Method 537. Draft EPA Method 1633 for non-drinking water matrices was issued in November 2021, and final EPA Method 1633A for non-drinking water, soils, biosolids, landfill leachate, and fish tissue matrices was issued in December 2024. The Department of Defense (2021) Environmental Data Quality Workgroup subsequently determined that draft EPA Method 1633 meets



precision, accuracy, and limits of quantitation requirements to “support sound decision-making,” and that all future analysis should be performed using draft Method 1633 for non-drinking water matrices. Therefore, samples will be analyzed by U.S. EPA Method 1633.

2.5 REPRESENTATIVENESS

Representativeness is a qualitative measure of how closely the measured results reflect the actual concentration or distribution of the constituent concentrations in the medium sampled. The sampling plan design, collection techniques, sample handling protocols, analytical methods, and data review procedures have been developed to ensure that the results obtained are representative of Site conditions. These issues are addressed in detail in the Sampling and Analysis Plan (SAP).



3.0 SAMPLING PROCEDURES

Procedures that will be used to collect, preserve, transport, handle, and analyze samples are described in the SAP.



4.0 ANALYTICAL PROCEDURES

Chemical and physical analyses to be performed during the remedial investigation at the Site are discussed in the SAP.



5.0 DATA MANAGEMENT, REDUCTION, REVIEW, AND REPORTING

This section outlines the procedures to be followed for the inventory, control, storage, and retrieval of data collected during performance of the remedial investigation. The procedures described in the RIWP are designed to ensure that the integrity of the collected data is maintained for subsequent use. In addition, project tracking data (e.g., schedules, progress reports) will be maintained to monitor, manage, and document the progress of the remedial investigation.

Farallon will maintain project files in accordance with MTCA and the procedures outlined in the QAPP. Data generated during field activities and laboratory analyses will be submitted directly to Farallon. Laboratory documentation from the analytical laboratories will be maintained in Farallon's project files to validate analytical data collected during the remedial investigation.

5.1 DATA TYPES

A variety of data will be generated during the remedial investigation, including sampling and analytical data and calculation results based on mathematical expressions. Laboratory analytical data will be transmitted to Farallon as an electronic file and in hard copy format. These formats will facilitate subsequent validation and analysis of these data while avoiding transcription errors that may occur with computer data entry. Calculations pertaining to the remedial investigation will be reviewed and verified by an independent reviewer, and calculation sheets will be retained in the project file.

5.2 DATA TRANSFER

Procedures for controlling the receipt and distribution of incoming data packages to Farallon and outgoing data reports from Farallon are outlined below.

5.2.1 Receipt of Data and Reports

Incoming documents will be date-stamped and filed in accordance with established procedures. Correspondence and transmittal letters for reports, maps, and data will be filed chronologically. Data packages such as those from field personnel, laboratories, and surveyors (e.g., soil analytical data, survey data, geologic observations) will be filed by project task, subject heading, and date. If distribution of a document is required, the required number of copies will be made and distributed to the appropriate persons or



agencies. The original document will not be distributed to project personnel and will be retained in the project file.

5.2.2 Outgoing Data and Reports

A transmittal sheet will be attached to outgoing project data and reports. A copy of each transmittal sheet will be kept in the project files. All outgoing reports and maps will be reviewed by the Project Manager and the QA/QC Officer prior to being sent.

Reports, data, and other documentation sent via electronic mailing also will be tracked. Copies of electronic mailings will be maintained in the electronic project files. Farallon is required to submit data generated during the remedial investigation to Ecology via their Environmental Information Management system. This information is input by Farallon and maintained by Ecology in their Environmental Information Management system database.

5.3 DATA INVENTORY

Procedures for filing, storing, and retrieving project files are described below.

5.3.1 Document Filing and Storage

Project files and raw data files will be maintained at the Farallon office. Files will be organized by project number and document type and maintained by the Document Control Clerk and the Project Manager. Electronic copies of final documents, email messages, boring logs, laboratory data, drafted project content, correspondence, and other project documentation will be maintained in Farallon's electronic project files. Draft documents and data will be removed from Farallon project files once final versions have been completed and distributed.

5.3.2 Access to Project Files

Access to project files will be controlled by and limited to authorized agents of the City of Issaquah, Ecology, and Farallon. Authorized agents may direct Farallon to provide project-related information to others, as appropriate and agreed to by other authorized agents. Project documents will be assigned a document control number/identifier, and a log will be maintained for all documents contained in the file. When a document is removed for use, a sign-out procedure will be used to track custody. Access to Farallon's electronic project files is restricted to Farallon personnel. Final documents will be converted to electronic files that cannot be altered or deleted by anyone but the Document Control Clerk.



5.4 DATA REDUCTION AND ANALYSIS

The Project Manager and the Project QA/QC Officer are responsible for data review and validation. Data validation parameters are outlined in Section 2, Data Quality Objectives. The particular type of analysis and presentation method selected for any given data set will depend on the type, quantity, quality, and prospective use of the data. Analysis of the project data likely will require data reduction for preparation of tables, charts, and maps. To ensure that data are accurately transferred during the reduction process, all reduced data will be checked by a second party, who will initial and date the reviewed data. Any incorrect transfer of data will be highlighted and corrected.

The physical and chemical characterization information developed for soil and groundwater at the Site in connection with the RIWP will be presented in the final report using the format described in the following sections.

5.4.1 Summary Tables

Laboratory reports will be categorized according to various parameters to summarize the information for easier assimilation and presentation. Soil sampling and analysis data will be categorized several ways, including by sample point number, constituent, and date of sample collection. The parameters chosen for categorizing soil and groundwater data will be determined based on the most appropriate format and the utility of the format in demonstrating the physical and chemical characteristics of interest.

5.4.2 Figures

Figures needed to illustrate the results of the RIWP will be assembled or prepared. Figures may include but are not limited to plan maps of the Site depicting sampling locations and chemical concentrations for individual and groups of chemicals.

5.4.3 Environmental Information System

Farallon will transfer laboratory and field measurement data into the Ecology Environmental Information Management System, as required under MTCA. Farallon will directly transfer the analytical data provided by the laboratory into the database, thus eliminating the likelihood of data entry errors inherent with manual data entry. Field measurements and other data requiring manual entry will be reviewed by Farallon personnel other than the data entry staff prior to submission to the Environmental Information Management System. Ecology's confirmation of receipt of the data will be maintained in Farallon electronic project files.



5.4.4 Meeting, Telephone, and Field Notes

Notes from project meetings and telephone conversations will be maintained in the project files by the Project Manager. Field notes will be retained by project field personnel until the conclusion of the field program, at which time the notes will be filed with the other project documents. Field notes also will be scanned into PDF file format and maintained in Farallon electronic project files.

5.4.5 Electronic Mailings

Electronic mailings associated with the project will be placed in Farallon electronic project files. These mailings typically include routine correspondence, laboratory data, and transmissions of reports or other project documentation. Electronic mailings that include draft versions of any project document will be deleted once the document has been issued in final format.



6.0 QUALITY CONTROL PROCEDURES

6.1 FIELD QUALITY CONTROL

Field QC samples (e.g., duplicate samples, equipment rinsate blanks) to be collected during this project are described in the SAP. The purpose of the field QC samples is discussed in Section 2 herein, Data Quality Objectives.

6.2 LABORATORY QUALITY CONTROL

Analytical laboratory QA/QC procedures are described in the laboratory Quality Assurance Manual, which is on file at the Farallon office.

6.3 DATA QUALITY CONTROL

Data will undergo two levels of QA/QC evaluation: one by the laboratory and one by Farallon. Initial data reduction, evaluation, and reporting will be performed by the laboratory, as specified in the laboratory Quality Assurance Manual. The analytical data will then be validated by Farallon under the supervision of the QA/QC Officer. The following types of QC information will be reviewed, as appropriate:

- Method deviations;
- Sample extraction and hold times;
- Method reporting limits;
- Blank samples (e.g., equipment rinsate, laboratory method);
- Duplicate samples;
- RPD (for precision);
- Matrix spike/matrix spike duplicate samples (for accuracy);
- Surrogate recoveries; and
- Percent completeness.



Farallon will review field records and the results of field observations and measurements to ensure that procedures were properly performed and documented. Field procedures will be reviewed for the following elements:

- Completeness and legibility of field logs;
- Preparation and frequency of field QC samples;
- Equipment calibration and maintenance; and
- Chain of Custody forms.



7.0 PERFORMANCE AND SYSTEM AUDITS

Performance audits will be completed for both sampling and analysis work. Field performance will be monitored through regular review of field notebooks, field measurements, and Chain of Custody forms. Periodic on-Site review of work in progress will be performed by the Project Manager and/or the Project QA/QC Officer.

Ecology accreditation for each of the analyses conducted by a laboratory demonstrates the laboratory's ability to properly perform requested methods. Therefore, a system audit of the analytical laboratory will not be conducted during the course of this project.

The Project Manager and/or the Project QA/QC Officer will oversee communication with the analytical laboratory on an ongoing basis during sample processing and analysis. This oversight will allow Farallon to assess progress toward achieving the DQOs and take corrective measures if problems are encountered. Corrective measures will be the joint responsibility of the Project Manager and the Project QA/QC Officer.

The analytical laboratory will be responsible for identifying any deviation from the performance standards described in the laboratory Quality Assurance Plan, and for taking appropriate corrective action. The laboratory will communicate to the Project Manager or the Project QA/QC Officer any deviation from the performance standards during sample analysis, and the corrective action taken. Corrective actions are discussed in Section 9, Corrective Action.



8.0 DATA ASSESSMENT PROCEDURES

The Project Manager and the Project QA/QC Officer are responsible for data review and validation of field documentation, laboratory data, and other documentation generated during completion of the remedial investigation. Upon receipt of each data package from the laboratory, calculations for precision, accuracy, and completeness will be performed using the equations presented in Section 2, Data Quality Objectives. Results obtained will be compared to the qualitative DQOs. The data validation parameters also are outlined in Section 2. The Project Manager and/or the Project QA/QC Officer also will validate data transferred to summary tables, figures, and other documentation prepared for the remedial investigation.



9.0 CORRECTIVE ACTION

Corrective action will be the joint responsibility of the Project Manager and the Project QA/QC Officer. Corrective procedures may include:

- Identifying the source of deviation from the quality standards set forth in the RIWP and its supporting documents;
- Re-analyzing soil and groundwater if hold-time criteria permit;
- Re-sampling and analyzing soil and/or groundwater if necessary to meet the quality standards set forth in the RIWP and its supporting documents;
- Evaluating and amending sampling, analytical, and/or data transfer procedures; and/or
- Qualifying data to indicate the level of uncertainty.

During field operations and sampling procedures, field team members will be responsible for identifying and correcting equipment malfunctions and documenting sampling procedures in a manner that will enable the Project Manager or the Project QA/QC Officer to evaluate whether corrective action is warranted. Equipment malfunctions, variances in sampling protocols, and corrective actions taken by field team members will be documented in the field notes. The Project Manager or the Project QA/QC Officer will evaluate the field notes upon submittal to determine whether the corrective action taken was adequate to meet project quality standards or whether additional corrective action is required.



10.0 QUALITY ASSURANCE REPORTS

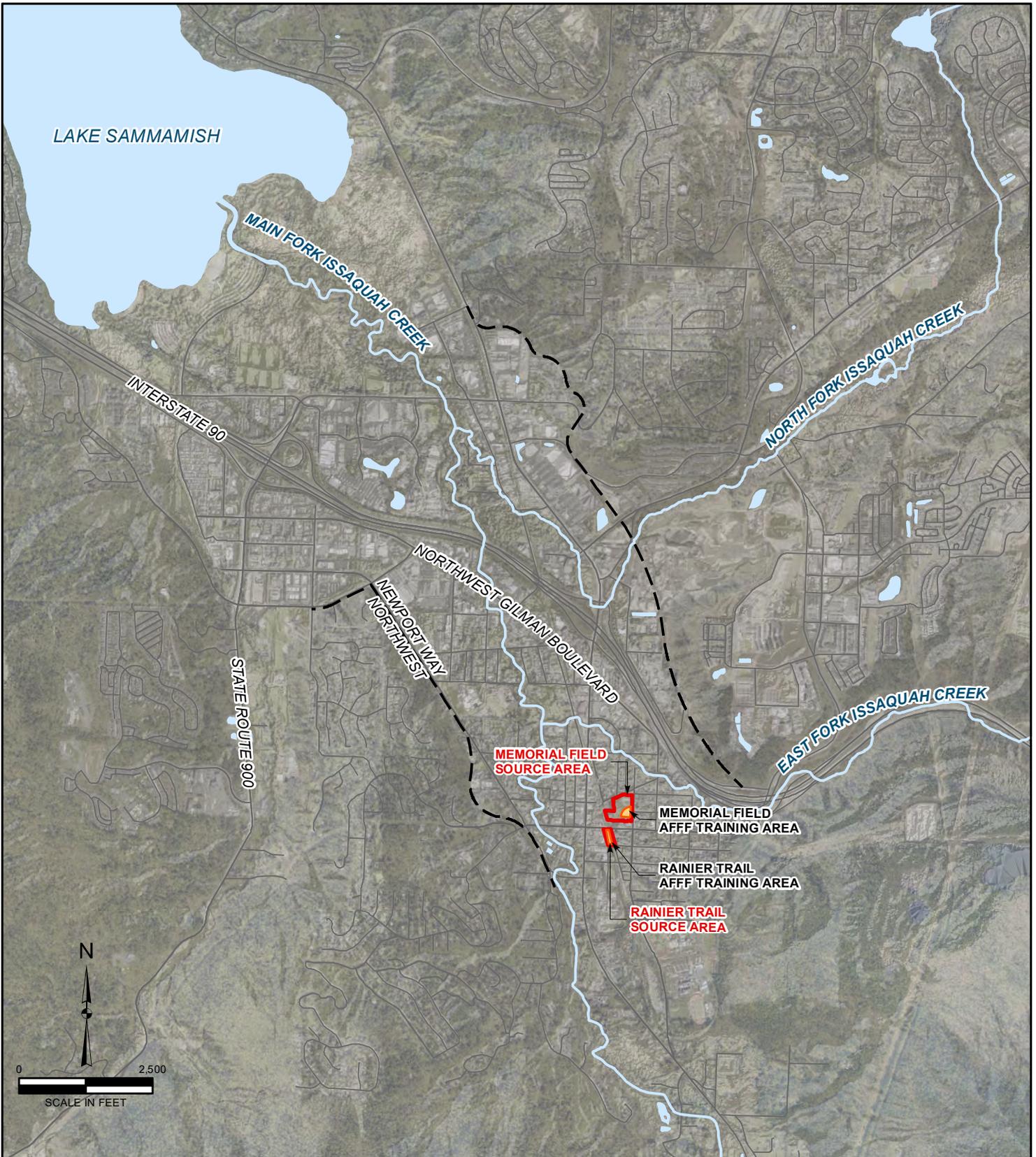
The Remedial Investigation Report will include a quality assurance section that summarizes data quality information. The summary will include:

- An assessment of data accuracy and completeness;
- The results of performance and/or system audits; and
- Significant quality assurance problems, if any, and their impact on the DQOs.

FIGURES

QUALITY ASSURANCE PROJECT PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010



LEGEND

- CREEK
- - LOWER ISSAQUAH VALLEY
- SOURCE AREA
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA

MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE

Washington
Bellevue | Bellingham | Seattle

Oregon
Portland | Baker City

California
Oakland | Irvine

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Drawn By: jjones

Checked By: SS

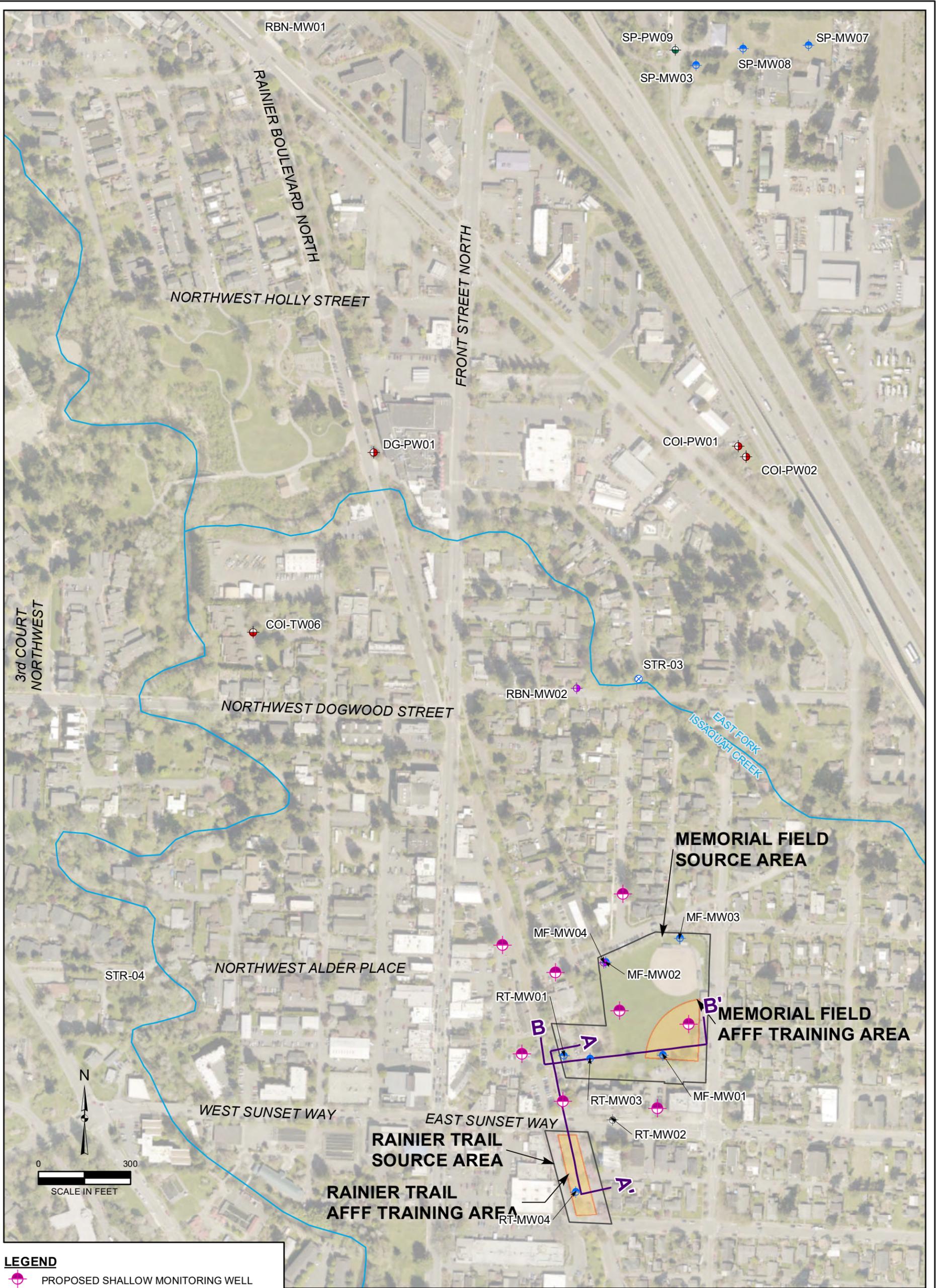
Date: 6/4/2025

Disc Reference:

FIGURE 1

LOWER ISSAQUAH VALLEY VICINITY MAP
MFRT SITE
105 2nd AVENUE NORTHEAST AND
PARCEL NUMBER 3424066043
ISSAQUAH, WASHINGTON

FARALLON PN: 821-010



LEGEND

- PROPOSED SHALLOW MONITORING WELL
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- STREAM GAUGING STATION
- INTERMEDIATE PRODUCTION WELL
- DEEP PRODUCTION WELL
- SHALLOW MONITORING WELL - DECOMMISSIONED
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA

LINE OF CROSS-SECTION

MFRT = MEMORIAL FIELD AND RAINIER TRAIL SITE

NOTES:

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



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Washington
Bellevue | Bellingham | Seattle

Oregon
Portland | Baker City

California
Oakland | Irvine

FIGURE 2
MFRT SITE PLAN
MFRT SITE
105 2nd AVENUE NORTHEAST AND
PARCEL NUMBER 3424066043
ISSAQUAH, WASHINGTON

FARALLON PN: 821-010

Drawn By: jjones

Checked By: SS

Date: 8/19/2025

Disc Reference:

Path: Q:\Projects\821 City of Issaquah\010 Memorial Field\Mapfiles\001\Figure-02_MFRT_SitePlan_2025.08.mxd

**APPENDIX D
HEALTH AND SAFETY PLAN**

REMEDIAL INVESTIGATION WORK PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010



SITE-SPECIFIC HEALTH AND SAFETY PLAN

PROJECT NO.:	821-010	START DATE:	TBD
PROJECT NAME:	Memorial Field and Rainier Trail Site – Remedial Investigation	EXPECTED DURATION:	1 year
PROJECT ADDRESS, CITY, STATE:	105 2 nd Avenue Northeast and Parcel 3424069043, Issaquah Washington,	CLIENT NAME:	City of Issaquah

(HASP expires 1 year from start date)

Fieldwork that Farallon Consulting, L.L.C. (Farallon) employees perform is conducted under the Farallon health and safety program, which includes the corporate Accident Prevention Plan and Hazardous Waste Operations Program. The program and these plans provide the basis upon which safety decisions should be made by Farallon personnel to maintain a safe and healthy work environment.

A site-specific Health and Safety Plan (HASP) is created to serve as a tool by which information about a project can be communicated to employees prior to field activities. As allowed under 29 CFR 1910.120(b)(1)(ii)(C), this HASP supplements the Farallon health and safety program and does not repeat standard operating procedures for safety and health. The information contained in this HASP is site-specific and directly applicable to the proposed scope of work.

Due to the potentially hazardous nature of the site and the activities occurring thereon, it is not possible to discover, evaluate, or provide protection for all possible hazards that may be encountered. Strict adherence to the health and safety guidelines set forth herein will reduce, but does not eliminate, the potential for injury. The health and safety guidelines in this HASP are prepared specifically for this site and its known or suspected conditions, and the HASP must be amended if conditions change.

This HASP has been prepared for the use of Farallon and its employees. Farallon personnel working at the job site must review and be responsible for complying with and implementing the provisions in this HASP. Safety briefings at the job site should include discussion of the HASP, and Farallon employees will sign Attachment 1.

Iris Hernandez

PREPARED BY:

Print name

REVIEWED BY:

Sarah Snyder
Project Manager



Signature

September 5, 2025

Date

APPROVED BY:

Kevin Halpin
State Health and Safety Coordinator



Signature

September 5, 2025

Date



TABLE OF CONTENTS

1.0	CONTACT AND EMERGENCY INFORMATION	1-1
1.1	PROJECT CONTACTS	1-1
1.2	LOCAL EMERGENCY CONTACT TELEPHONE NUMBERS	1-1
1.3	NEAREST HOSPITAL / EMERGENCY MEDICAL CENTER	1-2
1.4	EMERGENCY RESPONSE AND EVACUATION PLAN	1-3
2.0	PROJECT INFORMATION	2-1
2.1	SITE LOCATION AND CURRENT USE	2-1
2.2	SITE HISTORY	2-1
2.3	SCOPE OF WORK.....	2-1
3.0	JOB HAZARD ANALYSIS	3-1
3.1	TASK-SPECIFIC HAZARDS	3-1
3.2	SITE- OR PROJECT-SPECIFIC HAZARDS	3-2
4.0	SITE CONTAMINANTS AND MONITORING REQUIREMENTS	4-1
4.1	SITE CONTAMINANTS.....	4-1
4.2	MONITORING REQUIREMENTS	4-1
	4.2.1 Air Monitoring – Volatile Organic Vapors.....	4-1
	4.2.2 Personnel Monitoring.....	4-2
5.0	PERSONAL PROTECTIVE EQUIPMENT	5-1
6.0	UTILITIES.....	6-1
6.1	INVESTIGATION LOCATIONS AND UTILITIES	6-1
7.0	INCIDENTS / NEAR MISSES.....	7-1
8.0	SITE CONTROLS.....	8-1
8.1	WORK ZONE CONTROL	8-2
8.2	TRAFFIC CONTROL	8-2
8.3	DECONTAMINATION	8-3
9.0	ADDITIONAL ELEMENTS	9-1
9.1	EMPLOYEE TRAINING.....	9-1
9.2	MEDICAL SURVEILLANCE	9-2
9.3	CONFINED SPACE ENTRY	9-2
9.4	DRUM/CONTAINER HANDLING AND SPILL CONTAINMENT	9-3
9.5	WORKPLACE VIOLENCE.....	9-3
10.0	LIMITATIONS.....	10-1



ATTACHMENTS

- Attachment 1 Health and Safety Plan Acknowledgment and Agreement Form
Daily Health and Safety Briefing Log
- Attachment 2 Standard Job Site Protocols
- Attachment 3 Task-Specific Job Hazard Analyses
- Attachment 4 Health-Based and Monitoring Information for Potential Site Contaminants
- Attachment 5 Air Monitoring Log
Calibration/Check Log – Air Monitoring Equipment
- Attachment 6 Utility Clearance Log
- Attachment 7 Incident Report Form
- Attachment 8 Near Miss Report Form



1.0 CONTACT AND EMERGENCY INFORMATION

1.1 PROJECT CONTACTS

TITLE NAME	CONTACT INFORMATION	GENERAL PROJECT RESPONSIBILITIES
Site Health and Safety Officer Iris Hernandez	Cell: (509) 520-8680	Implements HASP and conducts ongoing inspections of site conditions to identify visible or potential hazards. Initiates actions to mitigate or eliminate hazards. Provides health and safety support to other on-site personnel. Communicates regularly with project management team.
Project Manager Sarah Snyder	Cell: (717) 395-0268	Ensures that field personnel have sufficient training and qualifications to perform tasks. Communicates with field team to confirm that identified health and safety protocols are implemented. Provides support for incidents, near misses, and other safety issues.
State Health and Safety Coordinator Kevin Halpin	Cell: (626) 329-8052	Reviews and approves HASP. Provides support in implementing HASP. Provides support for incidents, near misses, and other safety issues.
Client Contact Julie Wartes (City of Issaquah)	Cell: (206) 945-4295	Provides 1) knowledge of known or suspected site hazards; 2) access to the site; 3) information regarding available emergency supplies or protocols at the site; and 4) known analytical data from work performed by others.

1.2 LOCAL EMERGENCY CONTACT TELEPHONE NUMBERS

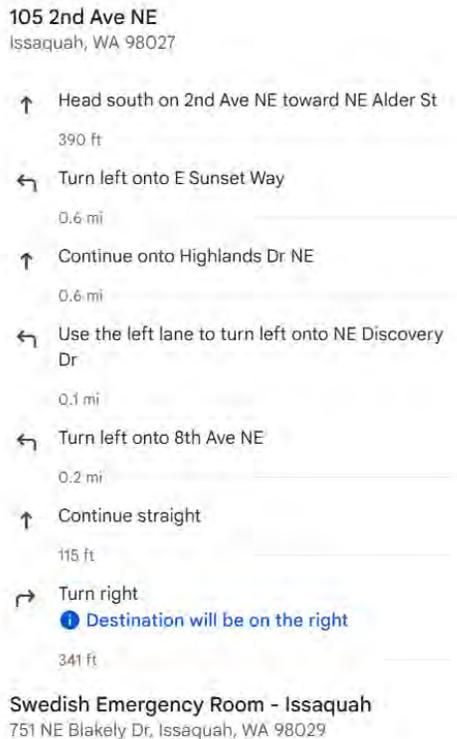
EMERGENCY CONTACT	TELEPHONE NO.
Issaquah Police Department	Emergency: 911 Non-Emergency: (425) 837-3200
Eastside Fire & Rescue	Emergency: 911 Non-Emergency: (425) 313-3200
Poison Control Center	(800) 222-1222
National Response Center	(800) 424-8802
Utility Notification Center (Washington).....	(811) or (800) 424-5555
Washington Ecology Spill Reporting	(800) 258-5990



1.3 NEAREST HOSPITAL / EMERGENCY MEDICAL CENTER

Facility Name:	Swedish Emergency Room- Issaquah
Street Address:	751 Northeast Blakely Drive
City, State:	Issaquah, Washington
Phone No. :	425-394-0610





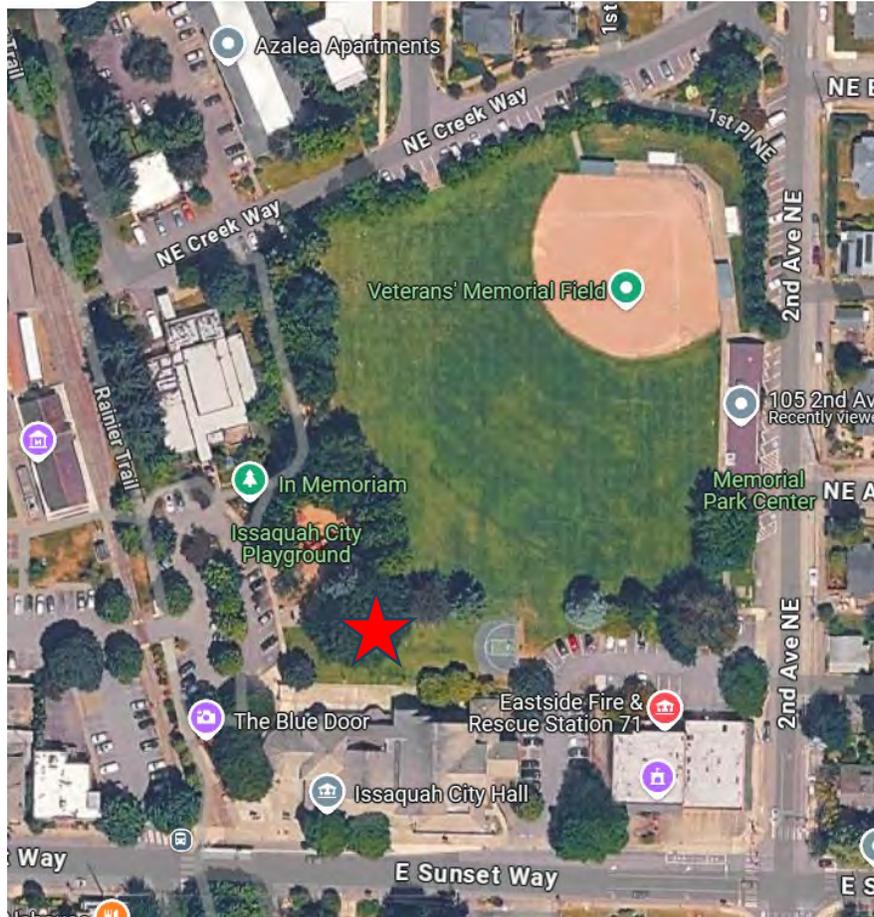
1.4 EMERGENCY RESPONSE AND EVACUATION PLAN

Farallon personnel and subcontractors working on the site are to be aware of site-specific emergency and evacuation procedures, including alarm systems and evacuation plans and routes. If an incident occurs that requires emergency response, such as a fire or spill, **CALL 911 and request assistance**. Farallon staff, subcontractors, and/or others working in an area where an emergency occurs are to evacuate to a safe location away from the incident area, preferably upwind, and take attendance. Farallon staff, subcontractors, and/or contractors may not reenter the scene of the emergency without specific approval from emergency response personnel.

Subcontractors have the responsibility to account for their own employees and provide requested information to emergency response personnel immediately upon request.

For this project, the emergency evacuation gathering location is in the southern field near the parking lot as marked by the red star in the figure below.

If the emergency causes the route to be obstructed, Farallon personnel and subcontractors are to move to an open area upwind of the hazard area, and remain there until instructed by emergency response personnel (e.g., police, fire, ambulance personnel, paramedics) to do otherwise.





2.0 PROJECT INFORMATION

2.1 SITE LOCATION AND CURRENT USE

The site is 105 2nd Avenue Northeast and Parcel 3424069043 in Issaquah, Washington (herein referred to as the Site). The Site consists of King County Parcel No. 5279100070 which is a 185,535-square-foot city park and sports field, and King County Parcel No. 3424069043, which is part of the Rainier Trail.

2.2 SITE HISTORY

According to historical information reviewed by Farallon, the City of Issaquah (City) conducted firefighting training exercises at the Site, which included lawful deployment of aqueous film-forming foam (AFFF) containing perfluorooctane sulfonate (PFOS) and additional per- and poly-fluorinated alkyl substances (PFAS). The known releases impacted vadose zone soil at two source areas, the Memorial Field Source Area at 105 2nd Avenue Northeast and Rainier Trail Source Area identified as Parcel No. 3424069043; and impacted groundwater, which is a source for the City's drinking water.

AFFF training was performed at two training areas:

- An area that currently is covered with lawn on the southeastern area of Memorial Field (Memorial Field AFFF Training Area); and
- An area that currently is covered with lawn and trees along a sections of Rainier Trail (Rainier Trail AFFF Training Area).

2.3 SCOPE OF WORK

Farallon's role in the next phase of work is to conduct a remedial investigation concerning the presence of PFAS on the site in accordance with the requirements of Agreed Order No. DE 23521 between the Washington State Department of Ecology (Ecology) and the City (Scope of Work). The specific activities that Farallon will perform are listed below:

- Hand auger and collect soil samples;
- Drill borings and collect soil samples;
- Monitoring well installation; and
- Groundwater monitoring.



3.0 JOB HAZARD ANALYSIS

A job hazard analysis (JHA) is a formal process that helps identify the most hazardous tasks at a job site, determine what the hazards and potential consequences of these tasks are, and develop corrective and preventative measures to eliminate or reduce the likelihood of accidents, injuries, and illnesses. A hazard is anything in the workplace that has the potential to cause harm to workers. JHAs should consider physical, chemical, biological, radiological, and other hazards that may be present. Conducting regular JHAs will help reduce worker injuries, illnesses, and unsafe work practices.

3.1 TASK-SPECIFIC HAZARDS

Many of the activities that Farallon personnel perform at job sites are routine in nature with well-known hazards. Farallon has prepared JHAs for common activities to support evaluation of site-specific hazards. All Farallon field work will be performed in accordance with the Standard Job Site Protocols found in Attachment 2.

Additionally, when checked below, the applicable JHAs must be included in Attachment 3 and will be reviewed with Site personnel prior to conducting field work:

Investigation Activities

- Environmental drilling with soil sampling
- Groundwater sampling – reconnaissance and monitoring wells
- Excavation activities
- Soil gas and subslab soil gas sampling
- Soil sampling with hand tools (no drilling)
- Other:

Cleanup Activities

- Underground storage tank decommissioning
- Excavation/construction observation
- Remediation systems installation, pilot tests, and operation and maintenance
- Remedial injections
- Other:



3.2 SITE- OR PROJECT-SPECIFIC HAZARDS

In addition to hazards inherent in the work to be performed, Farallon has identified these Site- and/or project-specific hazard(s):

- Transient debris, including drug paraphernalia;
- Lone worker concerns;
- Biological hazards;
- Adverse terrain; and
- Vehicular traffic.

To mitigate risk from Site- and/or project-specific hazard(s), employees should:

- Do not pick up or handle transient debris, including drug paraphernalia;
- Check in with the project manager at start and end of work day;
- Wear sturdy footwear and remove trip hazards;
- Wear hi-visibility vest and block work area with safety cones/barricades; and
- Use traffic control for locations within roadways, as necessary.



4.0 SITE CONTAMINANTS AND MONITORING REQUIREMENTS

4.1 SITE CONTAMINANTS

The following chemicals or compounds (“Site contaminants”) may be present at the Site due to current Site activities or the presence of known or suspected contamination and may pose a risk to workers during performance of the scope of work:

- Perfluorohexane Sulfonic Acid (PFHxS);
- Perfluorooctanoic Acid (PFOA);
- Perfluorooctane Sulfonic Acid (PFOS);
- Perfluorononanoic Acid (PFNA); and
- Perfluorodecanoic Acid (PFDA).

The table included in Attachment 4 provides health-based and air monitoring information for a variety of contaminants. This table should be reviewed for the identified Site contaminants prior to the start of work and any questions directed to the Site Health and Safety Officer.

4.2 MONITORING REQUIREMENTS

Based on the potential presence of the Site contaminants, the following monitoring protocols will be implemented.

4.2.1 Air Monitoring – Volatile Organic Vapors

As identified in Section 4.1, volatile organic vapors may be present in the breathing zone of Farallon personnel during field activities, which should be evaluated through air monitoring. Air monitoring equipment will consist of the following:

- Photoionization detector (PID)
- Colorimetric Detector Tubes; type (fill-in):

Air monitoring not required: As applicable, justification for no air monitoring at the project site:

Vapor inhalation is not applicable based on chemical properties of PFAS.

The following table provides general protocols for conducting air monitoring in the breathing zone for Farallon personnel.



Period when monitoring is required	The duration of field activities that can generate and/or sustain volatile organic vapors in the breathing zone of Farallon personnel.
Monitoring Frequency and Location	<p>Sampling should be continuous during the project while disturbing potentially contaminated soil, uncovering and/or removing tanks and piping, drilling, or managing other contaminated media such as groundwater or soil gas.</p> <p>Breathing zone: take measurements at least every 15 minutes. Exclusion zone boundaries: take measurements every 30 minutes. When collecting soil and groundwater samples, take measurements continuously.</p>
Action Levels if using PID only	<u>10 parts per million (ppm)</u> in breathing zone, sustained for at least 2 minutes: Stop work (including shutting down equipment if warranted), step away from zone for 15 minutes, and then take new readings. If PID measurements remain sustained at <u>10 ppm or greater</u> , contact the project manager to discuss how to proceed.
Action Levels if using PID and colorimetric detector tubes	<p><u>10 ppm</u> in breathing zone, sustained for at least 2 minutes: collect a colorimetric detector tube for appropriate contaminant of concern (typically benzene or vinyl chloride are used as indicator chemicals). Stop work if tube indicates <u>> 0.5 ppm</u> for benzene or vinyl chloride and contact the project manager to discuss how to proceed.</p> <p>Stop work if PID reaches or exceeds <u>50 ppm</u> above background in breathing zone and there is no discoloration of colorimetric detector tubes.</p>
Respirator Use	If the air monitoring results suggest that the use of respirators is warranted to mitigate hazardous levels of volatile organic vapors in breathing zones, the project manager is responsible for updating this HASP to confirm the type of respirator cartridge, rest intervals, decontamination procedures, and other applicable topics. The use of respirators must be coordinated with Farallon’s medical monitoring program and include yearly respirator fit testing.

Logs for recording air monitoring measurements and air monitoring equipment calibration are found in Attachment 5.

4.2.2 Personnel Monitoring

Personnel monitoring will not need to be conducted.



5.0 PERSONAL PROTECTIVE EQUIPMENT

Personal Protective Equipment (PPE) is selected based on the contaminant type(s), concentration(s) in applicable matrix (soil, water, air) and the known route(s) of entry into the human body. Project personnel are not permitted to use lower levels of protection from the specified levels of protection without the prior approval of the Site Health and Safety Officer.

PPE Level:	Modified Level D that adheres to PFAS sampling requirements
Safety Boots:	Required
Hard Hat:	Required when working around heavy equipment or locations where there is risk for head injury
Safety Vest:	Required when personal visibility is necessary or there's any vehicular traffic in the vicinity.
Safety Glasses:	Required
Hearing Protection:	Required when working around loud equipment
Gloves:	Nitrile gloves are used during contact with potentially contaminated media and surfaces Work gloves (leather or otherwise) for handling debris, heavy tools, or using hand tools
Additional Site-Specific/Client-Requirements:	Non-PFAS containing PPE
Level C PPE (respirator and chemical-resistant clothing):	Not required for this project. If air monitoring readings exceed action levels, this HASP must be modified to reflect requirements for proceeding under more protective PPE.



6.0 UTILITIES

When conducting subsurface or ground disturbing activities such as drilling or excavation, Farallon project tasks include overseeing subsurface surveys for underground utilities and structures. This is accomplished by filing a public utility notification request and by hiring a private utility locate service. When Farallon files the public utility notification, this alerts the underground utilities owners to mark the facilities on public property as required by law. Owners of underground utilities are **not required** to mark existing service laterals or utilities installed by the property owner. Therefore, private utility locate services must be hired to scan for service laterals and other buried utilities (e.g., on-Site electric distribution lines, irrigation pipes) on private property.

Public utility notification can be filed as early as 14 days prior to conducting the work, and typically is required to be filed at least 2 business days before the field work will occur (varies by state). Please provide the following information:

For projects requiring ground disturbance activities Farallon requires the Utility Locate Clearance Log to be completed and saved to the project folder (Attachment 6). In addition to the Log, please provide the following information:

Public Utility Notification Ticket No.: TBD

Date that **private** utility locate will be performed: _____

A copy of the public utility notification ticket should be included with paperwork kept on the Site during field activities.

Before starting work, identify and discuss the locations of utility and product line shutoff valves and switches on the job site with other field personnel.

6.1 INVESTIGATION LOCATIONS AND UTILITIES

Farallon’s project team should identify suitable location(s) of borings and other subsurface work through a thorough review of available construction drawings and known utilities, tanks, product lines, and other known or suspected subsurface obstructions. Additionally, at least the upper 5 feet of each boring will be cleared by one of the following methods:

- Hand auger; or
- Vactor truck and air knife.

Occasionally, project, Site, or regulatory requirements may not allow for hand-clearing the upper 5 feet of a boring. The project team will consult with the Farallon State Health and Safety Coordinator to request a variance to deviate from this subsurface work-related requirement.



7.0 INCIDENTS / NEAR MISSES

Farallon employees are required to report any injury sustained while performing project work or work-related illness to the Project Manager, their Group Manager, and the Corporate Health and Safety Officer, regardless of the seriousness of the incident. The employee will complete an Incident Report form to report the incident, provided in Attachment 7.

A “near miss” is defined as an incident in which no personal injury was sustained and no property damage was incurred, but where personal injury and/or property damage could have occurred, given a slight change in time or position. Employees are encouraged to complete a Near Miss Report form, provided in Attachment 8.



8.0 SITE CONTROLS

8.1 WORK ZONE CONTROL

Farallon personnel will secure and mark work zones so that the zones are visible to site occupants and visitors and are accessible only to personnel scheduled to be in the work zone. This is intended to prevent undesirable interface between pedestrian traffic and project workers and equipment. Devices to secure zones may include:

- Cones;
- Tubular markers; and
- Barricade tape.

If site conditions, such as hazardous levels of Site contaminants, warrant separate work zones, this HASP must be modified to identify Exclusion (Hot), Contamination Reduction (Warm), and Support (Cold) Zones. Modifications must include decontamination procedures for personnel and equipment.

8.2 TRAFFIC CONTROL

Work on the Site will be conducted in areas in or near parking lots and private roadways/lanes. Traffic control/warning devices will be placed around the work area to prevent undesirable interface between pedestrian and automotive traffic and project workers and equipment. These devices may include:

- Cones;
- Tubular markers (construction candles);
- Barricades;
- Temporary fencing; and
- Barricade tape.

The traffic control/warning devices will be placed around the work in such a way that traffic access is inhibited (i.e., place cones less than 8 feet apart so cars cannot easily drive through work area without moving a cone). Barricade tape or temporary fencing will be used to inhibit access to the work area in locations where pedestrians will be encountered.

Within driveways and sidewalks, use minimum of four delineators (e.g. cones with flags, stacker cones, looper tubes, grabber tubes, etc) to surround work zone, minimum 3.5 feet in total height and maximum 4 feet distance between delineators. Use caution tape, pennant strings or barricade boards between delineators. Workers should position at least 5 feet between the delineators and work location and should face the direction of oncoming traffic as much as possible. Stop work and move out of the area if needed until truck traffic clears.



8.3 DECONTAMINATION

Farallon personnel are directed to conduct field work in a manner that minimizes employee contact with hazardous substances or with equipment that has contacted hazardous substances. Typical site decontamination procedures include the use of Alconox or a similar product to clean field equipment prior to and following use at a job site. Farallon personnel use disposable gloves to minimize cross contamination between sample locations.

If site conditions warrant upgraded decontamination procedures, this HASP must be modified to describe the equipment and personnel procedures. The corporate Hazardous Waste Operations Program provides detailed procedures for this purpose.



9.0 ADDITIONAL ELEMENTS

Information contained in this section is required under OSHA HAZWOPER rule 29 CFR 1910.120.

9.1 EMPLOYEE TRAINING

Farallon maintains an employee training program for safety-related topics. Employees will be assigned to perform project tasks for which they have been provided training. Employees are encouraged and empowered to speak up if they believe they need training or additional instruction in order to safely perform a task.

Farallon employees who perform field work at sites that may fall within the definition of 29 CFR 1910.120 will receive training that will include:

- Names of personnel and alternates responsible for Site safety and health;
- Safety, health, and other hazards present on the Site;
- Use of PPE;
- Work practices by which the employee can minimize risks from hazards;
- Safe use of engineering controls and equipment on the Site;
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazards; and
- Instruction on how to review and implement the Site-specific HASP.

Additional safety training is provided in many venues, including:

- New-hire orientation;
- Annual safety training;
- Project-specific instruction;
- Safety moments during staff meetings; and
- Tailgate safety briefings.

Training records and employee training certificates are maintained by the corporate health and safety management team. These records are available upon request for project-specific purposes.



9.2 MEDICAL SURVEILLANCE

Farallon conducts a medical surveillance program for employees engaged in hazardous waste field operations. The following employees (at a minimum) are covered by the medical surveillance program:

- Employees who are or may be exposed to hazardous substances or health hazards at or above an OSHA Permissible Exposure Level (PEL), or above the published exposure levels for a substance for which there is no PEL, without regard to respirator use, for 30 days or more per year;
- Employees who wear a respirator for 30 days or more per year, or as required by state-specific rules; and
- Employees who are injured, become ill, or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from a hazardous waste operation.

The corporate Hazardous Waste Operations Program provides additional information on Farallon's medical surveillance program. The Corporate Health and Safety Officer works with Farallon Human Resource to manage medical surveillance and maintain confidential records.

9.3 CONFINED SPACE ENTRY

A confined space is defined as a space meeting all of the following criteria:

- The space is large enough and arranged so as to allow an employee to fully enter the space and conduct work;
- The space has limited or restricted entry or exit (e.g., tanks, vessels, silos, storage bins, hoppers, vaults, excavations, pits); and
- The space is not designed primarily for human occupancy.

Farallon personnel occasionally encounter confined-space entry conditions when performing environmental media sample collection from excavations, or when performing in-place underground storage tank closure work. In such situations, the work must be conducted in accordance with Farallon's Confined-Space Entry Program, which requires specialized training for employees performing such work.

Farallon does not perform permit-required confined space (PRCS) entry work. Exceptions to this rule must be approved in advance by the Corporate Health and Safety Officer and prior to fieldwork commencing.



9.4 DRUM/CONTAINER HANDLING AND SPILL CONTAINMENT

It is Farallon’s policy to minimize the number of situations in which employees could come into contact with drums or containers that may contain unknown chemicals or substances. Typical situations in which Farallon field personnel handle drums are waste-handling procedures following boring or monitoring well installation and sampling activities. Soil cuttings, monitoring well purge and development water, and equipment decontamination water typically are placed into drums pending disposal. In these instances, the contaminants and the range of potential concentrations typically are known. The Site-specific HASP, Work Plan, Sampling and Analysis Plan, or Waste Management Plan should present specific procedures for sampling the contents of the drums or containers. In instances where drums or containers having unknown contents are discovered at a site, Farallon typically hires a subcontractor with expertise in sampling and characterizing drum and container contents.

9.5 WORKPLACE VIOLENCE

Farallon is committed to providing employees with a safe work environment and does not tolerate any type of workplace violence committed by or against employees or other personnel at a site. Workplace violence is any act or threat of physical violence, harassment, intimidation, or other threatening disruptive behavior that occurs at the work site. It ranges from verbal abuse to physical assaults and even homicide.

If a Farallon employee feels threatened or unsafe at a project site, the employee should remove themselves from the situation and notify the project manager immediately. Employees who experience actual or threatened violent behavior should immediately report it to the appropriate authorities.

In the event of an active shooter situation, employees are encouraged to follow guidelines provided by the U.S. Department of Homeland Security.

Active Shooter Guidance

1. Run	2. Hide	3. Fight
<ul style="list-style-type: none"> • Have an escape route and plan in mind. • Leave your belongings behind. • Keep your hands visible. 	<ul style="list-style-type: none"> • Hide in an area out of the active shooter’s view. • Block entry to your hiding place and lock the doors. 	<ul style="list-style-type: none"> • As a last resort and only when your life is in imminent danger. • Attempt to incapacitate the active shooter. • Act with physical aggression and throw items at the active shooter.
CALL 911 WHEN IT IS SAFE TO DO SO		



10.0 LIMITATIONS

This Health and Safety Plan has been prepared by and for the sole use of Farallon Consulting, L.L.C. and its employees. Use of the information or protocols contained herein by any individual or entity other than the intended user is at the sole risk of that individual or entity. Entities and individuals other than Farallon and its employees must rely on their own safety programs and Health and Safety Plans. Laws, regulations, and standards pertaining to the information or protocols contained in this Health and Safety Plan may differ for other states or localities and other types of work. Any individuals or entities other than the intended users who consult this Health and Safety Plan are encouraged to independently review the pertinent laws, regulations, and standards. Under no circumstances shall Farallon Consulting, L.L.C., its officers, or employees be liable for any consequential, indirect, special, incidental, or punitive damages arising out of or related to the use of this Health and Safety Plan by anyone other than its intended user(s).

ATTACHMENT 1

Health and Safety Plan Acknowledgement and Agreement Form
Daily Health and Safety Briefing Log

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM

(All Farallon and subcontractor personnel must sign this form prior to commencing work.)

Farallon Employees: In signing this document, you indicate that you have reviewed the contents of this HASP and will work to implement and comply with the requirements in the HASP.

Farallon Subcontractors and others on the site: In signing this document, you indicate acknowledgement that:

- Non-Farallon personnel are expected to develop and work under their own safety program.
- The Farallon HASP provides general information about potential hazards at the job site but does NOT provide information pertaining to all of the hazards that a contractor's employees may be exposed to as a result of their work.
- You are required to coordinate activities and practices with the project Site Health and Safety Officer (SHSO).
- You are required to inform Farallon of any hazards you are aware of or that your work on the site might possibly pose to Farallon employees.
- You can be prohibited by the SHSO or other Farallon personnel from working on this project for unsafe work practices or failure to comply with Farallon jobsite requirements.

✓ SHSO	Company Name	Name (Print)	Signature	Date

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM

(All Farallon and subcontractor personnel must sign this form prior to commencing work.)

Farallon Employees: In signing this document, you indicate that you have reviewed the contents of this HASP and will work to implement and comply with the requirements in the HASP.

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- You can be prohibited by the SHSO or other Farallon personnel from working on this project for unsafe work practices or failure to comply with Farallon jobsite requirements.

✓ SHSO	Company Name	Name (Print)	Signature	Date

DAILY HEALTH AND SAFETY BRIEFING LOG

PROJECT INFORMATION		
Farallon PN:	Project Name:	
Site Address:	City/State:	
MEETING INFORMATION		
Conducted By:	Weather:	
Major Job Task:	Date:	
DAILY EQUIPMENT CHECKLIST		
<input type="checkbox"/> Site Check In	<input type="checkbox"/> First Aid Kit Location(s)	<input type="checkbox"/> Ear Plugs (if required)
<input type="checkbox"/> Proper ID/Safety Credentials	<input type="checkbox"/> Fire Extinguisher Location(s)	<input type="checkbox"/> Hand Protection (if required)
<input type="checkbox"/> Hard Hat	<input type="checkbox"/> Eye Wash Station	<input type="checkbox"/> Face Shield (if required)
<input type="checkbox"/> Safety Glasses	<input type="checkbox"/> Traffic Control (if needed)	<input type="checkbox"/> Respirator (if required)
<input type="checkbox"/> Orange Reflective Vest	<input type="checkbox"/> Safety Toe Boots	<input type="checkbox"/> _____
UTILITY CLEARANCE LOG - initial when markings confirmed		
_____ Electric = Red	_____ Gas-Oil-Steam = Yellow	_____ Water = Blue
_____ Sewer = Green	_____ Communications = Orange	_____ Temporary Survey = Pink
_____ Irrigation/non-potable = Purple	_____ No Utility Clearance required	
HEALTH AND SAFETY BRIEFING		
<input type="checkbox"/> Head Count (No. of employees:)	<input type="checkbox"/> Chemical/Contaminant Hazards	
<input type="checkbox"/> Emergency Response	<input type="checkbox"/> Health Hazards	
<input type="checkbox"/> Who will...? (Provide names below.) Call 911: Alternate to call 911: Provide First Aid/CPR:	<input type="checkbox"/> Environmental Hazards	
	<input type="checkbox"/> Physical Hazards	
	<input type="checkbox"/> Slips, Trips, and Falls	
	<input type="checkbox"/> Utility Locates	
<input type="checkbox"/> Emergency Exits/Rally Points/Hospital Route	<input type="checkbox"/> Utility/Product Shut-Off Valves/Switches	
<input type="checkbox"/> Site Security and Exclusion Zone	<input type="checkbox"/> Near Miss Reporting (reminder to look)	
<input type="checkbox"/> Vehicle/Equipment-Specific Safety Practices	<input type="checkbox"/> Incident Reporting (procedures and forms)	
<input type="checkbox"/> Stop Work Authority	<input type="checkbox"/> Traffic Control	
<input type="checkbox"/> Excavation Safety (if applicable)	<input type="checkbox"/> HASP Reviewed and Signed	
OTHER SITE-SPECIFIC HEALTH AND SAFETY ISSUES DISCUSSED		
1)	3)	
2)	4)	
DAILY HEALTH AND SAFETY BRIEFING ATTENDEES		
NAME	COMPANY	SIGNATURE

ATTACHMENT 2

Standard Job Site Protocols

Job Hazard Analysis – Standard Job Site Protocols Issued September 23, 2020

Farallon developed this Job Hazard Analysis to address typical hazards associated with performing field work. Farallon expects each employee to be safety-focused and to consider safety the top priority when working at a job site.

Safety Briefing	A safety briefing will be held at the job site at the beginning of each day and documented in field notes. On multiple-day projects on the same job site, a safety briefing is required each day.
------------------------	---

The following hazards may be present at any type of Farallon job site:

Potential Hazards	Preventive Measures
Inclement weather (e.g., hard rain, snow, ice, high winds, electrical storms, extreme temperatures)	<ul style="list-style-type: none"> • Check weather reports daily. Evaluate appropriateness of proceeding with field work during inclement weather. • Before driving, be sure that all windows of vehicles are clear of snow and other debris or obstructions. • Drive at the speed limit or less, as needed, to keep a safe distance from any vehicles ahead. Allow enough space between vehicles for braking and slowing. • Stop work and shut down the job site if high winds, lightning, or other adverse weather conditions may pose a risk to site workers.
Exposure to chemicals and contaminants	<ul style="list-style-type: none"> • Wash hands before eating, drinking, using tobacco products, or otherwise touching one's face. • Before beginning the project, evaluate whether it is safe to wear contact lenses. Most hazards related to eye protection require personal protective equipment upgrades regardless of contact lens use. • Before conducting field work, evaluate whether respirators may be used, to determine whether facial hair may need to be removed so it does not interfere with proper respirator fit.
Cold stress	<ul style="list-style-type: none"> • See page 2 for OSHA Quick Card.
Heat stress	<ul style="list-style-type: none"> • See page 3 for OSHA Quick Card.
Lone worker	<ul style="list-style-type: none"> • During HASP preparation, evaluate risks of working alone at a job site. Implement measures to mitigate risks. • Use the buddy system or re-evaluate tasks if the threat of personal harm cannot be mitigated. • Carry a cell phone or radio on person at all times. • Carry a whistle or other noise-making device if necessary. • In remote areas, carry a GPS-enabled beacon (set up reporting in office prior to field work). • Know the route to the closest hospital.
Plants and insects	<ul style="list-style-type: none"> • Be aware of poisonous plants. • Apply insect repellent. • Carry first-aid ointment or barrier cream. • Do not wear cologne or other scented products. • Avoid eating in areas where bees or wasps are located.

Job Hazard Analysis – Standard Job Site Protocols
Issued September 23, 2020



Protecting Workers from Cold Stress

Cold temperatures and increased wind speed (wind chill) cause heat to leave the body more quickly, putting workers at risk of cold stress. Anyone working in the cold may be at risk, e.g., workers in freezers, outdoor agriculture and construction.

Common Types of Cold Stress

Hypothermia

- Normal body temperature (98.6°F) drops to 95°F or less.
- **Mild Symptoms:** alert but shivering.
- **Moderate to Severe Symptoms:** shivering stops; confusion; slurred speech; heart rate/breathing slow; loss of consciousness; death.

Frostbite

- Body tissues freeze, e.g., hands and feet. Can occur at temperatures above freezing, due to wind chill. May result in amputation.
- **Symptoms:** numbness, reddened skin develops gray/white patches, feels firm/hard, and may blister.

Trench Foot (also known as Immersion Foot)

- Non-freezing injury to the foot, caused by lengthy exposure to wet and cold environment. Can occur at air temperature as high as 60°F, if feet are constantly wet.
- **Symptoms:** redness, swelling, numbness, and blisters.

Risk Factors

- Dressing improperly, wet clothing/skin, and exhaustion.

For Prevention, Your Employer Should:

- Train you on cold stress hazards and prevention.
- Provide engineering controls, e.g., radiant heaters.
- Gradually introduce workers to the cold; monitor workers; schedule breaks in warm areas.

For more information:



OSHA 3158-02H 2014



How to Protect Yourself and Others

- Know the symptoms; monitor yourself and co-workers.
- Drink warm, sweetened fluids (no alcohol).
- Dress properly:
 - Layers of loose-fitting, insulating clothes
 - Insulated jacket, gloves, and a hat (waterproof, if necessary)
 - Insulated and waterproof boots

What to Do When a Worker Suffers from Cold Stress

For Hypothermia:

- Call 911 immediately in an emergency.
- To prevent further heat loss:
 - Move the worker to a warm place.
 - Change to dry clothes.
 - Cover the body (including the head and neck) with blankets, and with something to block the cold (e.g., tarp, garbage bag). Do **not** cover the face.
- If medical help is more than 30 minutes away:
 - Give warm, sweetened drinks if alert (no alcohol).
 - Apply heat packs to the armpits, sides of chest, neck, and groin. Call 911 for additional rewarming instructions.

For Frostbite:

- Follow the recommendations "For Hypothermia".
- Do not rub the frostbitten area.
- Avoid walking on frostbitten feet.
- Do not apply snow/water. Do not break blisters.
- Loosely cover and protect the area from contact.
- Do not try to rewarm the area unless directed by medical personnel.

For Trench (Immersion) Foot:

- Remove wet shoes/socks; air dry (in warm area); keep affected feet elevated and avoid walking. Get medical attention.

For more information:



OSHA[®] QUICK CARD[™]

Protecting Workers from Heat Stress

Heat Illness

Exposure to heat can cause illness and death. The most serious heat illness is heat stroke. Other heat illnesses, such as heat exhaustion, heat cramps and heat rash, should also be avoided.

There are precautions that can be taken any time temperatures are high and the job involves physical work.

Risk Factors for Heat Illness

- High temperature and humidity, direct sun exposure, no breeze or wind
- Heavy physical labor
- No recent exposure to hot workplaces
- Low liquid intake
- Waterproof clothing

Symptoms of Heat Exhaustion

- Headache, dizziness, or fainting
- Weakness and wet skin
- Irritability or confusion
- Thirst, nausea, or vomiting

Symptoms of Heat Stroke

- May be confused, unable to think clearly, pass out, collapse, or have seizures (fits)
- May stop sweating

To Prevent Heat Illness:

- Establish a complete heat illness prevention program.
- Provide training about the hazards leading to heat stress and how to prevent them.
- Provide a lot of cool water to workers close to the work area. At least one pint of water per hour is needed.



For more information:
OSHA[®] Occupational Safety and Health Administration
www.osha.gov (800) 321-OSHA (6742)

OSHA 3194-09B-2017

OSHA[®] QUICK CARD[™]

- Modify work schedules and arrange frequent rest periods with water breaks in shaded or air-conditioned areas.
- Gradually increase workloads and allow more frequent breaks for workers new to the heat or those that have been away from work to adapt to working in the heat (acclimatization).
- Designate a responsible person to monitor conditions and protect workers who are at risk of heat stress.
- Consider protective clothing that provides cooling.



How to Protect Workers

- Know signs/symptoms of heat illnesses; monitor yourself; use a buddy system.
- Block out direct sun and other heat sources.
- Drink plenty of fluids. Drink often and BEFORE you are thirsty. Drink water every 15 minutes.
- Avoid beverages containing alcohol or caffeine.
- Wear lightweight, light colored, loose-fitting clothes.



What to Do When a Worker is Ill from the Heat

- Call a supervisor for help. If the supervisor is not available, call 911.
- Have someone stay with the worker until help arrives.
- Move the worker to a cooler/shaded area.
- Remove outer clothing.
- Fan and mist the worker with water; apply ice (ice bags or ice towels).
- Provide cool drinking water, if able to drink.

IF THE WORKER IS NOT ALERT or seems confused, this may be a heat stroke. CALL 911 IMMEDIATELY and apply ice as soon as possible.



For more information:
OSHA[®] Occupational Safety and Health Administration
www.osha.gov (800) 321-OSHA (6742)

ATTACHMENT 3

Task-Specific Job Hazard Analyses

Job Hazard Analysis – Groundwater Sampling, including Monitoring Wells Issued September 23, 2020

Farallon developed this Job Hazard Analysis (JHA) to address typical hazards associated with the noted activity. For each project, the project team should evaluate the listed hazards and update the JHA accordingly to note additional site-specific or project-specific hazards. Field work may be performed in conjunction with other JHAs, depending on project scope.

Farallon employees are responsible for being knowledgeable about general site conditions and associated preventive measures as noted in the Job Hazard Analysis – General Site Conditions.

Personal Protective Equipment (PPE)	Level D – safety boots, high-visibility clothing (vest if exposed to vehicular traffic), safety glasses with side shields, hard hat, appropriate gloves, hearing protection. Face shield may be warranted depending on contaminant(s).
Safety Data Sheets Needed	Sample preservative(s), equipment decontamination chemicals.
Safety Briefing	A safety briefing will be held at the job site at the beginning of each day and documented in field notes. On multiple-day projects on the same job site, a safety briefing is required each day.

Job Steps	Potential Hazards	Preventive Measures
Mobilize with equipment/supplies suitable for sampling.	Vehicle and pedestrian traffic. Strain from lifting and carrying. Slips, trips, or falls.	<ul style="list-style-type: none"> • Follow safe driving procedures. • Employ safe lifting procedures. Evaluate walking path before proceeding. Use hand truck or cart to avoid carrying heavy or awkward loads. • Be aware of surroundings.
Set up job site, including any site and traffic controls.	Vehicle and pedestrian traffic. Pedestrian interactions (unfriendly). Slips, trips, or falls.	<ul style="list-style-type: none"> • Begin with safety briefing. • Implement traffic control through cones or other barriers when working in parking lots or other on-site, low-speed vehicle traffic areas. • When conducting work within road right-of-way, subcontract a traffic control company to develop and implement traffic-control plans if warranted. • Use a traffic control subcontractor for implementing their traffic-control plan, such as setting out cones and tape in the road to define the safety area and/or conduct flagging operations. • Stand clear of vehicular traffic. • Be aware of surroundings. • Establish exclusion zone for job site. • Be aware of pedestrian traffic entering the exclusion zone.

Job Hazard Analysis – Groundwater Sampling, including Monitoring Wells Issued September 23, 2020

Job Steps	Potential Hazards	Preventive Measures
Gauge water levels and product thickness (where applicable) in well(s).	<p>Exposure to chemicals and contaminants.</p> <p>Strain and repetitive motion.</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Monitor breathing zone in accordance with the air monitoring protocol presented in site-specific HASP. Stop work and re-evaluate PPE if monitoring indicates respiratory protection is warranted. Have respirator at hand as identified in site-specific HASP. • Wear nitrile or other suitable gloves. • Wear protective clothing if contaminants pose a dermal hazard. • Employ safe lifting procedures. • Keep work area clear of trip or fall hazards.
Purge well(s) and collect purge water.	<p>Exposure to chemicals and contaminants.</p> <p>Strain and repetitive motion from bailing, pulling pumps, and carrying full containers of purge water.</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Monitor breathing zone in accordance with the air monitoring protocol presented in site-specific HASP. Stop work and re-evaluate PPE if monitoring indicates respiratory protection is warranted. Have respirator at hand as identified in site-specific HASP. • Wear nitrile or other suitable gloves. • Wear protective clothing if contaminants pose a dermal hazard. • Employ safe lifting procedures. • Keep work area clear of trip or fall hazards.
Collect samples in accordance with sampling plan.	<p>Exposure to chemicals and contaminants.</p> <p>Contact with sample preservative (acid).</p> <p>Sample-container breakage.</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Monitor breathing zone in accordance with the air monitoring protocol presented in site-specific HASP. Stop work and re-evaluate PPE if monitoring indicates respiratory protection is warranted. Have respirator at hand as identified in site-specific HASP. • Wear nitrile or other suitable gloves. • Wear protective clothing if contaminants pose a dermal hazard. • Handle sample containers carefully. • Keep work area clear of trip or fall hazards.
Dispose of or store purge water on the site.	<p>Exposure to chemicals and contaminants.</p> <p>Strain and repetitive motion from carrying and lifting full containers of purge water.</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Monitor breathing zone in accordance with the air monitoring protocol presented in site-specific HASP. Stop work and re-evaluate PPE if monitoring indicates respiratory protection is warranted. Have respirator at hand as identified in site-specific HASP. • Wear nitrile or other suitable gloves. • Wear protective clothing if contaminants pose a dermal hazard. • Use suitable equipment to transport water (e.g., pumps, drum dollies). • Keep work area clear of trip or fall hazards.

Job Hazard Analysis – Groundwater Sampling, including Monitoring Wells Issued September 23, 2020

Job Steps	Potential Hazards	Preventive Measures
Clean the site; demobilize.	Vehicle and pedestrian traffic. Strain from lifting. Slips, trips, or falls.	<ul style="list-style-type: none"> • Use buddy system to remove traffic control in parking lots or other similar low-speed vehicle traffic areas, as necessary. • Employ safe lifting procedures. • Keep work area clear of hazards.
Package and deliver samples to laboratory.	Sample-container breakage. Strain from lifting. Vehicle and pedestrian traffic.	<ul style="list-style-type: none"> • Handle and pack sample containers carefully. • Employ safe lifting procedures. Evaluate walking path before proceeding. Use hand truck or cart to avoid carrying heavy or awkward loads. • Follow safe driving procedures.

Job Hazard Analysis – Environmental Drilling

Issued September 23, 2020

Farallon developed this Job Hazard Analysis (JHA) to address typical hazards associated with the noted activity. For each project, the project team should evaluate the listed hazards and update the JHA accordingly to note additional site-specific or project-specific hazards. Field work may be performed in conjunction with other JHAs, depending on project scope.

Farallon employees are responsible for being knowledgeable about general site conditions and associated preventive measures as noted in the Job Hazard Analysis – General Site Conditions.

Key Pre-Field Tasks	Utility notification (Section 6 of site-specific Health and Safety Plan [HASP]).
Personal Protective Equipment (PPE)	Level D – safety boots, high-visibility clothing (vest if exposed to vehicular traffic), safety glasses with side shields, hard hat, appropriate gloves, hearing protection.
Safety Data Sheets Needed	Sample preservative(s), equipment decontamination chemicals.
Safety Briefing	A safety briefing will be held at the job site at the beginning of each day and documented in field notes. On multiple-day projects on the same job site, a safety briefing is required each day.

Job Steps	Potential Hazards	Preventive Measures
Mobilize to site with equipment/supplies suitable for drilling.	Vehicle and pedestrian traffic. Strain from lifting and carrying. Slips, trips, or falls.	<ul style="list-style-type: none"> • Follow safe driving procedures. • Employ safe lifting procedures. Evaluate walking path before proceeding. Use hand truck or cart to avoid carrying heavy or awkward loads. • Be aware of surroundings.
Set up job site, including any site and traffic controls, and conduct on-site utility clearance.	Vehicle and pedestrian traffic. Pedestrian interactions (unfriendly). Slips, trips, or falls.	<ul style="list-style-type: none"> • Begin with safety briefing. • Implement traffic control through cones or other barriers when working in parking lots or other on-site, low-speed vehicle traffic areas. • When conducting work within road right-of-way, subcontract a traffic control company to develop and implement traffic-control plans if warranted. • Use a traffic control subcontractor for implementing their traffic-control plan, such as setting out cones and tape in the road to define the safety area and/or conduct flagging operations. • Stand clear of vehicular traffic. • Be aware of surroundings. • Establish exclusion zone for job site. • Be aware of pedestrian traffic entering the exclusion zone.

Job Hazard Analysis – Environmental Drilling
Issued September 23, 2020

Job Steps	Potential Hazards	Preventive Measures
<p>Coordinate drill rig setup; establish workstation and exclusion zone if needed.</p>	<p>Accident or injury from rig movement or equipment failure.</p> <p>Contact with overhead utilities or obstructions.</p> <p>Soft terrain.</p> <p>Unexpected rig movement.</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Ensure that all staff know the location of the kill switch for the drilling rig. • Visually inspect rig (e.g., fire extinguisher on board, no oil or other fluid leaks, cabling and associated equipment in good condition, pressurized hoses secured with whip-checks or adequate substitute, jacks in good condition). • Verify a clear pathway to the drilling location and clearance for raising mast. • Provide hand signals and guidance to the driver, as needed, to place rig. • Use wooden blocks under jacks to spread load, if necessary. Chock wheels if on slope. • Set up workstations with clear walking paths to and from rig. Use safety tape and cones.
<p>Observe drilling activities.</p> <p>Includes clearing upper 5 feet of drilling location by air knife, Vactor truck, or hand auger.</p>	<p>Exposure to chemicals and contaminants.</p> <p>Eye injury from flying debris.</p> <p>Noise.</p> <p>Hitting an underground or overhead utility or other obstruction.</p> <p>Accident or injury from drill rig equipment failure or overturned rig.</p> <p>Strain and repetitive motion (if Farallon employee conducts hand-augering).</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Monitor breathing zone in accordance with the air monitoring protocol presented in site-specific HASP. Stop work and re-evaluate PPE if monitoring indicates respiratory protection is warranted. Have respirator at hand as identified in site-specific HASP. • Stand clear of operating equipment. • Wear eye and hearing protection. • Stand upwind to minimize exposure when possible. • Re-inspect utility markings at each drilling location before proceeding with boring. • If drilling within 3 feet of marked utilities, daylight the utility (hand-shovel) to verify its location. • Keep work area clear of trip or fall hazards. • Perform periodic visual inspections of drill rig. • Employ safe lifting procedures. • Contact Corporate Health and Safety Coordinator if variance for utility clearing is required.

Job Hazard Analysis – Environmental Drilling
Issued September 23, 2020

Job Steps	Potential Hazards	Preventive Measures
<p>Evaluate soil cores and collect soil samples in accordance with sampling plan.</p> <p>Include managing cuttings.</p> <p>See separate JHA for groundwater sampling.</p>	<p>Exposure to chemicals and contaminants.</p> <p>Contact with sample preservative (acid).</p> <p>Sample-container breakage.</p> <p>Strain from lifting and carrying soil cores and buckets.</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Monitor breathing zone in accordance with the air monitoring protocol presented in site-specific HASP. Stop work and re-evaluate PPE if monitoring indicates respiratory protection is warranted. Have respirator at hand as identified in site-specific HASP. • Wear nitrile or other suitable gloves. • Handle sample containers carefully to avoid spilling preservative. • Handle and store sample containers carefully. • Stand clear of operating equipment. • Employ safe lifting procedures. Request drilling crew to transport soil cores and buckets if necessary. • Keep work area clear of hazards. • Evaluate soil samples at arm’s length. Place soil inside a resealable plastic bag if closer evaluation is warranted. Avoid inhaling odors from samples.
<p>Observe borehole abandonment or monitoring well construction.</p>	<p>Exposure to chemicals and contaminants.</p> <p>Eye injury from splashing or release of pressurized grout.</p> <p>Strain from lifting bags of bentonite/grout (if Farallon employee is performing the backfill task).</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Monitor breathing zone in accordance with the air monitoring protocol presented in site-specific HASP. Stop work and re-evaluate PPE if monitoring indicates respiratory protection is warranted. Have respirator at hand as identified in site-specific HASP. • Wear goggles and/or splash shield if standing within splash zone of grout. • Wear nitrile or other suitable gloves. • Keep work area clear of hazards. • Employ safe lifting procedures.
<p>Manage investigation-derived waste.</p>	<p>Exposure to chemicals and contaminants.</p> <p>Strain from lifting.</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Monitor breathing zone in accordance with the air monitoring protocol presented in site-specific HASP. Stop work and re-evaluate PPE if monitoring indicates respiratory protection is warranted. Have respirator at hand as identified in site-specific HASP. • Wear nitrile or other suitable gloves. • Wear protective clothing if contaminants pose a dermal hazard. • Use suitable equipment to transport investigation-derived waste (e.g., pumps, drum dollies).

Job Hazard Analysis – Environmental Drilling
Issued September 23, 2020

Job Steps	Potential Hazards	Preventive Measures
Clean the site; demobilize.	Strain from lifting. Vehicle and pedestrian traffic. Slips, trips, or falls.	<ul style="list-style-type: none"> • Use buddy system to remove traffic control in parking lots or other similar low-speed vehicle traffic areas, as necessary. • Employ safe lifting procedures. • Keep work area clear of hazards.
Package and deliver samples to laboratory.	Sample-container breakage. Strain from lifting. Vehicle and pedestrian traffic.	<ul style="list-style-type: none"> • Handle and pack bottles carefully. • Employ safe lifting procedures. Evaluate walking path before proceeding. Use hand truck or cart to avoid carrying heavy or awkward loads. • Follow safe driving procedures.

Job Hazard Analysis – Soil Sampling With Hand Tools Issued September 23, 2020

Farallon developed this Job Hazard Analysis (JHA) to address typical hazards associated with the noted activity. For each project, the project team should evaluate the listed hazards and update the JHA accordingly to note additional site-specific or project-specific hazards. Field work may be performed in conjunction with other JHAs, depending on project scope.

Farallon employees are responsible for being knowledgeable about general site conditions and associated preventive measures as noted in the Job Hazard Analysis – General Site Conditions.

Key Pre-Field Tasks	Utility notification (Section 6 of site-specific Health and Safety Plan [HASP]).
Personal Protective Equipment (PPE)	Level D – safety boots, high-visibility clothing (vest if exposed to vehicular traffic), safety glasses with side shields, hard hat, appropriate gloves, hearing protection.
Safety Data Sheets Needed	Sample preservative(s), equipment decontamination chemicals.
Safety Briefing	A safety briefing will be held at the job site at the beginning of each day and documented in field notes. On multiple-day projects on the same job site, a safety briefing is required each day.

Job Steps	Potential Hazards	Preventive Measures
Mobilize to site with equipment/supplies suitable for soil sampling.	Vehicle and pedestrian traffic. Strain from lifting and carrying. Slips, trips, or falls.	<ul style="list-style-type: none"> • Follow safe driving procedures. • Employ safe lifting procedures. Evaluate walking path before proceeding. Use hand truck or cart to avoid carrying heavy or awkward loads. • Be aware of surroundings.
Set up job site, including any site and traffic controls, and conduct on-site utility clearance.	Vehicle and pedestrian traffic. Pedestrian interactions (unfriendly). Slips, trips, or falls.	<ul style="list-style-type: none"> • Begin with safety briefing. • Implement traffic control through cones or other barriers when working in parking lots or other on-site, low-speed vehicle traffic areas. • When conducting work within road right-of-way, subcontract a traffic control company to develop and implement traffic-control plans if warranted. • Use a traffic control subcontractor for implementing their traffic-control plan, such as setting out cones and tape in the road to define the safety area and/or conduct flagging operations. • Stand clear of vehicular traffic. • Be aware of surroundings. • Establish exclusion zone for job site. • Be aware of pedestrian traffic entering the exclusion zone.

Job Hazard Analysis – Soil Sampling With Hand Tools

Issued September 23, 2020

Job Steps	Potential Hazards	Preventive Measures
<p>Use hand tools to collect soil samples in accordance with sampling plan.</p> <p>Include managing cuttings.</p>	<p>Exposure to chemicals and contaminants.</p> <p>Strain and repetitive motion.</p> <p>Hitting an underground or overhead utility or other obstruction.</p> <p>Eye injury from flying debris.</p> <p>Contact with sample preservative (acid).</p> <p>Sample-container breakage.</p> <p>Strain from lifting and carrying soil cores and buckets.</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Monitor breathing zone in accordance with the air monitoring protocol presented in site-specific HASP. Stop work and re-evaluate PPE if monitoring indicates respiratory protection is warranted. Have respirator at hand as identified in site-specific HASP. • Wear nitrile or other suitable gloves. • Handle and store sample containers carefully to avoid spilling preservative. • Employ safe lifting procedures and good body posture when using hand tools. • Keep work area clear of hazards. • Evaluate soil samples at arm's length. Place soil inside a resealable plastic bag if closer evaluation is warranted. Avoid inhaling odors from samples. • Evaluate utility maps and mark out locations of underground utilities on ground surface. Do not locate or modify sample locations to be near marked utilities.
<p>Clean the site; demobilize.</p>	<p>Strain from lifting.</p> <p>Vehicle and pedestrian traffic.</p> <p>Slips, trips, or falls.</p>	<ul style="list-style-type: none"> • Use buddy system to remove traffic control in parking lots or other similar low-speed vehicle traffic areas, as necessary. • Employ safe lifting procedures. • Keep work area clear of hazards.
<p>Package and deliver samples to laboratory.</p>	<p>Sample-container breakage.</p> <p>Strain from lifting.</p> <p>Vehicle and pedestrian traffic.</p>	<ul style="list-style-type: none"> • Handle and pack sample containers carefully. • Employ safe lifting procedures. Evaluate walking path before proceeding. Use hand truck or cart to avoid carrying heavy or awkward loads. • Follow safe driving procedures.

ATTACHMENT 4

Health-Based and Monitoring Information for Potential Site Contaminants

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Farallon job sites may contain one or more of the chemicals or compounds provided in the following table. These substances may be present due to historical site use, current Site activities, or the presence of contamination from unknown sources. This table should be reviewed prior to the start of work and questions directed to the Site Health and Safety Officer. Air monitoring may be required at a Site based on the scope of work for the project. Refer to the site-specific Health and Safety Plan to determine whether air or personnel monitoring will be required for the scope of work.

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
Petroleum Compounds and Petroleum Additives						
Benzene	PEL – 1 ppm TLV – 0.5 ppm (skin)	PEL STEL – 5 ppm IDLH – 500 ppm	Characteristic benzene odor.	Inhalation; dermal; ingestion; eye contact.	Skin (dermatitis); eye, respiratory tract irritant; headache; dizziness; nausea.	Carcinogen; CNS; eye damage; bone marrow; blood; skin; leukemia.
Coal tar pitch volatiles (aka polycyclic aromatic hydrocarbons pyrene, phenanthrene, chrysene, anthracene, and benzo[a]pyrene)	PEL – 0.2 mg/m ³	NIOSH REL – 0.1 mg/m ³ (cyclohexane-extractable fraction) IDLH – 80 mg/m ³	Black or dark-brown amorphous residue.	Inhalation; dermal; ingestion; eye contact.	Irritation to eyes, skin; nose, throat irritation that may cause difficulty breathing.	Skin and lung cancer; damage to the reproductive system; thickening and darkening of the skin.
Ethylbenzene	PEL – 100 ppm TLV – 100 ppm	PEL STEL – 125 ppm TLV STEL – 125 ppm NIOSH REL – 100 ppm REL STEL – 125 ppm IDLH – 800 ppm	Pungent, aromatic odor.	Inhalation; dermal; ingestion; eye contact.	Skin, eye, mucous membrane irritant; headache; dizziness; drowsiness.	Eyes; respiratory tract; skin; CNS; blood; kidneys; liver.
2-Methylnaphthalene	Not established. 2-Methylnaphthalene is part of the naphthalenes family, but is not considered as hazardous as naphthalene. Limits for naphthalene should be used as a conservative approach.		Normally crystalline.	Inhalation; dermal; ingestion; eye contact.	Intoxication is most common following ingestion, but can occur after dermal or inhalation exposure. Eye irritant; conjunctivitis; superficial injury to cornea; diminished visual acuity; dermatitis; hypersensitivity; nausea and vomiting; skin irritation; headache; vomiting; fever; photosensitization; restlessness; lethargy; acute renal failure possible.	Anorexia; hemolysis; methemoglobinemia; hyperkalemia; anemia; cataracts. Seizures, coma may develop in severe intoxications.

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
Methyl tertiary-butyl ether (MTBE)	No PEL established. TLV – 40 ppm	AIHA WEEL – 100 ppm	Flammable liquid with a distinctive, disagreeable odor.	Inhalation; dermal; ingestion.	Irritated nose, throat; headache; dizziness; nausea; sleepiness.	CNS, liver, kidney, gastrointestinal damage; potential carcinogen.
Naphthalene	PEL – 10 ppm TLV – 10 ppm	TLV STEL – 15 ppm NIOSH REL – 10 ppm REL STEL – 15 ppm IDLH – 250 ppm	Mothball-like odor.	Inhalation; dermal; ingestion; eye contact.	Skin, eye, mucous membrane irritant, nausea.	Eyes, blood, skin, liver, kidney, RBC, CNS.
Toluene	PEL – 100 ppm TLV – 50 ppm	NIOSH REL – 100 ppm TWA; 150 ppm STEL IDLH – 500 ppm	Sweet, pungent, benzene-like odor.	Eye contact.	Skin (dermatitis); eye, respiratory tract irritant; headache; dizziness; weakness; fatigue.	CNS; liver; kidneys; skin.
Xylenes	PEL – 100 ppm TLV – 100 ppm	TLV STEL – 500 ppm NIOSH REL – 100 ppm NIOSH REL STEL – 100 ppm IDLH – 900 ppm	Aromatic odor.	Inhalation; dermal; ingestion; eye contact.	Throat, skin irritant (dermatitis); headache; nausea; drowsiness; fatigue.	CNS, liver, kidneys, skin, gastrointestinal damage; eye damage.
Chlorinated Volatile Organic Compounds						
Carbon Tetrachloride	PEL – 2 ppm C – 25 ppm TLV – 5 ppm	IDLH – 300 ppm	Colorless liquid with a characteristic ether-like odor.	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Irritation to eyes and skin; CNS depression; nausea, vomiting; liver and kidney injury; drowsiness, dizziness, incoordination.	Cancerous – liver. Liver and/or kidney damage. CNS, eyes, lungs, liver, kidneys, skin.
Chloroethane	PEL – 1,000 ppm TLV – 1,000 ppm	IDLH – 3,800 ppm	Colorless gas or liquid (below 54 °F) with a pungent, ether-like odor.	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Incoordination, inebriation, abdominal cramps.	Cardiac arrhythmias, cardiac arrest, liver and/or kidney damage. Liver, kidneys, respiratory system, CVS, CNS.
Chloroform	PEL – 2 ppm C – 50 ppm TLV – 10 ppm	WA STEL – 4 ppm IDLH – 500 ppm	Colorless liquid with a pleasant odor.	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Irritation to eyes and skin, dizziness, mental dullness, nausea, confusion, headache, lassitude, anesthesia.	Cancerous – liver and kidneys. Anesthesia, damage to liver, damage to kidneys. Liver, kidneys, heart, eyes, skin, CNS.

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
1,4-Dichlorobenzene	PEL – 75 ppm (450 mg/m ³) TLV – 10 ppm	IDLH – 1,000 ppm	Colorless or white crystalline solid with a mothball-like odor. Reacts to strong oxidizers.	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Eye irritation, swelling periorbital, profuse rhinitis, headache, anorexia, nausea, vomiting, weight loss, jaundice, cirrhosis.	Cancerous – liver and kidney. Liver and/or kidney damage. Liver, respiratory system, eyes, kidneys, and skin.
Dichlorodifluoromethane	PEL – 1,000 ppm TLV – 1,000 ppm	IDLH – 15,000 ppm	Colorless gas with an ether-like odor at extremely high concentrations.	Inhalation, skin and/or eye contact.	Dizziness, tremor, asphyxia, unconsciousness, cardiac arrhythmias, cardiac arrest, frostbite.	CVS, peripheral nervous system.
1,1-Dichloroethane	PEL – 100 ppm (400 mg/m ³) TLV – 100 ppm	WA STEL – 150 ppm IDLH – 3,000 ppm	Colorless, oily liquid with a chloroform-like odor.	Inhalation, ingestion, skin and/or eye contact.	Irritation to skin, CNS depression, liver damage, kidney damage, lung damage.	Liver, kidney, and/or lung damage. Skin, liver, kidneys, lungs, CNS.
1,2-Dichloroethane	PEL – 1 ppm C – 100 ppm TLV – 10 ppm	WA STEL – 2 ppm IDLH – 1,000 ppm	Colorless liquid with a pleasant, chloroform-like odor. Decomposes slowly, becomes acidic and darkens in color.	Inhalation, ingestion, skin absorption, skin and/or eye contact.	Irritation to eyes, corneal opacity, CNS depression, nausea, vomiting, dermatitis.	Liver, kidney, and/or CVS damage. Eyes, skin, kidneys, liver, CNS, CVS.
1,1-Dichloroethene (vinylidene chloride)	No PEL TLV – 5 ppm	NIOSH considers this compound to be a carcinogen.	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor.	Inhalation; skin absorption; ingestion; eye contact.	Irritation to eyes, skin, throat; dizziness; headache; nausea; dyspnea (breathing difficulty).	Liver, kidney dysfunction; pneumonitis; potential occupational liver and kidney carcinogen. Target Organs: Eyes, skin, respiratory system, CNS, liver, kidneys.
1,2-Dichloroethene (dichloroethylene)	PEL – TWA 200 ppm TLV – TWA 200 ppm	WA STEL – 250 ppm IDLH – 1,000 ppm	Solvent odor.	Inhalation; skin absorption; ingestion; eye contact.	Typical solvent symptoms.	Liver, kidney, CNS symptoms.

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
Methylene chloride	PEL – 25 ppm TLV – 50 ppm	WA STEL – 125 ppm	Colorless liquid with a chloroform-like odor.	Inhalation; dermal; ingestion; eye contact.	Irritation to eyes, skin; fatigue; weakness; somnolence (sleepiness, unnatural drowsiness); lightheadedness; numbness; tingling limbs; nausea.	Potential occupational carcinogen. Target Organs: Eyes, skin, CVS, CNS.
Tetrachloroethene (perchloroethylene)	PEL – 25 ppm TLV – 25 ppm	WA STEL – 38 ppm TLV STEL – 100 ppm IDLH – 150 ppm NIOSH considers this compound to be a carcinogen.	Colorless liquid with a mild, chloroform-like odor.	Inhalation; skin absorption; ingestion; eye contact.	Irritation to eyes, skin, nose, throat, respiratory system; nausea; flushed face, neck; vertigo (an illusion of movement); dizziness; lack of coordination; headache; skin erythema (redness).	Somnolence (sleepiness, unnatural drowsiness); liver damage; potential occupational liver carcinogen. Target Organs: Eyes, skin, respiratory system, liver, kidneys, CNS.
1,1,1-Trichloroethane (methyl chloroform)	PEL – TWA 350 ppm TLV – 350 ppm STEL – 450 ppm	NIOSH C – 350 ppm	Colorless liquid with a mild, chloroform-like odor.	Inhalation; skin absorption; ingestion; eye contact.	Irritation to eyes, skin; headache; CNS depressant; poor equilibrium; lassitude (weakness, exhaustion); depression; dermatitis.	Cardiac arrhythmias; liver damage. Target Organs: Eyes, skin, CNS, CVS, liver.
1,1,2-Trichloroethane	PEL TWA – 10 ppm (45 mg/m ³) (skin) TLV – 10 ppm	WA STEL – 20 ppm REL TWA – 10 ppm (45 mg/m ³) (skin)	Colorless liquid with a sweet, chloroform-like odor.	Inhalation; skin absorption; ingestion; eye contact.	Irritation to eyes, nose; CNS depressant; depression; dermatitis.	Liver, kidney damage; potential occupational liver carcinogen. Target Organs: Eyes, respiratory system, CNS, liver, kidneys.
Trichloroethene (trichloroethylene)	PEL – 50 ppm TLV – 50 ppm	WA STEL – 200 ppm PEL C – 200 ppm NIOSH considers trichloroethylene to be a carcinogen.	Colorless liquid (unless dyed blue) with a chloroform-like odor.	Inhalation; dermal; ingestion; eye contact.	Irritation to eyes, skin; headache; vertigo (an illusion of movement); visual disturbance; fatigue; giddiness; tremor; nausea; somnolence (sleepiness, unnatural drowsiness); vomiting; dermatitis.	Cardiac arrhythmias; paresthesia; liver injury; potential occupational carcinogen of liver, kidney.
Vinyl chloride	PEL – 1 ppm TLV – 1 ppm	WA STEL – 5 ppm WA action level is 0.5 ppm TWA 8 hrs NIOSH considers this material to be a carcinogen.	Liquid with a pleasant odor at high concentrations.	Inhalation; dermal; eye contact.	Weakness; abdominal pain; pallor or cyanosis of extremities; liquid frostbite.	Gastrointestinal bleeding; enlarged liver; potential occupational liver carcinogen; damage to CNS, blood, respiratory system, lymphatic system.

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
Other Organic Compounds						
Acetone	PEL – 750 ppm TLV – 500 ppm	WA STEL – 1,000 ppm NIOSH REL – 250 ppm TLV STEL – 750 ppm IDLH – 2,500 ppm	Fragrant, mint-like odor.	Inhalation; dermal; ingestion; eye contact.	Irritation to eyes, nose, throat; headache; dizziness; dermatitis.	CNS depressant; depression; liver, kidney damage.
Benzo(a)pyrene equivalent	PEL – TWA 0.2 mg/m ³	WA STEL – 0.6 mg/m ³	Solid powder, dark-yellow, aromatic	Inhalation; ingestion; dermal; eye contact	Symptoms of allergic reaction may include rash, itching, swelling, trouble breathing, tingling of the hands and feet, dizziness, lightheadedness, chest pain, muscle pain or flushing	Carcinogen
Bromoform	PEL – 0.5 ppm (5 mg/m ³) TLV – 0.5 ppm	WA STEL – 1.5 ppm IDLH – 850 ppm	Colorless to yellow liquid with a chloroform-like odor.	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Irritation to eyes, skin, and respiratory system; CNS depression; liver and kidney damage.	Liver and/or kidney damage. Eyes, skin, respiratory system, CNS, liver, and kidneys.
2-Butanone (methyl ethyl ketone)	PEL – 200 ppm TLV – 200 ppm	WA STEL – 300 ppm NIOSH REL – 200 ppm REL STEL – 300 ppm TLV STEL – 300 ppm	Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor.	Inhalation; dermal; ingestion; eye contact.	Irritation to eyes, skin, nose; headache; dizziness; vomiting; dermatitis.	Eyes; skin; respiratory system; CNS.
Carbon disulfide	PEL – 4 ppm TLV – 10 ppm	WA STEL – 12 ppm PEL C – 30 ppm	Colorless to faint yellow liquid with a sweet ether-like odor.	Inhalation; dermal; ingestion; eye contact.	Dizziness; headache; poor sleep; fatigue; nervousness; eye, skin burns; dermatitis.	Anorexia; weight loss; ocular changes; psychosis; polyneuropathy; Parkinson-like syndrome; coronary heart disease; gastritis; kidney, liver injury; reproductive effects.
Dioxins and Furans	OSHA and other health monitoring organizations have not established health-based action levels. 2,3,7,8-tetrachloro-p-dibenzo-dioxin (2,3,7,8 TCDD) is considered the most toxic of the dioxins and furans group of compounds and is the indicator compound.		Colorless to white crystalline solid.	Inhalation; dermal; ingestion; eye contact.	Irritation eyes; allergic dermatitis, chloracne; porphyria; gastrointestinal disturbance.	Possible reproductive or teratogenic effects.

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
2-Hexanone (methyl n-butyl ketone)	PEL – 5ppm TLV – 5 ppm	WA STEL – 10 ppm NIOSH REL – 1 ppm IDLH – 1,600 ppm	Colorless liquid with an acetone-like odor.	Inhalation; dermal; ingestion; eye contact.	Irritation to eyes, nose; dermatitis; headache; drowsiness.	Damages to eyes, skin, respiratory system, CNS, peripheral nervous system (peripheral neuropathy; weakness, paresthesia).
Methane	None	Explosive limits: LEL: 5% by volume UEL: 15% by volume	Flammable gas that may displace oxygen	Risk of explosion or asphyxiation	Mood changes, slurred speech, vision problems, memory loss, nausea, vomiting, facial flushing and headache	None identified
Pentachlorophenol (PCP)	PEL – 0.5 mg/m ³	WA STEL – 1.5 mg/m ³ NIOSH REL – 0.5 mg/m ³ IDLH – 2.5 mg/m ³	Colorless to white crystalline solid with a benzene-like odor.	Inhalation; skin absorption; ingestion; skin, eye contact.	Irritation to eyes, nose, throat; sneezing; cough; lassitude (weakness, exhaustion); anorexia; weight loss; sweating; headache; dizziness; nausea; vomiting; dyspnea (breathing difficulty); chest pain; high fever; dermatitis.	Eyes; skin; respiratory system; CNS; CVS; liver; kidneys.
Per- and polyfluoroalkyl substances (PFAS)	OSHA and other health monitoring organizations have not established health-based action levels. Perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorobutanesulfonic acid (PFBS), and hexafluoropropylene oxide dimer acid hexafluoropropylene oxide (HFPO) are indicator compounds for the PFAS group of compounds.		Found in various forms.	Inhalation; dermal; eye; ingestion.	Irritation to eyes, skin, respiratory tract.	Possible carcinogen.
Polychlorinated biphenyls (PCBs)	PEL 0.5 – 1 mg/m ³ TLV 0.5 – 1 mg/m ³ , depending on the species	WA STEL – 1.5 - 3 mg/m ³ NIOSH REL – 0.001 mg/m ³ NIOSH considers this material to be a carcinogen. IDLH – 5 mg/m ³	Pale or dark yellow odorless liquid.	Inhalation; dermal; ingestion. Skin absorption is a significant mode of exposure.	Irritation to eyes, skin, respiratory tract; chloroacne.	May cause reproductive, CNS, CVS, skin, eye, liver effects; cancer (leukemia).
Styrene	PEL – 50 ppm TLV – 20 ppm	WA STEL – 100 ppm PEL C – 200 ppm TLV STEL – 40 ppm NIOSH REL – 50 ppm	Colorless to yellow oily liquid with a sweet, floral odor.	Inhalation; dermal; ingestion; eye contact.	Irritation to eyes, nose, respiratory system; headache; fatigue; dizziness; confusion; malaise (vague feeling of discomfort); drowsiness; weakness; unsteady gait; narcosis.	Defatting dermatitis; possible liver injury; reproductive effects.

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
2,4,6-Trinitrotoluene (TNT)	PEL 0.5 mg/m ³ TWA	WA STEL - 1.5 mg/m ³	Colorless to pale yellow, odorless solid or crushed flakes.	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Irritation to skin and mucous membranes; liver damage/jaundice; cyanosis; sneezing; cough and/or sore throat; peripheral neuropathy; muscle pain; kidney damage; cataract; sensitization dermatitis; leukocytosis (increased blood leukocytes); anemia; cardiac irregularities.	Eyes, skin, respiratory system, blood, liver, cardiovascular system, CNS, kidneys.
Pesticides and Herbicides						
Dieldrin	PEL - 0.25 mg/m ³ TWA - 0.25 mg/m ³	WA STEL - 0.75 mg/m ³ IDLH - 50 mg/m ³	Insecticide, colorless to light tan crystals with a mild, chemical odor.	Inhalation, skin absorption, ingestion, skin and eye contact.	Headache, dizziness; nausea, vomiting, malaise (vague feeling of discomfort), sweating; myoclonic limb jerks; clonic-tonic convulsions; coma.	CNS, liver, kidneys, skin.
Metals and Other Inorganic Materials						
Arsenic	PEL - 0.010 mg/m ³	NIOSH REL - CA C 0.002 mg/m ³ [15-minutes]	Metal: Silver-gray or tin-white, brittle, odorless solid.	Inhalation; skin absorption; skin and/or eye contact; ingestion.	Ulceration of nasal septum; peripheral neuropathy; gastrointestinal disturbances; dermatitis; respiratory irritation; hyperpigmentation of skin (potential occupational carcinogen).	Lung and lymphatic cancer; liver; kidneys; skin; lungs; lymphatic system.
Asbestos	Per Part 1910.1001 of Title 29 of the Code of Federal Regulations and NIOSH: PEL and REL - 0.1 fiber per cubic centimeter of air (0.1 fiber/cm ³)	OSHA considers asbestos to be a carcinogen.	White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous, odorless solids.	Inhalation; ingestion; skin, eye contact.	Eye irritation; breathing difficulty; gastrointestinal issues.	Eye irritation; asbestosis; mesothelioma; lung cancer; dyspnea; cancer of the gastrointestinal tract. Target Organs: Respiratory system, eyes.

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
Beryllium	PEL - 0.0002 mg/m ³ STEL - 0.002 mg/m ³ TLV - 0.002 mg/m ³	IDLH - 4 mg/m ³	Metal - hard, brittle, gray-white solid.	Inhalation, skin and/or eye contact.	Irritation to eyes, dermatitis.	Cancerous - lung. Berylliosis: anorexia, weight loss, lassitude, chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency. Eyes, skin, respiratory system.
Barium	PEL - 0.5 mg/m ³ TLV - 0.5 mg/m ³	IDLH - 50 mg/m ³	White, colorless solid.	Inhalation, ingestion, skin and/or eye contact.	Irritation to eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasms.	Slow pulse, extrasystoles, hypokalemia. Eyes, skin, respiratory system, heart, CNS.
Cadmium	PEL - 0.005 mg/m ³		Odorless, yellow-brown, finely divided particulate dispersed in air.	Inhalation.	Pulmonary edema; dyspnea (breathing difficulty); cough; chest tightness; substernal (occurring beneath the sternum) pain; headache; chills; muscle aches; nausea; vomiting; diarrhea; emphysema; proteinuria; anosmia (loss of the sense of smell); mild anemia; potential occupational carcinogen.	Prostate and lung cancer; respiratory system; kidneys; blood.
Chromium	PEL - 0.5 mg/m ³ Cr (VI) - 0.005 mg/m ³	IDLH - 250 mg/m ³	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid.	Inhalation, ingestion, skin and/or eye contact.	Irritation to eyes and skin.	Lung fibrosis. Eyes, skin, respiratory system.
Cobalt	PEL - 0.05 mg/m ³ TLV - 0.05 mg/m ³	WA STEL - 0.15 mg/m ³ IDLH - 20 mg/m ³	Odorless, silver-gray to black solid.	Inhalation, ingestion, skin and/or eye contact.	Cough, dyspnea, wheezing, decreased pulmonary function, weight loss, dermatitis.	Diffuse nodular fibrosis, respiratory hypersensitivity, asthma. Skin, respiratory system.
Copper	PEL - 1 mg/m ³ TLV - 1 mg/m ³	WA STEL - 3 mg/m ³ IDLH - 100 mg/m ³	Reddish, lustrous, malleable, odorless solid.	Inhalation, ingestion, skin and/or eye contact.	Irritation to eyes, nose, and pharynx, nasal septum perforation; metallic taste; dermatitis.	Lung, liver, and/or kidney damage; anemia. Eyes, skin, respiratory system, liver, kidneys.

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
Cyanide (as CN)	PEL - 5 mg/m ³	WA STEL - 10 mg/m ³ NIOSH REL - 5 mg/m ³	Usually joined with other chemicals, ranging from colorless gas to a white solid. Faint to bitter almond-like odor.	Inhalation; dermal; ingestion; eye contact.	Headache, lightheadedness, dizziness, nausea, vomiting, agitation, drowsiness, and irritation of the eyes, nose, throat, and respiratory tract, and rapid breathing with a sense of suffocation.	Nose bleeds and sores; thyroid function
Lead	PEL - 0.05 mg/m ³ TLV - 0.05 mg/m ³	IDLH - 100 mg/m ³	A heavy, flexible, soft, gray solid.	Inhalation; dermal; ingestion; eye contact.	Lassitude (weakness, exhaustion); abdominal pain; gingival lead line; tremor; irritation to eyes; hypotension.	Insomnia; facial pallor; anorexia; weight loss; malnutrition; constipation; colic; anemia; paralysis of wrist, ankles; kidney disease; encephalopathy; potential for damage to eyes, gastrointestinal tract, CNS, kidneys, blood, gingival tissue.
Mercury	PEL - 0.1 mg/m ³	NIOSH REL - Mercury vapor: TWA - 0.05 mg/m ³ [skin] Other: C - 0.1 mg/m ³ [skin]	Metal: Silver-white, heavy, odorless liquid. "Other" mercury compounds include all inorganic and aryl mercury compounds except (organo) alkyls.	Inhalation; skin absorption; ingestion; skin and/or eye contact.	Irritation to eyes, skin; cough; chest pain; dyspnea (breathing difficulty); bronchitis; pneumonitis; tremor; lassitude (weakness, exhaustion); insomnia; irritability; indecision; headache; stomatitis; salivation; gastrointestinal disturbance; anorexia; weight loss; proteinuria.	Eyes; skin; respiratory system; CNS; kidneys.
Nickel	PEL - 1 mg/m ³ TLV - 1 mg/m ³	WA STEL - 3 mg/m ³ IDLH - 10 mg/m ³	Metal: lustrous, silvery, odorless solid.	Inhalation, ingestion, skin and/or eye contact.	Sensitization dermatitis, allergic asthma.	Cancerous - Lung and nasal. Pneumonitis. Nasal cavities, lungs, skin.
Selenium	PEL - 0.2 mg/m ³ TLV - 0.2 mg/m ³	WA STEL - 0.6 mg/m ³ IDLH - 1 mg/m ³	Amorphous or crystalline, red to gray solid.	Inhalation, ingestion, skin and/or eye contact.	Irritation to eyes, skin, nose, throat; visual disturbance; headache; shills, fever; dyspnea, bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye and skin burns.	Anemia, liver necrosis, cirrhosis, kidney and/or spleen damage. Eyes, skin, respiratory system, liver, kidneys, blood, spleen.

HEALTH-BASED AND MONITORING INFORMATION FOR POTENTIAL SITE CONTAMINANTS

Chemical (or Class)	WA/OSHA PEL ACGIH TLV	Other Pertinent Limits	Properties	Routes of Exposure or Irritation	Acute Health Effects	Chronic Health Effects/ Target Organs
Vanadium	PEL - 0.05 mg/m ³	WA STEL - 0.15 mg/m ³ IDLH - 35 mg/m ³ C - 0.5 mg/m ³	Yellow-orange powder.	Inhalation, ingestion, skin and/or eye contact.	Irritation to eyes, skin, throat; green tongue; metallic taste; eczema; cough; wheezing; fine rales.	Bronchitis, dyspnea. Eyes, skin, respiratory system.

ATTACHMENT 5

Air Monitoring Log
Calibration/Check Log – Air Monitoring Equipment

ATTACHMENT 6

Utility Clearance Log

UTILITY CLEARANCE LOG

Project Name: _____ Project Number: _____
Location: _____ Date of Work: _____
Completed by: _____

Instructions. This log must be completed by a Farallon staff member **before** any Farallon-directed ground disturbing activities (e.g., test pit excavation or drilling operations). This form must be completed by the team member who conducts the utility locate for the project scope of work (SOW), and used by the field crew who will be executing the ground disturbance activities.

GROUND DISTURBANCE ACTIVITIES MAY NOT COMMENCE UNTIL UTILITY LOCATES HAVE BEEN COMPLETED

Farallon is responsible for having underground utilities and structures located and marked when completing ground disturbance activities. All soil disturbing activities (e.g., drilling or excavation) within 2 feet of a known utility must be completed using hand tools.

Public utility searches are required for all projects via state-specific 811 dig tickets. Private utility locate services must be hired to locate service laterals and other buried utilities (e.g., on-site electric distribution lines, irrigation pipes) on private property.

Utility Locate Information and Checklist

- Attach map showing drilling and/or excavation sites and found utilities
- One-Call Utility Notification Ticket Number: _____

Utilities notified via One-Call ticket:

Company Name	Utility Responsible for (e.g., electrical, sewer)	Contact Information	Date Response Received

- Private Locate Information
Company name: _____
Date of locate: _____
Equipment used: _____
- Anticipated lithology at the site: _____
Type of pre-clearance to be used (hand-auger or air knife/vac truck): _____
- Photograph all soil disturbance locations and download to project file
- Review historical site information
- Review utilities and SOW locations with the Site Contact:

Name: _____ Phone: _____

Utilities and Structures found within the project area at the Site

Utility Type	Utility Name	Public Utilities Marked (Y/N)	Private Utilities/Laterals Marked (Y/N)	Marking Method (Flags, paint on pavement, wooden stakes, etc.)	Location, Depth Marked on Attached Map (Y/N)
Petroleum product lines					
Natural gas line					
Water line					
Sewer line					
Storm drain					
Telephone cable					
Electric power line					
Product tank					
Septic tank/drain field					
Overhead lines					
Other					

Include applicable items in this table with the attached map to document found utilities at your site. Be sure to include the site features, SOW locations, scale bar (e.g., 1 square = 5 feet), directional indicator (North arrow), description, distances, and depths of found utilities or other aboveground, overhead, or subsurface structures, including anomalies or unknowns.

Variance Request Review and Approval

If applicable, document the requested variance information below, and include the approval date and signatures of the Project Manager and Safety Team members.

Type of variance requested	Applicable locations, and justification	PM Review	Safety Team review and approval
Request to not pre-clear location to 5 feet below ground surface			
Request to work within 5 feet of a known utility			
Other, please describe			

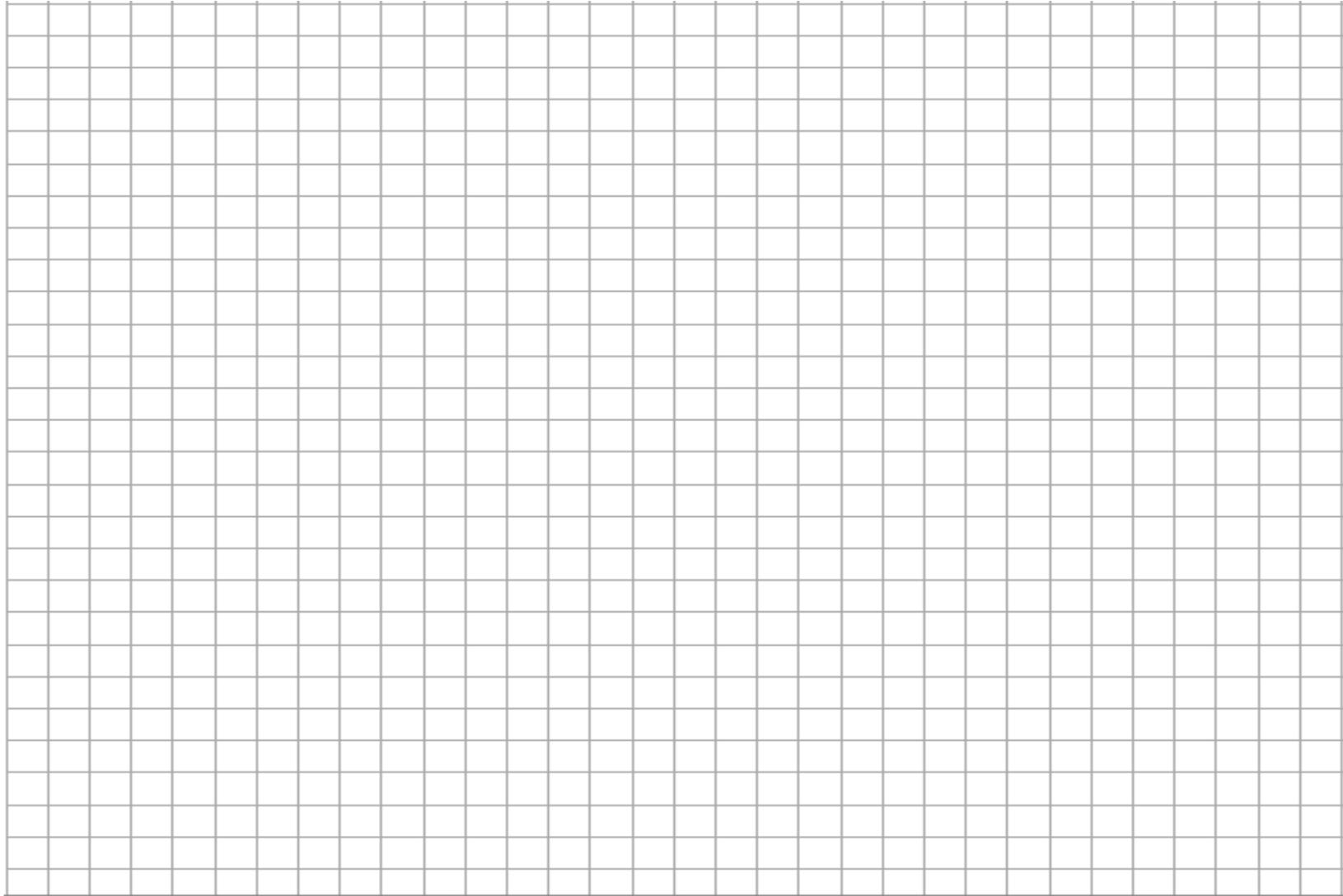
Electric = RED	Gas-Oil-Steam = YELLOW	Comm-CATV = ORANGE	Water = BLUE/PURPLE	Sewer = GREEN	Temp Survey = PINK
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Project Utility and Subsurface Structure Map

Project Name:

Date:

Scale:



Use this page to document found utilities at your site. Be sure to include the site features, SOW locations, scale bar (e.g., 1 square = 5 feet), directional indicator (North arrow), description, distances, and depths of found utilities or other aboveground, overhead, or subsurface structures, including anomalies or unknowns.

ATTACHMENT 7

Incident Report Form

INCIDENT REPORT FORM INSTRUCTIONS

The following process should be followed to submit an Incident Report Form to the Health and Safety Committee at Farallon Consulting, L.L.C.

1. Enter information into the form in Microsoft Word and save the draft document into the project folder under P:/Project/Field_Lab/Safety.
2. Email a link for the completed draft Incident Report Form to safety@farallonconsulting.com. The Corporate Health and Safety Coordinator (HSC) will review the form and provide comments or questions back to you.
3. Address any comments or questions and either resubmit to the HSC for additional review, if requested, or provide the HSC with the final signed and dated copy of the completed Incident Report Form. Attach photos on a separate document.
4. The HSC will route the completed Incident Report Form through the injured employee's Group Manager and the applicable Regional Operations Manager for signature.



INCIDENT REPORT FORM

This report must be completed promptly after the incident. Within 24 hours of the incident, the completed report must be reviewed and signed by the employee's Group Manager and submitted to safety@farallonconsulting.com. This should occur even if the employee is not available to review and sign.

Document the incident with photographs if possible (place in separate document). For environmental releases, discuss possible regulatory spill reporting with the Project Principal.

If there is an injury or fatality, immediately call your Health and Safety Coordinator.

INCIDENT REPORT INFORMATION							
Date of incident, injury, or onset of illness: Click or tap to enter a date.	Time of incident, injury, or onset of illness: <input type="checkbox"/> AM <input type="checkbox"/> PM						
Date Farallon notified of incident: Click or tap to enter a date.	Time Farallon notified: <input type="checkbox"/> AM <input type="checkbox"/> PM						
Date of this report: Click or tap to enter a date.	Project Number (if applicable):						
Farallon employee reporting incident:	To whom reported at Farallon?						
WHO WAS INVOLVED IN INCIDENT (list names and note company if not Farallon employee)							
Farallon Employee(s)	<input type="checkbox"/> None						
Non-Farallon Employee(s)	<input type="checkbox"/> None						
INCIDENT DESCRIPTION							
Location of Incident	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Address (street, city, state)</td> </tr> <tr> <td style="padding: 2px;">Location on property (building, floor, GPS coordinates, etc.)</td> </tr> <tr> <td style="padding: 2px;">Other description information</td> </tr> </table>	Address (street, city, state)	Location on property (building, floor, GPS coordinates, etc.)	Other description information			
Address (street, city, state)							
Location on property (building, floor, GPS coordinates, etc.)							
Other description information							
Provide detailed description of incident. Include specific activities during incident (lifting, pushing, walking, etc.)							
Describe the equipment, materials, or chemicals that directly caused the incident or injury							
Describe actions taken/to be taken to avoid future incidents from same cause							
INJURY OR ILLNESS INFORMATION <input type="checkbox"/> No Injury or Illness							
Describe the specific injury or illness (e.g., puncture, cut, contusion, strain, fracture, skin rash, etc.):							
Body part(s) affected (e.g., back, left wrist, right eye, etc.):							
If seen by Health Care Provider, please provide:	<table style="width: 100%;"> <tr> <td style="width: 80%;">Name:</td> <td></td> </tr> <tr> <td>Address:</td> <td></td> </tr> <tr> <td>Phone No.:</td> <td></td> </tr> </table>	Name:		Address:		Phone No.:	
Name:							
Address:							
Phone No.:							
Treated in Emergency Room: <input type="checkbox"/> Yes <input type="checkbox"/> No	Hospitalized Overnight as Inpatient: <input type="checkbox"/> Yes <input type="checkbox"/> No						

INCIDENT REPORT FORM

MOTOR VEHICLE ACCIDENT (MVA) Please provide photos	<input type="checkbox"/> Not a Motor Vehicle Accident
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If the incident involved two or more vehicles (at least one moving), including parking lot collisions, please also complete the Farallon Motor Vehicle Accident Report found in G:\Forms and Templates\Health and Safety\Forms Logs Checklist.

PROPERTY DAMAGE/THEFT (Including utilities)	<input type="checkbox"/> No Damage/Theft
(Please provide photos. Do not use this section for incidents involving moving vehicle(s).)	

Owner Name of Damaged/Stolen Property	
Owner address (if not incident location)	
Phone No. / Email address	

Description of Damage or Stolen Property:

Property Owner Insurance information:

Was (or will) a police report be filed? Yes No

Witness Name:	Address:	Phone No.:
Witness Name:	Address:	Phone No.:

SIGNATURES OF EMPLOYEE AND REVIEWERS

FARALLON PERSONNEL ROLES	NAME (PRINT)	SIGNATURE	TITLE	DATE
Employee				
Project Manager				

HEALTH AND SAFETY FINDINGS AND RECOMMENDED ACTIONS

Corporate Health and Safety Officer	NAME (PRINT)	SIGNATURE	TITLE	DATE

Distribution List: Group Manager of Farallon employee(s) involved in incident
 Regional Operations Manager

ATTACHMENT 8

Near Miss Report Form



NEAR MISS AND SAFETY OBSERVATION REPORT INSTRUCTIONS

The following process should be followed to submit a Near Miss and Safety Observation Report to the Health and Safety Committee at Farallon Consulting, L.L.C.

1. Enter information into the form in Microsoft Word and save the draft document into the project folder under P:/Project/Field_Lab/Safety.
2. Email a link for the completed draft Near Miss and Safety Observation Report to safety@farallonconsulting.com. The Corporate Health and Safety Coordinator (HSC) will review the form and provide comments or questions back to you.
3. Address any comments or questions and either resubmit to the HSC for additional review, if requested, or provide the HSC with the final signed and dated copy of the completed Near Miss and Safety Observation Report.



NEAR MISS REPORT

Employees involved in or witnessing a near miss or making a safety observation should complete this form. These are important indicators of potentially harmful future accidents, and they can provide valuable insights to preventing personal injury and/or property damage on future projects. Please submit the form to safety@farallonconsulting.com

- A near miss is an occurrence that did not result in any personal injury, property damage, environmental release, or production interruption, but could have under slightly different circumstances.
- A safety observation is witnessing any activity that places a person or property at risk of injury, accident, or damage but may not fit the definition of a near miss. For the purposes of this report, a safety observation is considered a near miss.

PROJECT INFORMATION			
Farallon PN:	Project Name:		
Site Address:	City/State:		
NEAR MISS INFORMATION			
Date of near miss: <small>Click or tap to enter a date.</small>	Time of near miss: <input type="checkbox"/> AM <input type="checkbox"/> PM		
Near Miss Category: <small>Choose an item.</small>			
Employee or Non-Employees Involved in Near Miss:			
Exact Location Onsite where Incident Occurred:			
Description of Near Miss			
Corrective Action Taken			
Lessons Learned			
To whom did employee first report the near miss?		Date reported:	<small>Click or tap to enter a date.</small>
		Time reported:	<input type="checkbox"/> AM <input type="checkbox"/> PM
SIGNATURES			
FARALLON PERSONNEL ROLES	NAME AND TITLE	SIGNATURE	DATE
Farallon employee completing form			
Corporate Health and Safety Coordinator			

**APPENDIX E
INADVERTENT DISCOVERY PLAN**

REMEDIAL INVESTIGATION WORK PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010



INADVERTENT DISCOVERY PLAN PLAN AND PROCEDURES FOR THE DISCOVERY OF CULTURAL RESOURCES AND HUMAN SKELETAL REMAINS

To request ADA accommodation, including materials in a format for the visually impaired, call Ecology at 360-407-6000 or visit <https://ecology.wa.gov/accessibility>. People with impaired hearing may call Washington Relay Service at 711. People with a speech disability may call TTY at 877-833-6341.

Site Name(s):

Location:

Project Lead/Organization:

County:

If this Inadvertent Discovery Plan (IDP) is for multiple (batched) projects, ensure the location information covers all project areas.

1. INTRODUCTION

The IDP outlines procedures to perform in the event of a discovery of archaeological materials or human remains, in accordance with applicable state and federal laws. An IDP is required, as part of Agency Terms and Conditions for all grants and loans, for any project that creates disturbance above or below the ground. An IDP is not a substitute for a formal cultural resource review (Executive 21-02 or Section 106).

Once completed, **the IDP should always be kept at the project site** during all project activities. All staff, contractors, and volunteers should be familiar with its contents and know where to find it.

2. CULTURAL RESOURCE DISCOVERIES

A cultural resource discovery could be prehistoric or historic. Examples include (see images for further examples):

- An accumulation of shell, burned rocks, or other food related materials.
- Bones, intact or in small pieces.
- An area of charcoal or very dark stained soil with artifacts.
- Stone tools or waste flakes (for example, an arrowhead or stone chips).
- Modified or stripped trees, often cedar or aspen, or other modified natural features, such as rock drawings.
- Agricultural or logging materials that appear older than 50 years. These could include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, and many other items.
- Clusters of tin cans or bottles, or other debris that appear older than 50 years.
- Old munitions casings. **Always assume these are live and never touch or move.**
- Buried railroad tracks, decking, foundations, or other industrial materials.
- Remnants of homesteading. These could include bricks, nails, household items, toys, food containers, and other items associated with homes or farming sites.

The above list does not cover every possible cultural resource. When in doubt, assume the material is a cultural resource.

3. ON-SITE RESPONSIBILITIES

If any employee, contractor, or subcontractor believes that they have uncovered cultural resources or human remains at any point in the project, take the following steps to **Stop-Protect-Notify**. **If you suspect that the discovery includes human remains, also follow Sections 5 and 6.**

STEP A: Stop Work.

All work must stop immediately in the vicinity of the discovery.

STEP B: Protect the Discovery.

Leave the discovery and the surrounding area untouched and create a clear, identifiable, and wide boundary (30 feet or larger) with temporary fencing, flagging, stakes, or other clear markings. Provide protection and ensure integrity of the discovery until cleared by the Department of Archaeological and Historical Preservation (DAHP) or a licensed, professional archaeologist.

Do not permit vehicles, equipment, or unauthorized personnel to traverse the discovery site. Do not allow work to resume within the boundary until the requirements of this IDP are met.

STEP C: Notify Project Archaeologist (if applicable).

If the project has an archaeologist, notify that person. If there is a monitoring plan in place, the archaeologist will follow the outlined procedure.

STEP D: Notify Project and Washington Department of Ecology (Ecology) contacts.

Project Lead Contacts

Primary Contact

Name:

Organization:

Phone:

Email:

Alternate Contact

Name:

Organization:

Phone:

Email:

Ecology Contacts (completed by Ecology Project Manager)

Ecology Project Manager

Name:

Program:

Phone:

Email:

Alternate or Cultural Resource Contact

Name:

Program:

Phone:

Email:

STEP E: Ecology will notify DAHP.

Once notified, the Ecology Cultural Resource Contact or the Ecology Project Manager will contact DAHP to report and confirm the discovery. To avoid delay, the Project Lead/Organization will contact DAHP if they are not able to reach Ecology.

DAHP will provide the steps to assist with identification. DAHP, Ecology, and Tribal representatives may coordinate a site visit following any necessary safety protocols. DAHP may also inform the Project Lead/Organization and Ecology of additional steps to further protect the site.

Do not continue work until DAHP has issued an approval for work to proceed in the area of, or near, the discovery.

DAHP Contacts:

Name: Rob Whitlam, PhD
Title: State Archaeologist
Cell: 360-890-2615
Email: Rob.Whitlam@dahp.wa.gov
Main Office: 360-586-3065

Human Remains/Bones:

Name: Guy Tasa, PhD
Title: State Anthropologist
Cell: 360-790-1633 (24/7)
Email: Guy.Tasa@dahp.wa.gov

4. TRIBAL CONTACTS

In the event cultural resources are discovered, the following tribes will be contacted. See Section 10 for Additional Resources.

Tribe:	Tribe:
Name:	Name:
Title:	Title:
Phone:	Phone:
Email:	Email:
Tribe:	Tribe:
Name:	Name:
Title:	Title:
Phone:	Phone:
Email:	Email:

Please provide contact information for additional tribes within your project area, if needed, in Section 11.

5. FURTHER CONTACTS (if applicable)

If the discovery is confirmed by DAHP as a cultural or archaeological resource, or as human remains, and there is a partnering federal or state agency, Ecology or the Project Lead/Organization will ensure the partnering agency is immediately notified.

Federal Agency:

Agency:

Name:

Title:

Phone:

Email:

State Agency:

Agency:

Name:

Title:

Phone:

Email:

6. SPECIAL PROCEDURES FOR THE DISCOVERY OF HUMAN SKELETAL MATERIAL

Any human skeletal remains, regardless of antiquity or ethnic origin, will at all times be treated with dignity and respect. Follow the steps under **Stop-Protect-Notify**. For specific instructions on how to handle a human remains discovery, see: [RCW 68.50.645: Skeletal human remains—Duty to notify—Ground disturbing activities—Coroner determination—Definitions](#).

Suggestion: If you are unsure whether the discovery is human bone or not, contact Guy Tasa with DAHP, for identification and next steps. Do not pick up the discovery.

Guy Tasa, PhD State Physical Anthropologist

Guy.Tasa@dahp.wa.gov

(360) 790-1633 (Cell/Office)

For discoveries that are confirmed or suspected human remains, follow these steps:

1. Notify law enforcement and the Medical Examiner/Coroner using the contacts below. **Do not call 911** unless it is the only number available to you.

Enter contact information below (required):

- Local Medical Examiner or Coroner name and phone:

 - Local Law Enforcement main name and phone:

 - Local Non-Emergency phone number (911 if without a non-emergency number):
2. The Medical Examiner/Coroner (with assistance of law enforcement personnel) will determine if the remains are human or if the discovery site constitutes a crime scene and will notify DAHP.
 3. **DO NOT speak with the media, allow photography or disturbance of the remains, or release any information about the discovery on social media.**
 4. If the remains are determined to be non-forensic, Cover the remains with a tarp or other materials (not soil or rocks) for temporary protection and to shield them from being photographed by others or disturbed.

Further activities:

- Per [RCW 27.44.055](#), [RCW 68.50](#), and [RCW 68.60](#), DAHP will have jurisdiction over non-forensic human remains. Ecology staff will participate in consultation. Organizations may also participate in consultation.
- Documentation of human skeletal remains and funerary objects will be agreed upon through the consultation process described in [RCW 27.44.055](#), [RCW 68.50](#), and [RCW 68.60](#).
- When consultation and documentation activities are complete, work in the discovery area may resume as described in Section 8.

If the project occurs on federal lands (such as a national forest or park or a military reservation) the provisions of the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) apply and the responsible federal agency will follow its provisions. Note that state highways that cross federal lands are on an easement and are not owned by the state.

If the project occurs on non-federal lands, the Project Lead/Organization will comply with applicable state and federal laws, and the above protocol.

7. DOCUMENTATION OF ARCHAEOLOGICAL MATERIALS

Archaeological resources discovered during construction are protected by state law [RCW 27.53](#) and assumed eligible for inclusion in the National Register of Historic Places under Criterion D until a formal Determination of Eligibility is made.

The Project Lead/Organization must ensure that proper documentation and field assessment are made of all discovered cultural resources in cooperation with all parties: the federal agencies (if any), DAHP, Ecology, affected tribes, and the archaeologist.

The archaeologist will record all prehistoric and historic cultural material discovered during project construction on a standard DAHP archaeological site or isolate inventory form. They will photograph site overviews, features, and artifacts and prepare stratigraphic profiles and soil/sediment descriptions for minimal subsurface exposures. They will document discovery locations on scaled site plans and site location maps.

Cultural features, horizons, and artifacts detected in buried sediments may require the archaeologist to conduct further evaluation using hand-dug test units. They will excavate units in a controlled fashion to expose features, collect samples from undisturbed contexts, or to interpret complex stratigraphy. They may also use a test unit or trench excavation to determine if an intact occupation surface is present. They will only use test units when necessary to gather information on the nature, extent, and integrity of subsurface cultural deposits to evaluate the site's significance. They will conduct excavations using standard archaeological techniques to precisely document the location of cultural deposits, artifacts, and features.

The archaeologist will record spatial information, depth of excavation levels, natural and cultural stratigraphy, presence or absence of cultural material, and depth to sterile soil, regolith, or bedrock for each unit on a standard form. They will complete test excavation unit level forms, which will include plan maps for each excavation level and artifact counts and material types, number, and vertical provenience (depth below

surface and stratum association where applicable) for all recovered artifacts. They will draw a stratigraphic profile for at least one wall of each test excavation unit.

The archaeologist will screen sediments excavated for purposes of cultural resources investigation through 1/8-inch mesh, unless soil conditions warrant 1/4-inch mesh.

The archaeologist will analyze, catalogue, and temporarily curate all prehistoric and historic artifacts collected from the surface and from probes and excavation units. The ultimate disposition of cultural materials will be determined in consultation with the federal agencies (if any), DAHP, Ecology, and the affected tribe(s).

Within 90 days of concluding fieldwork, the archaeologist will provide a technical report describing any and all monitoring and resultant archaeological excavations to the Project Lead/Organization, who will forward the report to Ecology, the federal agencies (if any), DAHP, and the affected tribe(s) for review and comment.

If assessment activities expose human remains (burials, isolated teeth, or bones), the archaeologist and Project Lead/Organization will follow the process described in **Section 6**.

8. PROCEEDING WITH WORK

The Project Lead/Organization shall work with the archaeologist, DAHP, and affected tribe(s) to determine the appropriate discovery boundary and where work can continue.

Work may continue at the discovery location only after the process outlined in this plan is followed and the Project Lead/Organization, DAHP, any affected tribe(s), Ecology, and the federal agencies (if any) determine that compliance with state and federal laws is complete.

9. ORGANIZATION RESPONSIBILITY

The Project Lead/Organization is responsible for ensuring:

- This IDP has complete and accurate information.
- This IDP is immediately available to all field staff at the sites and available by request to any party.
- This IDP is implemented to address any discovery at the site.
- That all field staff, contractors, and volunteers are instructed on how to implement this IDP.

10. ADDITIONAL RESOURCES

Informative Video

Ecology recommends that all project staff, contractors, and volunteers view this informative video explaining the value of IDP protocol and what to do in the event of a discovery. The target audience is anyone working on the project who could unexpectedly find cultural resources or human remains while excavating or digging. The video is also posted on DAHP's inadvertent discovery language website.

[Ecology's IDP Video](https://www.youtube.com/watch?v=ioX-4cXfbDY) (<https://www.youtube.com/watch?v=ioX-4cXfbDY>)

Informational Resources

[DAH P \(https://dahp.wa.gov\)](https://dahp.wa.gov)

[Washington State Archeology \(DAH P 2003\)](https://dahp.wa.gov/sites/default/files/Field%20Guide%20to%20WA%20Arch_0.pdf)

[\(https://dahp.wa.gov/sites/default/files/Field%20Guide%20to%20WA%20Arch_0.pdf\)](https://dahp.wa.gov/sites/default/files/Field%20Guide%20to%20WA%20Arch_0.pdf)

[Association of Washington Archaeologists \(https://www.archaeologyinwashington.com\)](https://www.archaeologyinwashington.com)

Potentially Interested Tribes

[Interactive Map of Tribes by Area](https://dahp.wa.gov/archaeology/tribal-consultation-information)

[\(https://dahp.wa.gov/archaeology/tribal-consultation-information\)](https://dahp.wa.gov/archaeology/tribal-consultation-information)

[WSDOT Tribal Contact Website](https://wsdot.wa.gov/tribal/TribalContacts.htm)

[\(https://wsdot.wa.gov/tribal/TribalContacts.htm\)](https://wsdot.wa.gov/tribal/TribalContacts.htm)

11. ADDITIONAL INFORMATION

Please add any additional contact information or other information needed within this IDP.

Implement the IDP if you see...

Chipped stone artifacts.

Examples are:

- Glass-like material.
- Angular material.
- “Unusual” material or shape for the area.
- Regularity of flaking.
- Variability of size.



Stone artifacts from Oregon.



Stone artifacts from Washington.



Biface-knife, scraper, or pre-form found in NE Washington. Thought to be a well knapped object of great antiquity. Courtesy of Methow Salmon Rec. Foundation.

Implement the IDP if you see...

Ground stone artifacts.

Examples are:

- Unusual or unnatural shapes or unusual stone.
- Striations or scratching.
- Etching, perforations, or pecking.
- Regularity in modifications.
- Variability of size, function, or complexity.



Above: Fishing Weight - credit [CRITFC Treaty Fishing Rights website](#).



Artifacts from unknown locations (left and right images).



Implement the IDP if you see...

Bone or shell artifacts, tools, or beads.

Examples are:

- Smooth or carved materials.
- Unusual shape.
- Pointed as if used as a tool.
- Wedge shaped like a “shoehorn”.
- Variability of size.
- Beads from shell (‘dentalium’) or tusk.



Upper Left: Bone Awls from Oregon.

Upper Center: Bone Wedge from California.

Upper Right: Plateau dentalium choker and bracelet, from Nez Perce National Historical Park, 19th century, made using Antalis pretiosa shells Credit: Nez Perce - Nez Perce National Historical Park, NEPE 8762, Public Domain.

Above: Tooth Pendants. Right: Bone Pendants. Both from Oregon and Washington.



Implement the IDP if you see...

Culturally modified trees, fiber, or wood artifacts.

Examples are:

- Trees with bark stripped or peeled, carvings, axe cuts, de-limbing, wood removal, and other human modifications.
- Fiber or wood artifacts in a wet environment.
- Variability of size, function, and complexity.



Left and Below: *Culturally modified tree and an old carving on an aspen (Courtesy of DAHP).*

Right, Top to Bottom: *Artifacts from Mud Bay, Olympia: Toy war club, two strand cedar rope, wet basketry.*



Implement the IDP if you see...

Strange, different, or interesting looking dirt, rocks, or shells.

Human activities leave traces in the ground that may or may not have artifacts associated with them. Examples are:

- “Unusual” accumulations of rock (especially fire-cracked rock).
- “Unusual” shaped accumulations of rock (such as a shape similar to a fire ring).
- Charcoal or charcoal-stained soils, burnt-looking soils, or soil that has a “layer cake” appearance.
- Accumulations of shell, bones, or artifacts. Shells may be crushed.
- Look for the “unusual” or out of place (for example, rock piles in areas with otherwise few rocks).



Shell Midden pocket in modern fill discovered in sewer trench.



Underground oven. Courtesy of DAHP.

Shell midden with fire cracked rock.



Hearth excavated near Hamilton, WA.

Implement the IDP if you see...

Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Agricultural or logging equipment. May include equipment, fencing, canals, spillways, chutes, derelict sawmills, tools, etc.
- Domestic items including square or wire nails, amethyst colored glass, or painted stoneware.



Left: Top to Bottom: *Willow pattern serving bowl and slip joint pocket knife discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*



Right: *Collections of historic artifacts discovered during excavations in eastern Washington cities.*



Implement the IDP if you see...

Historic period artifacts (historic archaeology considered older than 50 years).

Examples are:

- Railway tokens, coins, and buttons.
- Spectacles, toys, clothing, and personal items.
- Items helping to understand a culture or identity.
- Food containers and dishware.



Main Image: *Dishes, bottles, workboot found at the North Shore Japanese bath house (ofuro) site, Courtesy Bob Muckle, Archaeologist, Capilano University, B.C. This is an example of an above ground resource.*



Right, from Top to Bottom: *Coins, token, spectacles and Montgomery Ward pitchfork toy discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*



Implement the IDP if you see...

- Old munition casings – if you see ammunition of any type – ***always assume they are live and never touch or move!***
- Tin cans or glass bottles with an older manufacturer's technique – maker's mark, distinct colors such as turquoise, or an older method of opening the container.



Far Left: .303 British cartridge found by a WCC planting crew on Skagit River. Don't ever touch something like this!
Left: Maker's mark on bottom of old bottle.

Right: Old beer can found in Oregon. ACME was owned by Olympia Brewery. Courtesy of Heather Simmons.



Logo employed by Whithall Tatum & Co. between 1924 to 1938 (Lockhart et al. 2016).



Can opening dates, courtesy of W.M. Schroeder.

Implement the IDP if you see...

You see historic foundations or buried structures.

Examples are:

- Foundations.
- Railroad and trolley tracks.
- Remnants of structures.



Counter Clockwise, Left to Right: *Historic structure 45K1924, in WSDOT right of way for SR99 tunnel. Remnants of Smith Cove shantytown (45-KI-1200) discovered during Ecology CSO excavation, City of Spokane historic trolley tracks uncovered during stormwater project, intact foundation of historic home that survived the Great Ellensburg Fire of July 4, 1889, uncovered beneath parking lot in Ellensburg.*

Implement the IDP if you see...

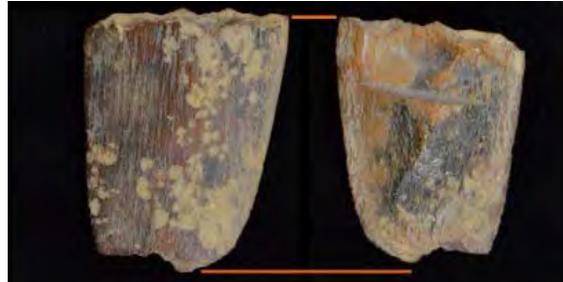
Potential human remains.

Examples are:

- Grave headstones that appear to be older than 50 years.
- Bones or bone tools--intact or in small pieces. It can be difficult to differentiate animal from human so they must be identified by an expert.
- These are all examples of animal bones and are not human.

Center: *Bone wedge tool, courtesy of Smith Cove Shantytown excavation (45KI1200).*

Other images (Top Right, Bottom Left, and Bottom) Center: Courtesy of DAHP.



Directly Above: This is a real discovery at an Ecology sewer project site.

What would you do if you found these items at a site? Who would be the first person you would call?

Hint: Read the plan!

**APPENDIX F
PRELIMINARY PROJECT SCHEDULE**

REMEDIAL INVESTIGATION WORK PLAN
Memorial Field and Rainier Trail Site
105 2nd Avenue Northeast and Parcel 3424069043
Issaquah, Washington

Farallon PN: 821-010

