FARALLON
CONSULTING

Remedial Investigation Work Plan

Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Ecology Cleanup Site ID: 16581

Farallon PN: 1754-008

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ACRONYMS AND ABBREVIATIONS

AFFF	aqueous film-forming foam
AFFF Training Areas	collectively, the West Playfield AFFF Training Area, Dodd Field AFFF Training Area, Newport Way Northwest AFFF Training Area, and Median Strip AFFF Training Area
AO	Agreed Order No. DE 23520
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
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
IVES	Issaquah Valley Elementary School

IVES Source Area	Issaquah Valley Elementary School Source Area at 555 Northwest Holly Street in Issaquah, Washington
MCLs	Maximum Contaminant Levels
MFRT Site	Memorial Field and Rainier Trail Site, CSID No. 16582, FSID No. 57044
MTCA	Model Toxics Control Act Cleanup Regulation
µg/l	micrograms per liter
NAVD88	North American Vertical Datum of 1988
NWN	Newport Way Northwest
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
PFNA	perfluoro-nonanoic acid
PFDA	perfluoro-decanoic acid
PLP	potentially liable person
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RI/FS	Remedial Investigation and Feasibility Study
RIWP	Remedial Investigation Work Plan
SAP	Sampling and Analysis Plan
Site	Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary Site, CSID No. 16581, FSID No. 87761647
Source Areas	collectively, the EFR HQ Source Area and IVES Source Area
the City	City of Issaquah
EPA	U.S. Environmental Protection Agency

WAC	Washington Administrative Code
WQC	water quality criteria

EXECUTIVE SUMMARY

Farallon Consulting, L.L.C. (Farallon) has prepared this Remedial Investigation Work Plan (RIWP) on behalf of Eastside Fire and Rescue (EFR) and the City of Issaquah (the City) for the EFR Headquarters (HQ) and Issaquah Valley Elementary School (IVES) Site (Site). EFR and the City were identified as the potentially liable persons (PLPs) 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 23520 (AO) between the Washington State Department of Ecology (Ecology) and the PLPs.

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 EFR HQ Source Area at 175 Newport Way Northwest and IVES Source Area at 555 Northwest Holly Street in Issaquah, Washington (collectively referred to as the Source Areas). The confirmed releases have impacted shallow groundwater at the Source Areas. The City withdraws groundwater from production wells at locations down-gradient of the Site, and a completed exposure pathway for groundwater has been confirmed. 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. Furthermore, the planned remedial investigation activities will characterize the nature and extent of impacts to surface water, sediment, and sediment pore water, if any, caused by groundwater transport from the source areas 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 Eastside Fire and Rescue (EFR) and the City of Issaquah (the City) for the EFR Headquarters (HQ) and Issaquah Valley Elementary School (IVES) Site (Site) (Figure 1). EFR and the City were identified as the potentially liable persons (PLPs) 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 23520 (AO) between the Washington State Department of Ecology (Ecology) and the PLPs. The AO is included as 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 EFR HQ Source Area at 175 Newport Way Northwest and IVES Source Area at 555 Northwest Holly Street in Issaquah, Washington (collectively referred to as the Source Areas). The confirmed releases have impacted shallow groundwater at the Source Areas. The City withdraws groundwater from production wells at locations down-gradient of the Site and a completed exposure pathway for groundwater has been confirmed. 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 on the EFR HQ Source Area (Figures 2 and 3):

- An area that currently is covered with lawn near the fire hydrant on the north-central portion (Median Strip AFFF Training Area); and
- The western gravel-surfaced area of the EFR Headquarters Property (Newport Way Northwest [NWN] AFFF Training Area).

AFFF training was performed at two locations on the IVES Source Area (Figures 2 and 4):

- An area that currently is covered with lawn on the southern area of the west playfield at IVES (West Playfield AFFF Training Area); and
- An area that currently is covered with lawn, trees, turf, and asphalt along the western side of Dodd Field (Dodd Field AFFF Training Area).

The Median Strip AFFF Training Area, NWN AFFF Training Area, West Playfield AFFF Training Area, and Dodd Field AFFF Training Area are collectively referred to as the AFFF Training Areas. The Source Areas are depicted on Figure 2, Figure 3 shows the EFR HQ Source Area plan, and Figure 4 shows the IVES Source Area plan. 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.
- Adequately characterize the nature and extent of impacts to surface water, sediment, and sediment pore water, if any, caused by groundwater transport from the 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:

- EFR's PLP Representative – Ben Lane, Fire Chief, EFR;
- 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 Source Areas in January 2016; PFAS were not listed as hazardous substances at the time. Additional investigation was delayed until the time when the contaminants reported, PFAS and PFOS, were confirmed to be hazardous substances under Washington State Model Toxics Control Act (MTCA) in October 2021.

Lawful training activities associated with AFFF deployment were identified as a potential source of the impacts to the drinking water aquifer. Ecology provided funding for investigation activities under six previous interagency agreements (IAAs), including:

- $46,795 to EFR under IAA No. C1800181 to further evaluate the soil and groundwater impacts at the known AFFF training locations;
- $50,000 to the City under IAA No. C2000069 to perform groundwater modeling to better understand the fate and transport of PFAS in the Lower Issaquah Valley;
- $449,015 to EFR under IAA No. C2000071 to further evaluate the soil and groundwater impacts at the EFR HQ Source Area and regional groundwater impacts;
- $300,000 to EFR under IAA No. C2100056 to further evaluate the soil and groundwater impacts at the EFR HQ Source Area and perform a pilot test of a permeable reactive barrier (PRB) comprised of colloidal activated carbon at the EFR HQ Source Area;
- $350,000 to EFR under IAA No. C2200169 to further evaluate the soil and groundwater impacts and prepare a draft Remedial Investigation Report for the Site; and
- $400,000 to the City under IAA No. 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 PLPs 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 PLPs held an open public comment period for the AO in May 2024. Agreed Order No. DE 23520 was signed by the PLPs and Ecology with an effective date of February 24, 2025. The AO requires the PLPs conduct a remedial investigation and feasibility study (RI/FS) for the Site and to prepare a detailed Interim Action Work Plan. The AO establishes that Ecology will not take additional enforcement action against the PLPs to require those remedial actions specified in the AO so long as the PLPs comply 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 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 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 EFR HQ Source Area at 175 Newport Way Northwest and IVES Source Area at 555 Northwest Holly Street 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 EFR HQ

Source Area and IVES Source Area; and impacted groundwater which is a source for the City's drinking water.

AFFF training was performed at two locations at the EFR HQ Source Area (Figures 2 and 3):

- An area that currently is covered with lawn near the fire hydrant on the north-central portion (Median Strip AFFF Training Area); and
- The western gravel-surfaced area of the EFR HQ Source Area (NWN AFFF Training Area.

AFFF training was performed at two locations at the IVES Source Area (Figures 2 and 4):

- An area that currently is covered with lawn on the southern area of the west playfield at IVES (West Playfield AFFF Training Area); and
- An area that currently is covered with lawn, trees, turf, and asphalt along the western side of Dodd Field (Dodd Field 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 EFR HQ Source Area

Based on King County records, Fire District 10 built on the EFR HQ Source Area in 1982 and operated headquarters and mechanical maintenance facilities as well as an active fire station through 1999. The original main building was converted to serve primarily as the current administrative office and maintenance facility for EFR by approximately 2002. Active fire station operations were moved to other properties throughout the jurisdiction after 2002.

The majority of the training events were performed on the NWN AFFF Training Area from approximately the early 1980s through the late 1990s at a frequency of up to 12 times per year. Residual AFFF associated with training exercises was washed down with service water on the EFR HQ Source Area, some of which was captured by the property's stormwater management system that routed water to a detention basin on the eastern portion of the property near Newport Way Northwest (Figure 3). Any unused AFFF concentrate solution collected from on-board engine tanks or unused buckets was disposed of from 175 Newport Way Northwest by a hazardous waste disposal contractor.

Active fire station operations and AFFF training at the EFR HQ Source Area were reduced beginning in 1999, when the facility transitioned fully into serving as EFR's administrative office and maintenance facility. Typically, one to three 5-gallon buckets of AFFF concentrate was expended during each training event. Training was performed at an area that currently is covered with lawn near the fire hydrant on the north-central portion of the property (Median Strip AFFF Training Area) and at the western gravel-surfaced portion of the property (NWN AFFF Training Area). Some AFFF mixture may also have been sprayed at the base of the hillside west of the western property boundary.

2.3.1.2 IVES Source Area

Historical AFFF training was performed at the West Playfield AFFF Training Area during the period from approximately the early 1970s through the early 1980s at a frequency of approximately once or twice per year. Typically, one to three 5-gallon buckets of AFFF concentrate were expended per training event. Exercises were conducted on the lawn proximate to the western wall of the Issaquah Valley Elementary gymnasium using service water from the southeast-adjacent fire hydrant.

Historical AFFF training was performed at the Dodd Field AFFF Training Area during the period from approximately the early 1970s through the early 1980s on a similar schedule to the West Playfield at a frequency of approximately once or twice per year. Exercises were conducted on the lawn east of the driveway in an area previously described as blackberry bramble using service water from the southwest-adjacent fire hydrant. Typically, one to three 5-gallon buckets of AFFF concentrate was expended during each training event. Spraying of the AFFF mixture occurred in the vegetated area that is now a lawn with trees, and likely extended onto land that is overlain by the present ballfields.

2.3.2 Current Land Use

The EFR HQ Source Area is currently used as an office and vehicle maintenance facility for EFR. The IVES Source Areas is currently used as an elementary school including a playground and multiple sports fields.

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 primarily residential and commercial in use. Properties to the south and west of the Site are primarily single family residences.

The properties adjoining both Source Areas are primarily residential. The parcel to the west of the EFR HQ Source Area is undeveloped steep slope and open space preservation that separates the EFR HQ Source Area from single family home residential developments.

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. Based on drilling observations and review of historical boring logs, the following general geologic units and sequence were identified for the Site:

- Surficial deposits of silty sand, silt, and fill material with a maximum thickness of approximately 30 feet. The surficial unit was observed to generally be thinner and discontinuous on the eastern side of the Lower Issaquah Valley.
- A coarse gravel and sand unit with occasional silt interbeds ranging from 40 to approximately 55 feet thick.
- Silt, or silt and clay with occasional sand interbeds. Silt was observed on the western portion of the Lower Issaquah Valley between the coarse gravel and sand and poorly graded sand units ranging in thickness from approximately 10 feet (IES-MW01) to 45 feet (COI-MW07) thick.
- Brown to gray poorly graded medium to coarse sand and gravel matching the description of the A-Zone Aquifer (see below). The A-Zone Aquifer is estimated to be approximately 60 to 70 feet thick based on drilling at wells IES-MW12, COI-MW08, and COI-PW04.
- An aquitard comprising interbedded firm gray clay, dense gray sand, and firm gray silt that is approximately 25 to 30 feet thick at monitoring well COI-MW08. Based on

upward groundwater gradients observed at this location, localized confined to semi-confined conditions are present in this area.

- The B-Zone Aquifer, comprising primarily gray fine to coarse sand with silt and gravel beds up to 100 feet thick.
- A hard gray silt (basement silt) that is likely weathered bedrock was observed beneath the EFR HW Source Area. This unit dips to the east and extends further under the Lower Issaquah Valley.

Previous drilling in the basement silt at monitoring well NWN-MW09 was terminated after 45 feet of continuous drilling in the same unit. Drilling approximately 120 feet to the east at monitoring well NWN-MW08 did not encounter the basement silt, although the wells were drilled to comparable final completion depths indicating the basement unit is likely deeper to the east of the EFR HQ Source Area under the Lower Issaquah Valley alluvial units.

Geologic cross-sections for the EFR HQ Source Area and IVES Source Area provided on Figures 5 and 6, respectively. Boring and monitoring well locations are presented on Figures 2, 3, and 4.

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 7). Shallow groundwater at the EFR HQ Source Area flows predominantly toward the northeast in proximity to the NWN AFFF Training Area then transitions to a north-northeast flow direction in the central to eastern area of the property (Figure 10).

Shallow groundwater gradients range from approximately 0.003 feet per foot on the southern portion of Site to 0.007 feet per foot in the northern portion of the Site. Shallow to intermediate groundwater vertical gradients at the Site are downward south of monitoring well IES-MW01 located in the southern portion of the IVES Source Area. Flow direction was consistent between monitoring events, groundwater elevations fluctuated by up to 15 feet between low- and high-water conditions.

Vertical gradients between shallow and intermediate groundwater that fluctuated seasonally were observed in monitoring well pair NDS-MW03/NDS-MW04, which reported downward vertical gradients from April through October in 2020, and upward vertical gradients in December through May 2022 and 2023. Vertical gradients between shallow and intermediate groundwater are upward in well pairs at, and north of, Northwest Holly Street and on the eastern portion of the Site. A summary of measured vertical gradients in groundwater at the Site is provided in Table 5.

Surface water elevations in the southern area of the Site at station STR-05 in the Main fork of Issaquah Creek are slightly higher than groundwater elevations in the shallow groundwater interval proximate to STR-05 (Figure 7). Relative elevations of groundwater and surface water indicate that the Main fork of Issaquah Creek is a losing stream in the southern portion of the Site. Losing streams lose water as it flows 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 and STR-02 located 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 between STR-02 and STR-05 (Figure 7). 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 7. Monitoring well construction details and groundwater elevation data are summarized in Tables 3 and 4.

2.4.2.2 Site Intermediate Groundwater

Site intermediate groundwater flow fluctuates from north-northeast to north-northwest (Figure 8). Intermediate groundwater gradients across the Site were approximately 0.002 feet per foot. Similar to shallow groundwater flow directions were consistent between monitoring events. Potentiometric head fluctuated by 4 to 5 feet seasonally.

Vertical gradients between intermediate and deep groundwater were evaluated at two monitoring wells pairs COI-MW05/IESMW12 and IES-MW06/IES-MW11. All four wells are screened in the A-Zone Aquifer. Vertical gradients were consistently downward in the IES-MW06/IES-MW11 well pair, located in the south-central portion of the Site on the southern boundary of the IVES Source Area (Table 5). The vertical gradient between intermediate and deep groundwater fluctuated in well pair COI-MW05/IES-MW12; a downward gradient was reported in the September 2022 monitoring event and upward gradients were reported in December 2022 through May 2023 (Table 5).

2.4.2.3 Site Deep Groundwater

Deep groundwater in the A-Zone Aquifer was gauged at monitoring wells IES-MW11 and IES-MW12. The gradient between the two wells ranged from 0.0004 to 0.002 feet per foot. The May 2023 flow direction using potentiometric elevations from IES-MW11, IES-MW12, and COI-TW03 was to the northwest with a gradient of 0.002 feet per foot (Figure 9). The vertical gradient between deep groundwater in the A-Zone Aquifer and B-Zone Aquifer measured at monitoring well pair IES-MW12/COI-MW03 was upward in the February and May 2023 monitoring events (Table 5), suggesting localized confined to semi-confined conditions in this area.

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 and 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).

Since 2016, water withdrawn from the A-Zone Aquifer at production well COI-PW04 has been treated at the point of entry with granular activated carbon. The treatment has reduced PFAS concentrations in service water to less than applicable screening levels.

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 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 tool[2] 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

[1] https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-rights-search
[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 north of the Site, west of the Main fork of Issaquah Creek and South of I-90 (Figure 2, Geosyntec 2016a). Wells COI-PW04 and COI-PW05 are located north 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.

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 (Figure 2);
- 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 at the 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 (Figure 16; Table 7). PFAS were also detected at concentrations exceeding current MTCA Method B cleanup levels for soil samples collected from the EFR HQ Source Area, confirming AFFF training was a source of PFAS to vadose zone soil (Figure 11; Table 6). PFAS were not detected at the laboratory practical quantitation limits in the surface water samples collected from Issaquah Creek.

3.3 PFAS INVESTIGATIONS AND MONITORING 2018 THROUGH 2023

This section presents a summary of additional investigation activities at the Site performed by Farallon and others 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:

- Sammamish Plateau Water and Sewer District performed surface water sampling at four locations in the Main fork of Issaquah Creek in 2018 as part of a Lower Issaquah Valley-wide evaluation of PFAS impacts to drinking water production wells. Sampling locations were immediately upstream of Interstate 90, immediately downstream of the confluence of the East and Main forks of Issaquah Creek, downstream of the EFR HQ Source Area, and upstream of the EFR HQ Source Area;
- Collection of groundwater samples from monitoring wells DF-MW02 and DF-MW03 within the IVES Source Area proximate to the Dodd Field AFFF Training Area in August 2018 (Farallon 2018);
- Advancement of eight borings (IES-R01 through IES-R05 and NWN-R01 through NWN-R03) for soil and/or reconnaissance groundwater sampling; completion of multi-incremental soil sampling within the AFFF Training Areas (decision units DU-1A, DU-1B, DU-2A, DU-2B, DU-05, and DU-06); installation of nine shallow groundwater monitoring wells (IES-MW-1 through IEW-MW05 and NWN-MW01 through NWN-MW04); collection of shallow soil samples using a hand auger; and sampling of the installed monitoring wells and existing monitoring wells (Farallon 2019);

- Advancement of 15 borings (NWN-R04 through NWN-R18) for soil and/or reconnaissance groundwater sampling; installation of three shallow monitoring wells (NWN-MW05, NWN-MW06, and NWN-MW-07) and two intermediate monitoring wells (NWN-MW08 and NWN-MW09); installation of two piezometers for aquifer testing; and sampling of the installed monitoring wells and existing monitoring wells (Farallon 2021a);
- Evaluation of potential upgradient sources of PFAS (Farallon 2021b); and
- Installation of six additional shallow monitoring wells on the EFR HQ Source Area; completion of a pilot test to install and evaluate the performance of a permeable reactive barrier (PRB) on the downgradient side of the NWN AFFF Training Area; and sampling of existing Site monitoring wells (Farallon 2023).
- Additional shallow soil sampling west of the NWN AFFF Training Area; installation of one shallow monitoring well on the EFR HQ Source Area; installation of eight intermediate and deep monitoring wells at and down-gradient of the IVES Source Area; and sampling of the installed and existing Site monitoring wells (Farallon 2023).

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 20 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, intermediate, and deep 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 PLPs 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 EFR HQ IVES 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).

The following constituents were detected in groundwater at concentrations exceeding applicable screening levels and are retained as COPCs at the EFR HQ IVES 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 in exceedance of 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 in exceedance of 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 body to the Source Areas is the Main fork of Issaquah Creek located west-adjacent to the IVES Source Area and approximately 500 feet west of the EFR HQ Source Area. As detailed in Section 3.2, surface water in the Main fork of Issaquah Creek in the vicinity of the Source Areas was previously sampled and PFAS constituents were not detected at the laboratory practical quantitation limits.

As detailed in Section 2.4.2, the Main fork of Issaquah Creek transitions to a gaining stream (i.e., groundwater discharges to surface water in the stream) downstream of the confluence of the Main and East forks of Issaquah Creek which is proximate to the IVES Source Area (Figure 7).

Groundwater does not discharge to surface water in the vicinity of the EFR HQ Source Area. Monitoring of groundwater and surface water elevations indicates that the Main fork of Issaquah Creek adjacent to the EFR HQ Source Area is a losing stream. Generally, downward vertical gradients from shallow groundwater to the intermediate groundwater interval were measured consistently throughout monitoring from 2020 to 2023 within the southern area of the Site and upward vertical gradients were measured within proximity to Issaquah Creek in the northern area of the Site (Figure 7). Seasonal fluctuations in vertical gradients were measured at well pair NDS-MW03/NDS-MW04, which is proximate to the confluence of the Main and East forks of Issaquah Creek.

Based on upward gradients and gaining section of the Main fork of Issaquah Creek within the northern portion of the Site, the groundwater to surface water pathway at the Site is potentially complete.

The ground surfaces of the AFFF Training Areas 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 EFR HQ Source Area with exception to the stormwater detention basin is covered by impervious surfaces, preventing contact of stormwater with contaminated soil.

Previous testing of the stormwater detention basin indicated PFAS impacts to soil exceeded applicable cleanup levels in surficial soil. Stormwater collection and drainage to the stormwater detention basin comprises a series of catch basins in the paved parking area surrounding the EFR Headquarters Building, the release is likely associated with former training activity wash-down and/or minor spills of AFFF detergent. The stormwater detention basin is fully vegetated with grass and does not have exposed soil.

The remainder of the ground surface in the IVES Source Area includes both impervious and pervious surfaces, with pervious surfaces separating the AFFF Training Areas and Issaquah Creek.

Based on the reported concentrations of PFAS in surficial soil in the stormwater detention basin, the soil to surface water pathway may potentially be complete at the stormwater detention basin at the EFR HQ Source Area. The groundwater to surface water pathway has also been established as potentially complete at the Site. Therefore, surface water is retained as a medium of concern at the Site.

4.3.4 Sediment

As described above, the soil to surface water pathway may potentially be complete and the groundwater to surface water pathway is potentially complete at the Site. Therefore, sediment is retained as a medium of concern at the 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 shall 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 6.

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 x 10^{-5} cancer risk.[3] 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, 7, and 8.

4.4.3 Surface Water Screening Levels

Cleanup levels evaluated as screening levels for COPCs at the Site include EPA surface water quality criteria (WQC) protective of freshwater aquatic life (acute and chronic exposure) and PFAS concentrations protective of ecological receptors in surface water based on a literature review (Ecology 2023). PFOS and PFOA are the only PFAS constituents with established WQC. Therefore, the minimum of the WQC and the literature-based values will be used as screening levels for PFOS and PFOA. Recommended PFAS concentrations protective of ecological receptors in surface water published by Ecology (2023) will be used as screening levels for the remaining COPCs.

4.4.4 Sediment Screening Levels

Sediment cleanup levels have not been established as of the date of this RIWP. Sediment screening levels will be established for the Site in coordination with Ecology.

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.

[3] 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.

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 EFR HQ and IVES Source Areas where AFFF is known to have been used lawfully for the purpose of training for fire-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

Limited soil sampling has been performed within the stormwater detention basin and paved asphalt area of the EFR HQ Source Area. Additional remedial investigation is required to confirm if vadose zone contamination in these areas is a source to shallow groundwater or surface water contamination. The additional investigation will be performed in accordance with the Ecology-approved Remedial Investigation Work Plan.

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 11 and 15).

Soil analytical results are summarized in Table 6. Cross-sections presenting the estimated vertical extent of soil contamination at the EFR HQ and IVES Source Areas, respectively, are included on Figures 5 and 6. The current understanding of the lateral extent of soil contamination within the two Source Areas is depicted on Figures 11 and 15. Figures 11 through 14 present the lateral extent of soil contamination in the upper 0 to 5 feet bgs, 5 to 10 feet bgs, 10 to 15 feet bgs, and greater than 15 feet bgs beneath the EFR HQ Source Area. Figure 15 presents the lateral extent of soil contamination at the IVES Source Area based on existing data. Locations proposed for soil boring installation and soil sample collection by hand auger are illustrated on Figures 21 and 22.

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 Tables 7 and 8. The lateral extent of groundwater contamination at the Site is illustrated on Figures 16 through 18. The lateral extent of groundwater contamination at the EFR HQ Source Area is illustrated on Figure 19. 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 2.

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, cross-, and down-gradient from the EFR HQ and IVES Source Areas is contaminated with PFAS constituents (including PFBS, PFHxS, PFOA, PFOS, PFNA, and PFDA) at concentrations exceeding applicable screening levels (Figures 16 and 19; Table 7).

4.5.3.2 Intermediate Groundwater Interval

Analytical results of groundwater samples collected from permanent monitoring wells screening within the intermediate groundwater interval at the Site indicate that intermediate groundwater beneath, cross-, and down-gradient from the EFR HQ and IVES Source Areas is contaminated with PFAS constituents (including PFHxS, PFOA, PFOS, PFNA, and PFDA) at concentrations exceeding applicable screening levels (Figure 17; Table 8).

4.5.3.3 Deep Groundwater Interval

No monitoring wells at or directly down-gradient of the EFR HQ IVES Source Area are screened in the deep groundwater interval. Analytical results of groundwater samples collected from permanent monitoring wells screening within the deep groundwater interval at the Site indicate that intermediate groundwater beneath, cross-, and down-gradient from the IVES Source Area is contaminated with PFAS constituents (including PFHxS, PFOA, PFOS, and PFNA) at concentrations exceeding applicable screening levels (Figure 18; Table 8).

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 from the Source Areas. Based on these data, the migration of PFAS from soil to groundwater has been confirmed to be complete at the EFR HQ and IVES Source Areas.

4.6.2 Soil to Surface Water

Reported concentrations of PFAS in the stormwater detention basin exceed applicable screening levels. Although the stormwater detention basin is covered by grass and no bare soil is present, the surficial soil may still be a potential source to surface water during high-runoff events.

4.6.3 Groundwater to Surface Water and Sediment

Monitoring of groundwater and surface water elevations at the Site has demonstrated the Main fork of Issaquah Creek to be a losing stream in the southern portion of the Site and a gaining stream in the northern portion of the Site (Figure 7). Seasonal variations in vertical flow directions have been observed at well pair NDS-MW03/NDS-MW04, which is proximate to the confluence of the Main and East forks of Issaquah Creek. Based on these data, the groundwater to surface water and sediment pathways is potentially complete.

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 and the stormwater detention basin confirmed the presence of soil contaminated with PFAS at concentrations exceeding applicable screening levels at depths as shallow as 0 to 0.5 feet bgs (Figures 11 and 15; Table 6). These soil samples were collected from pervious surfaces within both Source Areas and groundwater contamination at the source areas has been confirmed. Based on the presence of exposed contaminated soils at the ground surface, the soil direct contact exposure pathway is complete within both Source Areas.

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

4.7.2 Groundwater Ingestion

Point of entry treatment at production well COI-PW04 with granular activated carbon has reduced concentrations of PFAS to less than applicable screening levels. However, the engineering control must remain in-place to prevent ingestion of groundwater that contains PFAS at concentrations greater than applicable screening levels.

Based on the confirmed presence of PFAS in the vicinity of and down-gradient from the Source Areas, the confirmed presence of PFAS contamination in shallow and intermediate interval groundwater, and confirmed presence of PFAS at concentrations greater than applicable screening levels in raw water extracted at City production well COI-PW04, the groundwater ingestion and direct contact exposure pathways are considered complete.

4.7.3 Groundwater to Surface Water and Sediment

As detailed in Section 4.6.2, the Main fork of Issaquah Creek has been demonstrated to be a losing stream in the southern portion of the Site and a gaining stream in the northern portion of the Site (Figure 7). Therefore, the groundwater to surface water and sediment exposure pathways are potentially complete.

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 US 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 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.

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 EFR HQ Source Area

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

- The lateral and vertical extents of soil contaminated with PFAS at concentrations exceeding applicable screening levels within the stormwater detention basin and asphalt paved areas remain undefined.
- The range of potential concentrations of PFAS in soil within the stormwater detention basin and asphalt paved areas remains undefined.

Table 9 presents a summary of data gaps and proposed scope of work to address the identified data gaps for the EFR HQ Source Area. Figure 21 depicts proposed locations for additional investigation of soil.

5.2.2 IVES Source Area

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

- The lateral and vertical extent of soil contaminated with PFAS at concentrations exceeding applicable screening levels remains undefined.
- The range of potential concentrations of PFAS in exposed soil remains undefined.

Table 9 presents a summary of data gaps and proposed scope of work to address the identified data gaps for the IVES Source Area. Figure 22 depicts proposed locations for additional investigation of soil.

5.3 SITE GROUNDWATER IMPACTS

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

- Groundwater flow conditions and range of potential concentrations of PFAS in shallow groundwater at the IVES Source Area remain undefined.
- It is unknown if vadose zone PFAS concentrations in the stormwater detention basin at the EFR HQ Source Area have impacted groundwater.
- The lateral extent of groundwater in the shallow interval contaminated with PFAS at concentrations exceeding applicable screening levels remains undefined north of COI-PW04 and east of IEW-MW07.
- The lateral extent of groundwater in the intermediate and deep intervals contaminated with PFAS at concentrations exceeding applicable screening levels remains undefined.
- The groundwater to surface water and sediment pathways remain undefined.

The groundwater data gap investigation will comprise of expanding the shallow, intermediate, and deep groundwater monitoring well network to laterally bound the extent of groundwater contamination. Additionally, the groundwater to surface water and sediment pathways will be investigated through semi-annual surface water, sediment porewater, and sediment sampling.

Table 9 presents a summary of data gaps and proposed scope of work to address the identified groundwater data gaps. Figure 2 depicts proposed locations for additional investigation of groundwater, surface water, sediment, and sediment porewater.

6.0 SCOPE OF WORK

This section presents the objectives, technical elements, inadvertent discoveries, climate change considerations, and management of investigation derived waste 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;
- Address the data gaps identified in Section 5; and
- Prepare 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 EFR HQ Source Area – Soil and Groundwater

The following activities are proposed to investigate data gaps in soil at the EFR HQ Source Area (Table 9, Figure 21):

- Drill up to eight sonic borings to 15 feet bgs within the paved asphalt area of the EFR HQ Source Area (Figure 21). Collect three soil samples per boring at depths of 5, 10, and 15 feet bgs. QA/QC samples will include two trip blanks, two duplicate samples, and two equipment blanks. Analyze samples for PFAS by EPA Method 1633.
- Drill up to two sonic borings to 15 feet bgs within the stormwater detention basin at the EFR HQ Source Area (Figure 21). 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. One of the borings in the stormwater detention basin will be completed as a shallow monitoring well, installed to a depth of

approximately 15 to 20 feet bgs, with a stickup monument. Analyze samples for PFAS by EPA Method 1633.

6.2.3 IVES Source Area – Soil and Groundwater

The following activities are proposed to investigate data gaps in soil at the IVES Source Area (Table 9, Figure 22):

- Install up to nine shallow monitoring wells to a depth of approximately 25 to 30 feet bgs using a sonic drill rig (Figure 22). Collect three soil samples at each location at depths of 5, 10, and 15 feet bgs. Five 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.
- Hand auger at up to 17 locations to a depth of approximately 1.5 feet bgs within the West Playfield AFFF Training Area on an approximately 75- by 75-foot grid (Figure 22). 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 by EPA Method 1633. The samples collected at 0.5 foot bgs from the following locations will be released for laboratory analysis of PFAS by EPA Method 1633: four locations within the West Playfield AFFF Training Area and four additional locations within the West Playfield most likely to be used by children during play and/or with 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. QA/QC samples will include two trip blanks, two duplicate samples, and two equipment blanks.
    - Drill up to four sonic borings to 15 feet bgs within the West Playfield 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.

- Hand auger at up to 14 locations to a depth of approximately 1.5 feet bgs within the Dodd Field AFFF Training Area on an approximately 75- by 75-foot grid (Figure 22). Collect two soil samples at each location, including one sample near surface level beneath the grass and root system (approximately 0.5 feet 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 by EPA Method 1633. The samples collected at 0.5 foot bgs from the following locations will be released for laboratory analysis of PFAS by EPA Method 1633: four locations within the Dodd Field AFFF Training Area and four additional locations within Dodd Field most likely to be used by children during play and/or with 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. QA/QC samples will include two trip blanks, two duplicate samples, and two equipment blanks.
    - Drill up to four borings to 15 feet bgs within the Dodd 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.

6.2.4 Site Groundwater

The following activities are proposed to investigate data gaps in groundwater at the Site (Table 9, Figure 2):

- Install up to two shallow monitoring wells to depths of approximately 20 to 30 feet bgs proximate to monitoring well COI-MW02 and east of monitoring well COI-MW05 (Figure 2). No soil samples will be collected during monitoring well installation.
- Install up to two intermediate monitoring wells to depths of approximately 90 feet bgs east of monitoring well COI-MW05 and proximate to the COI-TW01 well cluster (Figure 2). No soil samples will be collected during monitoring well installation.
- Install up to two deep monitoring wells to depths of approximately 130 feet bgs at well clusters COI-MW02 and COI-MW06 (Figure 2). No soil samples will be collected during monitoring well installation.

- Perform up to two semi-annual groundwater monitoring events at all existing (63 each) and newly proposed (up to 16 each) Site monitoring wells (Figure 2). QA/QC samples will include ten trip blanks, eight duplicate samples, and eight equipment blanks per event.

6.2.5 Site Sediment

The following activities are proposed to investigate data gaps in sediment at the Site (Table 9, Figure 2):

- Perform up to two semi-annual sediment sampling events using hand tools (i.e., sediment sampler, hand auger, and shovel) at up to five locations in the East and Main forks of Issaquah Creek (Figure 2). Sediment samples will be collected at four existing stream gauging locations, STR-01, STR-02, STR-04, and STR-05; and east of existing monitoring well COI-MW08. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank per event. Analyze samples for PFAS by EPA Method 1633.

6.2.6 Site Sediment Porewater

The following activities are proposed to investigate data gaps in sediment porewater at the Site (Table 9, Figure 2):

- Perform up to two semi-annual sediment porewater sampling events at three locations along the streambank along the Main fork of Issaquah Creek (Figure 2). Temporary drive-point piezometers will be installed and removed to allow for sampling during both events. Sediment porewater samples will be collected at three existing stream gauging locations, including STR-01, STR-02, and STR-04. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank per event. Analyze samples for PFAS by EPA Method 1633.

6.2.7 Site Surface Water

The following activities are proposed to investigate data gaps in surface water at the Site (Table 9, Figure 2):

- Perform up to two semi-annual surface water sampling events at three locations along the Main fork of Issaquah Creek (Figure 2). Surface water samples will be collected using a swing sampler and laboratory grade PFAS-free sample containers. Surface water samples will be collected at three existing stream gauging locations, STR-01, STR-02, and STR-04. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank per event. Analyze samples for PFAS by EPA Method 1633.

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 as 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 as 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 as 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 as Appendix E.

6.8 CLIMATE CHANGE CONSIDERATIONS

Sufficient information will be collected on current and projected local and regional climatological characteristics during the RI to evaluate climate change impacts which 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

Investigation derived waste (IDW) in the form of soil cuttings from soil 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 offsite 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-EFR-00086.

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-EFR-00086 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 PLPs, 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 PLPs to address the unique needs of the PLPs at the EFR HQ IVES Site at a specific point in time.

This is not a general grant of reliance. No one other than the PLPs 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
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

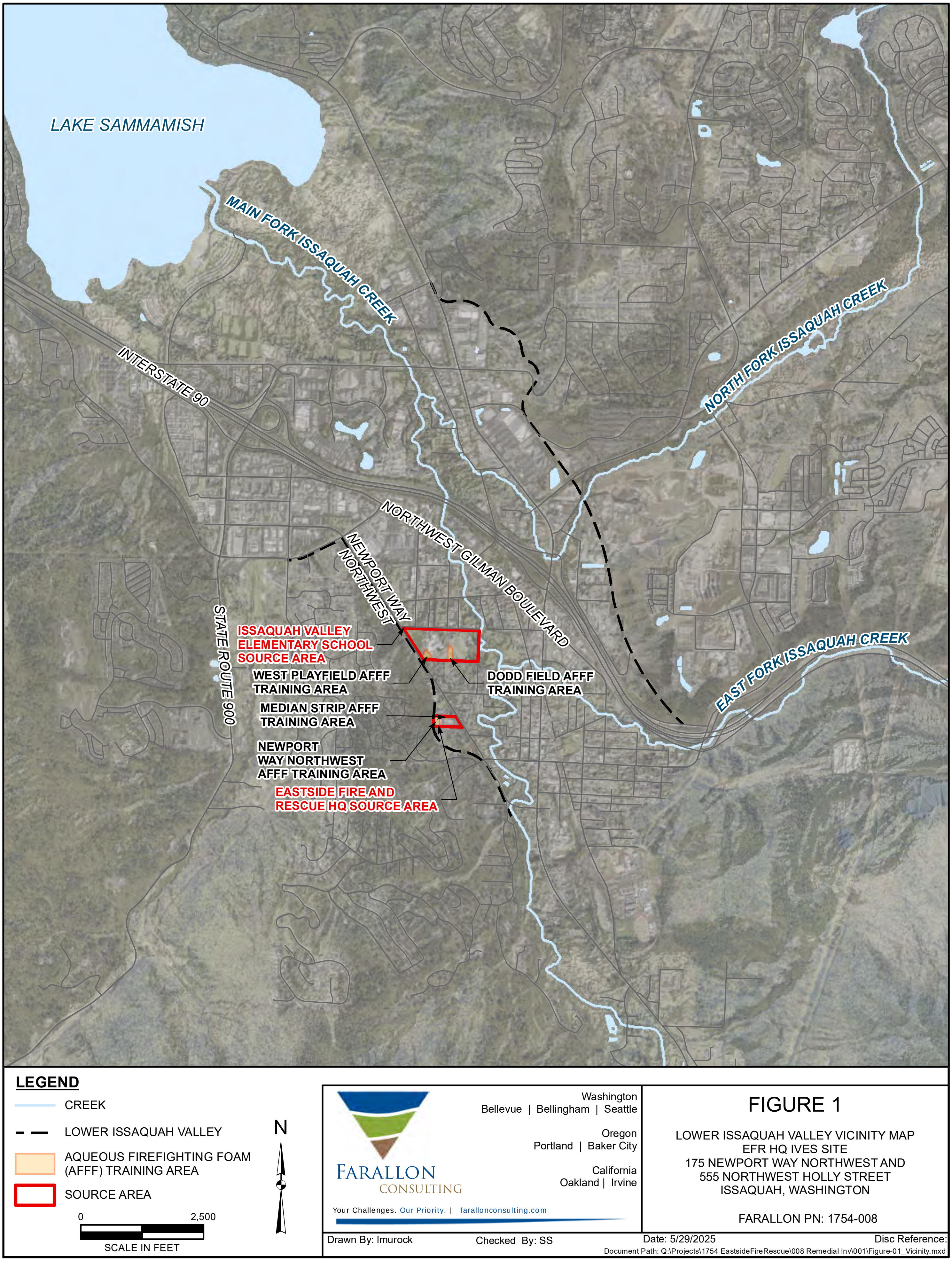

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FIGURE 1

LOWER ISSAQUAH VALLEY VICINITY MAP
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock	Checked By: SS	Date: 5/29/2025	Disc Reference:

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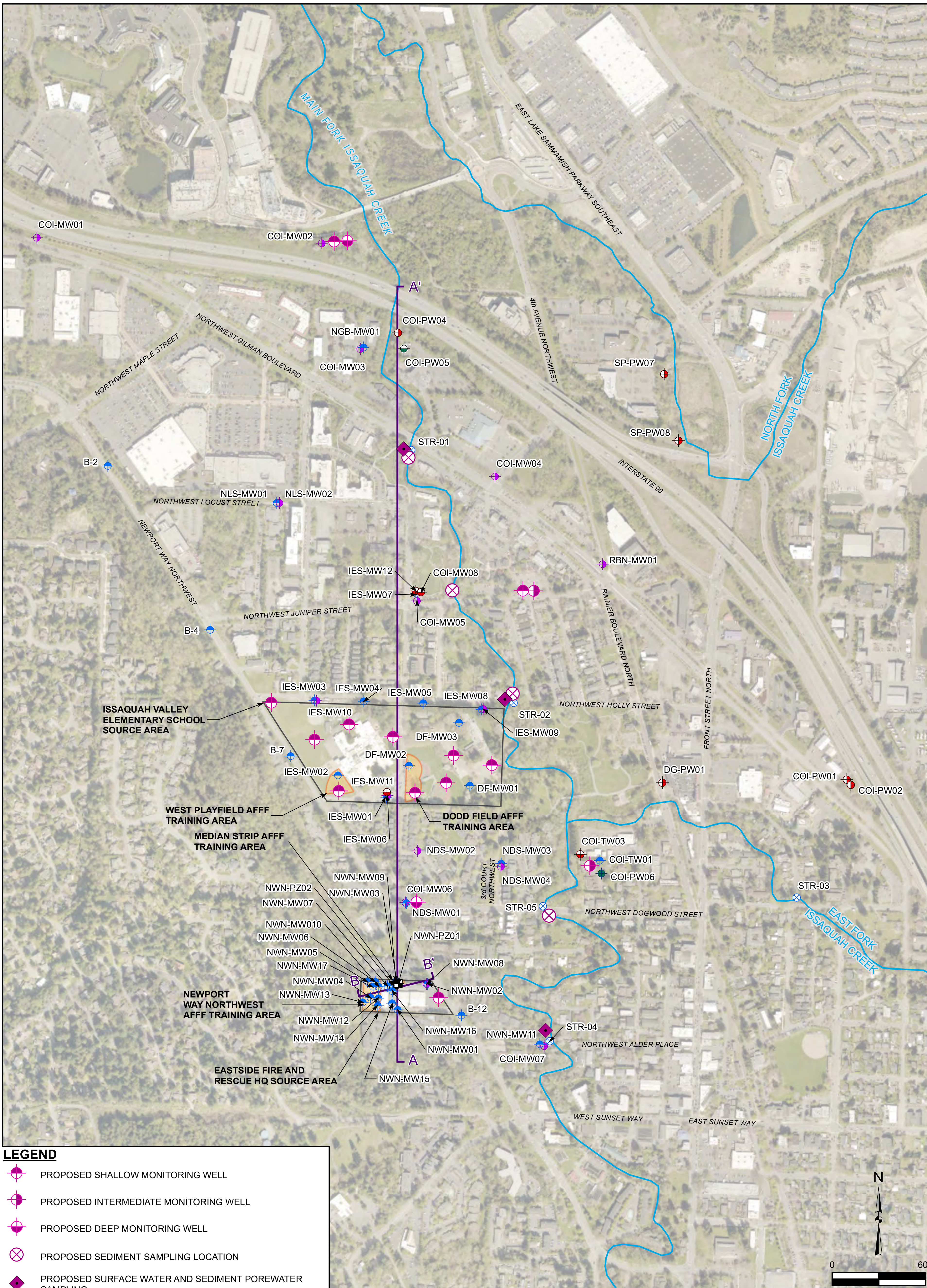

LEGEND

- PROPOSED SHALLOW MONITORING WELL
- PROPOSED INTERMEDIATE MONITORING WELL
- PROPOSED DEEP MONITORING WELL
- PROPOSED SEDIMENT SAMPLING LOCATION
- PROPOSED SURFACE WATER AND SEDIMENT POREWATER SAMPLING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- PIEZOMETER
- STREAM GAUGING STATION
- INTERMEDIATE PRODUCTION WELL
- DEEP PRODUCTION WELL
- PRODUCTION WELL
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- A — A' LINE OF CROSS-SECTION

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

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

EFR HQ IVES SITE PLAN
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

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

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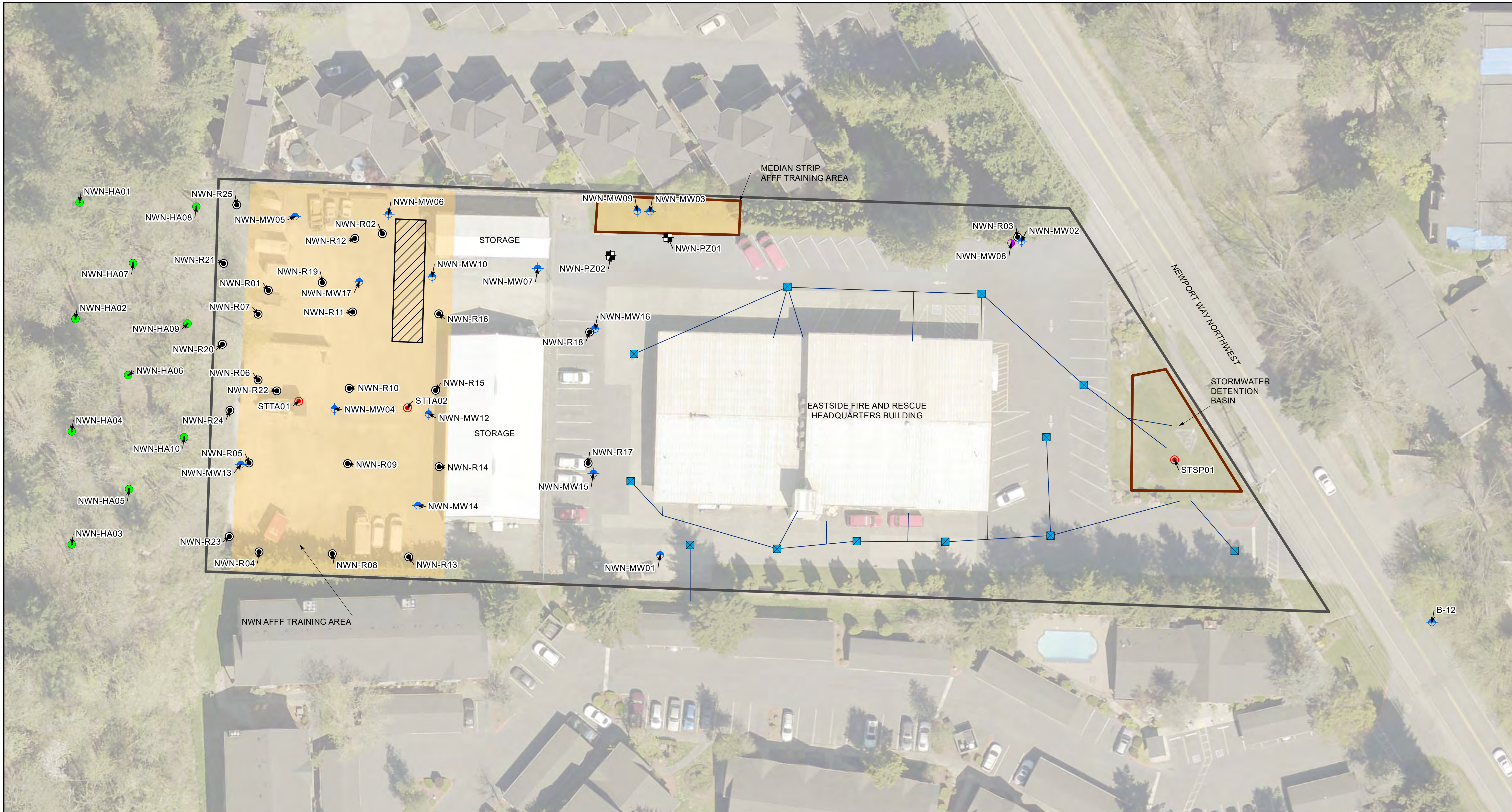

LEGEND

- HAND AUGER LOCATION
- BORING
- GEOSYNTEC SAMPLE
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- PIEZOMETER
- CATCH BASIN
- STORMWATER LINE
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

0 50
SCALE IN FEET

N

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FIGURE 3

EFR HQ SOURCE AREA PLAN
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 3/19/2025 | Disc Reference: Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-03_EFR-HQ-Plan.mxd

LEGEND

- BORING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- TEST WELL
- FIRE HYDRANT
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- LISTED SITE

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

0 100
SCALE IN FEET

N

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FIGURE 4

IVES SOURCE AREA PLAN
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Date: 3/19/2025

Disc Reference:
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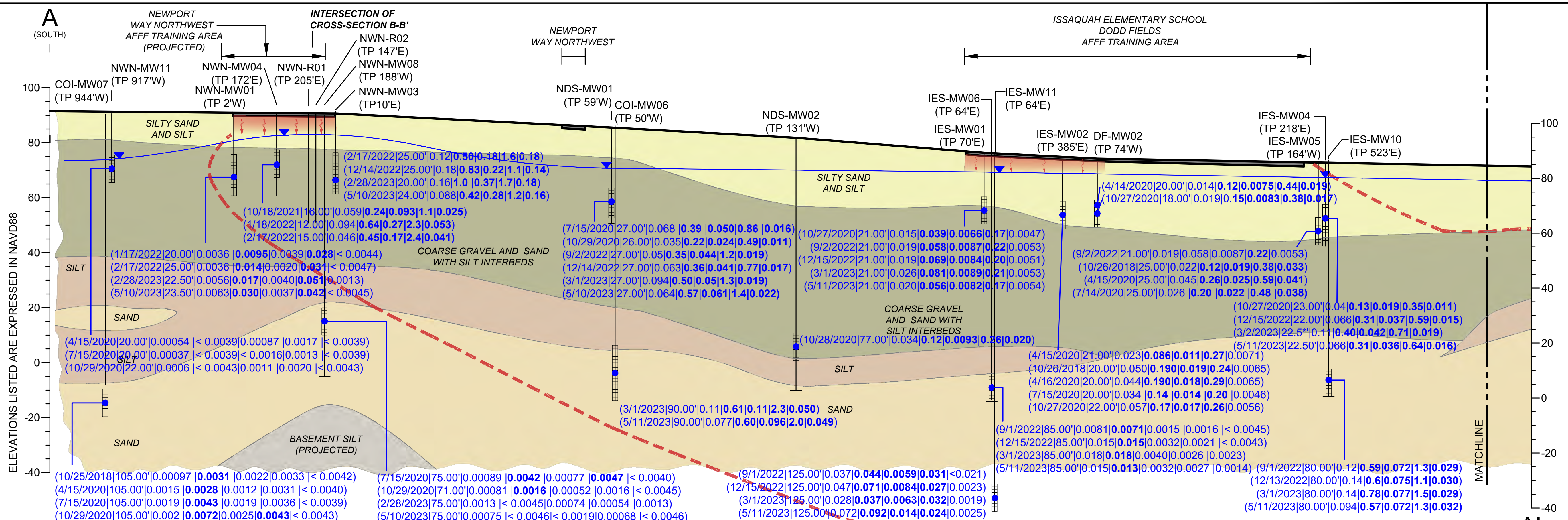


LEGEND

IES-MW04 (TP 220'E) — BORING OR MONITORING WELL LOCATION TRANSPOSED (TP) IN FEET, EAST (E) OR WEST (W), TO CROSS-SECTION LINE.

STRATIGRAPHIC CONTACT/DASHED WHERE INFERRED

APPROXIMATE EXTENT OF GROUNDWATER WITH PFAS CONCENTRATIONS THAT EXCEED SCREENING LEVEL

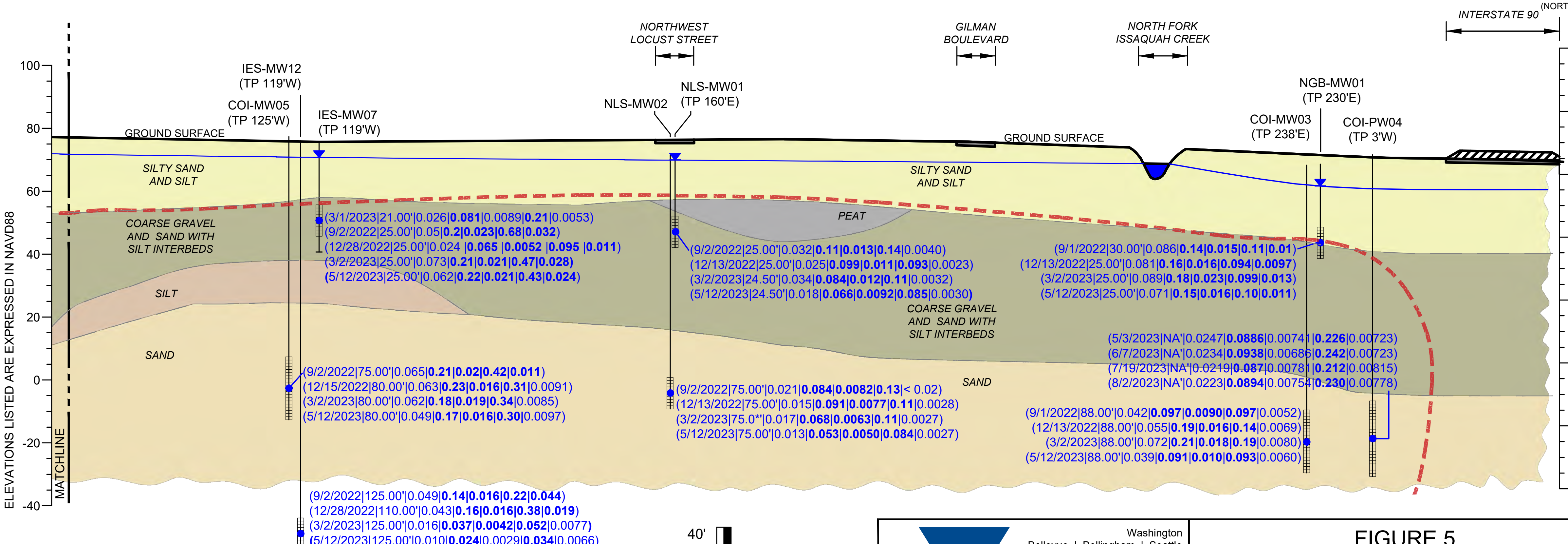
GROUNDWATER ELEVATION (MAY 9, 2023)

GROUNDWATER SAMPLE

WELL SCREEN INTERVAL

<	DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT LISTED
BOLD	DENOTES CONCENTRATIONS THAT EXCEED APPLICABLE WASHINGTON STATE DEPARTMENT OF ECOLOGY INVESTIGATORY LEVELS
PFBS	PERFLUOROBUTANE SULFONIC ACID
PFHxS	PERFLUOROHEXANE SULFONIC ACID
PFOA	PERFLUOROOCTANOIC ACID
PFOS	PERFLUOROOCTANE SULFONIC ACID
PENA	PERFLUORONONANOIC ACID
BGS	BELOW GROUND SURFACE
NAVD88	NORTH AMERICAN VERTICAL DATUM OF 1988

(5/12/2023|25.00'|0.071|**0.15**|**0.016**|**0.10**|0.011) GROUNDWATER RESULTS LISTED AS (DATE SAMPLED|DEPTH BGS|PFBS|PFHxS|PFOA|PFOS|PFNA) IN MICROGRAMS PER LITER



NOTES
1) ALL LOCATIONS ARE APPROXIMATE
2) FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION
3) ELEVATIONS LISTED ARE EXPRESSED IN NAVD88
4) STANDARD PRODUCT NAMES ARE PROVIDED FOR PFOS AND PFOA. BOTH COMPOUNDS WILL BE IN THEIR ANIONIC FORM WHEN ENCOUNTERED IN THE ENVIRONMENT.

40' 0' 0' 200'

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FIGURE 5

CROSS SECTION A-A'
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST
AND 555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

Drawn By: RB   Checked By: SS

FARALLON PN: 1754-008

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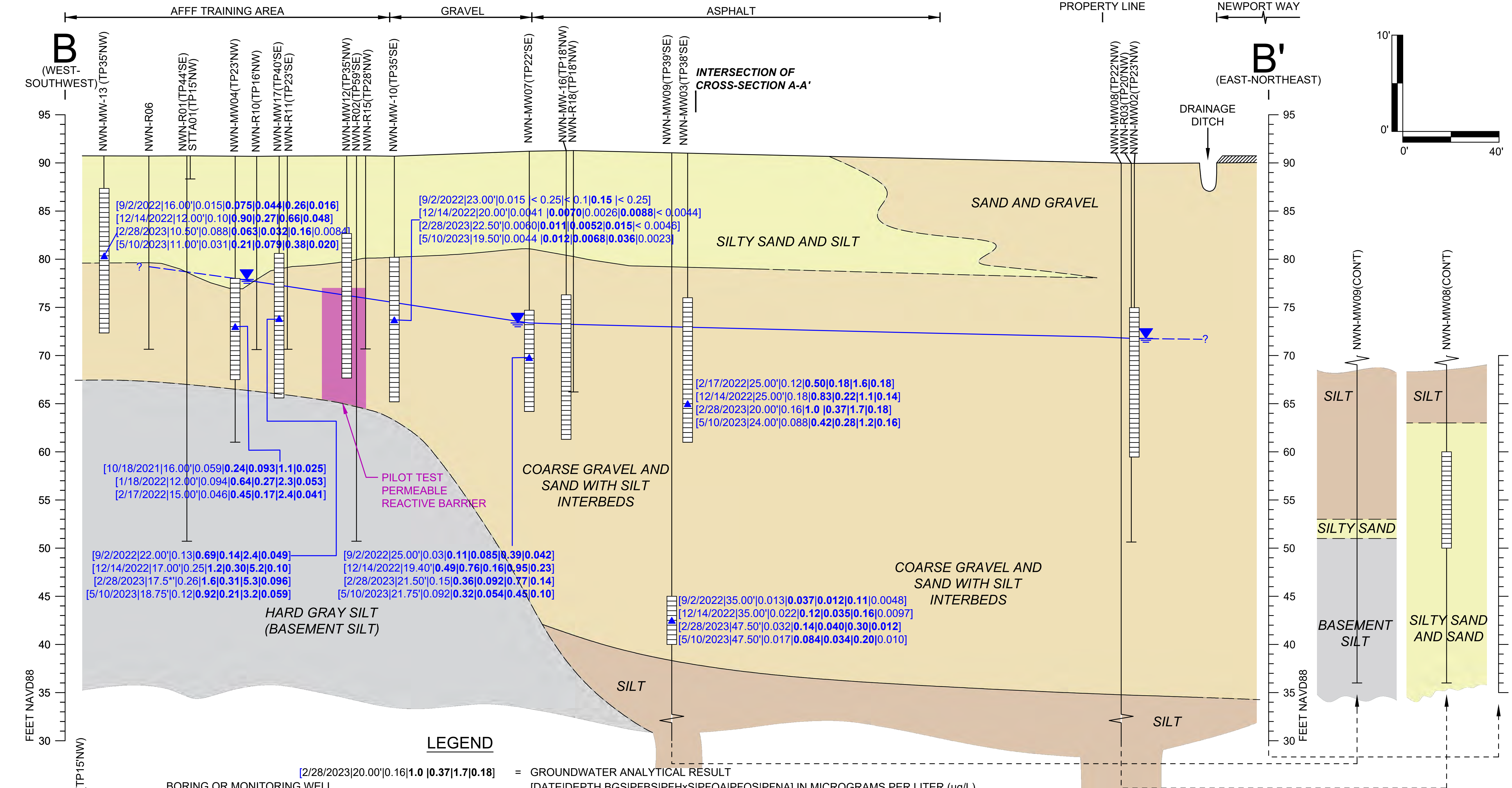

LEGEND

[2/28/2023|20.00'|0.16|**1.0** |**0.37**|**1.7**|**0.18**]	=	GROUNDWATER ANALYTICAL RESULT [DATE|DEPTH BGS|PFBS|PFHxS|PFOA|PFOS|PFNA] IN MICROGRAMS PER LITER (μg/L)
PFBS	=	PERFLUOROBUTANE SULFONIC ACID
PFHxS	=	PERFLUOROHEXANE SULFONIC ACID
PFOA	=	PERFLUOROOCTANOIC ACID
PFOS	=	PERFLUOROOCTANE SULFONIC ACID
PFNA	=	PERFLUORONONANOIC ACID
<	=	DENOTES ANALYTE NOT DETECTED AT OR EXCEEDING THE REPORTING LIMIT
BOLD	=	DENOTES CONCENTRATIONS THAT EXCEED APPLICABLE WASHINGTON STATE DEPARTMENT OF ECOLOGY INVESTIGATORY LEVELS
NAVD88	=	NORTH AMERICAN VERTICAL DATUM OF 1988
AFFF	=	AQUEOUS FILM FORMING FOAM

NWN-R06(TP15'NW)

BORING OR MONITORING WELL LOCATION TRANSPOSED (TP) IN FEET, NORTHWEST (NW) OR SOUTHEAST (SE), TO CROSS-SECTION LINE

GROUNDWATER SAMPLE

GROUNDWATER LEVEL (DASHED WHERE INFERRED)

STRATIGRAPHIC CONTACT (DASHED WHERE INFERRED)

BLANK CASING OR BORING

GROUNDWATER ELEVATION (APRIL 13, 2020)

WELL SCREEN

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

NOTES (CON'T):
3. STANDARD PRODUCT NAMES ARE PROVIDED FOR PFOS AND PFOA. BOTH COMPOUNDS WILL BE IN THEIR IONIC FORM WHEN ENCOUNTERED IN THE ENVIRONMENT.
4. ADDITIONAL ANALYTICAL DATA AVAILABLE IN REPORT TABLES.

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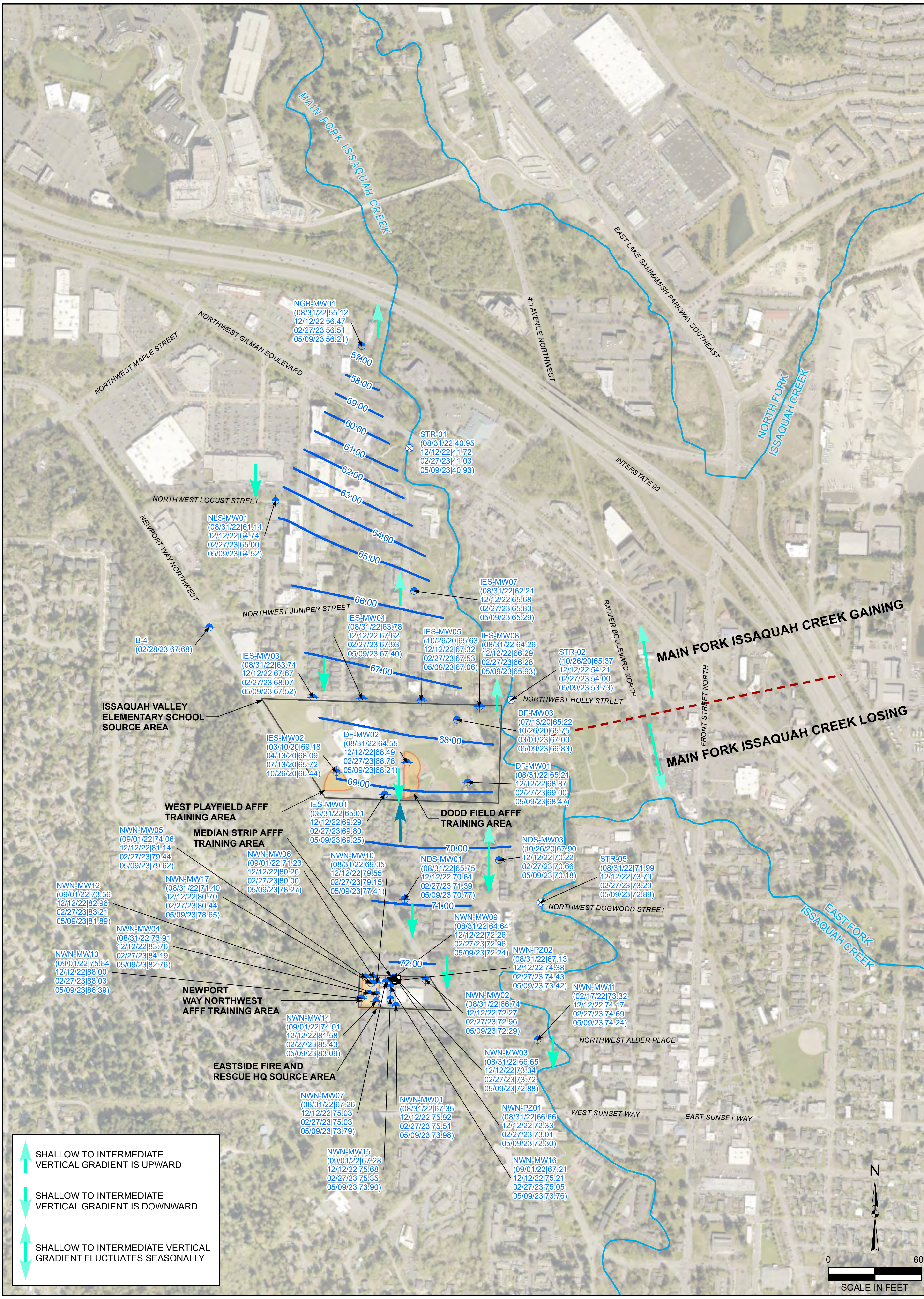
FIGURE 6

EFR HQ SOURCE AREA CROSS SECTION B-B'
EFR HQ IVES SITE
175 NEWPORT WAY NW AND 555 NW HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008



LEGEND

SHALLOW MONITORING WELL
PIEZOMETER
STREAM GAUGING STATION
LISTED SITE
AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
(2/24/2023 | 75.35) GROUNDWATER ELEVATION SAMPLE DATE AND ELEVATION MEASURED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM 1988
APPROXIMATE DIRECTION OF GROUNDWATER FLOW
78.00 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

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

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FIGURE 7
EFR HQ IVES SITE
GROUNDWATER ELEVATIONS - SHALLOW ZONE
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 3/19/2025 | Disc Reference:

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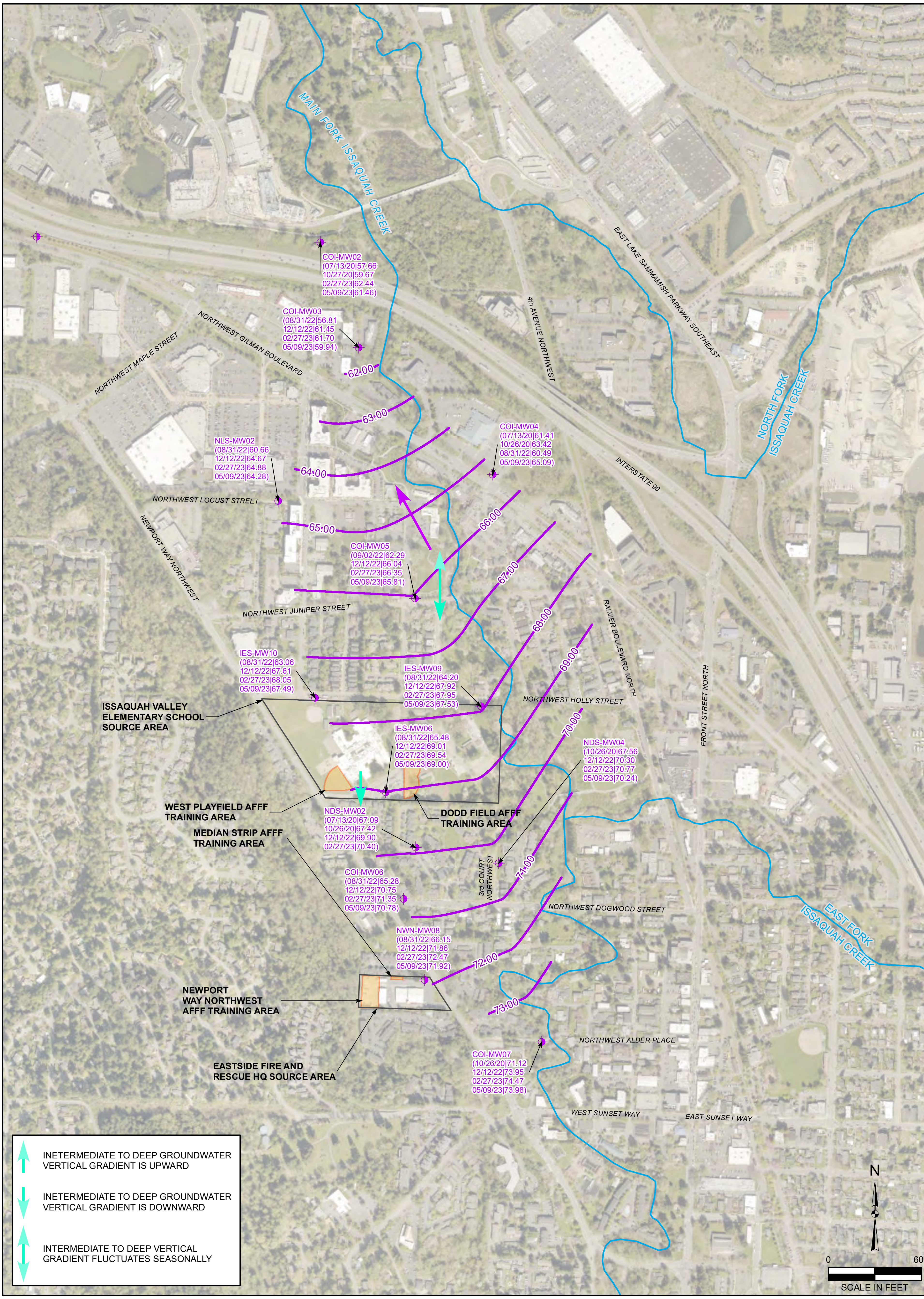

LEGEND

- INTERMEDIATE MONITORING WELL
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- (2/27/23 | 75.47) GROUNDWATER ELEVATION SAMPLE DATE AND ELEVATION MEASURED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM 1988
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- 78.00 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

NOTES:
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FIGURE 8

EFR HQ IVES SITE
GROUNDWATER ELEVATIONS - INTERMEDIATE ZONE
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

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LEGEND

- DEEP MONITORING WELL
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- (2/27/2023 | 68.89) GROUNDWATER ELEVATION SAMPLE DATE AND ELEVATION MEASURED IN FEET RELATIVE TO NORTH AMERICAN VERTICAL DATUM 1988
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- 71.00 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

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FIGURE 9

EFR HQ IVES SITE
GROUNDWATER ELEVATIONS - DEEP ZONE
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

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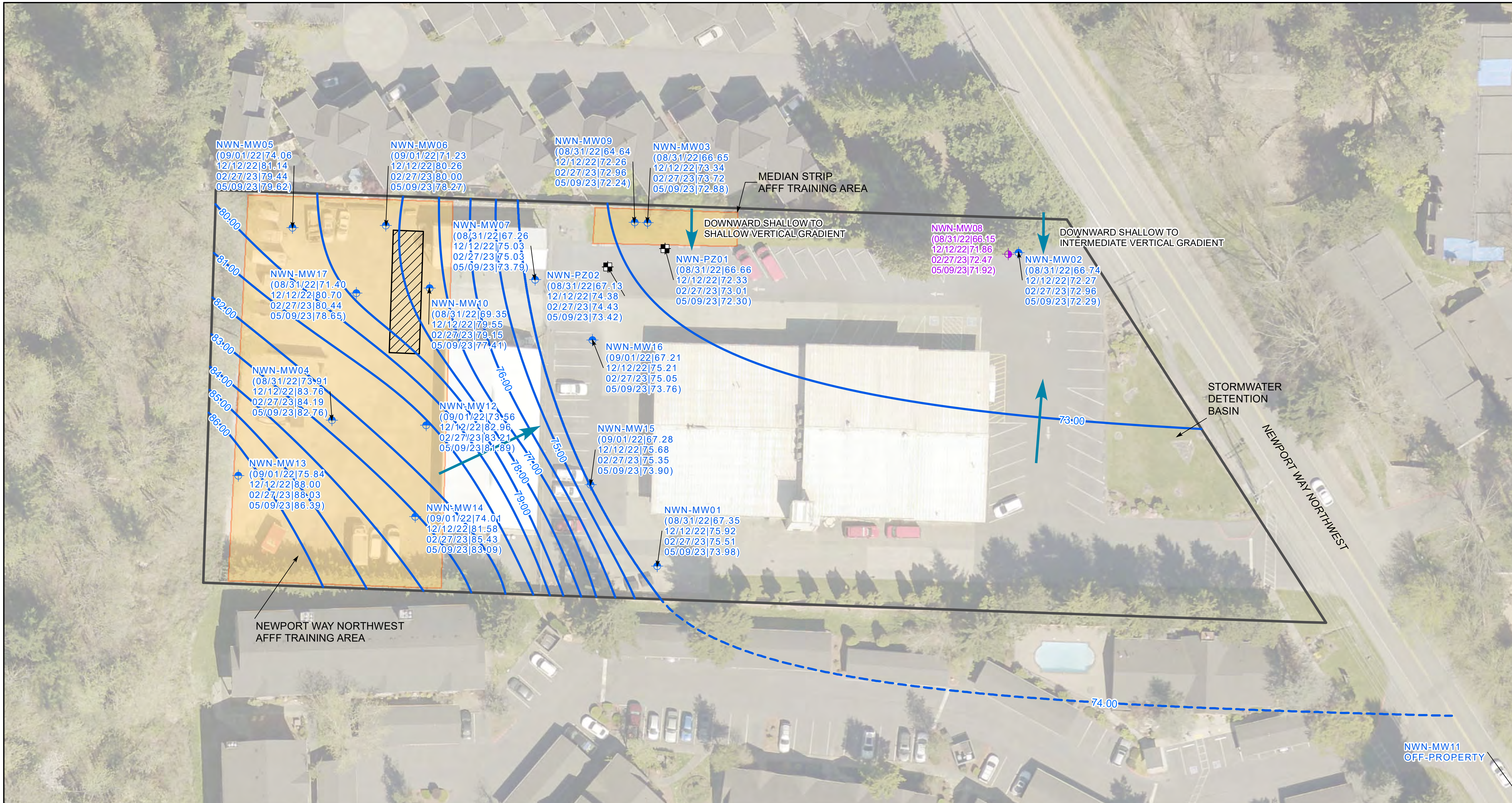

LEGEND

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- PIEZOMETER
- PROPERTY BOUNDARY
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

2/17/22|74.53 SHALLOW GROUNDWATER MEASUREMENT DATE AND ELEVATION

2/17/22|72.89 INTERMEDIATE GROUNDWATER MEASUREMENT DATE AND ELEVATION

86.00 GROUNDWATER ELEVATION CONTOUR (MAY 9, 2023) (DASHED WHERE INFERRED)

APPROXIMATE DIRECTION OF SHALLOW GROUNDWATER FLOW

GROUNDWATER ELEVATIONS IN NORTH AMERICAN VERTICAL DATUM OF 1988.
EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

0 50
SCALE IN FEET

N

NOTES:
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FIGURE 10

EFR HQ SOURCE AREA GROUNDWATER ELEVATIONS
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

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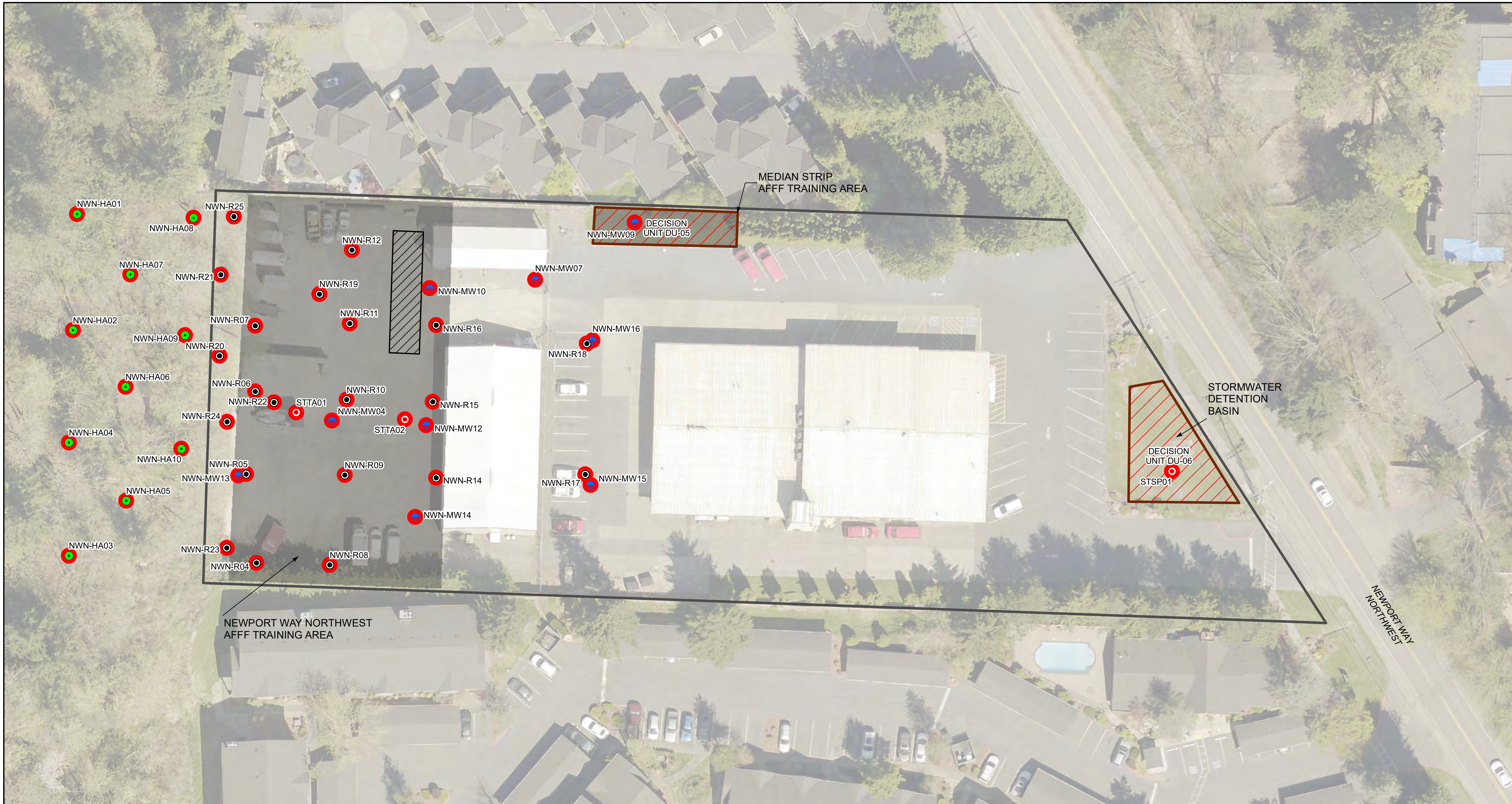

LEGEND

- HAND AUGER LOCATION
- BORING
- GEOSYNTEC SAMPLE
- SHALLOW MONITORING WELL
- 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
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT (DU)
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

N

0 50
SCALE IN FEET

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FIGURE 11

EFR HQ SOURCE AREA SOIL PFAS CONCENTRATIONS
<5 FEET BELOW GROUND SURFACE
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

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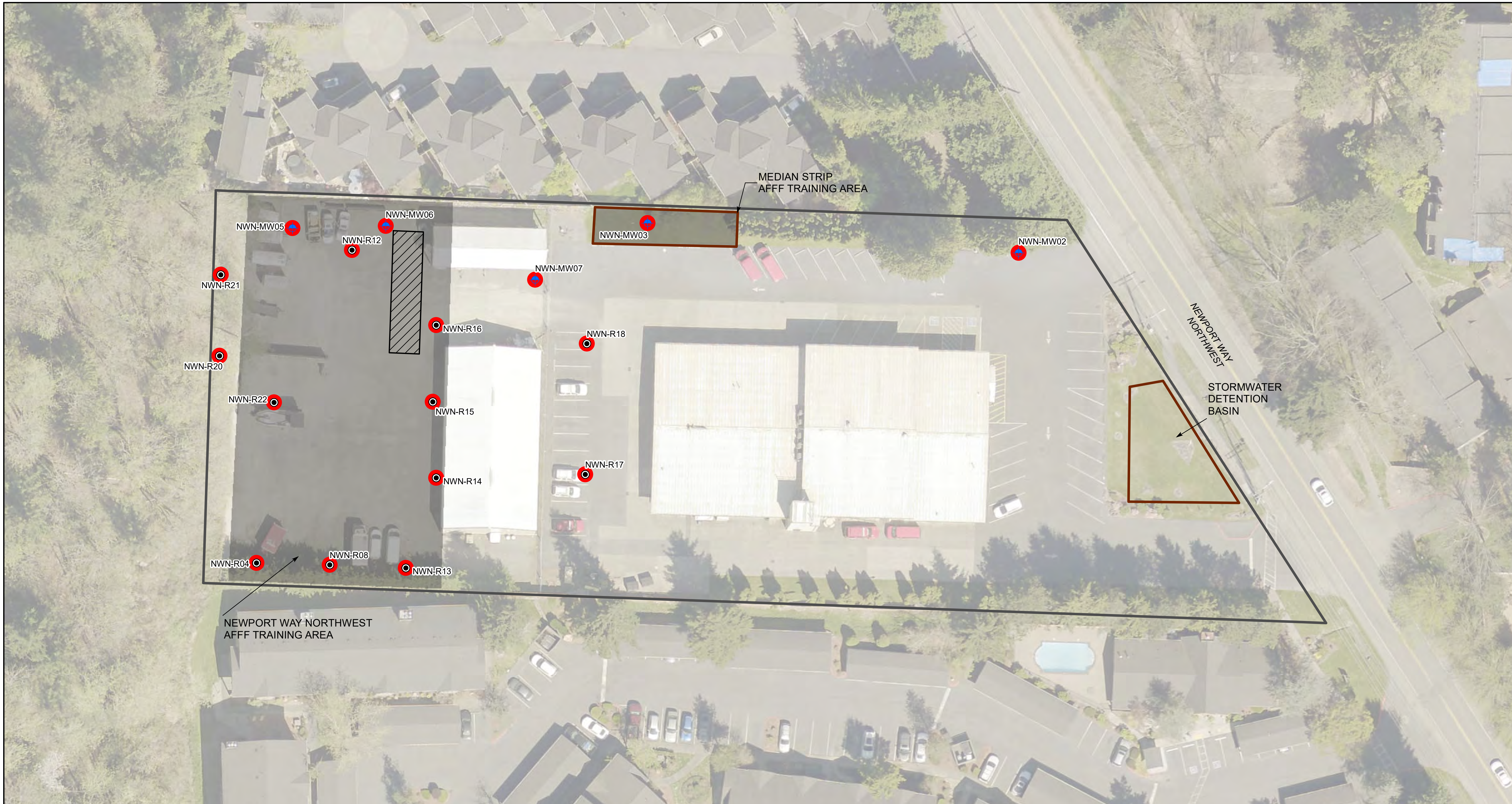
Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-11_EFR-HQ_Soil-PFAS_Lift_1.mxd



LEGEND

- BORING
- SHALLOW MONITORING WELL
- DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT (DU)
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

N

0 50
SCALE IN FEET

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FIGURE 12
EFR HQ SOURCE AREA SOIL PFAS CONCENTRATIONS
5 TO 9.9 FEET BELOW GROUND SURFACE
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

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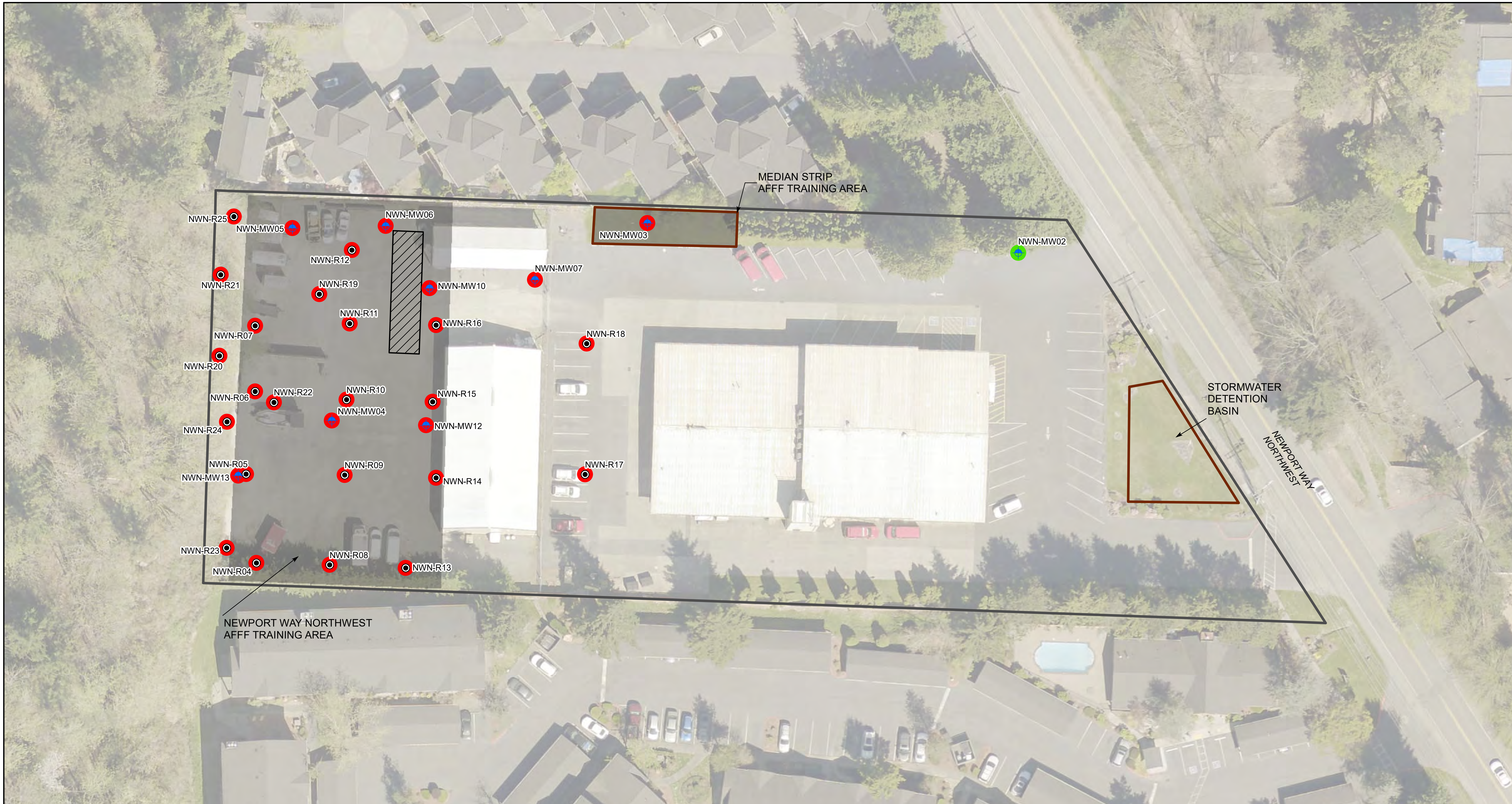

LEGEND

- BORING
- SHALLOW MONITORING WELL
- 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
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT (DU)
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

NOTES:
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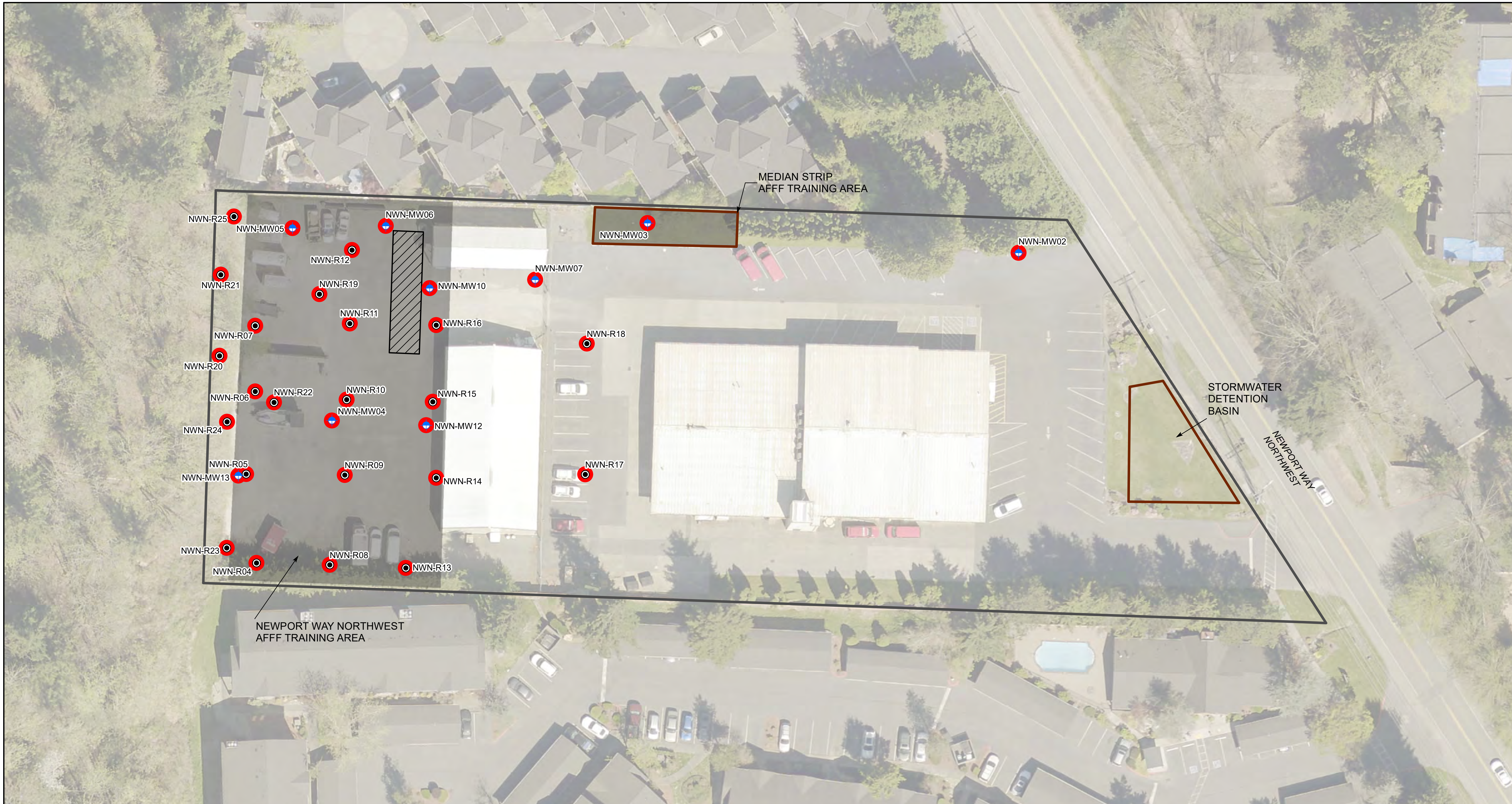
FIGURE 13
EFR HQ SOURCE AREA SOIL PFAS CONCENTRATIONS
10 TO 14.9 FEET BELOW GROUND SURFACE
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON
FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 3/19/2025 | Disc Reference: Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-13_EFR-HQ_Soil-PFAS_Lift_3.mxd



LEGEND

- SHALLOW MONITORING WELL
- BORING
- DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT (DU)
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

0 50
SCALE IN FEET

N

NOTES:
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FIGURE 14

EFR HQ SOURCE AREA SOIL PFAS CONCENTRATIONS
>15 FEET BELOW GROUND SURFACE
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

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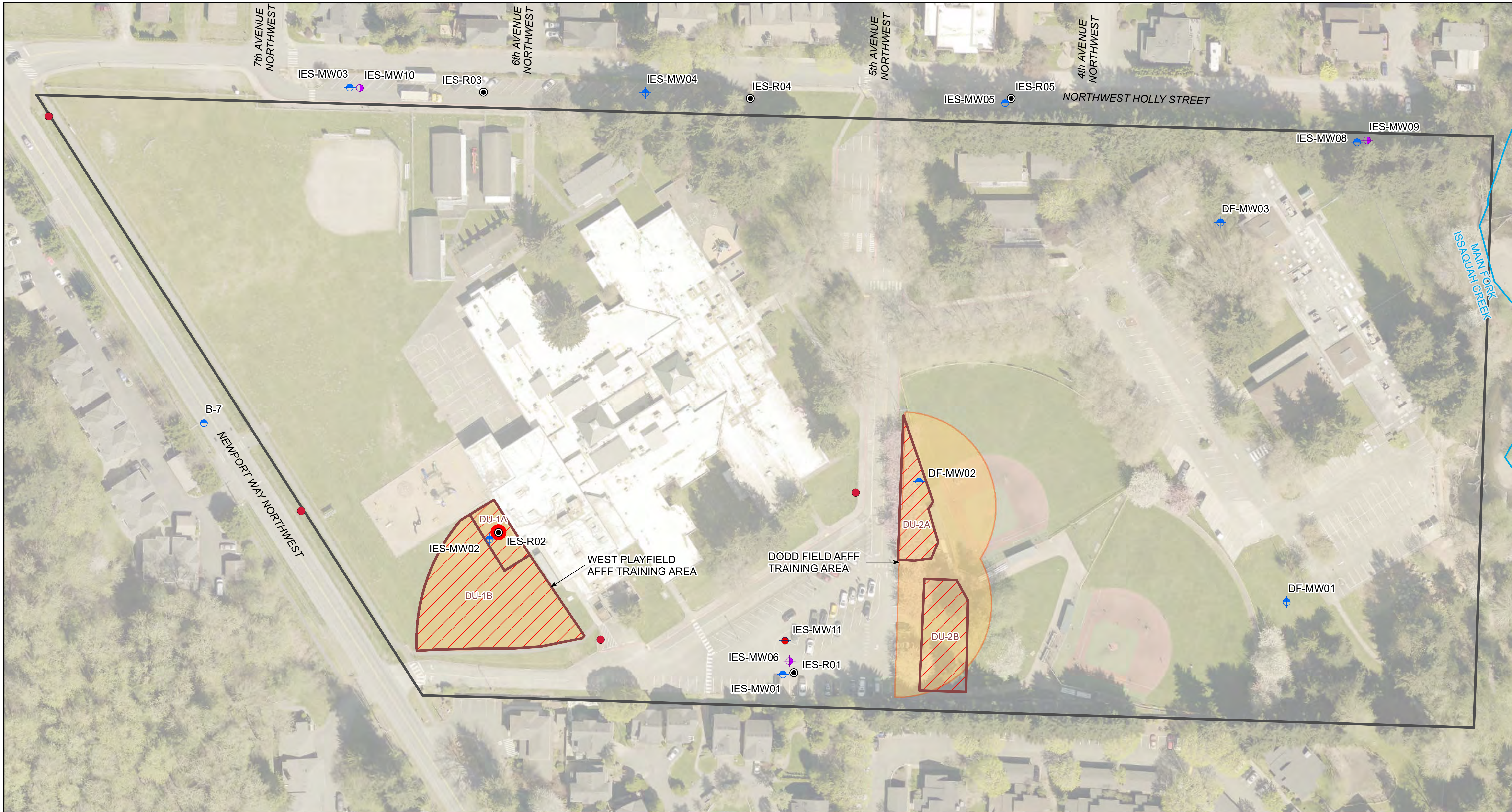

LEGEND

- BORING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- TEST WELL
- FIRE HYDRANT
- 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
- MULTI-INCREMENTAL SAMPLE DECISION UNIT (DU)
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

0 100
SCALE IN FEET

N

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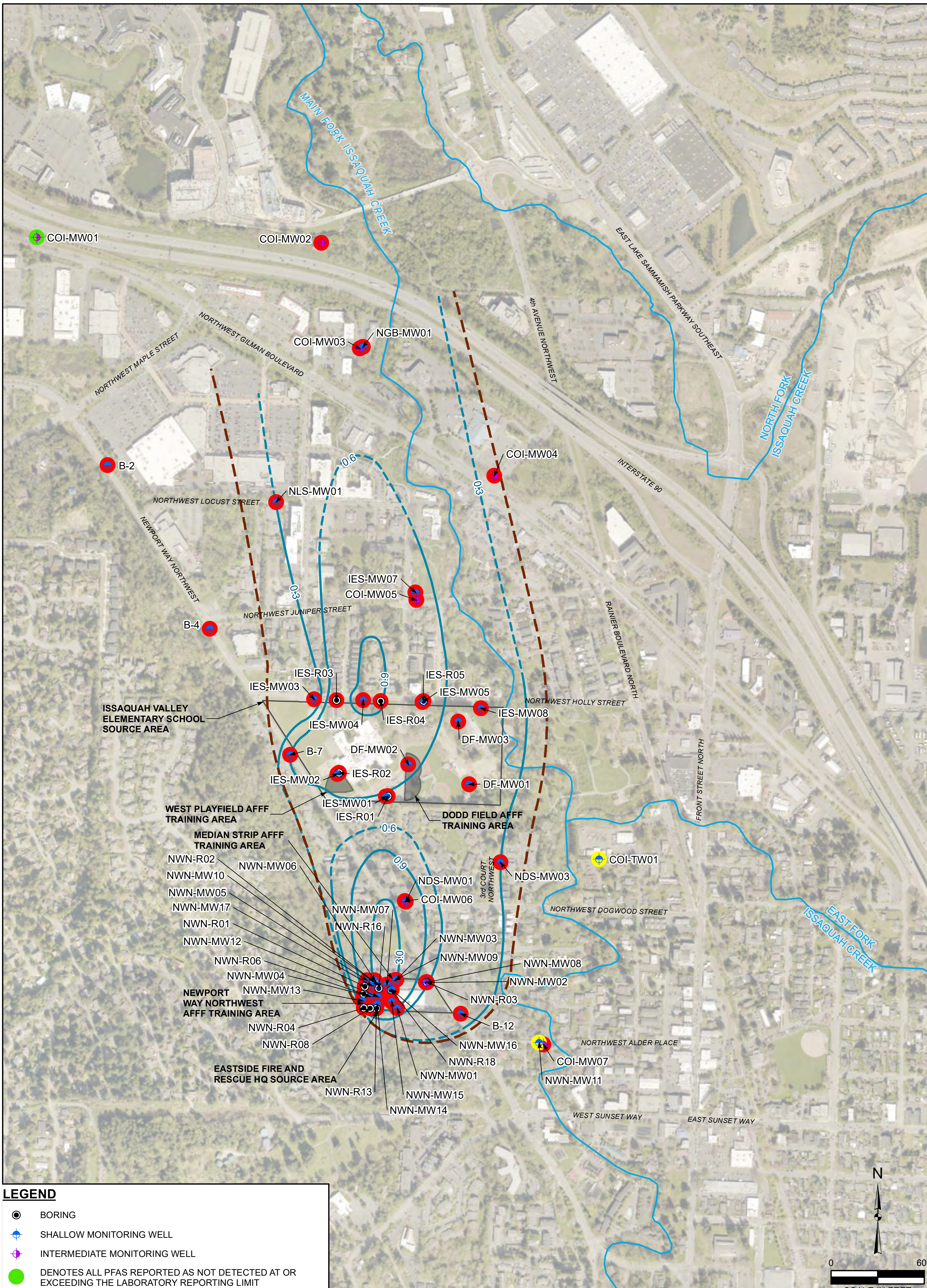
FIGURE 15

IVES SOURCE AREA SOIL PFAS CONCENTRATIONS
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 3/20/2025 | Disc Reference: Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-15_IVES_Soil_PFAS.mxd



LEGEND

- BORING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DENOTES ALL PFAS REPORTED AS NOT DETECTED AT OR EXCEEDING THE LABORATORY REPORTING LIMIT
- DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING THE LABORATORY REPORTING LIMIT, BUT NOT EXCEEDING CLEANUP LEVELS
- DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS
- ISOCONCENTRATION CONTOUR OF PFAS IN GROUNWATER IN MICROGRAMS PER LITER (DASHED WHERE INFERRED)
- APPROXIMATE MAXIMUM EXTENT OF PFAS IN GROUNDWATER THAT EXCEEDS AT LEAST ONE SCREENING LEVEL IN SHALLOW GROUNDWATER ZONE
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

NOTES:
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FIGURE 16

EFR HQ IVES SITE SHALLOW GROUNDWATER PFAS CONCENTRATIONS
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND 555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

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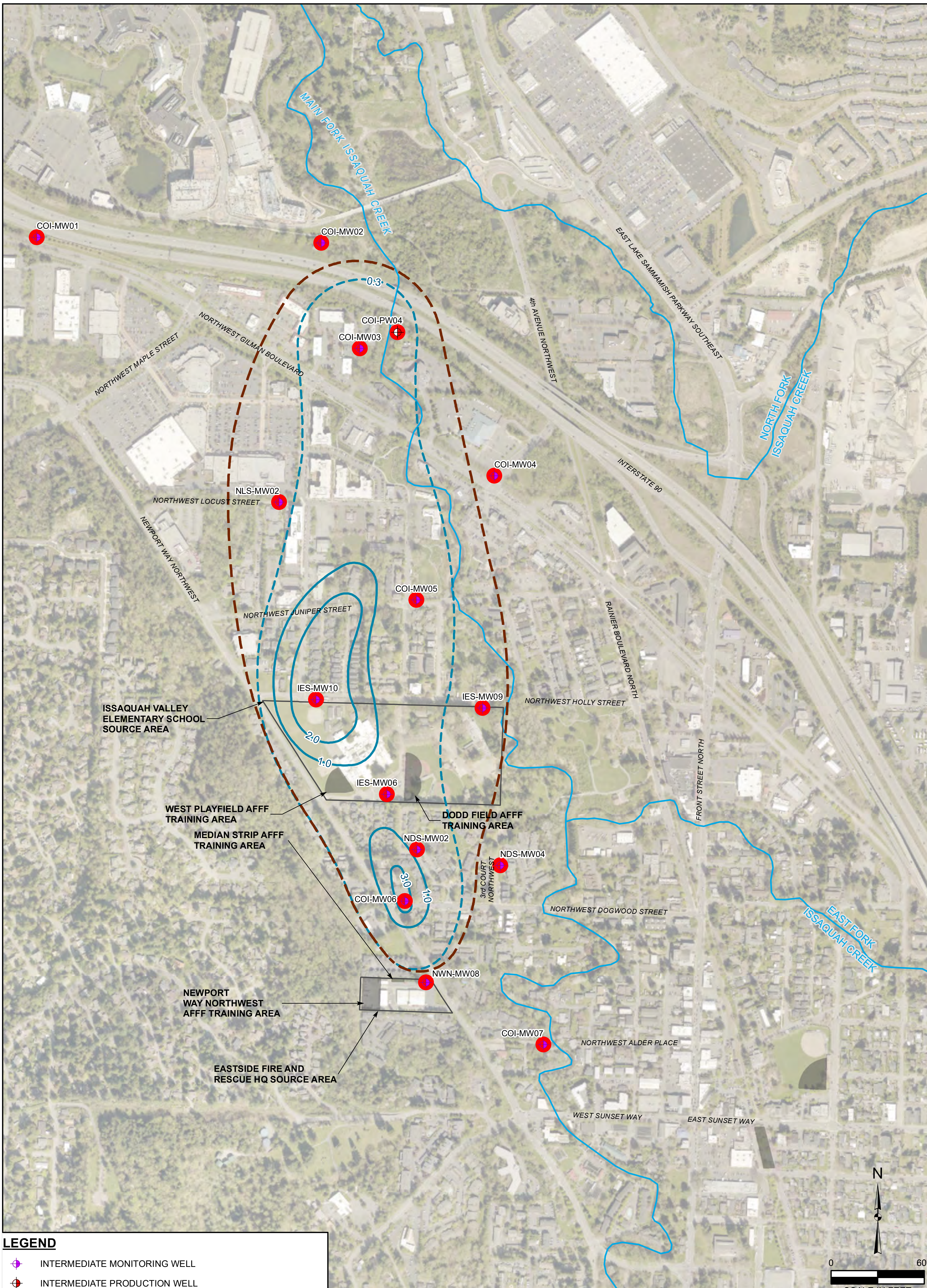
Path: Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-16_GW-Shallow-PFAS-Total.mxd



LEGEND

- INTERMEDIATE MONITORING WELL
- INTERMEDIATE PRODUCTION WELL
- DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS
- ISOCONCENTRATION CONTOUR OF PFAS IN GROUNDWATER IN MICROGRAMS PER LITER (DASHED WHERE INFERRED)
- APPROXIMATE MAXIMUM EXTENT OF PFAS IN GROUNDWATER THAT EXCEEDS AT LEAST ONE SCREENING LEVEL IN INTERMEDIATE GROUNDWATER ZONE
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

NOTES:
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FIGURE 17

EFR HQ IVES SITE INTERMEDIATE GROUNDWATER PFAS CONCENTRATIONS
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND 555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: jjones | Checked By: SS | Date: 9/2/2025 | Disc Reference:

Path: Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-17_GW-Intermediate-PFAS-Total.mxd

LEGEND

- DEEP MONITORING WELL
- DEEP PRODUCTION WELL
- 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
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING
- APPROXIMATE DIRECTION OF GROUNDWATER FLOW
- 71.00 GROUNDWATER ELEVATION CONTOUR (MAY 2023) (DASHED WHERE INFERRED)

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

NOTES:
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FIGURE 18

EFR HQ IVES SITE DEEP GROUNDWATER PFAS CONCENTRATIONS
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND 555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

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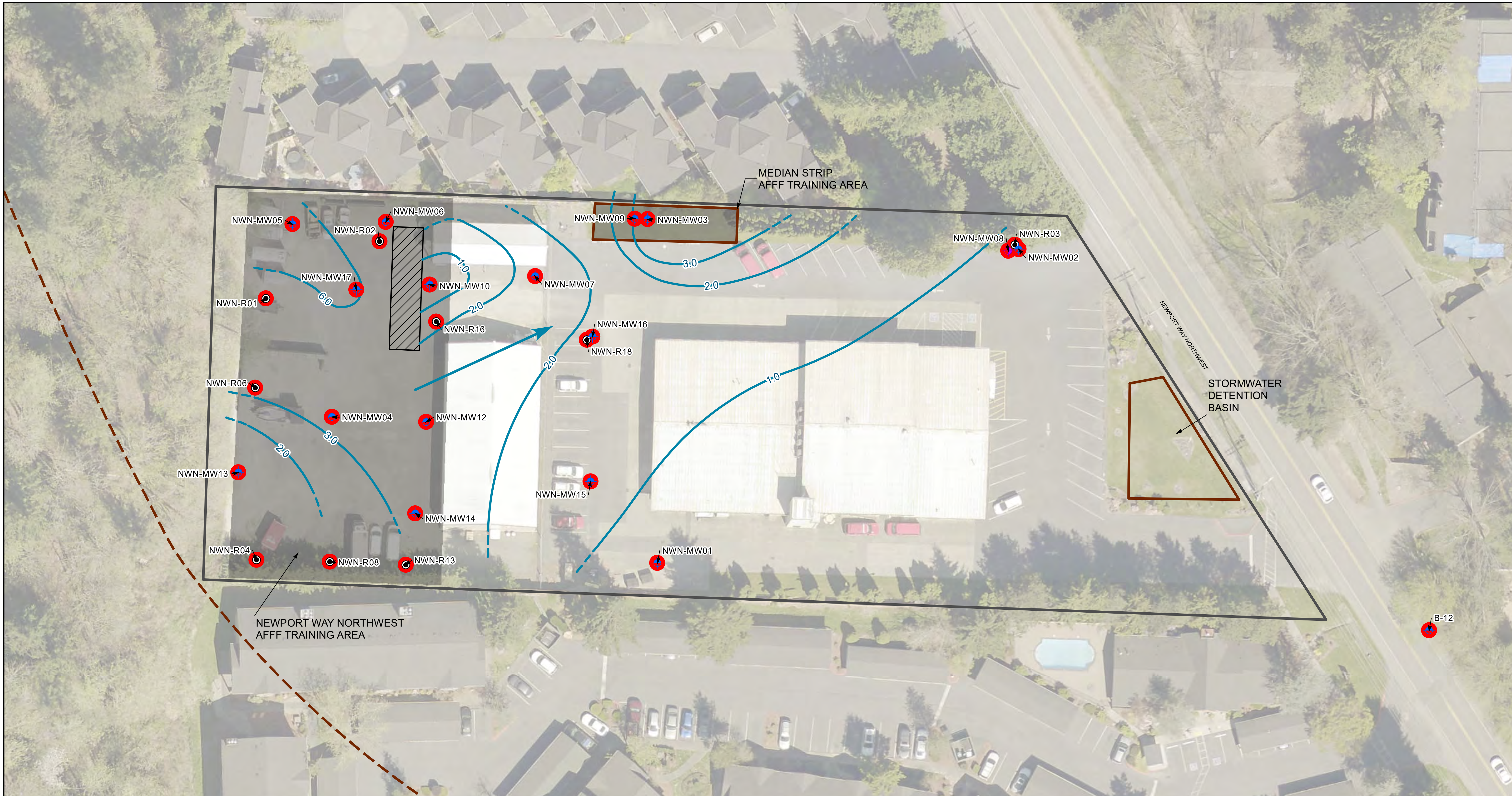
Path: Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-18_GW-Deep-PFAS-Total.mxd



LEGEND

- BORING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DENOTES ONE OR MORE PFAS DETECTED AT A CONCENTRATION EXCEEDING CLEANUP LEVELS
- ISOCONCENTRATION CONTOUR OF PFAS IN GROUNWATER IN MICROGRAMS PER LITER (DASHED WHERE INFERRED)
- APPROXIMATE GROUNDWATER FLOW DIRECTION
- APPROXIMATE MAXIMUM EXTENT OF PFAS IN GROUNDWATER THAT EXCEEDS AT LEAST ONE SCREENING LEVEL IN SHALLOW GROUNDWATER ZONE
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT (DU)
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

0 50
SCALE IN FEET

N

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

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FIGURE 19

EFR HQ SOURCE AREA GROUNDWATER AVERAGE TOTAL PFAS CONCENTRATIONS
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND 555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

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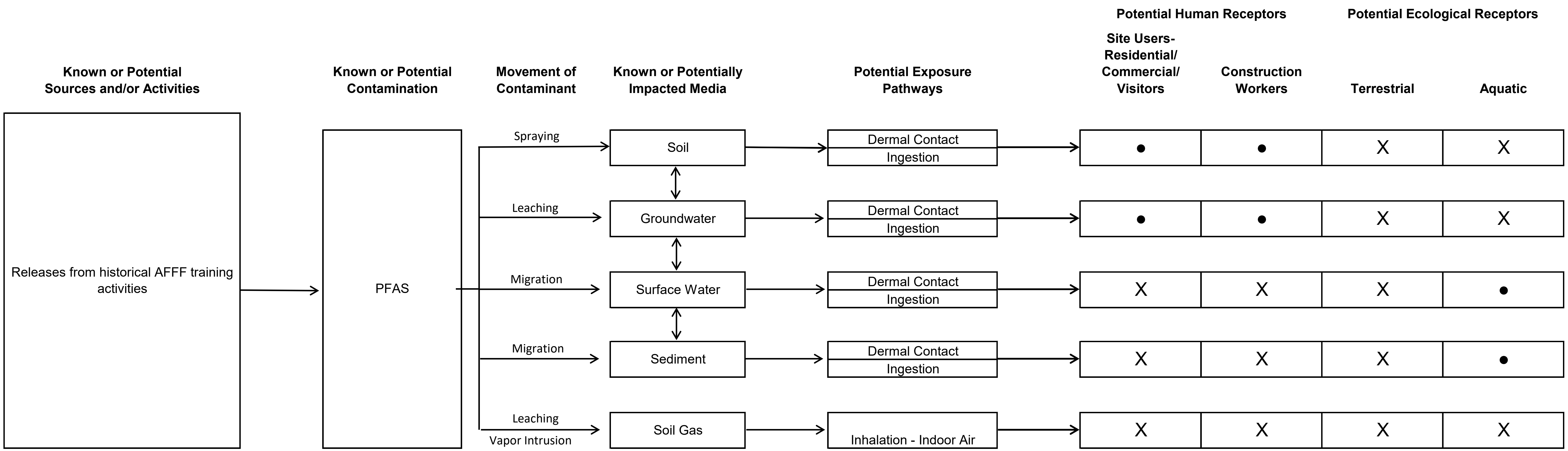
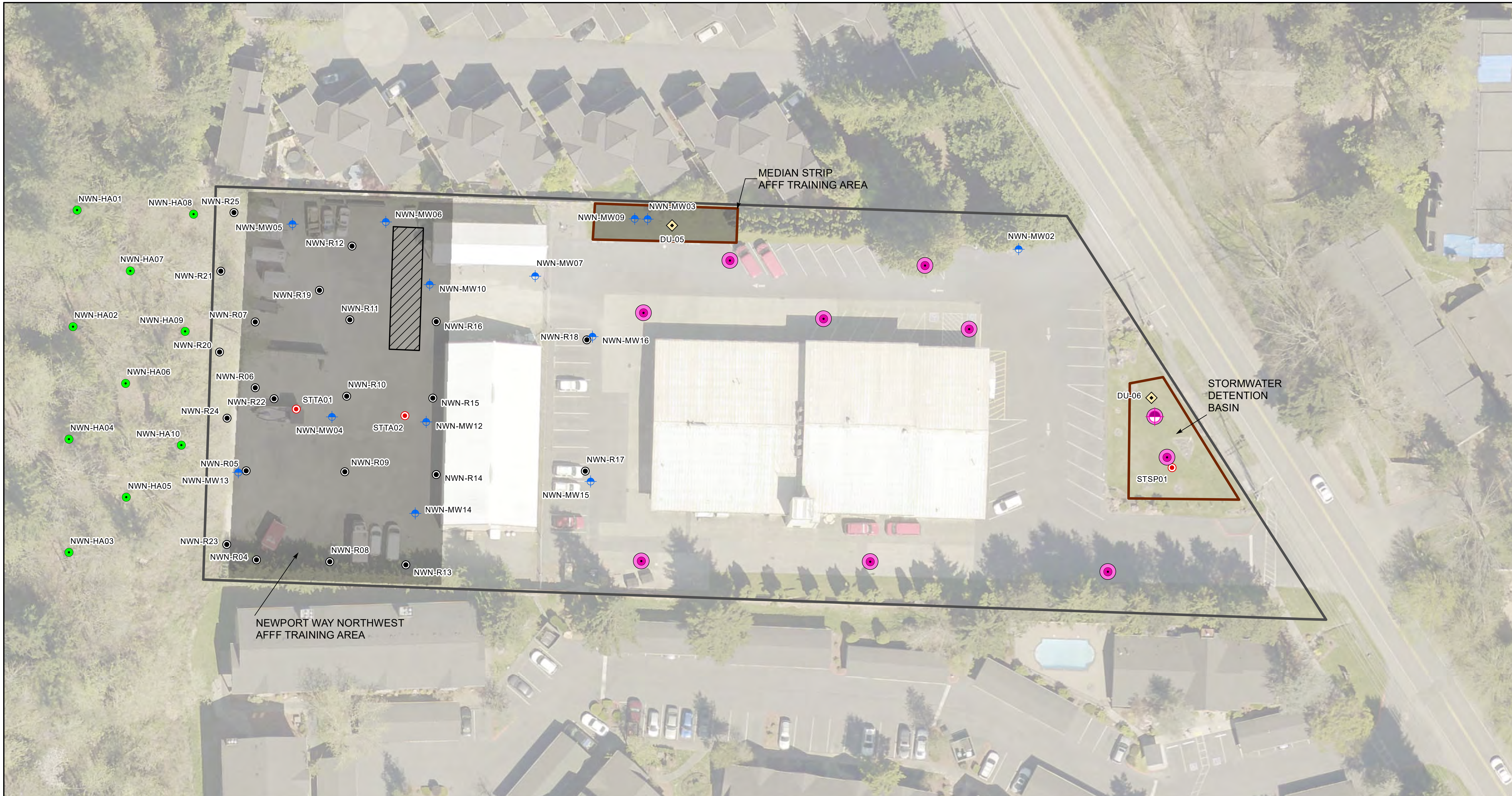
Figure 20
Conceptual Site Model: EFR HQ IVES Site



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 BORING
- PROPOSED SHALLOW MONITORING WELL
- DECISION UNIT SAMPLE
- HAND AUGER LOCATION
- BORING
- GEOSYNTEC SAMPLE
- SHALLOW MONITORING WELL
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT (DU)
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

0 50
SCALE IN FEET

N

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FIGURE 21

PROPOSED BORING AND MONITORING WELL LOCATIONS
EFR HQ SOURCE AREA
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND 555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON
FARALLON PN: 1754-008

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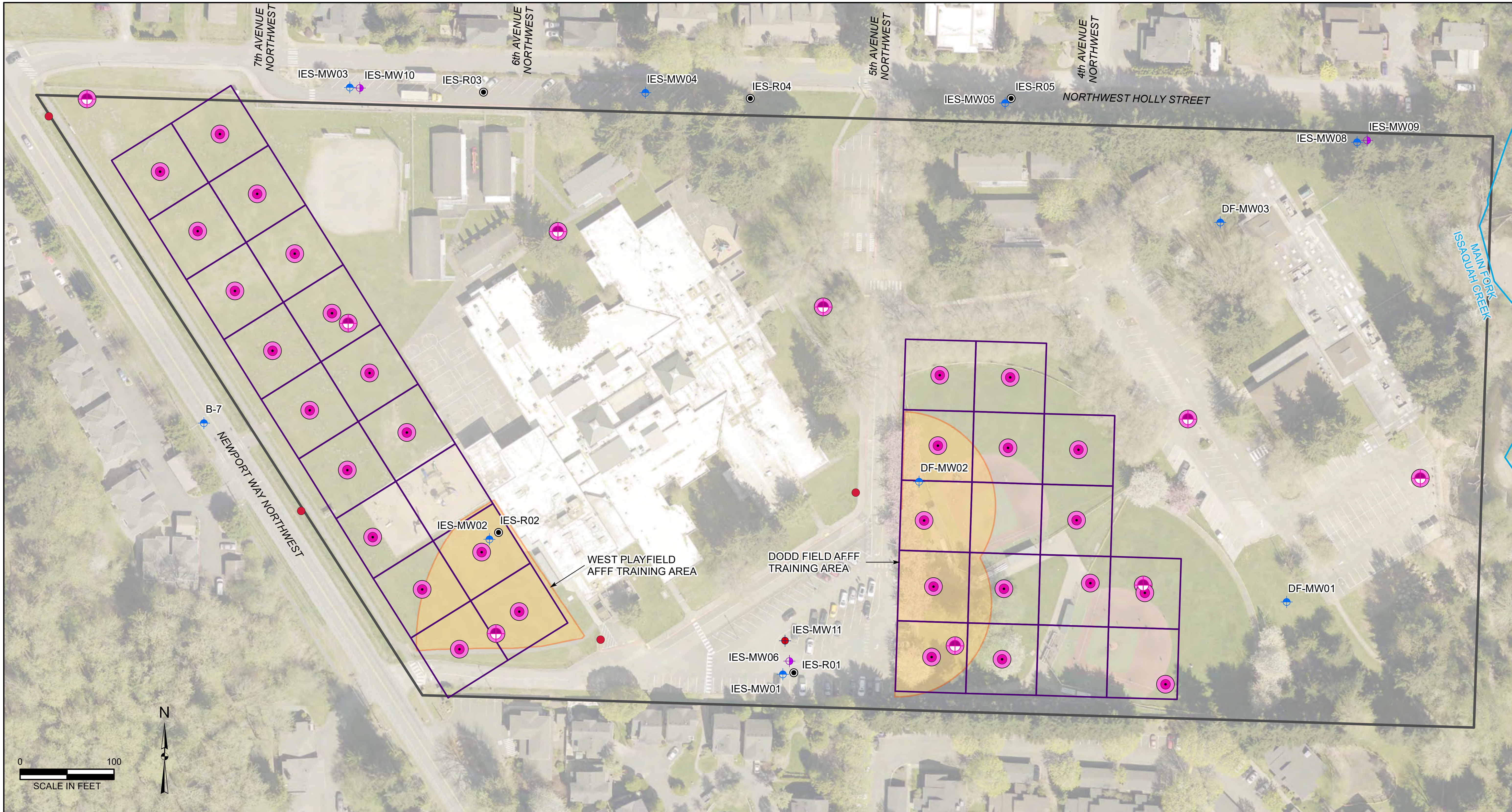

LEGEND

- PROPOSED HAND AUGER SAMPLING LOCATION
- PROPOSED SHALLOW MONITORING WELL
- BORING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- TEST WELL
- FIRE HYDRANT
- SAMPLING GRID (75'X75')
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

NOTE:
1. UP TO FOUR BORINGS WILL BE DRILLED AT THE WEST PLAYFIELD AND DODD FIELD AFFF TRAINING AREAS (UP TO 8 BORINGS TOTAL). BORING LOCATIONS WILL BE COORDINATED WITH ECOLOGY AND SELECTED BASED ON THE RESULTS OF THE HAND AUGER SAMPLING.

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
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FIGURE 22
PROPOSED BORING AND MONITORING WELL LOCATIONS
IVES SOURCE AREA
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND 555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON
FARALLON PN: 1754-008

Drawn By: jjones | Checked By: SS | Date: 9/2/2025 | Disc Reference: Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-22_IVES_ProposedLocs.mxd

TABLES

REMEDIAL INVESTIGATION WORK PLAN
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

Table 1
Soil Screening Levels
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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	0.0000000026	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	0.000000022	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

[1]Washington 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
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Constituent of Potential Concern	Groundwater Screening Levels							
	Method B Groundwater Noncancer (µg/l)[1]	Federal Maximum Contaminant Levels (MCLs) (µg/l)[2]	Adjustment Factors: Laboratory Method Reporting Limit (µg/l)	Proposed Groundwater Screening Level (µg/l)	Reported Maximum Value (µg/l)	Property	Sample Identification	Retained as Groundwater COPC
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

[1]Washington 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, unless otherwise noted.

[2]U.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
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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-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	---	---
Geotechnical Wells-Newport Way Northwest									
B-2	---	City of Issaquah	80.98	80.54	20	30	10	60.54	50.54
B-4	---	City of Issaquah	74.37	73.83	20	30	10	53.83	43.83
B-7	---	City of Issaquah	NM	NM	22.5	32.5	10	NM	NM
B-12	---	City of Issaquah	NM	NM	20	30	10	NM	NM
Resource Protection Monitoring Wells									
Issaquah Valley Elementary School Source Area									
IES-MW01	---	Eastside Fire & Rescue	76.52	76.31	16	26	10	60.31	50.31
IES-MW02	---	Eastside Fire & Rescue	74.43	73.74	15	25	10	58.74	48.74
IES-MW03	---	Eastside Fire & Rescue	73.09	72.70	15	25	10	57.7	47.7
IES-MW04	---	Eastside Fire & Rescue	72.97	72.43	15	30	15	57.43	42.43
IES-MW05	---	Eastside Fire & Rescue	72.75	72.76	20	30	10	52.76	42.76
IES-MW06	---	Eastside Fire & Rescue	76.29	75.92	80	90	10	-4.08	-14.08
IES-MW08	---	Eastside Fire & Rescue	72.55	72.07	20	30	10	52.07	42.07
IES-MW09	---	Eastside Fire & Rescue	72.45	72.18	75	85	10	-2.82	-12.82
IES-MW10	---	Eastside Fire & Rescue	73.08	72.66	75	85	10	-2.34	-12.34
IES-MW11	---	Eastside Fire & Rescue	75.92	75.69	120	130	10	-44.31	-54.31
DF-MW01	EB-1W	Eastside Fire & Rescue	77.99	77.71	5	15	10	72.71	62.71
DF-MW02	EB-5W	Eastside Fire & Rescue	74.57	74.21	15	25	10	59.21	49.21
DF-MW03	EB-3W	Eastside Fire & Rescue	74.71	74.35	20	30	10	54.35	44.35

Table 3
Monitoring Well Construction Details
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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)
Eastside Fire & Rescue Headquarters Source Area									
NWN-MW01	---	Eastside Fire & Rescue	90.93	90.69	15	30	15	75.69	60.69
NWN-MW02	---	Eastside Fire & Rescue	90.04	89.84	15	30	15	74.84	59.84
NWN-MW03	---	Eastside Fire & Rescue	91.60	91.35	15	30	15	76.35	61.35
NWN-MW04	---	Eastside Fire & Rescue	90.68	90.41	13	23	10	77.41	67.41
NWN-MW05	---	Eastside Fire & Rescue	90.65	90.34	7	17	10	83.34	73.34
NWN-MW06	---	Eastside Fire & Rescue	91.19	90.98	15	25	10	75.98	65.98
NWN-MW07	---	Eastside Fire & Rescue	91.28	90.89	16.5	26.5	10	74.39	64.39
NWN-MW08	---	Eastside Fire & Rescue	90.37	89.95	70	80	10	19.95	9.95
NWN-MW09	---	Eastside Fire & Rescue	91.63	91.29	45	50	5	46.29	41.29
NWN-MW10	---	Eastside Fire & Rescue	91.04	90.66	10	25	15	80.66	65.66
NWN-MW12	---	Eastside Fire & Rescue	91.04	90.56	8	23	15	82.56	67.56
NWN-MW13	---	Eastside Fire & Rescue	90.28	89.80	3	18	15	86.80	71.80
NWN-MW14	---	Eastside Fire & Rescue	91.01	90.68	8	23	15	82.68	67.68
NWN-MW15	---	Eastside Fire & Rescue	90.77	90.37	15	30	15	75.37	60.37
NWN-MW16	---	Eastside Fire & Rescue	90.87	90.55	15	30	15	75.55	60.55
NWN-MW17	---	Eastside Fire & Rescue	91.04	90.74	10	25	15	80.74	65.74
NWN-PZ01	---	Eastside Fire & Rescue	91.20	90.76	20	30	10	70.76	60.76
NWN-PZ02	---	Eastside Fire & Rescue	90.99	90.44	20	30	10	70.44	60.44
Lower Issaquah Valley Regional Wells									
COI-MW01	MW01	City of Issaquah	58.36	58.4	28	38	10	30.4	20.4
COI-MW02	MW02	City of Issaquah	59.7	62.8	70	90	20	-7.2	-27.2
COI-MW03	MW03	City of Issaquah	63.16	62.9	78	98	20	-15.1	-35.1
COI-MW04	MW04	City of Issaquah	73.3	73.1	70	90	20	3.1	-16.9
COI-MW05	MW05	City of Issaquah	72.05	71.9	70	90	20	1.9	-18.1
COI-MW06	MW06	City of Issaquah	86.5	86.3	80	100	20	6.3	-13.7
COI-MW07	MW07	City of Issaquah	90.7	90.3	100	110	10	-9.7	-19.7
COI-MW08	---	City of Issaquah	70.22	69.85	238	248	10	-168.15	-178.15
COI-PW05-OBS	COI Well5OBS	City of Issaquah	NM	NM	223	405	182	---	---
COI-TW01[1]	COI-MW1	City of Issaquah	NM	NM	10	20	10	---	---
COI-TW03[1]	COI-TW3	City of Issaquah	NM	81.8	284	289	5	-202.2	-207.2
IES-MW07	---	Eastside Fire & Rescue	70.54	70.25	20	30	10	50.25	40.25
IES-MW12	---	Eastside Fire & Rescue	70.06	69.77	120	130	10	-50.23	-60.23

Table 3
Monitoring Well Construction Details
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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)
Lower Issaquah Valley Regional Wells (continued)									
NDS-MW01	---	Eastside Fire & Rescue	86.16	85.48	22	32	10	63.48	53.48
NDS-MW02	---	Eastside Fire & Rescue	82.10	81.75	71	81	10	10.75	0.75
NDS-MW03	---	Eastside Fire & Rescue	82.54	82.07	25	35	10	57.07	47.07
NDS-MW04	---	Eastside Fire & Rescue	82.19	81.71	72	82	10	9.71	-0.29
NGB-MW01	---	Eastside Fire & Rescue	63.34	62.96	20	30	10	42.96	32.96
NLS-MW01	---	Eastside Fire & Rescue	66.96	66.62	19.5	29.5	10	47.12	37.12
NLS-MW02	---	Eastside Fire & Rescue	67.12	66.88	70	80	10	-3.12	-13.12
NWN-MW11	---	Eastside Fire & Rescue	90.91	90.58	15	25	10	75.58	65.58

NOTES:
— denotes not applicable.
[1]TOC elevation calculated by Geosyntec, 2016

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

Table 4
Summary of Groundwater Elevation Data
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Zone	Date Measured	Well Head Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[1]
Eastside Fire & Rescue Headquarters Source Area					
NWN-MW01	Shallow	10/26/2018	90.69	21.43	69.26
		3/10/2020		15.33	75.36
		4/13/2020		17.56	73.13
		7/14/2020		21.35	69.34
		10/26/2020		20.17	70.52
		7/29/2021		23.68	67.01
		8/12/2021		24.33	66.36
		9/1/2021		25.00	65.69
		1/17/2022		10.86	79.83
		2/17/2022		17.65	73.04
		8/31/2022		23.34	67.35
		12/12/2022		14.77	75.92
		2/27/2023		15.18	75.51
		5/9/2023		16.71	73.98
NWN-MW02	Shallow	10/26/2018	89.84	21.10	68.74
		3/10/2020		16.70	73.14
		4/13/2020		18.24	71.60
		7/14/2020		21.38	68.46
		10/26/2020		20.45	69.39
		7/29/2021		23.63	66.21
		8/12/2021		24.12	65.72
		2/17/2022		18.47	71.37
		8/31/2022		23.10	66.74
		12/12/2022		17.57	72.27
		2/27/2023		16.88	72.96
		5/9/2023		17.55	72.29
NWN-MW03	Shallow	10/26/2018	91.35	22.77	68.58
		4/13/2020		19.16	72.19
		7/14/2020		22.69	68.66
		10/26/2020		21.87	69.48
		7/29/2021		25.23	66.12
		8/12/2021		25.76	65.59
		9/1/2021		26.40	64.95
		10/18/2021		24.18	67.17
		12/9/2021		16.17	75.18
		1/17/2022		13.07	78.28
		2/17/2022		19.49	71.86
		8/31/2022		24.70	66.65
		12/12/2022		18.01	73.34
		2/27/2023		17.63	73.72
		5/9/2023		18.47	72.88

Table 4
Summary of Groundwater Elevation Data
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Zone	Date Measured	Well Head Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[1]
Eastside Fire & Rescue Headquarters Source Area (continued)					
NWN-MW04	Shallow	10/26/2018	90.41	13.20	77.21
		4/13/2020		8.71	81.70
		7/14/2020		12.65	77.76
		10/26/2020		10.72	79.69
		7/29/2021		15.57	74.84
		8/12/2021		16.40	74.01
		9/1/2021		17.04	73.37
		10/18/2021		13.31	77.10
		12/9/2021		5.91	84.50
		1/18/2022		5.43	84.98
		2/17/2022		8.28	82.13
		8/31/2022		16.50	73.91
		12/12/2022		6.65	83.76
		2/27/2023		6.22	84.19
		5/9/2023		7.65	82.76
NWN-MW05	Shallow	4/13/2020	90.34	11.51	78.83
		7/14/2020		14.92	75.42
		10/26/2020		12.80	77.54
		7/29/2021		16.23	74.11
		8/12/2021		16.24	74.10
		2/17/2022		11.47	78.87
		9/1/2022		16.28	74.06
		12/12/2022		9.20	81.14
		2/27/2023		10.90	79.44
		5/9/2023		10.72	79.62
NWN-MW06	Shallow	4/13/2020	90.98	13.71	77.27
		7/14/2020		16.60	74.38
		10/26/2020		14.58	76.40
		7/29/2021		18.68	72.30
		8/12/2021		19.30	71.68
		9/1/2021		19.85	71.13
		10/18/2021		17.20	73.78
		12/9/2021		10.11	80.87
		1/18/2022		9.14	81.84
		2/17/2022		13.48	77.50
		9/1/2022		19.75	71.23
		12/12/2022		10.72	80.26
		2/27/2023		10.98	80.00
		5/9/2023		12.71	78.27
NWN-MW07	Shallow	4/13/2020	90.89	17.92	72.97
		7/14/2020		21.70	69.19
		10/26/2020		20.58	70.31
		7/29/2021		24.00	66.89
		8/12/2021		24.50	66.39
		9/1/2021		25.29	65.60
		10/18/2021		23.06	67.83
		12/9/2021		14.07	76.82
		1/18/2022		11.96	78.93
		2/17/2022		18.00	72.89
		8/31/2022		23.63	67.26
		12/12/2022		15.86	75.03
		2/27/2023		15.86	75.03
		5/9/2023		17.10	73.79

Table 4
Summary of Groundwater Elevation Data
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Zone	Date Measured	Well Head Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[1]
Eastside Fire & Rescue Headquarters Source Area (continued)					
NWN-MW08	Intermediate	4/13/2020	89.95	18.87	71.08
		7/14/2020		22.15	67.80
		10/26/2020		20.77	69.18
		7/29/2021		24.71	65.24
		8/12/2021		25.16	64.79
		2/17/2022		19.13	70.82
		8/31/2022		23.80	66.15
		12/12/2022		18.09	71.86
		2/27/2023		17.48	72.47
		5/9/2023		18.03	71.92
NWN-MW09	Shallow	4/13/2020	91.29	19.73	71.56
		7/14/2020		22.92	68.37
		10/26/2020		22.03	69.26
		7/29/2021		25.19	66.10
		8/12/2021		25.73	65.56
		9/1/2021		26.31	64.98
		10/18/2021		24.11	67.18
		12/9/2021		17.24	74.05
		1/17/2022		14.16	77.13
		2/17/2022		19.97	71.32
		8/31/2022		26.65	64.64
		12/12/2022		19.03	72.26
		2/27/2023		18.33	72.96
		5/9/2023		19.05	72.24
NWN-MW10	Shallow	7/29/2021	90.66	19.93	70.73
		8/12/2021		21.02	69.64
		9/1/2021		21.38	69.28
		10/18/2021		19.12	71.54
		12/9/2021		10.48	80.18
		1/18/2022		9.41	81.25
		2/17/2022		14.23	76.43
		8/31/2022		21.31	69.35
		12/12/2022		11.11	79.55
		2/27/2023		11.51	79.15
		5/9/2023		13.25	77.41
NWN-MW12	Shallow	7/29/2021	90.56	15.98	74.58
		8/12/2021		16.79	73.77
		9/1/2021		17.41	73.15
		10/18/2021		13.96	76.60
		12/9/2021		6.86	83.70
		1/18/2022		6.37	84.19
		2/17/2022		9.18	81.38
		9/1/2022		17.00	73.56
		12/12/2022		7.60	82.96
		2/27/2023		7.35	83.21
		5/9/2023		8.67	81.89

Table 4
Summary of Groundwater Elevation Data
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Zone	Date Measured	Well Head Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[1]
Eastside Fire & Rescue Headquarters Source Area (continued)					
NWN-MW13	Shallow	7/29/2021	89.80	13.32	76.48
		8/12/2021		13.94	75.86
		9/1/2021		14.55	75.25
		10/18/2021		10.10	79.70
		12/9/2021		1.54	88.26
		1/18/2022		1.26	88.54
		2/17/2022		3.40	86.40
		9/1/2022		13.96	75.84
		12/12/2022		1.80	88.00
		2/27/2023		1.77	88.03
		5/9/2023		3.41	86.39
NWN-MW14	Shallow	7/29/2021	90.68	15.70	74.98
		8/12/2021		16.53	74.15
		9/1/2021		20.10	70.58
		1/18/2022		4.38	86.30
		2/17/2022		7.94	82.74
		9/1/2022		16.67	74.01
		12/12/2022		9.10	81.58
		2/27/2023		5.25	85.43
		5/9/2023		7.59	83.09
NWN-MW15	Shallow	7/29/2021	90.37	23.40	66.97
		8/12/2021		24.03	66.34
		9/1/2021		24.71	65.66
		1/17/2022		10.63	79.74
		2/17/2022		17.33	73.04
		9/1/2022		23.09	67.28
		12/12/2022		14.69	75.68
		2/27/2023		15.02	75.35
		5/9/2023		16.47	73.90
NWN-MW16	Shallow	7/29/2021	90.55	23.83	66.72
		8/12/2021		24.40	66.15
		9/1/2021		25.08	65.47
		1/17/2022		11.17	79.38
		2/17/2022		17.72	72.83
		9/1/2022		23.34	67.21
		12/12/2022		15.34	75.21
		2/27/2023		15.50	75.05
		5/9/2023		16.79	73.76
NWN-MW17	Shallow	8/31/2022	90.74	19.34	71.40
		12/12/2022		10.04	80.70
		2/27/2023		10.30	80.44
		5/9/2023		12.09	78.65
NWN-PZ01	Shallow	4/13/2020	90.76	19.15	71.61
		7/14/2020		22.43	68.33
		10/26/2020		21.48	69.28
		7/29/2021		NM	---
		8/12/2021		NM	---
		8/31/2022		24.10	66.66
		12/12/2022		18.43	72.33
		2/27/2023		17.75	73.01
		5/9/2023		18.46	72.30

Table 4
Summary of Groundwater Elevation Data
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Zone	Date Measured	Well Head Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[1]
Eastside Fire & Rescue Headquarters Source Area (continued)					
NWN-PZ02	Shallow	4/13/2020	90.44	17.76	72.68
		7/14/2020		21.41	69.03
		10/26/2020		20.34	70.10
		7/29/2021		NM	---
		8/12/2021		NM	---
		8/31/2022		23.31	67.13
		12/12/2022		16.06	74.38
		2/27/2023		16.01	74.43
		5/9/2023		17.02	73.42
Issaquah Valley Elementary School Source Area					
IES-MW01	Shallow	10/26/2018	76.31	7.52	68.79
		3/10/2020		6.51	69.80
		4/13/2020		7.58	68.73
		7/13/2020		9.66	66.65
		10/26/2020		9.30	67.01
		8/31/2022		11.30	65.01
		12/12/2022		7.02	69.29
		2/27/2023		6.51	69.80
		5/9/2023		7.06	69.25
IES-MW02	Shallow	10/26/2018	73.74	7.15	66.59
		3/10/2020		4.56	69.18
		4/13/2020		5.65	68.09
		7/13/2020		8.02	65.72
		10/26/2020		7.30	66.44
IES-MW03	Shallow	10/26/2018	72.7	7.74	64.96
		3/10/2020		5.00	67.70
		4/13/2020		5.82	66.88
		7/13/2020		8.12	64.58
		10/26/2020		7.26	65.44
		8/31/2022		8.96	63.74
		12/12/2022		5.03	67.67
		2/27/2023		4.63	68.07
		5/9/2023		5.18	67.52
IES-MW04	Shallow	10/26/2018	72.43	6.79	65.64
		3/10/2020		4.73	67.70
		4/13/2020		5.57	66.86
		7/13/2020		7.74	64.69
		10/26/2020		6.92	65.51
		8/31/2022		8.65	63.78
		12/12/2022		4.81	67.62
		2/27/2023		4.50	67.93
		5/9/2023		5.03	67.40
IES-MW06	Intermediate	4/13/2020	75.92	7.66	68.26
		7/13/2020		10.01	65.91
		10/26/2020		11.31	64.61
		8/31/2022		10.44	65.48
		12/12/2022		6.91	69.01
		2/27/2023		6.38	69.54
		5/9/2023		6.92	69.00
IES-MW10	Intermediate	4/13/2020	72.66	6.12	66.54
		7/13/2020		9.10	63.56
		10/26/2020		7.95	64.71
		8/31/2022		9.60	63.06
		12/12/2022		5.05	67.61
		2/27/2023		4.61	68.05
		5/9/2023		5.17	67.49

Table 4
Summary of Groundwater Elevation Data
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Zone	Date Measured	Well Head Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[1]
Issaquah Valley Elementary School Source Area (continued)					
IES-MW11	Deep	8/31/2022	75.69	14.66	61.03
		12/12/2022		7.11	68.58
		2/27/2023		6.80	68.89
		5/9/2023		6.96	68.73
IES-MW05	Shallow	10/26/2018	72.26	9.68	62.58
		3/10/2020		4.83	67.43
		4/13/2020		5.51	66.75
		7/13/2020		7.30	64.96
		10/26/2020		6.63	65.63
		8/31/2022		NM	---
		12/12/2022		4.94	67.32
		2/27/2023		4.73	67.53
		5/9/2023		5.20	67.06
IES-MW08	Shallow	4/13/2020	72.07	6.21	65.86
		7/13/2020		7.15	64.92
		10/26/2020		6.75	65.32
		8/31/2022		7.81	64.26
		12/12/2022		5.78	66.29
		2/27/2023		5.79	66.28
		5/9/2023		6.14	65.93
IES-MW09	Intermediate	4/13/2020	72.18	5.10	67.08
		7/13/2020		6.92	65.26
		10/26/2020		6.45	65.73
		8/31/2022		7.98	64.20
		12/12/2022		4.26	67.92
		2/27/2023		4.23	67.95
		5/9/2023		4.65	67.53
DF-MW01	Shallow	10/26/2018	77.71	10.99	66.72
		3/10/2020		8.61	69.10
		4/13/2020		9.53	68.18
		7/13/2020		11.39	66.32
		10/26/2020		10.79	66.92
		8/31/2022		12.50	65.21
		12/12/2022		8.84	68.87
		2/27/2023		8.71	69.00
		5/9/2023		9.24	68.47
DF-MW02	Shallow	8/3/2018	74.21	10.05	64.16
		10/26/2018		8.10	66.11
		3/10/2020		5.51	68.70
		4/13/2020		6.46	67.75
		7/13/2020		8.56	65.65
		10/26/2020		7.89	66.32
		8/31/2022		9.66	64.55
		12/12/2022		5.72	68.49
		2/27/2023		5.43	68.78
		5/9/2023		6.00	68.21
DF-MW03	Shallow	8/3/2018	74.35	10.09	64.26
		3/10/2020		7.07	67.28
		4/13/2020		7.76	66.59
		7/13/2020		9.13	65.22
		10/26/2020		8.60	65.75
		8/31/2022		NM	---
		12/12/2022		NM	---
		3/1/2023		7.35	67.00
		5/9/2023		7.52	66.83

Table 4
Summary of Groundwater Elevation Data
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Zone	Date Measured	Well Head Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[1]
Geotechnical Wells-Newport Way Northwest					
B-4	Shallow	2/28/2023	73.83	6.15	67.68
B-7	Shallow	2/28/2023	NS	10.89	NM
Lower Issaquah Valley Regional Wells					
COI-MW01	Intermediate	8/31/2022	58.4	3.93	54.47
		12/12/2022		2.30	56.10
		2/27/2023		2.30	56.10
		5/9/2023		2.47	55.93
COI-MW02	Intermediate	10/26/2018	62.80	3.71	59.09
		3/10/2020		1.98	60.82
		4/13/2020		2.65	60.15
		7/13/2020		5.14	57.66
		10/27/2020		3.13	59.67
		9/1/2021		NM	---
		12/12/2022		NM	---
		2/27/2023		0.36	62.44
		5/9/2023		1.34	61.46
COI-MW03	Intermediate	10/24/2018	62.90	5.92	56.98
		3/10/2020		NM	--
		4/13/2020		4.46	58.44
		7/14/2020		6.61	56.29
		10/26/2020		4.75	58.15
		8/31/2022		6.09	56.81
		12/12/2022		1.45	61.45
		2/27/2023		1.20	61.70
		5/9/2023		2.96	59.94
COI-MW04	Intermediate	10/24/2018	73.10	10.20	62.90
		3/10/2020		8.19	64.91
		4/13/2020		9.03	64.07
		7/13/2020		11.69	61.41
		10/26/2020		9.68	63.42
		8/31/2022		12.61	60.49
		12/12/2022		NM	---
		2/27/2023		NM	---
		5/9/2023		8.01	65.09
COI-MW05	Intermediate	10/25/2018	71.90	8.09	63.81
		3/10/2020		5.96	65.94
		4/13/2020		6.71	65.19
		7/13/2020		8.72	63.18
		10/26/2020		8.72	63.18
		9/2/2022		9.61	62.29
		12/12/2022		5.86	66.04
		2/27/2023		5.55	66.35
		5/9/2023		6.09	65.81
COI-MW06	Intermediate	10/25/2018	86.30	18.62	67.68
		3/10/2020		15.22	71.08
		4/13/2020		16.51	69.79
		7/13/2020		19.51	66.79
		10/26/2020		18.21	68.09
		8/31/2022		21.02	65.28
		12/12/2022		15.55	70.75
		2/27/2023		14.95	71.35
		5/9/2023		15.52	70.78

Table 4
Summary of Groundwater Elevation Data
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Zone	Date Measured	Well Head Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[1]
Lower Issaquah Valley Regional Wells (continued)					
COI-MW07	Intermediate	10/25/2018	90.30	19.44	70.86
		3/10/2020		15.94	74.36
		4/13/2020		17.25	73.05
		7/13/2020		20.66	69.64
		10/26/2020		19.18	71.12
		8/31/2022		NM	--
		12/12/2022		16.35	73.95
		2/27/2023		15.83	74.47
		5/9/2023		16.32	73.98
COI-MW08	Deep	1/12/2023	69.85	2.23	67.62
		2/27/2023		2.30	67.55
		5/9/2023		2.72	67.13
COI-TW01[1]	Shallow	5/9/2023	81.9	11.38	70.52
COI-TW03[1]	Deep	5/9/2023	81.8	11.24	70.56
IES-MW07	Shallow	4/13/2020	70.25	5.46	64.79
		7/13/2020		7.21	63.04
		10/26/2020		6.30	63.95
		8/31/2022		8.04	62.21
		12/12/2022		4.57	65.68
		2/27/2023		4.42	65.83
		5/9/2023		4.96	65.29
IES-MW12	Deep	8/31/2022	69.77	8.79	60.98
		12/12/2022		3.29	66.48
		2/27/2023		3.02	66.75
		5/9/2023		3.53	66.24
NDS-MW01	Shallow	4/13/2020	85.48	15.32	70.16
		7/13/2020		18.11	67.37
		10/26/2020		17.32	68.16
		8/31/2022		19.73	65.75
		12/12/2022		14.84	70.64
		2/27/2023		14.09	71.39
		5/9/2023		14.71	70.77
NDS-MW02	Intermediate	4/13/2020	81.75	12.39	69.36
		7/13/2020		14.66	67.09
		10/26/2020		14.33	67.42
		12/12/2022		11.85	69.90
		2/27/2023		11.35	70.40
		5/9/2023		11.87	69.88
NDS-MW03	Shallow	4/13/2020	82.07	12.43	69.64
		7/13/2020		15.09	66.98
		10/26/2020		14.17	67.90
		8/31/2022		NM	---
		12/12/2022		11.85	70.22
		2/27/2023		11.41	70.66
		5/9/2023		11.89	70.18
NDS-MW04	Intermediate	4/13/2020	81.71	12.42	69.29
		7/13/2020		15.67	66.04
		10/26/2020		14.15	67.56
		12/12/2022		11.41	70.30
		2/27/2023		10.94	70.77
		5/9/2023		11.47	70.24
NGB-MW01	Shallow	8/31/2022	62.96	7.84	55.12
		12/12/2022		6.49	56.47
		2/27/2023		6.45	56.51
		5/9/2023		6.75	56.21

Table 4
Summary of Groundwater Elevation Data
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Zone	Date Measured	Well Head Elevation (feet)[1]	Depth to Water (feet)[2]	Groundwater Elevation (feet)[1]
Lower Issaquah Valley Regional Wells (continued)					
NLS-MW01	Shallow	8/31/2022	66.62	5.48	61.14
		12/12/2022		1.88	64.74
		2/27/2023		1.62	65.00
		5/9/2023		2.10	64.52
NLS-MW02	Intermediate	8/31/2022	66.88	6.22	60.66
		12/12/2022		2.21	64.67
		2/27/2023		2.00	64.88
		5/9/2023		2.60	64.28
NWN-MW11	Shallow	4/13/2020	90.58	16.93	73.65
		7/13/2020		19.35	71.23
		10/26/2020		18.47	72.11
		7/29/2021		NM	---
		8/12/2021		NM	---
		9/1/2021		21.57	69.01
		2/17/2022		17.26	73.32
		8/31/2022		NM	NM
		12/12/2022		16.41	74.17
		2/27/2023		15.89	74.69
		5/9/2023		16.34	74.24
Lower Issaquah Valley Creek Monitoring Stations[3]					
STR-01	Creek	4/13/2020	Reference Elevation Reported in Error	---	---
		7/13/2020		---	---
		10/26/2020		---	---
		8/31/2022	71.63	14.37	57.26
		12/12/2022		13.60	58.03
		2/27/2023		14.29	57.34
		5/9/2023		14.39	57.24
STR-02	Creek	4/13/2020	66.79	2.12	64.67
		7/13/2020		2.5	64.29
		10/26/2020		1.42	65.37
		8/31/2022	77.45	NM	---
		12/12/2022		12.58	64.87
		2/27/2023		12.79	64.66
		5/9/2023		13.06	64.39
STR-05	Creek	8/31/2022	89.49	17.50	71.99
		12/12/2022		15.70	73.79
		2/27/2023		16.20	73.29
		5/9/2023		16.60	72.89

NOTES:

--- denotes not available

[1] Elevations reported in North American Vertical Datum of 1988.

[2] In feet below top of well casing.

[3] Fixed Monitoring Location

Farallon = Farallon Consulting, L.L.C.

NM = not measured

NS = not surveyed

Table 5
Summary of Shallow Groundwater Head Differences
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Well Pair	Zone	Measurement Date	Middle of Screened Interval Elevation (feet)[1]		Groundwater Elevation (feet)[1]		Groundwater Elevation Head Differential (feet)	Gradient		
			Upper	Lower	Upper Screen	Lower Screen		Vertical Gradient	Direction	
IES-MW01 to IES-MW06	Shallow Intermediate	4/13/2020	55.31	-9.08	68.73	68.26	0.47	-0.007	DOWN	↓
		7/13/2020			66.65	65.91	0.74	-0.011	DOWN	↓
		10/26/2020			67.01	64.61	2.40	-0.037	DOWN	↓
		9/1/2022			65.01	65.48	-0.47	0.007	UP	↑
		12/12/2022			69.29	69.01	0.28	-0.004	DOWN	↓
		2/27/2023			69.80	69.54	0.26	-0.004	DOWN	↓
		5/9/2023			69.25	69.00	0.25	-0.004	DOWN	↓
IES-MW03 to IES-MW10	Shallow Intermediate	4/13/2020	52.7	-7.34	66.88	66.54	0.34	-0.006	DOWN	↓
		7/13/2020			64.58	63.56	1.02	-0.017	DOWN	↓
		10/26/2020			65.44	64.71	0.73	-0.012	DOWN	↓
		8/31/2022			63.74	63.06	0.68	-0.011	DOWN	↓
		12/12/2022			67.67	67.61	0.06	-0.001	DOWN	↓
		2/27/2023			68.07	68.05	0.02	0.000	NEUTRAL	
		5/9/2023			67.52	-1.92	69.44	-1.156	DOWN	↓
IES-MW07 to COI-MW05	Shallow Intermediate	4/13/2020	45.25	-8.1	64.79	65.19	-0.40	0.007	UP	↑
		7/13/2020			63.04	63.18	-0.14	0.003	UP	↑
		10/26/2020			63.95	64.26	-0.31	0.006	UP	↑
		8/31/2022			60.69	63.86	-3.17	0.059	UP	↑
		12/12/2022			65.68	66.04	-0.36	0.007	UP	↑
		2/27/2023			65.83	66.35	-0.52	0.010	UP	↑
		5/9/2023			65.29	65.81	-0.52	0.010	UP	↑
IES-MW08 to IES-MW09	Shallow Intermediate	4/13/2020	47.07	-7.82	65.86	67.08	-1.22	0.022	UP	↑
		7/13/2020			64.92	65.26	-0.34	0.006	UP	↑
		10/26/2020			65.32	65.73	-0.41	0.007	UP	↑
		8/31/2022			64.26	64.70	-0.44	0.008	UP	↑
		12/12/2022			66.29	67.92	-1.63	0.030	UP	↑
		2/27/2023			66.28	67.95	-1.67	0.030	UP	↑
		5/9/2023			65.93	67.53	-1.60	0.029	UP	↑
NDS-MW01 to COI-MW06	Shallow Intermediate	4/13/2020	58.48	-3.7	70.16	69.79	0.37	-0.006	DOWN	↓
		7/13/2020			67.37	66.79	0.58	-0.009	DOWN	↓
		10/26/2020			68.16	68.09	0.07	-0.001	DOWN	↓
		8/31/2022			65.75	65.28	0.47	-0.008	DOWN	↓
		12/12/2022			70.64	70.75	-0.11	0.002	UP	↑
		2/27/2023			71.39	71.35	0.04	-0.001	DOWN	↓
		5/9/2023			70.77	70.78	-0.01	0.0002	UP	↑
NDS-MW03 to NDS-MW04	Shallow Intermediate	4/13/2020	52.07	4.71	69.64	69.29	0.35	-0.007	DOWN	↓
		7/13/2020			66.98	66.04	0.94	-0.020	DOWN	↓
		10/26/2020			67.90	67.56	0.34	-0.007	DOWN	↓
		12/12/2022			70.22	70.30	-0.08	0.002	UP	↑
		2/27/2023			70.66	70.77	-0.11	0.002	UP	↑
		5/9/2023			70.18	70.24	-0.06	0.001	UP	↑

Table 5
Summary of Shallow Groundwater Head Differences
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Well Pair	Zone	Measurement Date	Middle of Screened Interval Elevation (feet)[1]		Groundwater Elevation (feet)[1]		Groundwater Elevation Head Differential (feet)	Gradient		
			Upper	Lower	Upper Screen	Lower Screen		Vertical Gradient	Direction	
NGB-MW01 to COI-MW03	Shallow Intermediate	8/31/2022	37.96	-25.1	55.12	56.81	-1.69	0.027	UP	↑
		12/12/2022			56.47	61.45	-4.98	0.079	UP	↑
		2/27/2023			56.51	61.70	-5.19	0.082	UP	↑
		5/9/2023			56.21	59.94	-3.73	0.059	UP	↑
NLS-MW01 to NLS-MW02	Shallow Intermediate	8/31/2022	42.12	-8.12	61.14	60.66	0.48	-0.010	DOWN	↓
		12/12/2022			64.74	64.67	0.07	-0.001	DOWN	↓
		2/27/2023			65.00	64.88	0.12	-0.002	DOWN	↓
		5/9/2023			64.52	64.28	0.24	-0.005	DOWN	↓
NWN-MW02 to NWN-MW08	Shallow Intermediate	4/13/2020	65.72	14.95	71.60	71.08	0.52	-0.010	DOWN	↓
		7/14/2020	64.15		68.46	67.80	0.66	-0.013	DOWN	↓
		10/26/2020	64.615		69.39	69.18	0.21	-0.004	DOWN	↓
		9/29/2021	63.025		66.21	65.24	0.97	-0.020	DOWN	↓
		8/12/2021	62.78		65.72	64.79	0.93	-0.019	DOWN	↓
		2/17/2022	65.605		71.37	70.82	0.55	-0.011	DOWN	↓
		8/31/2022	63.29		66.74	66.15	0.59	-0.012	DOWN	↓
		12/12/2022	66.055		72.27	71.86	0.41	-0.008	DOWN	↓
		2/27/2023	66.4		72.96	72.47	0.49	-0.010	DOWN	↓
		5/9/2023	66.065		72.29	71.92	0.37	-0.007	DOWN	↓
NWN-MW03 and NWN-MW09	Shallow to Shallow	12/9/2021	68.265	43.79	75.18	74.05	1.13	-0.046	DOWN	↓
		1/17/2022	69.815		78.28	77.13	1.15	-0.044	DOWN	↓
		2/17/2022	66.605		71.86	71.32	0.54	-0.024	DOWN	↓
		8/31/2022	64		66.65	64.64	2.01	-0.099	DOWN	↓
		12/12/2022	67.345		73.34	72.26	1.08	-0.046	DOWN	↓
		2/27/2023	67.535		73.72	72.96	0.76	-0.032	DOWN	↓
		5/9/2023	67.115		72.88	72.24	0.64	-0.027	DOWN	↓
NWN-MW11 to COI-MW07	Shallow Intermediate	4/13/2020	69.615	-14.7	73.65	73.05	0.60	-0.007	DOWN	↓
		7/13/2020	68.405		71.23	69.64	1.59	-0.019	DOWN	↓
		10/26/2020	68.845		72.11	71.12	0.99	-0.012	DOWN	↓
		12/12/2022	69.875		74.17	73.95	0.22	-0.003	DOWN	↓
		2/27/2023	70.135		74.69	74.47	0.22	-0.003	DOWN	↓
		5/9/2023	69.91		74.24	73.98	0.26	-0.003	DOWN	↓
COI-MW05 to IES-MW12	Intermediate Deep	9/2/2022	-8.1	-55.23	62.29	60.98	1.31	-0.028	DOWN	↓
		12/12/2022			66.04	66.48	-0.44	0.009	UP	↑
		2/27/2023			66.35	66.75	-0.40	0.008	UP	↑
		5/9/20233			65.81	66.24	-0.43	0.009	UP	↑
IES-MW06 to IES-MW11	Intermediate Deep	8/31/2022	-9.08	-49.31	65.48	61.03	4.45	-0.111	DOWN	↓
		12/12/2022			69.01	68.58	0.43	-0.011	DOWN	↓
		2/27/2023			69.54	68.89	0.65	-0.016	DOWN	↓
		5/9/2023			69.00	68.73	0.27	-0.007	DOWN	↓
IES-MW12 to COI-MW08	Deep	2/27/2023	-58.23	-173.15	66.75	67.55	-0.80	0.007	UP	↑
	Deep	5/9/2023			66.24	67.13	-0.89	0.008	UP	↑

NOTES:
[1] Elevations in feet North American Vertical Datum of 1988. Where the water table intersected the screened interval of shallow zone wells, the "middle of screened interval elevation" was calculated as the mid-point between the top of the saturated zone to the bottom of the screen.

Table 6
Soil Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Sample Location	Sampled By	Sample Date	Sample Identification	Sample Type	Zone	Sample Depth (feet)[1]	Analytical Results (milligrams per kilogram)[1] 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 (HFPO-DA/GenX)
2016 Hydrogeological Characterization Investigation																
Eastside Fire & Rescue Headquarters Source Area																
STSP01	Geosyntec	7/22/2016	COI-STSP01-20160722	Discrete	Unsaturated	2.2 - 2.3	---	< 0.0019	0.00058	< 0.0019	< 0.00072	**0.023**	**0.00077**	**0.0012**	---	---
STTA01	Geosyntec	7/22/2016	COI-STTA01-20160722	Discrete	Unsaturated	2.2 - 2.3	---	0.0089	0.03	**0.08**	**0.011**	**1.3**	**0.0097**	< 0.00054	---	---
STTA02	Geosyntec	7/22/2016	COI-STTA02-20160722	Discrete	Unsaturated	3.8 - 3.9	---	0.0045	0.015	**0.025**	**0.0043**	**0.18**	**0.033**	**0.0039**	---	---
	Geosyntec	7/22/2016	COI-STTA02-20160722-DUP	Discrete	Unsaturated	3.8 - 3.9	---	0.0054	0.019	**0.029**	**0.0052**	**0.25**	**0.043**	**0.0045**	---	---
2018 Subsurface Investigation																
Issaquah Valley Elementary School Source Area																
DU-1A	Farallon	8/6/2018	DU-1A-COMPOSITE	MI	Unsaturated	0.0 - 0.5	0.00037	< 0.00082	0.00072 J	**0.00022**	**0.0011**	**0.0028**	**0.00034**	**0.0015**	< 0.00082	---
DU-1B	Farallon	8/7/2018	DU-1B-COMPOSITE	MI	Unsaturated	0.0 - 0.5	< 0.00098	< 0.00098	0.00024 J	**0.00017 J**	**0.00053**	**0.0024**	< 0.00098	**0.0005** J	< 0.00098	---
IES-R02	Farallon	8/10/2018	IES-R02-180810-12	Discrete	Unsaturated	12.0	< 0.00097	< 0.00097	< 0.00097	< 0.00097	< 0.00097	< 0.00097	< 0.00097	< 0.00097	< 0.00097	---
	Farallon	8/10/2018	IES-R02-180810-23	Discrete	Saturated	23.0	< 0.00096	< 0.00096	< 0.00096	**0.0002**	< 0.00096	**0.00055**	< 0.00096	< 0.00096	< 0.00096	---
DU-2A	Farallon	8/8/2018	DU-2A-COMPOSITE	MI	Unsaturated	0.0 - 0.5	0.0010	< 0.0010	0.00096 J	**0.0024**	**0.00094** J	**0.085**	**0.0011**	**0.00082** J	< 0.0010	---
DU-2B	Farallon	8/9/2018	DU-2B-COMPOSITE	MI	Unsaturated	0.0 - 0.5	< 0.00096	< 0.00096	0.00026 J	**0.00086** J	**0.00042** J	**0.016**	< 0.00096	**0.00028** J	< 0.00096	---
DF-R01	Farallon	9/6/2018	DF-R01-180906-3.5	Discrete	Unsaturated	3.5	0.00044 J	< 0.0012	0.00049 J	**0.0036**	**0.00040** J	**0.043**	**0.0072**	**0.00037** J	< 0.0012	---
Eastside Fire & Rescue Headquarters Source Area																
DU-05	Farallon	8/14/2018	DU-05-COMPOSITE	MI	Unsaturated	0.0 - 0.5	0.00061 J	0.00019 J	0.00068 J	**0.0039**	**0.00077** J	**0.024**	**0.00057** J	**0.00039** J	0.00019 J	---
DU-06	Farallon	8/15/2018	DU-06 COMPOSITE	MI	Unsaturated	0.0 - 0.5	0.00088 J	0.00021 J	0.0014	**0.0049**	**0.0015**	**0.026**	**0.00063** J	**0.00093** J	0.0015	---
NWN-MW02	Farallon	10/18/2018	NWN-MW02-181018-10	Discrete	Unsaturated	10.0	< 0.00096	< 0.00096	< 0.00096	< 0.00096	< 0.00096	< 0.00096	< 0.00096	< 0.00096	< 0.00096	---
	Farallon	10/18/2018	NWN-MW02-181018-19	Discrete	Unsaturated	19.0	< 0.0010	< 0.0010	< 0.0010	**0.00026 J**	< 0.0010	**0.0064**	< 0.0010	< 0.0010	< 0.0010	---
NWN-MW03	Farallon	10/18/2018	NWN-MW03-181018-12	Discrete	Unsaturated	12.0	< 0.0013	< 0.0013	0.00039 J	**0.0036**	**0.00036** J	**0.056**	< 0.0013	< 0.0013	< 0.0013	---
	Farallon	10/18/2018	NWN-MW03-181018-25	Discrete	Unsaturated	25.0	< 0.0010	< 0.0010	0.00028 J	**0.00045** J	**0.00021** J	**0.0064**	**0.00023** J	< 0.0010	0.0018	---
NWN-MW04	Farallon	10/19/2018	NWN-MW04-181019-5	Discrete	Unsaturated	5.0	0.00068 J	0.00081 J	0.0039	**0.0061**	**0.0017**	**0.086**	**0.0025**	< 0.0013	0.011	---
	Farallon	10/19/2018	NWN-MW04-181019-DUP	Discrete	Unsaturated	5.0	0.00044 J	0.00073 J	0.0025	**0.0049**	**0.0015**	**0.088**	**0.0019**	< 0.0014	0.0077	---
	Farallon	10/19/2018	NWN-MW04-181019-13	Discrete	Unsaturated	13.0	< 0.0012	< 0.0012	0.00027 J	**0.00059** J	**0.00034** J	**0.016**	**0.00048** J	< 0.0012	0.0022	---
2020 through 2022 Subsurface Investigations																
Eastside Fire & Rescue Headquarters Source Area																
NWN-R04	Farallon	3/18/2020	NWN-R04-200318-5.0	Discrete	Unsaturated	5.0	0.0016	0.00083 J	0.0081	**0.0070**	**0.0010** J	**0.013**	< 0.0014	< 0.0014	0.016	**0.0007** J
	Farallon	3/18/2020	NWN-R04-200318-10.0	Discrete	Saturated	10.0	0.0013 J	0.00063 J	**0.0065**	**0.0053**	**0.0011** J	**0.0092**	< 0.0014	< 0.0014	**0.017**	**0.00089** J
	Farallon	3/18/2020	NWN-R04-200318-15.0	Discrete	Saturated	15.0	0.00051 J	< 0.0013	0.0025	**0.0020**	**0.00041** J	**0.0056**	< 0.0013	< 0.0013	**0.0073**	**0.0012** J
NWN-R05	Farallon	3/20/2020	NWN-R05-200320-3.0	Discrete	Unsaturated	3.0	0.00092 J	< 0.0013	0.0032	**0.0032**	**0.0021**	**0.83**	**0.0035**	**0.00049** J	0.0041	**0.00033** J
	Farallon	3/20/2020	NWN-R05-200320-5.0	Discrete	Saturated	5.0	< 0.0014	< 0.0014	0.0013 J	**0.0014** J	**0.00098** J	**0.23**	**0.0010** J	**0.0004** J	0.0023	**0.00024** J
	Farallon	3/20/2020	NWN-R05-200320-10.0	Discrete	Saturated	10.0	< 0.0012	< 0.0012	< 0.00099	< 0.0012	**0.00022** J	**0.04**	< 0.0012	< 0.00099	0.00079 J	< 0.00012
MTCA Method B Direct Contact Cleanup Levels for Soil[3]							**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 Soil[3]							**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 Celsius[3]							**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 Saturated[3]							**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**

Table 6
Soil Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Sample Location	Sampled By	Sample Date	Sample Identification	Sample Type	Zone	Sample Depth (feet)[1]	Analytical Results (milligrams per kilogram)[1] 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 (HFPO-DA/GenX)
	Farallon	3/20/2020	NWN-R06-200320-2.0	Discrete	Unsaturated	2.0	0.0018	0.00090 J	0.0083	**0.017**	**0.0066**	**1.2**	**0.0043**	< 0.0011	0.047	**0.00019** J
NWN-R06	Farallon	3/20/2020	NWN-R06-200320-5.0	Discrete	Unsaturated	5.0	0.00059 J	0.00035 J	0.0019	**0.0039**	**0.0025**	**0.67**	**0.00064** J	**0.0006** J	0.014	**0.00027** J
	Farallon	3/20/2020	NWN-R06-200320-10.0	Discrete	Saturated	10.0	< 0.0013	< 0.0013	0.00071 J	**0.0017**	**0.00063** J	**0.094**	**0.00053** J	**0.0014**	**0.0052**	< 0.00013
	Farallon	3/20/2020	NWN-R07-200320-3.0	Discrete	Unsaturated	3.0	0.0022	0.0035	0.011	**0.077**	**0.0053**	**0.051**	**0.00045** J	< 0.0011	0.057	**0.00019** J
NWN-R07	Farallon	3/20/2020	NWN-R07-200320-5.0	Discrete	Unsaturated	5.0	0.0020	0.0034	0.011	**0.071**	**0.0061**	**0.10**	**0.00075** J	< 0.0011	0.052	**0.00046** J
	Farallon	3/20/2020	NWN-R07-200320-10.0	Discrete	Unsaturated	10.0	< 0.0013	0.00039 J	0.0016	**0.0065**	**0.00090** J	**0.063**	< 0.0013	< 0.0010	0.0074	< 0.00013
	Farallon	3/18/2020	NWN-R08-200318-5.0	Discrete	Unsaturated	5.0	0.0014	< 0.0013	0.0053	< 0.0013	**0.0022**	**0.016**	< 0.0013	< 0.0013	0.017	**0.00086** J
NWN-R08	Farallon	3/18/2020	NWN-R08-200318-10.0	Discrete	Saturated	10.0	< 0.0011	< 0.0011	0.00073 J	< 0.0011	**0.00088** J	**0.0089**	< 0.0011	< 0.0011	**0.0056**	**0.00079** J
	Farallon	3/18/2020	NWN-R08-200318-15.0	Discrete	Saturated	15.0	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	**0.00026** J	< 0.0011	< 0.0011	0.00026 J	**0.00058** J
	Farallon	3/20/2020	NWN-R09-200320-3.0	Discrete	Unsaturated	3.0	0.0051	0.0045	**0.037**	**0.061**	**0.0079**	**0.93**	**0.033**	**0.00039** J	**0.48**	**0.0003** J
NWN-R09	Farallon	3/20/2020	NWN-R09-200320-5.0	Discrete	Unsaturated	5.0	0.00062 J	0.00046 J	0.0043	**0.0039**	**0.00085** J	**0.15**	**0.0018**	< 0.0011	0.035	**0.00036** J
	Farallon	3/20/2020	NWN-R09-200320-10.0	Discrete	Saturated	10.0	0.0011 J	0.00076 J	**0.0064**	**0.0078**	**0.0011** J	**0.12**	**0.0027**	< 0.0010	**0.073**	< 0.00013
	Farallon	3/20/2020	NWN-R10-200320-3.0	Discrete	Unsaturated	3.0	0.010	0.016	**0.066**	**0.066**	**0.014**	**0.10**	**0.058**	**0.0028**	**0.081**	**0.00028** J
NWN-R10	Farallon	3/20/2020	NWN-R10-200320-5.0	Discrete	Unsaturated	5.0	0.0096	0.017	**0.060**	**0.12**	**0.037**	**0.78**	**0.074**	**0.0027**	**0.19**	**0.00049** J
	Farallon	3/20/2020	NWN-R10-200320-10.0	Discrete	Unsaturated	10.0	0.0029	0.0046	0.015	**0.019**	**0.0037**	**0.30**	**0.0060**	**0.0016**	0.023	< 0.0001
	Farallon	3/20/2020	NWN-R11-200320-3.0	Discrete	Unsaturated	3.0	0.0063	0.010	**0.037**	**0.14**	**0.022**	**0.034**	**0.0037**	< 0.0008	**0.09**	**0.00015** J
NWN-R11	Farallon	3/20/2020	NWN-R11-200320-5.0	Discrete	Unsaturated	5.0	0.0036	0.0050	0.025	**0.15**	**0.015**	**0.33**	**0.0050**	< 0.0008	0.059	**0.00023** J
	Farallon	3/20/2020	NWN-R11-200320-10.0	Discrete	Unsaturated	10.0	0.00098	0.0012	0.0057	**0.03**	**0.0039**	**0.081**	**0.0060**	< 0.0008	0.027	< 0.0001
	Farallon	3/23/2020	NWN-R12-200323-5.0	Discrete	Unsaturated	5.0	0.0011	0.0019	0.0085	**0.066**	**0.0099**	**0.65**	**0.0020**	< 0.0008	**0.078**	**0.00029** J
NWN-R12	Farallon	3/23/2020	NWN-R12-200323-10.0	Discrete	Unsaturated	10.0	0.00057 J	0.00086 J	0.0040	**0.028**	**0.0063**	**0.39**	**0.0012**	< 0.0008	0.035	< 0.0001
	Farallon	3/23/2020	NWN-R12-200323-15.0	Discrete	Unsaturated	15.0	0.00039 J	0.00045 J	0.0020	**0.012**	**0.0021**	**0.13**	**0.00035** J	< 0.0008	0.014	< 0.0001
	Farallon	3/18/2020	NWN-R13-200318-6.5	Discrete	Unsaturated	6.5	0.00051 J	< 0.0011	0.0024	< 0.0011	**0.00081** J	**0.0036**	< 0.0011	**0.00032** J	0.0075	**0.00038** J
NWN-R13	Farallon	3/18/2020	NWN-R13-200318-10.0	Discrete	Saturated	10.0	0.0020	< 0.0011	**0.010**	**0.00081** J	**0.0027**	**0.031**	**0.00057** J	**0.0003** J	**0.091**	**0.00038** J
	Farallon	3/18/2020	NWN-R13-200318-15.0	Discrete	Saturated	15.0	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	**0.00046** J	< 0.0011	< 0.0011	0.00066 J	**0.00045** J
	Farallon	3/19/2020	NWN-R14-200319-5.0	Discrete	Unsaturated	5.0	0.0014	0.0033	0.0091	**0.041**	**0.0053**	**0.089**	**0.0037**	< 0.0012	0.048	< 0.0012
NWN-R14	Farallon	3/19/2020	NWN-R14-200319-10.0	Discrete	Unsaturated	10.0	< 0.0013	0.00044 J	0.0011 J	**0.0016**	**0.00033** J	**0.0046**	< 0.0013	< 0.0013	0.0028	< 0.0013
	Farallon	3/19/2020	NWN-R14-200319-15.0	Discrete	Saturated	15.0	< 0.0012	< 0.0012	0.00096 J	**0.0012**	**0.00033** J	**0.0052**	< 0.0012	< 0.0012	0.0027	< 0.0012
	Farallon	3/19/2020	NWN-R15-200319-5.0	Discrete	Unsaturated	5.0	0.0091	0.017	**0.049**	**0.19**	**0.067**	**0.54**	**1.4**	**0.0056**	**0.24**	**0.0014**
NWN-R15	Farallon	3/19/2020	NWN-R15-200319-10.0	Discrete	Unsaturated	10.0	0.0053	0.012	0.029	**0.11**	**0.038**	**0.49**	**1.1**	**0.0062**	**0.18**	**0.0014**
	Farallon	3/19/2020	NWN-R15-200319-15.0	Discrete	Saturated	15.0	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	**0.0053**	**0.00056** J	< 0.0011	0.0019	< 0.0011
	Farallon	3/19/2020	NWN-R16-200319-5.0	Discrete	Unsaturated	5.0	0.0019	0.0030	0.011	**0.021**	**0.0060**	**0.15**	**0.066**	**0.0024**	0.025	**0.00056** J
NWN-R16	Farallon	3/19/2020	NWN-R16-200319-10.0	Discrete	Unsaturated	10.0	< 0.0010	0.00042 J	0.0015	**0.0018**	**0.00046** J	**0.021**	**0.0039**	< 0.0010	0.0036	**0.00062** J
	Farallon	3/19/2020	NWN-R16-200319-15.0	Discrete	Saturated	15.0	< 0.0010	0.00052 J	0.0020	**0.0028**	**0.0010**	**0.032**	**0.018**	**0.00041** J	**0.0057**	**0.00085** J
	Farallon	3/19/2020	NWN-R17-200319-5.0	Discrete	Unsaturated	5.0	< 0.0011	< 0.0011	0.00037 J	**0.0018**	< 0.0011	**0.0014**	< 0.0011	< 0.0011	< 0.0011	**0.0013**
NWN-R17	Farallon	3/19/2020	NWN-R17-200319-10.0	Discrete	Unsaturated	10.0	< 0.0010	< 0.0010	< 0.0010	**0.00061** J	**0.00015** J	**0.0039**	< 0.0010	< 0.0010	0.0016	**0.00051** J
	Farallon	3/19/2020	NWN-R17-200319-15.0	Discrete	Unsaturated	15.0	< 0.0010	< 0.0010	0.00049 J	< 0.0010	< 0.0010	**0.0021**	< 0.0010	< 0.0010	0.00036 J	**0.00059** J
	Farallon	3/19/2020	NWN-R18-200319-5.0	Discrete	Unsaturated	5.0	< 0.0012	< 0.0012	0.00043 J	**0.0028**	**0.00074** J	**0.0042**	< 0.0012	< 0.0012	0.001 J	**0.00069** J
NWN-R18	Farallon	3/19/2020	NWN-R18-200319-10.0	Discrete	Unsaturated	10.0	< 0.0012	< 0.0012	0.00064 J	**0.0019**	**0.00045** J	**0.0091**	**0.00054** J	< 0.0012	0.0013	**0.00095** J
	Farallon	3/19/2020	NWN-R18-200319-15.0	Discrete	Unsaturated	15.0	< 0.0011	< 0.0011	< 0.0011	**0.0010** J	**0.00028** J	**0.0071**	< 0.0011	< 0.0011	0.00047 J	**0.0011** J
MTCA Method B Direct Contact Cleanup Levels for Soil[3]							**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 Soil[3]							**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 Celsius[3]							**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 Saturated[3]							**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**

Table 6
Soil Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Sample Location	Sampled By	Sample Date	Sample Identification	Sample Type	Zone	Sample Depth (feet)[1]	Analytical Results (milligrams per kilogram)[1] 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 (HFPO-DA/GenX)
NWN-MW05	Farallon	3/23/2020	NWN-MW05-200323-6.0	Discrete	Unsaturated	6.0	0.00057 J	0.00051 J	0.0031	**0.0046**	**0.0013**	**0.25**	**0.0011**	< 0.0008	0.015	**0.00021** J
	Farallon	3/23/2020	NWN-MW05-200323-10.0	Discrete	Unsaturated	10.0	< 0.00082	0.00027 J	0.0016	**0.0030**	**0.00069** J	**0.12**	**0.00046** J	< 0.0008	0.0046	< 0.0001
	Farallon	3/23/2020	NWN-MW05-200323-15.0	Discrete	Unsaturated	15.0	< 0.0010	< 0.0010	< 0.00081	**0.00048** J	**0.00021** J	**0.012**	< 0.0010	< 0.00081	0.00079 J	< 0.0001
NWN-MW06	Farallon	3/23/2020	NWN-MW06-200323-6.0	Discrete	Unsaturated	6.0	< 0.00096	0.00027 J	0.00088 J	**0.0045**	**0.0013**	**0.22**	**0.0048**	**0.0017**	0.0044	**0.00023** J
	Farallon	3/23/2020	NWN-MW06-200323-10.0	Discrete	Unsaturated	10.0	< 0.0010	0.00042 J	0.00065 J	**0.0050**	**0.00087** J	**0.13**	**0.0019**	**0.00075** J	0.0032	< 0.0001
	Farallon	3/23/2020	NWN-MW06-200323-15.0	Discrete	Unsaturated	15.0	< 0.00084	0.00033 J	0.00065 J	**0.0033**	**0.00053** J	**0.077**	**0.00096**	**0.00062** J	0.0019	< 0.0001
NWN-MW07	Farallon	3/30/2020	NWN-MW07_200330-5	Discrete	Unsaturated	5.0	< 0.0011	< 0.0011	0.00036 J	**0.0015**	**0.00025** J	**0.031**	**0.00049** J	**0.00038** J	0.0048	< 0.0011
	Farallon	3/30/2020	NWN-MW07_200330-10	Discrete	Unsaturated	10.0	0.00047 J	0.00080 J	0.0021	**0.0054**	**0.0013**	**0.056**	**0.0082**	**0.00061** J	0.0056	< 0.0012
	Farallon	3/30/2020	NWN-MW07_200330-15	Discrete	Unsaturated	15.0	< 0.00097	< 0.00097	0.00037 J	**0.00049** J	< 0.00097	**0.0031**	**0.00045** J	< 0.00097	0.0019	< 0.00097
NWN-MW09	Farallon	3/19/2020	NWN-MW09-200319-5	Discrete	Unsaturated	5.0	< 0.0014	< 0.0014	0.00056 J	**0.0015**	**0.00069** J	**0.078**	< 0.0014	< 0.0014	< 0.0014	< 0.0014
NWN-MW10	Farallon	6/15/2021	NWN-MW10-3	Discrete	Unsaturated	3.0	0.0037	0.0099	0.032	**0.21**	**0.094**	**0.44**	**0.9**	**0.0013**	**0.11**	< 0.0011
	Farallon	6/15/2021	NWN-MW10-5	Discrete	Unsaturated	5.0	0.0019	0.0046	0.019	**0.14**	**0.0039**	**0.00087** J	**0.0096**	< 0.0011	0.0094	< 0.0011
	Farallon	6/15/2021	NWN-MW10-10	Discrete	Unsaturated	10.0	< 0.0010	0.00028 J	0.00067 J	**0.0018**	**0.00041** J	**0.039**	**0.0028**	< 0.0010	0.0023	< 0.0010
NWN-MW12	Farallon	6/15/2021	NWN-MW12-3	Discrete	Unsaturated	3.0	0.0018	0.025	**0.065**	**0.21**	**0.047**	**0.48**	**0.62**	**0.013**	0.066	< 0.0013
	Farallon	6/15/2021	NWN-MW12-5	Discrete	Unsaturated	5.0	0.0016	0.0030	0.0049	**0.0031**	**0.00086** J	**0.0052**	**0.0056**	< 0.0012	0.00096 J	< 0.0012
	Farallon	6/15/2021	NWN-MW12-10	Discrete	Unsaturated	10.0	0.0036	0.0071	0.0095	**0.0024**	**0.00063** J	**0.0042**	**0.0071**	< 0.0014	0.00048 J	< 0.0014
NWN-MW13	Farallon	6/15/2021	NWN-MW13-3	Discrete	Unsaturated	3.0	0.0018	0.00068 J	0.0031	**0.019**	**0.0026**	**0.54**	**0.0033**	**0.0009** J	0.0029	< 0.0012
	Farallon	6/15/2021	NWN-MW13-5	Discrete	Unsaturated	5.0	0.0010 J	0.00035 J	0.0022	**0.0039**	**0.0011** J	**0.046**	**0.00087** J	< 0.0013	0.0017	< 0.0013
	Farallon	6/15/2021	NWN-MW13-10	Discrete	Unsaturated	10.0	< 0.0011	< 0.0011	< 0.0011	< 0.0011	**0.00026** J	**0.0065**	< 0.0011	**0.00031** J	0.0011	< 0.0011
NWN-MW14	Farallon	6/15/2021	NWN-MW14-3	Discrete	Unsaturated	3.0	< 0.0012	0.00056 J	0.0018	**0.011**	**0.0013**	**0.028**	< 0.0012	< 0.0012	0.0014	< 0.0012
	Farallon	6/15/2021	NWN-MW14-5	Discrete	Unsaturated	5.0	< 0.0011	0.00052 J	0.0018	**0.015**	**0.0020**	**0.046**	**0.00051** J	< 0.0011	0.0014	< 0.0011
	Farallon	6/15/2021	NWN-MW144-5	Discrete	Unsaturated	5.0	< 0.0011	0.00052 J	0.0015	**0.012**	**0.0014**	**0.041**	< 0.0011	< 0.0011	0.0011 J	< 0.0011
NWN-MW15	Farallon	6/17/2021	NWN-MW15-3	Discrete	Unsaturated	3.0	< 0.0011	< 0.0011	< 0.0011	**0.00061** J	< 0.0011	**0.0091**	< 0.0011	< 0.0011	< 0.0011	< 0.0011
	Farallon	6/17/2021	NWN-MW15-5	Discrete	Unsaturated	5.0	< 0.0011	0.00030 J	0.00072 J	**0.0020**	**0.00025** J	**0.0012**	< 0.0011	< 0.0011	< 0.0011	< 0.0011
NWN-MW16	Farallon	6/17/2021	NWN-MW11-3	Discrete	Unsaturated	3.0	< 0.00093	< 0.00093	0.00034 J	**0.0010**	**0.00023** J	**0.011**	< 0.00093	< 0.00093	< 0.00093	< 0.00093
	Farallon	6/17/2021	NWN-MW11-5	Discrete	Unsaturated	5.0	< 0.0011	< 0.0011	< 0.0011	**0.00071** J	**0.00015** J	**0.022**	< 0.0011	< 0.0011	0.00021 J	< 0.0011
	Farallon	6/17/2021	NWN-MW111-5	Discrete	Unsaturated	5.0	< 0.0012	< 0.0012	< 0.0012	**0.00063** J	**0.00022** J	**0.054**	< 0.0012	< 0.0012	0.0005 J	< 0.0012
NWN-R19	Farallon	6/15/2021	NWN-R19-3	Discrete	Unsaturated	3.0	0.0055	0.0058	0.035	**0.12**	**0.027**	**3.6**	**0.032**	**0.0069**	**0.28**	< 0.0011
	Farallon	6/15/2021	NWN-R19-5	Discrete	Unsaturated	5.0	0.0024	0.0026	0.014	**0.043**	**0.01**	**1.5**	**0.016**	**0.0065**	**0.12**	< 0.0011
	Farallon	6/15/2021	NWN-R19-10	Discrete	Unsaturated	10.0	< 0.00091	< 0.00091	0.00085 J	**0.0018**	**0.00040** J	**0.018**	< 0.00091	< 0.00091	0.003	< 0.00091
NWN-R20	Farallon	6/15/2021	NWN-R20-3	Discrete	Unsaturated	3.0	0.00069 J	0.00032 J	0.0027	**0.0097**	**0.0041**	**0.89**	**0.0047**	**0.0029**	0.011	< 0.00098
	Farallon	6/15/2021	NWN-R20-5	Discrete	Unsaturated	5.0	< 0.0013	< 0.0013	0.0018	**0.0028**	**0.00099** J	**0.14**	< 0.0013	< 0.0013	0.0051	< 0.0013
	Farallon	6/15/2021	NWN-R20-10	Discrete	Unsaturated	10.0	0.00064 J	0.00036 J	0.0027	**0.013**	**0.0042**	**2.5**	**0.0045**	**0.00049** J	0.023	< 0.0014
	Farallon	6/15/2021	NWN-R20-15	Discrete	Unsaturated	15.0	< 0.0011	< 0.0011	< 0.0011	< 0.0011	< 0.0011	**0.0023**	< 0.0011	< 0.0011	0.00031 J	< 0.0011
NWN-R21	Farallon	6/15/2021	NWN-R21-3	Discrete	Unsaturated	3.0	0.00043 J	< 0.0011	0.00094 J	**0.0027**	**0.00060** J	**0.076**	**0.0012**	**0.00088** J	0.0047	< 0.0011
	Farallon	6/15/2021	NWN-R21-6	Discrete	Unsaturated	6.0	< 0.0011	0.00060 J	0.0020	**0.019**	**0.0036**	**0.64**	**0.0031**	**0.00067** J	0.0052	< 0.0011
	Farallon	6/15/2021	NWN-R211-6	Discrete	Unsaturated	6.0	< 0.0010	0.0014	0.0033	**0.023**	**0.0042**	**0.35**	**0.0022**	**0.00039** J	0.0032	< 0.0010
	Farallon	6/15/2021	NWN-R21-10	Discrete	Unsaturated	10.0	< 0.00098	< 0.00098	0.00052 J	**0.0018**	**0.00045** J	**0.042**	**0.00041** J	< 0.00098	0.0012	< 0.00098
	Farallon	6/15/2021	NWN-R21-15	Discrete	Saturated	15.0	< 0.0011	< 0.0011	< 0.0011	**0.00042** J	**0.00016** J	**0.0047**	< 0.0011	< 0.0011	0.00037 J	< 0.0011
MTCA Method B Direct Contact Cleanup Levels for Soil[3]							**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 Soil[3]							**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 Celsius[3]							**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 Saturated[3]							**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**

Table 6
Soil Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Sample Location	Sampled By	Sample Date	Sample Identification	Sample Type	Zone	Sample Depth (feet)[1]	Analytical Results (milligrams per kilogram)[1] 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 (HFPO-DA/GenX)
NWN-R22	Farallon	6/15/2021	NWN-R22-0.5-2.0-H	Discrete	Unsaturated	0.5 - 2.0	0.0027	0.0032	0.012	**0.10**	**0.022**	**2.7**	**0.019**	**0.0018**	**0.17**	< 0.0010
	Farallon	6/15/2021	NWN-R22-3	Discrete	Unsaturated	3.0	0.0081	0.018	**0.040**	**0.19**	**0.025**	**3.3**	**0.0029**	< 0.0015	**0.22**	< 0.0015
	Farallon	6/15/2021	NWN-R22-5	Discrete	Unsaturated	5.0	0.0028	0.0049	0.014	**0.03**	**0.0040**	**0.39**	**0.00073** J	< 0.0013	0.03	< 0.0013
	Farallon	6/15/2021	NWN-R22-10	Discrete	Unsaturated	10.0	< 0.0011	< 0.0011	0.00045 J	**0.0011** J	**0.00040** J	**0.14**	**0.00044** J	**0.00065** J	0.0031	< 0.0011
	Farallon	6/15/2021	NWN-R22-15	Discrete	Unsaturated	15.0	< 0.0011	< 0.0011	0.00054 J	**0.00068** J	**0.00021** J	**0.017**	< 0.0011	< 0.0011	0.0015	< 0.0011
NWN-R23	Farallon	8/18/2022	FB-01-2.5	Discrete	Unsaturated	2.5	< 0.0013	< 0.0013	0.0010 J	**0.0064**	**0.00025** J	**0.0019**	< 0.0013	< 0.0013	< 0.0013	< 0.0013
	Farallon	8/18/2022	FB-01-5.0	Discrete	Unsaturated	5.0	< 0.0012	< 0.0012	< 0.0012	< 0.0012	< 0.0012	**0.0013**	< 0.0012	< 0.0012	< 0.0012	< 0.0012
	Farallon	8/18/2022	FB-01-10.0	Discrete	Unsaturated	10.0	< 0.0012	< 0.0012	< 0.0012	< 0.0012	< 0.0012	**0.00044** J	< 0.0012	< 0.0012	< 0.0012	< 0.0012
NWN-R24	Farallon	8/18/2022	FB-02-2.5	Discrete	Unsaturated	2.5	0.00078 J	0.00070 J	0.0026	**0.0048**	**0.0024**	**0.66**	**0.0018**	**0.0029**	0.024	< 0.0013
	Farallon	8/18/2022	FB-02-5.0	Discrete	Unsaturated	5.0	0.00070 J	0.00044 J	0.0027	**0.0051**	**0.0026**	**1.3**	**0.0020**	**0.006**	0.021	< 0.0013
	Farallon	8/18/2022	FB-02-10.0	Discrete	Unsaturated	10.0	0.00054 J	0.00027 J	0.0017	**0.0036**	**0.0013**	**0.43**	**0.00069** J	**0.0018**	0.012	< 0.0012
NWN-R25	Farallon	8/18/2022	FB-03-2.5	Discrete	Unsaturated	2.5	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.00018** J	**0.022**	< 0.0010	< 0.0010	0.00076 J	< 0.0010
	Farallon	8/18/2022	FB-03-5.0	Discrete	Unsaturated	5.0	< 0.0014	< 0.0014	0.0016	**0.0010** J	**0.00047** J	**0.058**	< 0.0014	< 0.0014	0.0017	< 0.0014
	Farallon	8/18/2022	FB-03-10.0	Discrete	Unsaturated	10.0	< 0.0012	< 0.0012	0.0010 J	**0.00073** J	**0.00040** J	**0.025**	< 0.0012	< 0.0012	0.002	< 0.0012
NWN-HA01	Farallon	8/9/2022	HA-01-2.0	Discrete	Unsaturated	2.0	< 0.0010	< 0.0010	< 0.0010	**0.0021**	**0.00027** J	**0.0012**	< 0.0010	< 0.0010	< 0.0010	< 0.0010
NWN-HA02	Farallon	8/9/2022	HA-02-2.0	Discrete	Unsaturated	2.0	< 0.0011	0.00026 J	< 0.0011	< 0.0011	< 0.0011	**0.0013**	< 0.0011	< 0.0011	< 0.0011	< 0.0011
NWN-HA03	Farallon	8/9/2022	HA-03-2.0	Discrete	Unsaturated	2.0	0.00098 J	< 0.0011	0.0010 J	**0.00049** J	**0.00043** J	**0.0043**	< 0.0011	< 0.0011	< 0.0011	< 0.0011
NWN-HA04	Farallon	8/9/2022	HA-04-2.0	Discrete	Unsaturated	2.0	0.00094 J	< 0.0010	0.0013	**0.00064** J	**0.00041** J	**0.0046**	< 0.0010	< 0.0010	< 0.0010	< 0.0010
NWN-HA05	Farallon	8/9/2022	HA-05-2.0	Discrete	Unsaturated	2.0	0.0039	< 0.00096	0.0028	**0.0026**	**0.0030**	**0.08**	**0.0060**	< 0.00096	< 0.00096	< 0.00096
NWN-HA06	Farallon	8/9/2022	HA-06-2.0	Discrete	Unsaturated	2.0	0.0022	0.00078 J	0.0020	**0.018**	**0.0038**	**0.45**	**0.0020**	**0.00043** J	0.00057 J	< 0.0011
NWN-HA07	Farallon	8/9/2022	HA-07-2.0	Discrete	Unsaturated	2.0	0.00095 J	0.00048 J	0.00087 J	**0.00094** J	**0.00085** J	**0.0073**	< 0.00098	< 0.00098	< 0.00098	< 0.00098
NWN-HA08	Farallon	8/18/2022	HA-08-2.0	Discrete	Unsaturated	2.0	< 0.0012	< 0.0012	0.00079 J	**0.0018**	**0.00070** J	**0.03**	**0.00068** J	**0.00065** J	0.0017	< 0.0012
NWN-HA09	Farallon	8/18/2022	HA-09-2.0	Discrete	Unsaturated	2.0	< 0.0010	< 0.0010	0.0011	**0.0017**	**0.00087** J	**0.045**	**0.00057** J	**0.0027**	0.0037	< 0.0010
NWN-HA10	Farallon	8/18/2022	HA-10-2.0	Discrete	Unsaturated	2.0	0.0018	0.00040 J	0.0025	**0.0066**	**0.0017**	**0.36**	**0.0020**	**0.00057** J	0.0016	< 0.0011
MTCA Method B Direct Contact Cleanup Levels for Soil[3]							**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 Soil[3]							**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 Celsius[3]							**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 Saturated[3]							**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 or information unknown.

[1]Depth in feet below ground surface.

[2]Samples collected in 2016 analyzed by U.S. Environmental Protection Agency (EPA) Method 537; samples collected in 2018 and later analyzed by EPA Method 537 Modified.

[3]Washington 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 Janurary 2025.

Farallon = Farallon Consulting, L.L.C.
Geosyntec = Geosyntec Consultants, Inc.
J = result is an estimate
MI = multi-incremental
NE = not established
PFAS = per- and poly-fluoroalkyl substances

Table 7
Shallow Groundwater Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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														
Eastside Fire & Rescue Headquarters Source Area														
NWN-R01	Farallon	8/24/2018	NWN_R01_180824_19	19.0	0.25	0.31	0.89	**2.3**	**0.39**	**7.3**	**0.078**	**0.02**	2.2	---
	Farallon	8/24/2018	NWN_R01_180824_19_DUPLICATE	19.0	0.23	0.31	0.84	**1.8**	**0.39**	**6.8**	**0.091**	**0.02**	2.2	---
NWN-R02	Farallon	8/23/2018	NMW-R02-180823-23	23.0	0.24	0.30	0.82	**1.90**	**0.45**	**9.50**	**0.24**	**0.04**	2.3	---
NWN-R03	Farallon	8/22/2018	NMW-R03-180822-28	28.0	0.010	0.018	0.044	**0.180**	**0.032**	**0.380**	**0.015**	**0.0095**	0.011	---
	Farallon	8/23/2018	NMW-R03-180823-39	39.0	0.0090 J	0.011	0.035	**0.120**	**0.021**	**0.25**	**0.015**	**0.011**	0.007	---
NWN-R04	Farallon	3/18/2020	NWN-R04-12.0	12.0	0.05	0.065	0.25	**0.22**	**0.024**	**0.18**	0.0025 J	< 0.004	0.49	< 0.0040
NWN-R06	Farallon	3/20/2020	NWN-R06-200320-10.0W	10.0	0.38	0.38	1.1	**3**	**0.65**	**21**	**0.3**	**0.14**	1.5	< 0.0008
NWN-R08	Farallon	3/18/2020	NWN-R08-13.0	13.0	0.058	0.029	0.17	**0.15**	**0.10**	**0.39**	**0.024**	**0.0094**	0.27	< 0.0040
NWN-R13	Farallon	3/18/2020	NWN-R13-14.0	14.0	0.15	0.013	0.56	**0.063**	**0.17**	**0.51**	**0.034**	**0.014**	0.94	< 0.0041
NWN-R16	Farallon	3/19/2020	NWN-R16-17.0	17.0	0.31	0.34	1.6	**2**	**0.83**	**7.4**	**9.6**	**0.055**	1.8	< 0.0040
NWN-R18	Farallon	3/19/2020	NWN-R18-23.0	23.0	0.091	0.041	0.35	**0.23**	**0.14**	**2.0**	**0.11**	**0.017**	1.2	< 0.0040
NWN-MW08	Farallon	3/20/2020	NWN-MW08-200320-53	53.0	0.053	0.077	0.14	**0.31**	**0.038**	**0.3**	**0.012**	**0.0041** J	0.056	0.00045 J
NWN-MW09	Farallon	3/19/2020	NWN-MW09-200319-43	43.0	0.13	0.071	0.46	**0.34**	**0.14**	**2.0**	**0.086**	**0.0071**	1.3	0.0003 J
Issaquah Valley Elementary School Source Area														
IES-R01	Farallon	8/8/2018	IES-R01-180808	20.0	0.0091	0.025	0.036	**0.11**	**0.012**	**0.27**	**0.011**	< 0.0045	0.019	---
IES-R02	Farallon	8/10/2018	IES-R02-180810 (1140)	15.0	< 0.0093	0.02	0.041	**0.13**	**0.023**	**0.21**	0.0088	**0.0013** J	< 0.0046	---
	Farallon	8/10/2018	IES-R02-180810 (1305)	25.0	0.031	0.068	0.15	**0.36**	**0.045**	**0.72**	**0.026**	**0.0027** J	0.17	---
IES-R03	Farallon	8/9/2018	IES-R03-180809 (0925)	13.5	< 0.0091	< 0.0045	0.0025 J	**0.0022** J	0.0035	0.0031 J	< 0.0045	< 0.0045	0.0018 J	---
	Farallon	8/9/2018	IES-R03-180809 (1110)	24.0	0.024	0.051	0.088	**0.23**	**0.026**	**0.38**	**0.012**	**0.0021** J	0.012	---
IES-R04	Farallon	8/9/2018	IES-R04-180809	23.0	< 0.012	0.033	0.082	**0.20**	**0.03**	**0.36**	**0.034**	**0.0021** J	0.077	---
IES-R05	Farallon	8/10/2018	IES-R05-180810 (0825)	11.0	< 0.0091	0.01	0.008	**0.017**	**0.0092**	**0.028**	0.0012 J	< 0.0045	< 0.0045	---
	Farallon	8/10/2018	IES-R05-180810 (0940)	28.0	0.013	0.039	0.053	**0.20**	**0.026**	**0.51**	**0.04**	**0.0022** J	0.046	---
Lower Issaquah Valley Regional Wells														
COI-MW01	Geosyntec	5/26/2016	MW01_30 TO 40_20160526	30 - 40	---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
	Geosyntec	5/26/2016	MW01_55 TO 65_20160526	55 - 65	---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
COI-MW02	Geosyntec	5/31/2016	MW02_40TO50_20160531	40 - 50	---	0.0073	0.0051	**0.0077**	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
COI-MW03	Geosyntec	5/24/2016	MW03_10 TO 20_20160524	10 - 20	---	0.019	0.012	**0.031**	**0.0046**	**0.01**	0.0027	< 0.0025	---	---
	Geosyntec	5/24/2016	MW03_40 TO 50_20160524	40 - 50	---	0.036	0.021	**0.08**	**0.0075**	**0.11**	0.0091	< 0.0025	---	---
COI-MW04	Geosyntec	5/27/2016	MW04_29 TO 39_20160527	29 - 39	---	0.0051	< 0.0025	**0.0084**	< 0.0025	0.0028	< 0.0025	< 0.0025	---	---
COI-MW05	Geosyntec	5/23/2016	MW05_10 TO 20_20160523	10 - 20	---	0.03	0.036	**0.039**	**0.022**	**0.013**	0.0084	< 0.0025	---	---
COI-MW06	Geosyntec	10/5/2016	COI-MW06-20161005-19.5-24.5	19.5 - 24.5	---	0.03	0.061	**0.14**	**0.021**	**0.30**	0.0069	< 0.0025	---	---
	Geosyntec	10/6/2016	COI-MW06-20161006-34.5-39.5	34.5 - 39.5	---	0.052	0.10	**0.24**	**0.036**	**0.50**	**0.021**	< 0.0025	---	---
	Geosyntec	10/6/2016	COI-MW06-20161006-51-56	51 - 56	---	0.073	0.13	**0.3**	**0.04**	**0.74**	**0.022**	< 0.0025	---	---
COI-MW07	Geosyntec	10/7/2016	COI-MW07-20161007-20-25	20 - 25	---	0.0044	0.011	**0.0094**	**0.029**	**0.025**	< 0.0025	< 0.0025	---	---
	Geosyntec	10/7/2016	COI-MW07-20161007-35-40	35 - 40	---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	**0.0042**	< 0.0025	< 0.0025	---	---
	Geosyntec	10/7/2016	COI-MW07-20161007-65-70	65 - 70	---	< 0.0025	< 0.0025	**0.0037**	< 0.0025	**0.018**	< 0.0025	< 0.0025	---	---
MTCA Method B Groundwater Cleanup Levels[3]					**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**

Table 7
Shallow Groundwater Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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)
Shallow Groundwater Monitoring Well Samples														
Eastside Fire & Rescue Headquarters Source Area														
NWN-MW01	Farallon	10/26/2018	NWN-MW01-181026	24.0	0.0078 J	0.0072	0.023	**0.013**	**0.012** J	**0.052**	0.0030 J	**0.00094** J	< 0.0042	---
	Farallon	4/16/2020	NWN-MW01-200416	25.0	0.0028 J	0.0070	< 0.0092	**0.033**	0.0032	**0.063**	< 0.0041	< 0.0041	0.0024 J	< 0.0041
	Farallon	9/2/2021	NWN-MW01-20210902	28.0	0.0043	0.015	< 0.0092	**0.0091**	**0.0056**	**0.062**	< 0.0042	< 0.0042	< 0.0042	< 0.0042
	Farallon	1/17/2022	NWN-MW01-20220117	20.0	< 0.0044	0.0036 J	< 0.0092	**0.0095**	0.0039	**0.028**	< 0.0044	< 0.0044	0.001 J	< 0.0044
	Farallon	2/17/2022	NWN-MW01-20220217	25.0	0.0013 J	0.0036 J	< 0.0094	**0.014**	0.0020	**0.031**	< 0.0047	< 0.0047	< 0.0047	---
	Farallon	2/28/2023	NWN-MW01-022823	22.5	0.00047 J	0.0056	< 0.0092	**0.017**	0.0040	**0.051**	0.0013 J	< 0.0045	< 0.0045	< 0.0045
	Farallon	5/10/2023	NWN-MW01-051023	23.5	< 0.0045	0.0063	< 0.0092	**0.030**	0.0037	**0.042**	< 0.0045	< 0.0045	< 0.0045	< 0.0045
NWN-MW02	Farallon	10/26/2018	NWN-MW02-181026	26.0	0.0066 J	0.012	0.0097	**0.14**	**0.0091**	**0.086**	0.0043	**0.0029** J	0.0038 J	---
	Farallon	4/16/2020	NWN-MW02-200416	24.0	0.017	0.047	0.051	**0.19**	**0.023**	**0.61**	0.0047	**0.0013** J	0.045	< 0.0040
	Farallon	10/29/2020	NWN-MW02-102920	27.0	0.021	0.021	0.042	**0.27**	**0.020**	**0.27**	0.0067	**0.0035** J	0.034	< 0.0045
	Farallon	2/28/2023	NWN-MW02-022823	20.0	0.018	0.061	0.060	**0.16**	**0.021**	**0.29**	0.0050	< 0.0046	0.21	< 0.0046
	Farallon	5/10/2023	NWN-MW02-051023	24.0	0.012	0.032	0.057	**0.14**	**0.019**	**0.40**	0.0033 J	< 0.0046	0.025	< 0.0046
NWN-MW03	Farallon	10/26/2018	NWN-MW03-181026	26.0	0.17	0.061	0.55	**0.26**	**0.16**	**1.0**	**0.13**	**0.0081**	1.3	---
	Farallon	4/17/2020	NWN-MW03-200417	25.0	0.22	0.13	0.96	**0.58**	**0.37**	**2.2**	**0.23**	**0.011**	2.2	< 0.0040
	Farallon	7/16/2020	NWN-MW03-200716		0.11	0.046	0.48	**0.20**	**0.17**	**0.90**	**0.081**	**0.0056**	1.2	< 0.0040
	Farallon	10/29/2020	NWN-MW03-102920	26.0	0.16	0.074	0.44	**0.30**	**0.12**	**0.68**	**0.073**	**0.0056**	0.97 E	< 0.0042
	Farallon	9/2/2021	NWN-MW03-20210902	29.0	0.088	0.035	0.30	**0.16**	**0.097**	**0.82**	**0.056**	**0.0046**	0.75	< 0.0042
	Farallon	10/18/2021	NWN-MW03-20211018	27.0	0.12	0.04	0.36	**0.20**	**0.13**	**0.78** H*	**0.073**	**0.0058**	0.82	< 0.0045
	Farallon	12/9/2021	NWN-MW03-20211209	22.0	0.24	0.22	0.76	**0.70**	**0.29**	**1.9**	**0.17**	**0.0089**	1.7	< 0.0045
	Farallon	1/17/2022	NWN-MW03-20220117	20.0	0.25	0.23	0.84	**0.90**	**0.24**	**2.4**	**0.28**	**0.0099**	1.5	< 0.0044
	Farallon	2/17/2022	NWN-MW03-20220217	25.0	0.21	0.12	0.76	**0.50**	**0.18**	**1.6**	**0.18**	**0.0077**	1.7	---
	Farallon	12/14/2022	NWN-MW03-121422[H]	25.0	0.23	0.18	0.67	**0.83**	**0.22**	**1.1**	**0.14**	**0.0071**	1.1	< 0.0045
	Farallon	12/14/2022	DUPLICATE 1[H]		0.27	0.17	0.72	**1.1**	**0.27**	**1.4**	**0.16**	**0.0085**	0.99	< 0.0044
	Farallon	2/28/2023	NWN-MW03-022823	20.0	0.24	0.19	0.88	**0.58** J	**0.33**	**1.6**	**0.18**	**0.0076**	1.9	< 0.0046
	Farallon	2/28/2023	NWN-MW33-022823		0.25	0.16	0.98	**1.0** J	**0.37**	**1.7**	**0.18**	**0.0094**	1.9	< 0.0045
	Farallon	5/10/2023	NWN-MW03-051023	24.0	0.15	0.08	0.70	**0.41**	**0.28**	**1.1**	**0.15**	**0.0073**	1.1	< 0.0045
	Farallon	5/10/2023	NWN-MW33-051023		0.16	0.088	0.67	**0.42**	**0.28**	**1.2**	**0.16**	**0.009**	1.2	< 0.0046
NWN-MW04	Farallon	10/26/2018	NWN-MW04-181026	13.0 - 23.0	0.17	0.14	0.67	**0.61**	**0.20**	**2.2**	**0.057**	**0.017**	1.1	---
	Farallon	10/26/2018	NWN-MW04-181026-DUP		0.17	0.13	0.67	**0.65**	**0.21**	**2.4**	**0.057**	**0.016**	1.3	---
	Farallon	4/17/2020	NWN-MW04-200417	18.0	0.065	0.041	0.24	**0.31**	**0.13**	**2.6**	**0.043**	**0.013**	0.86	< 0.0040
	Farallon	4/17/2020	NWN-MW44-200417		0.064	0.039	0.24	**0.27**	**0.13**	**2.7**	**0.042**	**0.012**	0.86	< 0.0040
	Farallon	7/16/2020	NWN-MW04-200716		0.055	0.021	0.19	**0.15**	**0.091**	**1.5**	**0.028**	**0.011**	0.46	< 0.0041
	Farallon	7/16/2020	NWN-MW44-200716		0.053	0.023	0.19	**0.15**	**0.089**	**1.3**	**0.025**	**0.01**	0.56	< 0.0042
	Farallon	10/29/2020	NWN-MW04-102920		0.15	0.079	0.45	**0.34**	**0.14**	**1.6**	**0.033**	**0.012**	0.78	< 0.0044
	Farallon	10/29/2020	NWN-MW44-102920		0.46	0.28	0.48	**0.32**	**0.15**	**1.7**	**0.036**	**0.012**	0.82	< 0.0043
	Farallon	9/2/2021	NWN-MW04-20210902	20.0	0.064	0.037	0.22	**0.21**	**0.094**	**1.4**	**0.027**	**0.0083**	0.74	< 0.0042
	Farallon	10/18/2021	NWN-MW04-20211018	16.0	0.087	0.059	0.22	**0.24**	**0.093**	**1.1** H*	**0.025**	**0.0094**	0.49	< 0.0044
	Farallon	12/9/2021	NWN-MW04-20211209	12.0	0.20	0.15	0.61	**0.69**	**0.31**	**1.9**	**0.044**	**0.012**	1.2	< 0.0045
	Farallon	1/18/2022	NWN-MW04-20220118		0.20	0.094	0.56	**0.64**	**0.27**	**2.3**	**0.053**	**0.013**	1.4	< 0.0044
	Farallon	2/17/2022	NWN-MW04-20220217	15.0	0.11	0.046	0.36	**0.45**	**0.17**	**2.4**	**0.041**	**0.013**	1.0	---
MTCA Method B Groundwater Cleanup Levels[3]					**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**

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EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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)
Eastside Fire & Rescue Headquarters Source Area (continued)														
NWN-MW05	Farallon	4/16/2020	NWN-MW05-200416	15.0	0.19	0.26	0.49	**1.6**	**0.32**	**4.7**	**0.095**	**0.033**	0.8	< 0.0040
	Farallon	7/16/2020	NWN-MW05-200716		0.21	0.18	0.58	**1.3**	**0.33**	**2.8**	**0.080**	**0.015**	0.84	< 0.0039
	Farallon	10/29/2020	NWN-MW05-102920		0.48	0.081	1.1	**1.8**	**0.49**	**4.8**	**0.12**	**0.04**	1.4	< 0.0045
	Farallon	2/28/2023	NWN-MW05-022823	12.0	0.30	0.30	0.77	**2.3**	**0.44**	**4.0**	**0.10**	**0.027**	1.3	< 0.0045
	Farallon	2/28/2023	NWN-MW55-022823		0.26	0.28	0.73	**2.2**	**0.42**	**4.2**	**0.095**	**0.029**	1.2	< 0.0045
	Farallon	5/10/2023	NWN-MW05-051023	14.0	0.14	0.17	0.45	**1.5**	**0.29**	**3.8**	**0.090**	**0.027**	0.58	< 0.0044
	Farallon	5/10/2023	NWN-MW55-051023		0.14	0.16	0.48	**1.7**	**0.29**	**3.4**	**0.088**	**0.03**	0.5	< 0.0044
NWN-MW06	Farallon	4/17/2020	NWN-MW06-200417	20.0	0.24	0.31	0.79	**2.0**	**0.41**	**8.6**	**0.12**	**0.033**	1.2	< 0.0042
	Farallon	7/16/2020	NWN-MW06-200716		0.15	0.17	0.49	**0.99**	**0.28**	**5.0**	**0.076**	**0.026**	1.1	< 0.0039
	Farallon	9/1/2021	NWN-MW06-20210901	23.0	0.14	0.15	0.44	**1.1**	**0.25**	**6.8**	**0.075**	**0.023**	1.2	< 0.0042
	Farallon	10/18/2021	NWN-MW06-20211018	20.0	0.15	0.14	0.43	**1.0** H*	**0.21**	**3.5** H*	**0.059**	**0.019**	0.89	< 0.0043
	Farallon	12/9/2021	NWN-MW06-20211209	18.0	0.15	0.016	0.063	**0.072**	**0.019**	**0.23**	0.0058	< 0.0044	0.07	< 0.0044
	Farallon	1/18/2022	NWN-MW06-20220118	15.0	0.30	0.12	0.38	**0.59**	**0.12**	**1.4**	**0.039**	**0.004** J	0.46	< 0.0045
	Farallon	2/17/2022	NWN-MW06-20220217	19.0	0.29	0.039	0.19	**0.14**	**0.029**	**0.33**	0.0056	< 0.0045	0.093	---
NWN-MW07	Farallon	4/17/2020	NWN-MW07-200417	21.5	0.17	0.16	0.74	**0.65**	**0.22**	**2.9**	**0.29**	**0.014**	1.5	< 0.0041
	Farallon	4/17/2020	NWN-MW77-200417		0.16	0.16	0.70	**0.64**	**0.21**	**3.0**	**0.27**	**0.013**	1.6	< 0.0041
	Farallon	7/16/2020	NWN-MW07-200716		0.10	0.086	0.43	**0.36**	**0.14**	**2.0**	**0.22**	**0.012**	1.1	< 0.0041
	Farallon	10/29/2020	NWN-MW07-102920	22.0	0.31	0.31	1.2	**0.75**	**0.16**	**1.7**	**0.26**	**0.011**	1.4 E	< 0.0044
	Farallon	10/18/2021	NWN-MW07-20211018	25.0	0.16	0.14	0.52	**0.24**	**0.14**	**0.67** H*	**0.083**	**0.0034** J	0.96	< 0.0045
	Farallon	12/9/2021	NWN-MW07-20211209	18.0	0.21	0.15	0.80	**0.47**	**0.37**	**0.83**	**0.15**	**0.007**	2.2	< 0.0045
	Farallon	1/18/2022	NWN-MW07-20220118		0.33	0.41	1.5	**1.3**	**0.35**	**2.6**	**0.64**	**0.015**	1.8	< 0.0044
	Farallon	2/17/2022	NWN-MW07-20220217	22.0	0.14	0.056	0.28	**0.17**	**0.042**	**0.49**	**0.092**	**0.0035** J	0.73	---
	Farallon	9/2/2022	NWN-MW07	25.0	0.063	0.03	0.20	**0.11**	**0.085**	**0.39**	**0.042**	**0.003** J	0.66	< 0.0042
	Farallon	9/2/2022	NWN-MW07-DUP		0.069	0.03	0.22	**0.11**	**0.093**	**0.43**	**0.041**	**0.0034** J	0.69	< 0.0043
	Farallon	12/14/2022	NWN-MW07-121422[H]	19.4	0.38	0.49	1.2	**0.76**	**0.16**	**0.95**	**0.23**	**0.0055**	1.2	< 0.0044
	Farallon	12/14/2022	DUPLICATE 2[H]		0.38	0.35	1.2	**0.71**	**0.18**	**0.87**	**0.23**	**0.0058**	1.0	< 0.0044
	Farallon	2/28/2023	NWN-MW07-022823	21.5	0.19	0.15	0.58	**0.36**	**0.092**	**0.77**	**0.14**	**0.0057**	0.96	< 0.0045
	Farallon	2/28/2023	NWN-MW77-022823		0.17	0.16	0.49	**0.35**	**0.079**	**0.61**	**0.12**	**0.0051**	0.60	< 0.0045
	Farallon	5/10/2023	NWN-MW07-051023	21.8	0.12	0.092	0.41	**0.32**	**0.054**	**0.45**	**0.10**	**0.0035** J	0.26	< 0.0045
	Farallon	5/10/2023	NWN-MW77-051023		0.10	0.081	0.34	**0.23**	**0.045**	**0.38**	**0.080**	**0.0032** J	0.26	< 0.0045
NWN-MW09	Farallon	4/17/2020	NWN-MW09-200417	47.5	0.029	0.025	0.099	**0.091**	**0.022**	**0.23**	0.0092	< 0.0040	0.13	< 0.0040
	Farallon	7/16/2020	NWN-MW09-200716		0.012	0.011	0.038	**0.031**	**0.011**	**0.10**	0.0046	< 0.0041	0.021	< 0.0041
	Farallon	10/29/2020	NWN-MW09-102920	45.0	0.011	0.0089	0.024	**0.027**	**0.011**	**0.092**	0.0037 J	< 0.0043	0.018	< 0.0043
	Farallon	9/2/2021	NWN-MW09-20210902	30.0	0.026	0.019	0.077	**0.073**	**0.019**	**0.22**	**0.011**	< 0.0042	0.10	< 0.0042
	Farallon	10/18/2021	NWN-MW09-20211018	24.0	0.012	0.012	0.035	**0.032**	**0.011**	**0.10** H*	0.0041 J	< 0.0045	0.023	< 0.0045
	Farallon	12/9/2021	NWN-MW09-20211209	22.0	0.046	0.036	0.14	**0.17**	**0.047**	**0.25**	**0.012**	**0.0013** J	0.13	< 0.0044
	Farallon	1/17/2022	NWN-MW09-22020117	20.0	0.038	0.033	0.12	**0.15**	**0.038**	**0.33**	**0.013**	< 0.0045	0.18	< 0.0045
	Farallon	2/17/2022	NWN-MW09-20220217	25.0	0.029	0.021	0.095	**0.12**	**0.022**	**0.31**	0.0096	< 0.0046	0.10	---
	Farallon	9/2/2022	NWN-MW09	35.0	0.011	0.013	0.031	**0.037**	**0.012**	**0.11**	0.0048	< 0.0042	0.023	< 0.0042
	Farallon	12/14/2022	NWN-MW09-121422[H]		0.032	0.022	0.096	**0.12**	**0.035**	**0.16**	0.0097	< 0.0045	0.11	< 0.0045
	Farallon	2/28/2023	NWN-MW09-022823	47.5	0.036	0.032	0.12	**0.14**	**0.040**	**0.30**	**0.012**	**0.0018** J	0.18	< 0.0046
	Farallon	5/10/2023	NWN-MW09-051023		0.024	0.017	0.098	**0.084**	**0.034**	**0.20**	0.010	< 0.0045	0.12	< 0.0045
MTCA Method B Groundwater Cleanup Levels[3]					**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**

Table 7
Shallow Groundwater Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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)
Eastside Fire & Rescue Headquarters Source Area (continued)														
NWN-MW10	Farallon	9/1/2021	NWN-MW10-20210901	23.5	0.092	0.073	0.30	**0.46**	**0.14**	**2.4**	**0.051**	**0.0094**	0.82	< 0.0042
	Farallon	9/1/2021	NWN-MW99-20210901		0.097	0.076	0.32	**0.49**	**0.14**	**2.6**	**0.057**	**0.01**	0.76	< 0.0044
	Farallon	10/18/2021	NWN-MW10-20211018	22.0	0.11	0.074	0.36	**0.41**	**0.12**	**1.6** H*	**0.19**	**0.0066**	0.60	< 0.0045
	Farallon	10/18/2021	NWN-MW-99-20211018		0.099	0.073	0.33	**0.37**	**0.11**	**1.2** H*	**0.17**	**0.0064**	0.57	< 0.0045
	Farallon	12/9/2021	NWN-MW10-20211209	18.0	0.042	0.0012 J	< 0.0092	**0.0034** J	0.0016 J	**0.011**	0.0018 J	< 0.0044	0.0067	< 0.0044
	Farallon	12/9/2021	NWN-MW99-20211209		0.04	0.00087 J	< 0.0092	**0.0043**	0.0011 J	**0.011**	0.0015 J	< 0.0043	0.006	< 0.0043
	Farallon	1/18/2022	NWN-MW10-20220118	15.0	0.055	0.0027 J	0.011	**0.0099**	0.0039	**0.047**	**0.011**	< 0.0045	0.015	< 0.0045
	Farallon	1/18/2022	NWN-MW99-20220118		0.057	0.0031 J	0.012	**0.012**	0.0036	**0.054**	**0.014**	< 0.0045	0.016	< 0.0045
	Farallon	2/17/2022	NWN-MW10-20220217	19.0	0.062	0.0020 J	0.017	**0.0079**	0.0025	**0.025**	< 0.0045	< 0.0045	0.016	---
	Farallon	2/17/2022	NWN-MW99-20220217		0.067	0.0020 J	0.019	**0.0085**	0.0027	**0.026**	< 0.0045	< 0.0045	0.017	---
	Farallon	9/2/2022	NWN-MW10	23.0	0.089 J	0.015 J	< 0.5	< 0.25	< 0.1	**0.15 J**	< 0.25	< 0.25	0.05 J	< 0.25
	Farallon	12/14/2022	NWN-MW10-121422[H]	20.0	0.08	0.0041 J	0.022	**0.0070**	0.0026	**0.0088**	< 0.0044	< 0.0044	0.0048	< 0.0044
	Farallon	2/28/2023	NWN-MW10-022823	22.5	0.083	0.0060	0.031	**0.011**	**0.0052**	**0.015**	< 0.0046	< 0.0046	0.014	< 0.0046
	Farallon	5/10/2023	NWN-MW10-051023	19.5	0.062	0.0044 J	0.037	**0.012**	**0.0068**	**0.036**	0.0023 J	< 0.0045	0.016	< 0.0045
NWN-MW12	Farallon	9/1/2021	NWN-MW12-20210901	20.0	0.047	0.023	0.18	**0.095**	**0.05**	**0.46**	**0.016**	**0.0025** J	0.40	< 0.0042
	Farallon	10/18/2021	NWN-MW12-20211018	18.0	0.096	0.084	0.33	**0.34**	**0.097**	**0.65** H*	**0.024**	**0.0036** J	0.65	< 0.0043
	Farallon	12/9/2021	NWN-MW12-20211209	12.0	0.27	0.071	1.0	**0.33**	**0.60**	**0.84**	**0.055**	**0.010**	2.0	< 0.0045
	Farallon	1/18/2022	NWN-MW12-20220118		0.34	0.084	1.6	**0.43**	**1.0**	**0.88**	**0.059**	**0.012**	2.4	< 0.0045
	Farallon	2/17/2022	NWN-MW12-20220217	15.0	0.21	0.057	0.81	**0.37**	**0.49**	**0.89**	**0.045**	**0.0093**	2.1	---
NWN-MW13	Farallon	9/2/2021	NWN-MW13-20210902	17.0	0.029 J	0.0081	0.084	**0.065**	**0.041**	**0.38**	**0.019**	**0.0045** J	0.31	< 0.0045
	Farallon	10/18/2021	NWN-MW13-20211018	14.0	0.12	0.049	0.26	**0.24**	**0.14**	**0.48**	**0.026**	**0.0087**	0.64	< 0.0045
	Farallon	12/9/2021	NWN-MW13-20211209	12.0	0.085	0.066	0.21	**0.52**	**0.17**	**0.75**	**0.03**	**0.015**	0.76	< 0.0045
	Farallon	1/18/2022	NWN-MW13-20220118		0.076	0.051	0.16	**0.56**	**0.12**	**0.60**	**0.031**	**0.014**	0.61	< 0.0045
	Farallon	2/17/2022	NWN-MW13-20220217	9.0	0.033	0.016	0.081	**0.14**	**0.053**	**0.37**	**0.017**	**0.0088**	0.29	---
	Farallon	9/2/2022	NWN-MW13	16.0	0.032	0.015	0.093	**0.075**	**0.044**	**0.26**	**0.016**	**0.0055**	0.29	< 0.0042
	Farallon	12/14/2022	NWN-MW13-121422[H]	12.0	0.16	0.10	0.43	**0.90**	**0.27**	**0.66**	**0.048**	**0.023**	0.92	< 0.0044
	Farallon	2/28/2023	NWN-MW13-022823	10.5	0.017	0.0088	0.039	**0.063**	**0.032**	**0.16**	0.0084	**0.0061**	0.13	< 0.0043
	Farallon	5/10/2023	NWN-MW13-051023	11.0	0.040	0.031	0.12	**0.21**	**0.079**	**0.38**	**0.020**	**0.011**	0.35	< 0.0045
NWN-MW14	Farallon	1/18/2022	NWN-MW14-20220118	12.0	0.32	0.088	1.6	**0.57**	**0.98**	**1.2**	**0.084**	**0.029**	2.3	< 0.0045
	Farallon	2/17/2022	NWN-MW14-20220217	15.0	0.11	0.032	0.44	**0.23**	**0.19**	**0.69**	**0.031**	**0.01**	1.4	---
NWN-MW15	Farallon	9/2/2021	NWN-MW15-20210902	28.0	0.066	0.045	0.25	**0.17**	**0.064**	**1.3**	**0.059**	**0.0043**	0.10	< 0.0042
	Farallon	1/17/2022	NWN-MW15-20220117	20.0	0.062	0.084	0.17	**0.41**	**0.074**	**1.2**	0.0086	< 0.0044	0.47	< 0.0044
	Farallon	2/17/2022	NWN-MW15-20220217	25.0	0.054	0.087	0.19	**0.32**	**0.04**	**0.78**	0.0064	< 0.0048	0.12	---
NWN-MW16	Farallon	9/2/2021	NWN-MW16-20210902	28.0	0.05	0.016	0.15	**0.063**	**0.037**	**0.25**	0.0079	< 0.0042	0.16	< 0.0042
	Farallon	1/17/2022	NWN-MW16-20220117	20.0	0.061	0.055	0.20	**0.31**	**0.069**	**1.0**	**0.040**	**0.0031** J	0.44	< 0.0045
	Farallon	2/17/2022	NWN-MW16-20220217	25.0	0.11	0.043	0.46	**0.24**	**0.14**	**0.71**	**0.047**	**0.0039** J	1.5	---
	Farallon	12/14/2022	NWN-MW16-121422[H]	22.5	0.15	0.079	0.43	**0.49**	**0.12**	**0.69**	**0.039**	**0.0037** J	0.47	< 0.0045
	Farallon	2/28/2023	NWN-MW16-022823	23.0	0.052	0.049	0.17	**0.18**	**0.091**	**0.51**	**0.026**	**0.0026** J	0.88	< 0.0045
	Farallon	5/10/2023	NWN-MW16-051023	24.0	0.10	0.041	0.45	**0.22**	**0.23**	**0.56**	**0.059**	**0.004** J	1.1	< 0.0046
MTCA Method B Groundwater Cleanup Levels[3]					**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**

Table 7
Shallow Groundwater Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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)
Eastside Fire & Rescue Headquarters Source Area (continued)														
NWN-MW17	Farallon	9/2/2022	NWN-MW17	22.0	0.10	0.13	0.29	**0.69**	**0.14**	**2.4**	**0.049**	**0.017** J	0.57	< 0.021
	Farallon	12/14/2022	NWN-MW17-121422[H]	17.0	0.26	0.25	0.63	**1.2**	**0.30**	**5.2**	**0.10**	**0.019**	1.2	< 0.0042
	Farallon	2/28/2023	NWN-MW17-022823	17.5*	0.27	0.26	0.75	**1.6**	**0.31**	**5.3**	**0.096**	**0.021**	1.2	< 0.0045
	Farallon	5/10/2023	NWN-MW17-051023	18.8	0.14	0.12	0.48	**0.92**	**0.21**	**3.2**	**0.059**	**0.015**	0.66	< 0.0043
Issaquah Valley Elementary School Source Area														
IES-MW01	Farallon	10/26/2018	1ES-MW05-181026	21.0	0.0072 J	0.019	0.018	**0.062**	**0.0097**	**0.19**	0.0077	< 0.0041	0.012	---
	Farallon	4/15/2020	IES-MW01-200415		0.010	0.023	0.031	**0.086**	**0.011**	**0.27**	0.0071	< 0.0041	0.028	< 0.0041
	Farallon	7/14/2020	IES-MW01-200714		0.0075	0.017	0.022	**0.058**	**0.0095**	**0.18**	0.0053	< 0.0039	0.018	< 0.0039
	Farallon	10/27/2020	IES-MW01-102720		0.0065	0.015	0.017	**0.039**	**0.0066**	**0.17**	0.0047	< 0.0042	0.012	< 0.0042
	Farallon	9/2/2022	IES-MW01		0.0073	0.019	0.017	**0.058**	**0.0087**	**0.22**	0.0053	< 0.0045	0.014	< 0.0045
	Farallon	12/15/2022	IES-MW01-121522[H]		0.0058	0.019	0.019	**0.069**	**0.0084**	**0.20**	0.0051	< 0.0043	0.012	< 0.0043
	Farallon	3/1/2023	IES-MW01-030123		0.0072	0.026	0.026	**0.081**	**0.0089**	**0.21**	0.0053	< 0.0045	0.019	< 0.0045
	Farallon	5/11/2023	IES-MW01-051123		0.0049	0.020	0.024	**0.056**	**0.0082**	**0.17**	0.0054	< 0.0044	0.014	< 0.0044
IES-MW02	Farallon	10/26/2018	1ES-MW03-181026	20.0	0.021	0.050	0.062	**0.190**	**0.019**	**0.24**	0.0065	**0.00065** J	0.0039 J	---
	Farallon	4/16/2020	IES-MW02-200416		0.018	0.044	0.059	**0.190**	**0.018**	**0.29**	0.0065	< 0.0040	0.006	< 0.0040
	Farallon	7/15/2020	IES-MW02-200715		0.014	0.034	0.041	**0.14**	**0.014**	**0.20**	0.0046	< 0.0040	0.0017 J	< 0.0040
	Farallon	10/27/2020	IES-MW02-102720	22.0	0.022	0.057	0.066	**0.17**	**0.017**	**0.26**	0.0056	< 0.0045	0.0041 J	< 0.0045
IES-MW03	Farallon	10/26/2018	1ES-MW01-181026	20.0	0.0056 J	0.015	0.016	**0.065**	**0.0056**	**0.076**	0.0014 J	< 0.0042	0.0029 J	---
	Farallon	4/15/2020	IES-MW03-200415		0.0083	0.020	0.022	**0.080**	**0.0049**	**0.075**	< 0.0042	< 0.0042	0.0031 J	< 0.0042
	Farallon	7/14/2020	IES-MW03-200714		0.0055	0.013	0.014	**0.063**	**0.0041**	**0.055**	0.0011 J	< 0.0041	0.0014 J	< 0.0041
	Farallon	10/27/2020	IES-MW03-102720	19.0	0.0064	0.015	0.014	**0.054**	**0.0045**	**0.066**	0.0011 J	< 0.0042	0.0016 J	< 0.0042
	Farallon	9/1/2022	IES-MW03	20.0	0.0037 J	0.01	< 0.0092	**0.043**	0.0038	**0.062**	0.0014 J	< 0.0045	0.00067 J	< 0.0045
	Farallon	12/13/2022	IES-MW03-121322[H]		0.0050	0.014	0.014	**0.069**	**0.0060**	**0.077**	< 0.0045	< 0.0045	0.0015 J	< 0.0045
	Farallon	3/1/2023	IES-MW03-030123		0.0063	0.018	0.018	**0.11**	**0.0075**	**0.11**	0.0032 J	< 0.0045	0.0029 J	< 0.0045
	Farallon	5/11/2023	IES-MW03-051123		0.0032 J	0.015	0.015	**0.08**	**0.0056**	**0.082**	0.0021 J	< 0.0045	0.0012 J	< 0.0045
IES-MW04	Farallon	10/26/2018	1ES-MW02-181026	20.0	0.029	0.055	0.10	**0.26**	**0.037**	**0.53**	**0.022**	**0.0012** J	0.16	---
	Farallon	10/27/2020	IES-MW04-1022720	23.0	0.019	0.04	0.060	**0.13**	**0.019**	**0.35**	**0.011**	< 0.0043	0.05	< 0.0043
	Farallon	12/15/2022	IES-MW04-121522[H]	22.0	0.03	0.066	0.096	**0.31**	**0.037**	**0.59**	**0.015**	< 0.0044	0.056	< 0.0044
	Farallon	3/2/2023	IES-MW04-030223	22.5*	0.036	0.11	0.10	**0.40**	**0.042**	**0.71**	**0.019**	**0.0015** J	0.062	< 0.0045
	Farallon	5/11/2023	IES-MW04-051123	22.5	0.025	0.066	0.097	**0.31**	**0.036**	**0.64**	**0.016**	< 0.0044	0.034	< 0.0044
IES-MW05	Farallon	10/26/2018	1ES-MW04-181026	25.0	0.012	0.022	0.034	**0.12**	**0.019**	**0.38**	**0.033**	**0.0012** J	0.012	---
	Farallon	4/15/2020	IES-MW05-200415		0.021	0.045	0.067	**0.26**	**0.025**	**0.59**	**0.041**	**0.0017** J	0.029	< 0.0041
	Farallon	7/14/2020	IES-MW05-200714		0.013	0.026	0.042	**0.20**	**0.022**	**0.48**	**0.038**	**0.0013** J	0.010	< 0.0042
IES-MW08	Farallon	4/15/2020	IES-MW08-200415	25.0	0.0027 J	0.0062	< 0.0092	**0.025**	0.0040	**0.074**	0.0040 J	< 0.0040	< 0.0040	< 0.0040
	Farallon	10/27/2020	IES-MW08-102720		0.0012 J	0.0017 J	< 0.0092	**0.0024** J	0.0025	**0.011**	0.0012 J	< 0.0043	0.00069 J	< 0.0043
	Farallon	9/1/2022	IES-MW08		0.0015 J	0.0042 J	< 0.0092	**0.0078**	0.0032	**0.022**	0.0018 J	< 0.0045	< 0.0045	< 0.0045
	Farallon	12/13/2022	IES-MW08-121322[H]		0.0020 J	0.0056	< 0.0092	**0.021**	0.0040	**0.034**	0.0030 J	< 0.0044	< 0.0044	< 0.0044
	Farallon	3/1/2023	IES-MW08-030123		0.0057	0.019	0.019	**0.11**	**0.011**	**0.23**	**0.012**	**0.0016** J	0.0021 J	< 0.0045
	Farallon	5/11/2023	IES-MW08-051123		0.0030 J	0.014	0.015	**0.074**	**0.010**	**0.17**	**0.013**	< 0.0046	0.0013 J	< 0.0046
MTCA Method B Groundwater Cleanup Levels[3]					**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**

Table 7
Shallow Groundwater Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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)
Issaquah Valley Elementary School Source Area (continued)														
DF-MW01	Farallon	10/27/2020	DF-MW01-102720	12	0.00091 J	0.0034 J	< 0.0092	**0.018**	0.0018	**0.042**	0.0025 J	< 0.0042	< 0.0042	< 0.0042
	Farallon	12/15/2022	DF-MW01-121522[H]	10.0	< 0.0042	0.0042	< 0.0092	**0.018**	0.0022	**0.053**	0.0041 J	0.0013 J	< 0.0042	< 0.0042
	Farallon	3/1/2023	DF-MW01-030123	12.0*	< 0.0045	0.0057	< 0.0092	**0.040**	0.0039	**0.068**	0.0049	0.0018 J	< 0.0045	< 0.0045
	Farallon	5/11/2023	DF-MW01-051123	12.5	< 0.0045	0.0050	< 0.0092	**0.029**	0.0025	**0.045**	0.0035 J	< 0.0045	< 0.0045	< 0.0045
DF-MW02	Farallon	8/3/2018	DF-MW02-180803	17.0	0.0044 J	0.022	0.012	**0.23**	**0.010**	**0.55**	**0.025**	0.0020 J	0.0030 J	---
	Farallon	8/3/2018	QA/QC-01-180803		0.0042 J	0.020	0.011	**0.20**	**0.0093**	**0.52**	**0.025**	0.0016 J	0.0020 J	---
	Farallon	4/14/2020	DF-MW02-200414	20.0	0.0027 J	0.014	< 0.0092	**0.12**	**0.0075**	**0.44**	**0.019**	0.0016 J	< 0.0041	< 0.0041
	Farallon	10/27/2020	DF-MW02-102720	18.0	0.0043 J	0.019	0.010	**0.15**	**0.0083**	**0.38**	**0.017**	0.0018 J	< 0.0044	< 0.0044
	Farallon	10/27/2020	DF-MW22-102720		0.0042 J	0.016	0.010	**0.18**	**0.0087**	**0.38**	**0.019**	0.0012 J	< 0.0044	< 0.0044
DF-MW03	Farallon	8/3/2018	DF-MW03-180803	18.0	0.0048 J	0.0079	0.012	**0.033**	**0.0062**	**0.13**	**0.0092**	0.00073 J	0.0033 J	---
	Farallon	3/1/2023	DF-MW03-030123	25.0	0.0085	0.025	0.028	**0.14**	**0.016**	**0.36**	**0.023**	0.0013 J	0.0038 J	< 0.0044
	Farallon	5/11/2023	DF-MW03-051123		0.0075	0.021	0.029	**0.16**	**0.020**	**0.45**	**0.033**	< 0.0046	0.0035 J	< 0.0046
Lower Issaquah Valley Regional Wells														
B-2	Farallon	10/29/2020	B-2-102920	25.0	0.0019 J	0.0024 J	< 0.0092	**0.0032** J	0.00077 J	0.0036 J	< 0.0043	< 0.0043	0.018	< 0.0043
B-4	Farallon	7/16/2020	B-4-200716	20.0 - 30.0	0.00094 J	0.0052	< 0.0092	**0.014**	0.00078 J	**0.012**	< 0.0040	< 0.0040	< 0.0040	< 0.004
	Farallon	2/28/2023	B-4-022823	25.0	0.00067 J	0.0093	< 0.0093	**0.019**	0.0035	**0.014**	< 0.0046	**0.0015** J	0.0017 J	< 0.0046
B-7	HWA	2/12/2020	B7-GW	22.5 - 32.5	0.013	0.027	---	**0.31**	**0.017**	**0.27**	0.0058	< 0.0041	< 0.0041	---
	Farallon	2/28/2023	B-7-022823	27.5	0.0069	0.014	0.017	**0.17**	**0.0099**	**0.12**	0.003 J	< 0.0045	0.0014 J	< 0.0045
B-12	HWA	2/12/2020	B12-GW	20.0 - 30.0	< 0.0042	0.011	---	**0.039**	**0.0070**	**0.042**	< 0.0042	< 0.0042	< 0.0042	---
	HWA	2/12/2020	DUP-GW		< 0.0040	0.010	---	**0.041**	**0.0071**	**0.040**	< 0.0040	< 0.0040	< 0.0040	---
COI-TW01	Geosyntec	5/17/2016	COI-MW1-051716	84-94	---	< 0.003	< 0.003	< 0.003	< 0.003	0.0034	< 0.003	< 0.003	---	---
IES-MW07	Farallon	4/15/2020	IES-MW07-200415	25.0	0.028	0.066	0.084	**0.21**	**0.023**	**0.53**	**0.026**	< 0.0041	0.043	< 0.0041
	Farallon	10/27/2020	IES-MW07-102720		0.016	0.038	0.041	**0.1**	**0.014**	**0.34**	**0.016**	< 0.0043	0.0092	< 0.0043
	Farallon	9/2/2022	IES-MW07		0.021	0.05	0.055	**0.2**	**0.023**	**0.68**	**0.032**	< 0.0045	0.017	< 0.0045
	Farallon	12/28/2022	IES-MW07-122822		0.0056	0.024 J	0.014	**0.065** J	**0.0052 J**	**0.095** J	**0.011** J	< 0.0044	0.10	< 0.0044
	Farallon	3/2/2023	IES-MW07-030223		0.021	0.073	0.052	**0.21**	**0.021**	**0.47**	**0.028**	**0.0012** J	0.0086	< 0.0045
	Farallon	5/12/2023	IES-MW07-051223		0.020	0.062	0.065	**0.22**	**0.021**	**0.43**	**0.024**	< 0.0042	0.011	< 0.0042
NDS-MW01	Farallon	4/16/2020	NDS-MW01-200416	27.0	0.048	0.085	0.17	**0.55**	**0.062**	**1.3**	**0.021**	**0.0022** J	0.25	< 0.0039
	Farallon	7/15/2020	NDS-MW01-200715		0.038	0.068	0.12	**0.39**	**0.050**	**0.86**	**0.016**	**0.0013** J	0.15	< 0.0040
	Farallon	10/29/2020	NDS-MW01-102920	26.0	0.022	0.035	0.058	**0.22**	**0.024**	**0.49**	**0.011**	**0.0012** J	0.026	< 0.0045
	Farallon	9/2/2022	NDS-MW01	27.0	0.031	0.05	0.092	**0.35**	**0.044**	**1.2**	**0.019**	**0.0017** J	0.065	< 0.0046
	Farallon	12/14/2022	NDS-MW01-121422[H]		0.028	0.063	0.078	**0.36**	**0.041**	**0.77**	**0.017**	**0.0012** J	0.046	< 0.0044
	Farallon	3/1/2023	NDS-MW01-030123		0.045	0.094	0.12	**0.50**	**0.05**	**1.3**	**0.019**	**0.0019** J	0.14	< 0.0045
	Farallon	5/10/2023	NDS-MW01-051023		0.044	0.064	0.15	**0.57**	**0.061**	**1.4**	**0.022**	**0.0019** J	0.14	< 0.0045
NDS-MW03	Farallon	4/16/2020	NDS-MW03-200416	30.0	0.0011 J	0.0067	< 0.0092	**0.012**	0.0040	**0.022**	0.0014 J	< 0.0040	< 0.0040	< 0.0040
	Farallon	10/28/2020	NDS-MW03-102820	31.0	0.0011 J	0.0051	< 0.0092	**0.007**	0.0025	**0.016**	< 0.0045	< 0.0045	< 0.0045	< 0.0045
	Farallon	12/14/2022	NDS-MW03-121422[H]	30.0	0.0012 J	0.0046	< 0.0092	**0.011**	0.0035	**0.014**	< 0.0045	< 0.0045	0.00092 J	< 0.0045
	Farallon	2/28/2023	NDS-MW03-022823		< 0.0044	0.0050	< 0.0092	**0.0086**	0.0037	**0.022**	< 0.0044	< 0.0044	< 0.0044	< 0.0044
	Farallon	5/10/2023	NDS-MW03-051023		< 0.0044	0.0046	< 0.0092	**0.0074**	0.0034	**0.018**	< 0.0044	< 0.0044	< 0.0044	< 0.0044
MTCA Method B Groundwater Cleanup Levels[3]					**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**

Table 7
Shallow Groundwater Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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)
Lower Issaquah Valley Regional Wells (continued)														
NGB-MW01	Farallon	9/1/2022	NGB-MW01	30.0	0.017	0.086	0.043	**0.14**	**0.015**	**0.11**	**0.01**	< 0.0046	0.034	< 0.0046
	Farallon	12/13/2022	NGB-MW01-121322[H]	25.0	0.018	0.081	0.052	**0.16**	**0.016**	**0.094**	**0.0097**	< 0.0045	0.011	< 0.0045
	Farallon	3/2/2023	NGB-MW01-030223		0.019	0.089	0.065	**0.18**	**0.023**	**0.099**	**0.013**	< 0.0045	0.016	< 0.023
	Farallon	5/12/2023	NGB-MW01-051223		0.015	0.071	0.055	**0.15**	**0.016**	**0.10**	**0.011**	< 0.0045	0.0085	< 0.0045
NLS-MW01	Farallon	9/2/2022	NLS-MW01	25.0	0.014	0.032	0.035	**0.11**	**0.013**	**0.14**	0.0040 J	0.0012 J	0.0078	< 0.0045
	Farallon	12/13/2022	NLS-MW01-121322[H]		0.012	0.025	0.028	**0.099**	**0.011**	**0.093**	0.0023 J	0.0014 J	0.0039 J	< 0.0045
	Farallon	3/2/2023	NLS-MW01-030223	24.5	0.0099	0.034	0.023	**0.084**	**0.012**	**0.11**	0.0032 J	0.0019 J	0.0065	< 0.0043
	Farallon	5/12/2023	NLS-MW01-051223		0.0065	0.018	0.023	**0.066**	**0.0092**	**0.085**	0.0030 J	< 0.0045	0.003 J	< 0.0045
NWN-MW11	Farallon	4/15/2020	NWN-MW11-200415	20.0	< 0.0039	0.00054 J	< 0.0092	< 0.0039	0.00087 J	0.0017 J	< 0.0039	< 0.0039	< 0.0039	< 0.0039
	Farallon	7/15/2020	NWN-MW11-200715		< 0.0039	0.00037 J	< 0.0092	< 0.0039	< 0.0016	0.0013 J	< 0.0039	< 0.0039	< 0.0039	< 0.0039
	Farallon	10/29/2020	NWN-MW11-102920	22.0	0.0005 J	0.0006 J	< 0.0092	< 0.0043	0.0011 J	0.0020 J	< 0.0043	< 0.0043	< 0.0043	< 0.0043
MTCA Method B Groundwater Cleanup Levels[3]					**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.

[1]Depth in feet below ground surface.

[2]Samples collected in 2016 analyzed by U.S. Environmental Protection Agency (EPA) Method 537; samples collected in 2018 and later analyzed by EPA Method 537 Modified.

[3]Washington 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.

[4]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.

E = result exceeded calibration range of instrument and is an estimate

Farallon = Farallon Consulting, L.L.C.

Geosyntec = Geosyntec Consultants, Inc.

H = sample analyzed outside of holding time; results are estimates

HWA = HWA Geosciences Inc.

J = result is an estimate

NE = not established

PFAS = per- and poly-fluoroalkyl substances

* indicates the sample intake depth was not reported; value represents the center of the well screen when fully saturated or center of water column when screen was not fully saturated.

Table 8
Intermediate and Deep Groundwater Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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 (HFPO-DA/GenX)
Eastside Fire & Rescue Headquarters Source Area														
NWN-MW08	Farallon	4/17/2020	NWN-MW08-200417	75.0	< 0.0040	0.00080 J	< 0.0092	**0.0013** J	0.00063 J	**0.0046**	< 0.0040	< 0.0040	0.011	< 0.0040
	Farallon	7/15/2020	NWN-MW08-200715		0.00062 J	0.00089 J	< 0.0092	**0.0042**	0.00077 J	**0.0047**	< 0.0040	< 0.0040	0.0073	< 0.0040
	Farallon	10/29/2020	NWN-MW08-102920	71.0	0.00045 J	0.00081 J	< 0.0092	**0.0016** J	0.00052 J	0.0016 J	< 0.0045	< 0.0045	0.0022 J	< 0.0045
	Farallon	2/28/2023	NWN-MW08-022823	75.0	< 0.0045	0.0013 J	< 0.0092	< 0.0045	0.00074 J	0.00054 J	0.0013 J	< 0.0045	0.00081 J	< 0.0045
	Farallon	5/10/2023	NWN-MW08-051023		< 0.0046	0.00075 J	< 0.0093	< 0.0046	< 0.0019	0.00068 J	< 0.0046	< 0.0046	0.0011 J	< 0.0046
Issaquah Valley Elementary School Source Area														
IES-MW06	Farallon	4/15/2020	IES-MW06-200415	85.0	0.0012 J	0.0049	< 0.0092	**0.0079**	0.0013 J	**0.015**	< 0.0040	< 0.0040	0.04	< 0.0040
	Farallon	7/14/2020	IES-MW06-200714		0.00095 J	0.0053	< 0.0092	**0.0042**	0.00095 J	0.0018 J	< 0.0039	< 0.0039	0.00061 J	< 0.0039
	Farallon	10/27/2020	IES-MW06-102720		0.0017 J	0.0087	< 0.0092	**0.0056**	0.0014 J	0.0018 J	< 0.0042	< 0.0042	< 0.0042	< 0.0042
	Farallon	9/1/2022	IES-MW06		0.0017 J	0.0081	< 0.0092	**0.0071**	0.0015 J	0.0016 J	< 0.0045	< 0.0045	< 0.0045	< 0.0045
	Farallon	12/15/2022	IES-MW06-121522[H]		0.0013 J	0.015	0.011	**0.015**	0.0032	0.0021 J	< 0.0043	< 0.0043	< 0.0043	< 0.0043
	Farallon	3/1/2023	IES-MW06-030123		0.0019 J	0.018	0.013	**0.018**	0.0040	0.0026 J	0.0023 J	< 0.0044	0.00062 J	< 0.0044
	Farallon	5/11/2023	IES-MW06-051123		0.00082 J	0.015	0.012	**0.013**	0.0032	0.0027 J	0.0014 J	< 0.0044	0.00069 J	< 0.0044
IES-MW09	Farallon	4/15/2020	IES-MW09-200415	80.0	< 0.0040	0.0021 J	< 0.0092	**0.0057**	0.0016 J	**0.052**	0.0038 J	< 0.0040	0.00096 J	< 0.0040
	Farallon	7/14/2020	IES-MW09-200714		< 0.0040	0.0015 J	< 0.0092	**0.0035** J	0.00084 J	**0.0080**	< 0.0040	< 0.0040	< 0.0040	< 0.0040
	Farallon	10/27/2020	IES-MW09-102720	76.0	0.00044 J	0.0021 J	< 0.0092	**0.0036** J	0.00072 J	**0.0072**	< 0.0042	< 0.0042	< 0.0042	< 0.0042
	Farallon	9/1/2022	IES-MW09	80.0	0.00084 J	0.0020 J	< 0.0092	**0.0051**	0.00074 J	**0.0099**	0.0012 J	< 0.0042	< 0.0042	< 0.0042
	Farallon	12/13/2022	IES-MW09-121322[H]		< 0.0047	0.0018 J	< 0.0094	**0.0029** J	0.00099 J	**0.0083**	< 0.0047	< 0.0047	< 0.0047	< 0.0047
	Farallon	3/1/2023	IES-MW09-030123		< 0.0045	0.0041 J	< 0.0092	**0.0082**	0.0010 J	**0.016**	0.0014 J	< 0.0045	< 0.0045	< 0.0045
	Farallon	5/11/2023	IES-MW09-051123		< 0.0045	0.0018 J	< 0.0092	**0.0061**	0.00071 J	**0.0099**	< 0.0045	< 0.0045	< 0.0045	< 0.0045
IES-MW10	Farallon	4/16/2020	IES-MW10-200416	80.0	0.071	0.11	0.27	**0.55**	**0.066**	**1.2**	**0.030**	**0.0024** J	0.33	< 0.0040
	Farallon	7/14/2020	IES-MW10-200714		0.062	0.099	0.24	**0.45**	**0.067**	**1.1**	**0.028**	**0.0021** J	0.31	< 0.0041
	Farallon	10/27/2020	IES-MW10-102720		0.068	0.12	0.24	**0.4**	**0.058**	**1.0**	**0.025**	**0.0019** J	0.27	< 0.0045
	Farallon	9/1/2022	IES-MW10		0.059	0.12	0.19	**0.59**	**0.072**	**1.3**	**0.029**	**0.002** J	0.31	< 0.0046
	Farallon	9/1/2022	IES-MW10-DUP		0.066	0.12	0.22	**0.7**	**0.078**	**1.6**	**0.036**	**0.0021** J	0.32	< 0.0046
	Farallon	12/13/2022	IES-MW10-121322[H]		0.071	0.14	0.22	**0.6**	**0.075**	**1.1**	**0.030**	**0.0018** J	0.32	< 0.0045
	Farallon	3/1/2023	IES-MW10-030123		0.067	0.14	0.20	**0.78**	**0.077**	**1.5**	**0.029**	**0.0026** J	0.35	< 0.0045
	Farallon	5/11/2023	IES-MW10-051123		0.052	0.094	0.22	**0.57**	**0.072**	**1.3**	**0.032**	**0.0015** J	0.24	< 0.0044
IES-MW11	Farallon	9/1/2022	IES-MW11	125.0	0.0090 J	0.037	< 0.046	**0.044**	**0.0059** J	**0.031**	< 0.021	< 0.021	0.0077 J	< 0.021
	Farallon	12/15/2022	IES-MW11-121522[H]		0.0083	0.047	0.042	**0.071**	**0.0084**	**0.027**	0.0023 J	< 0.0043	0.017	< 0.0043
	Farallon	3/1/2023	IES-MW11-030123		0.0050	0.028	0.025	**0.037**	**0.0063**	**0.032**	0.0019 J	< 0.0045	0.066	< 0.0045
	Farallon	5/11/2023	IES-MW11-051123		0.013	0.072	0.077	**0.092**	**0.014**	**0.024**	0.0025 J	< 0.0049	0.029	< 0.0049
IES-MW12	Farallon	9/2/2022	IES-MW12	125.0	< 0.13	0.049 J	< 0.25	**0.14**	**0.016** J	**0.22**	**0.044** J	< 0.13	0.021 J	< 0.13
	Farallon	12/28/2022	IES-MW12-122822	110.0	0.016	0.043 J	0.040	**0.16** J	**0.016** J	**0.38** J	**0.019** J	< 0.0044	0.014	< 0.0044
	Farallon	3/2/2023	IES-MW12-030223	125.0*	0.0026 J	0.016	0.013	**0.037**	**0.0042**	**0.052**	0.0077	< 0.0045	0.46	< 0.0045
	Farallon	5/12/2023	IES-MW12-051223	125.0	0.00098 J	0.010	0.0093	**0.024**	0.0029	**0.034**	0.0066	< 0.0043	0.32	< 0.0043
MTCA Method B Groundwater Cleanup Levels[3]					**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**

Table 8
Intermediate and Deep Groundwater Analytical Results for PFAS
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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 (HFPO-DA/GenX)
Lower Issaquah Valley Regional Wells														
COI-TW03	Geosyntec	5/17/2016	COI-TW3-051716	Unknown	---	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	< 0.003	---	---
COI-MW01	Geosyntec	6/7/2016	COI-MW01-060716	28.0 - 38.0	---	< 0.0025	< 0.0025	< 0.0025	**0.0068**	< 0.0025	< 0.0025	< 0.0025	---	---
	Geosyntec	10/17/2016	COI-MW01-20161017		---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
COI-MW02	Geosyntec	6/7/2016	COI-MW02-060716	70.0 - 90.0	---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
	Geosyntec	10/17/2016	COI-MW02-2016017		---	0.008	< 0.0025	**0.005**	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
	Farallon	10/25/2018	C01-MW02-181025	80.0	< 0.0083	0.0049	< 0.0042	**0.0026** J	< 0.0017	< 0.0042	< 0.0042	< 0.0042	< 0.0042	---
	Farallon	3/2/2023	COI-MW02-030223		< 0.0044	0.0016 J	< 0.0092	< 0.0044	0.00067 J	0.00090 J	0.0012 J	< 0.0044	0.00077 J	< 0.0044
	Farallon	5/11/2023	COL-MW02-051123		< 0.0042	0.0013 J	< 0.0092	< 0.0042	< 0.0017	< 0.0042	< 0.0042	< 0.0042	< 0.0042	< 0.0042
COI-MW03	Geosyntec	6/7/2016	COI-MW03-060716	78.0 - 98.0	---	0.092	0.065	**0.28**	**0.029**	**0.44**	**0.051**	< 0.0025	---	---
	Geosyntec	6/7/2016	COI-MW03-060716-DUP		---	0.094	0.067	**0.30**	**0.030**	**0.46**	**0.051**	< 0.0025	---	---
	Geosyntec	6/21/2016	COI-MW03-20160621		---	0.062	0.033	**0.17**	**0.020**	**0.26**	**0.016**	< 0.0025	---	---
	Geosyntec	6/21/2016	COI-MW03-20160621-DUP		---	0.059	0.033	**0.17**	**0.019**	**0.26**	**0.018**	< 0.0025	---	---
	Geosyntec	6/28/2016	COI-MW03-20160628		---	0.049	0.031	**0.11**	**0.012**	**0.17**	**0.016**	< 0.0025	---	---
	Geosyntec	6/28/2016	COI-MW03-20160628-DUP		---	0.047	0.026	**0.097**	**0.012**	**0.15**	**0.013**	< 0.0025	---	---
	Geosyntec	7/6/2016	COI-MW03-20160716		---	0.025	0.015	**0.062**	**0.0051** J	**0.100**	0.0061	< 0.0025	---	---
	Geosyntec	7/6/2016	COI-MW03-20160716-DUP		---	0.026	0.014	**0.062**	**0.0071** J	**0.100**	0.0056	< 0.0025	---	---
	Geosyntec	7/13/2016	COI-MW03-20160713		---	0.031	0.016	**0.075**	**0.006**	**0.088**	0.0063	< 0.0025	---	---
	Geosyntec	7/13/2016	COI-MW03-20160713 DUP		---	0.029	0.014	**0.070**	**0.0053**	**0.100**	0.0055	< 0.0025	---	---
	Geosyntec	7/20/2016	COI-MW03-20160720		---	0.032	0.017	**0.080**	**0.0062**	**0.098**	0.0063	< 0.0025	---	---
	Geosyntec	7/20/2016	COI-MW03-20160720-DUP		---	0.033	0.017	**0.074**	**0.0063**	**0.100**	0.0071	< 0.0025	---	---
	Geosyntec	7/28/2016	COI-MW03-20160728		---	0.071	0.039	**0.17**	**0.016**	**0.360**	**0.025**	< 0.0025	---	---
	Geosyntec	7/28/2016	COI-MW03-20160728-DUP		---	0.072	0.035	**0.16**	**0.015**	**0.330**	**0.022**	< 0.0025	---	---
	Geosyntec	10/17/2016	COI-MW03-2016017		---	0.032	0.018	**0.067**	**0.0059**	**0.088**	0.0055	< 0.0025	---	---
	Geosyntec	10/17/2016	COI-MW03-20161017-DUP		---	0.033	0.018	**0.070**	**0.0061**	**0.099**	0.0056	< 0.0025	---	---
	Farallon	10/24/2018	C01-MW03-181024	88.0	0.0087	0.039	0.025	**0.048**	**0.0071**	**0.053**	0.0048	< 0.0042	0.0052	---
	Farallon	4/15/2020	C01-MW03-200415		0.012	0.046	0.031	**0.11**	**0.010**	**0.14**	0.0068	< 0.0039	0.0074	< 0.0039
	Farallon	10/28/2020	COL-MW03-102820	94.0	0.012	0.049	0.028	**0.073**	**0.0084**	**0.099**	0.0053	< 0.0046	0.0041 J	< 0.0046
	Farallon	9/1/2022	COI-MW03	78.0 - 98.0	0.013	0.042	0.042	**0.097**	**0.0090**	**0.097**	0.0052	< 0.0044	0.55	< 0.0044
	Farallon	12/13/2022	COI-MW03-121322[H]	78.0 - 98.0	0.02	0.055	0.053	**0.19**	**0.016**	**0.14**	0.0069	< 0.0047	0.012	< 0.0047
	Farallon	3/2/2023	COI-MW03-030223	78.0 - 98.0	0.021	0.072	0.058	**0.21**	**0.018**	**0.19**	0.0080	< 0.0044	0.017	< 0.0044
	Farallon	5/12/2023	COL-MW03-051223	78.0 - 98.0	0.011	0.039	0.042	**0.091**	**0.010**	**0.093**	0.0060	< 0.0044	0.028	< 0.0044
COI-MW04	Geosyntec	6/7/2016	COI-MW04-060716	70.0 - 90.0	---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	0.0030	< 0.0025	< 0.0025	---	---
	Geosyntec	6/21/2016	COI-MW04-20160621		---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
	Geosyntec	6/28/2016	COI-MW04-20160628		---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
	Geosyntec	7/6/2016	COI-MW04-20160716		---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
	Geosyntec	7/13/2016	COI-MW04-20160713		---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
	Geosyntec	7/20/2016	COI-MW04-20160720		---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
	Geosyntec	7/27/2016	COI-MW04-20160727		---	< 0.0025	< 0.0025	< 0.0025	0.0039	< 0.0025	< 0.0025	< 0.0025	---	---
	Geosyntec	10/17/2016	COI-MW04-20161017		---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	0.0025	< 0.0025	< 0.0025	---	---
	Farallon	10/24/2018	C01-MW04-101024	80.0	< 0.0083	0.0017 J	< 0.0042	**0.0034** J	< 0.0017	0.0023 J	< 0.0042	< 0.0042	< 0.0042	---
	Farallon	10/28/2020	COL-MW04-102820	74.0	0.0013 J	0.0018 J	< 0.0092	**0.0024** J	0.00064 J	0.0031 J	< 0.0045	< 0.0045	0.002 J	< 0.0045
MTCA Method B Groundwater Cleanup Levels[3]					**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**

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EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

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 (HFPO-DA/GenX)
Lower Issaquah Valley Regional Wells (continued)														
COI-MW05	Geosyntec	6/7/2016	COI-MW05-060716	70.0 - 90.0	---	0.057	0.040	**0.16**	**0.017**	**0.39**	0.0086	< 0.0025	---	---
	Geosyntec	6/21/2016	COI-MW05-20160621		---	0.054	0.042	**0.17**	**0.013**	**0.49**	0.008	< 0.0025	---	---
	Geosyntec	6/28/2016	COI-MW05-20160628		---	0.07	0.056	**0.18**	**0.017**	**0.50**	0.01	< 0.0025	---	---
	Geosyntec	7/6/2016	COI-MW05-20160716		---	0.056	0.039	**0.17**	**0.011**	**0.48**	0.0075	< 0.0025	---	---
	Geosyntec	7/13/2016	COI-MW05-20160713		---	0.058	0.054	**0.21**	**0.018**	**0.44**	**0.012**	< 0.0025	---	---
	Geosyntec	7/20/2016	COI-MW05-20160720		---	0.052	0.040	**0.18**	**0.013**	**0.51**	0.0093	< 0.0025	---	---
	Geosyntec	7/28/2016	COI-MW05-20160728		---	0.066	0.049	**0.18**	**0.018**	**0.51**	0.0087	< 0.0025	---	---
	Geosyntec	10/17/2016	COI-MW05-20161017		---	0.061	0.048	**0.17**	**0.015**	**0.40**	0.0079	< 0.0025	---	---
	Farallon	10/25/2018	C01-MW05-181025	80.0	0.022	0.050	0.080	**0.14**	**0.019**	**0.29**	**0.011**	**0.00073** J	0.045	---
	Farallon	4/15/2020	C01-MW05-200415		0.0091	0.025	0.025	**0.084**	**0.0083**	**0.26**	0.0068	< 0.0039	0.005	< 0.0039
	Farallon	7/14/2020	COI-MW05-200714		0.011	0.031	0.039	**0.11**	**0.011**	**0.24**	0.0073	< 0.0039	0.0095	< 0.0039
	Farallon	10/27/2020	COL-MW05-102720		0.013	0.039	0.037	**0.09**	**0.0098**	**0.23**	0.0074	< 0.0045	0.0075	< 0.0045
	Farallon	9/2/2022	COI-MW05	75.0	0.021	0.065	0.063	**0.21**	**0.02**	**0.42**	**0.011**	< 0.0046	0.021	< 0.0046
	Farallon	12/15/2022	COI-MW05-121522[H]	80.0	0.016	0.063	0.051	**0.23**	**0.016**	**0.31**	0.0091	< 0.0045	0.0087	< 0.0045
	Farallon	3/2/2023	COI-MW05-030223		0.016	0.062	0.051	**0.18**	**0.019**	**0.34**	0.0085	**0.0014** J	0.0079	< 0.0045
	Farallon	5/12/2023	COL-MW05-051223		0.013	0.049	0.05	**0.17**	**0.016**	**0.30**	0.0097	< 0.0044	0.0053	< 0.0044
COI-MW06	Geosyntec	10/17/2016	COI-MW06-20161017	80.0 - 100.0	---	0.096	0.22	**0.49**	**0.08**	**2.2**	**0.053**	**0.0029**	---	---
	Farallon	10/25/2018	C01-MW06-181025	90.0	0.15	0.23	0.60	**1.1**	**0.25**	**3.3**	**0.15**	**0.0065**	0.37	---
	Farallon	4/16/2020	C01-MW06-200416		0.10	0.18	0.43	**0.93**	**0.15**	**2.5**	**0.065**	**0.0051**	1.1	< 0.0040
	Farallon	4/16/2020	C01-MW66-200416		0.10	0.18	0.39	**0.87**	**0.15**	**2.5**	**0.065**	**0.0055**	1.2	< 0.0039
	Farallon	7/15/2020	COI-MW06-200715		0.058	0.10	0.21	**0.43**	**0.087**	**1.4**	**0.038**	**0.0032** J	0.70	< 0.0041
	Farallon	7/15/2020	COI-MW66-200715		0.059	0.097	0.23	**0.42**	**0.087**	**1.4**	**0.040**	**0.0031** J	0.69	< 0.0042
	Farallon	10/29/2020	COL-MW06-102920	96.0	0.058	0.088	0.21	**0.45**	**0.08**	**1.4**	**0.035**	**0.0036** J	0.47	< 0.0045
	Farallon	10/29/2020	COL-MW66-102920		0.059	0.075	0.20	**0.52**	**0.075**	**1.4**	**0.042**	**0.0041** J	0.51	< 0.0044
	Farallon	9/2/2022	COI-MW06	90.0	0.069	0.093	0.23	**0.63**	**0.11**	**1.9**	**0.052**	**0.0047**	0.68	< 0.0042
	Farallon	12/14/2022	COI-MW06-121422[H]		0.14	0.20	0.50	**0.79**	**0.19**	**2.0**	**0.078**	**0.0061**	0.87	< 0.0043
	Farallon	12/14/2022	DUPLICATE 3[H]		0.11	0.17	0.40	**0.72**	**0.15**	**1.6**	**0.074**	**0.0043** J	0.88	< 0.0045
	Farallon	3/1/2023	COI-MW06-030123		0.074	0.11	0.25	**0.61**	**0.11**	**2.3**	**0.050**	**0.0047**	0.74	< 0.0044
	Farallon	3/1/2023	COI-MW66-030123		0.070	0.098	0.23	**0.60**	**0.10**	**2.0**	**0.043**	**0.0047**	0.64	< 0.0045
	Farallon	5/11/2023	COL-MW06-051123		0.059	0.077	0.25	**0.60**	**0.096**	**2.0**	**0.049**	**0.0034** J	0.49	< 0.0045
	Farallon	5/11/2023	COL-MW66-051123		0.057	0.076	0.24	**0.55**	**0.093**	**1.9**	**0.043**	**0.0032** J	0.55	< 0.0046
COI-MW07	Geosyntec	10/17/2016	COI-MW07-20161017	100.0 - 110.0	---	< 0.0025	< 0.0025	**0.0049**	0.003	**0.0049**	< 0.0025	< 0.0025	---	---
	Farallon	10/25/2018	C01-MW07-181025	105.0	< 0.0083	0.00097 J	0.0011 J	**0.0031** J	0.0022	0.0033 J	< 0.0042	< 0.0042	0.0023 J	---
	Farallon	4/15/2020	C01-MW07-200415		0.00054 J	0.0015 J	< 0.0092	**0.0028** J	0.0012 J	0.0031 J	< 0.0040	< 0.0040	0.00069 J	< 0.0040
	Farallon	7/15/2020	COI-MW07-200715		0.0011 J	0.0019 J	< 0.0092	**0.0043**	0.0019	0.0036 J	< 0.0039	< 0.0039	< 0.0039	< 0.0039
	Farallon	10/29/2020	COL-MW07-102920		0.0013 J	0.002 J	< 0.0092	**0.0072**	0.0025	**0.0043**	< 0.0043	< 0.0043	< 0.0043	< 0.0043
COI-MW08[5]	Farallon	1/12/2023	COI-MW08-011223	245.0	< 0.25	0.043 J	< 0.50	**0.16** J	**0.025** J	**0.37**	< 0.25	< 0.25	0.062 J	< 0.25
	Farallon	3/2/2023	COI-MW08-030223	125.0	< 0.0046	0.0088	0.013	**0.041**	**0.0055**	**0.086**	0.0056	< 0.0046	0.013	< 0.0046
	Farallon	5/12/2023	COL-MW08-051223	243.0	0.012	0.040	0.047	**0.16**	**0.021**	**0.29**	**0.029**	< 0.0040	0.076	< 0.0040
MTCA Method B Groundwater Cleanup Levels[3]					**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**

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Farallon PN: 1754-008

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 (HFPO-DA/GenX)
Lower Issaquah Valley Regional Wells (continued)														
COI-PW04	COI	9/22/2020	WELL 4 RAW WATER-43	NA	---	0.0358 J	---	**0.108**	**0.0105 J**	**0.311**	**0.0116** J	---	---	---
	COI	10/20/2020	WELL 4 RAW WATER-44	NA	---	0.0316 J	---	**0.120**	**0.00854 J**	**0.287**	0.00949 J	---	---	---
	COI	1/6/2023	MDA0161-06	NA	0.00814	0.0251	0.0262	**0.0928**	**0.00782**	**0.258**	0.00814	---	---	< 0.001
	COI	3/8/2023	MDC0264-01	NA	0.00778	0.0252	0.0246	**0.0900**	**0.00789**	**0.230**	**0.0101**	---	---	< 0.001
	COI	5/3/2023	MDE0193-01	NA	0.00771	0.0247	0.0266	**0.0886**	**0.00741**	**0.226**	0.00723	---	---	< 0.001
	COI	6/7/2023	MDF0248-03	NA	0.00794	0.0234	0.0259	**0.0938**	**0.00686**	**0.242**	0.00723	---	---	< 0.002
	COI	7/19/2023	MDG0615-01	NA	0.00753	0.0219	0.0224	**0.087**	**0.00781**	**0.212**	0.00815	---	---	< 0.002
	COI	8/2/2023	MDH0118-01	NA	0.00766	0.0223	0.0263	**0.0894**	**0.00754**	**0.230**	0.00778	---	---	< 0.002
COI-PW05	Geosyntec	7/6/2016	COI-WELL 5-20160716	NA	---	0.0064	0.0060	**0.022**	0.0028	**0.032**	0.0035	< 0.0025	---	---
	Geosyntec	7/13/2016	COI-WELL5-20160713	NA	---	0.0081	0.0072	**0.026**	0.0031	**0.032**	0.0043	< 0.0025	---	---
	Geosyntec	7/27/2016	COI-WELL5-20160727	NA	---	0.0041	0.0030	**0.014**	0.0037	**0.019**	< 0.0025	< 0.0025	---	---
	Geosyntec	2/11/2021	MBB0292-2	NA	---	< 0.0900	---	**0.0245**	< 0.0200	**0.0436**	---	---	---	---
	Geosyntec	3/11/2021	MBC0332-02	NA	---	< 0.0900	---	**0.0232**	< 0.0200	**0.0452**	---	---	---	---
	Geosyntec	5/6/2021	MBE0152-02	NA	---	< 0.0900	---	**0.0218**	< 0.0200	**0.0496**	---	---	---	---
	Geosyntec	6/3/2021	MBF0100-02	NA	---	< 0.0900	---	**0.0236**	< 0.0200	**0.0472**	---	---	---	---
COI-PW05-OBS	Geosyntec	7/6/2016	COI-WELL 50BS-20160716	330 - 450	---	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	< 0.0025	---	---
NDS-MW02	Farallon	4/16/2020	NDS-MW02-200416	76.0	0.011	0.04	0.024	**0.14**	**0.010**	**0.29**	**0.041**	< 0.0040	0.001 J	< 0.0040
	Farallon	10/28/2020	NDS-MW02-102820	77.0	0.012	0.034	0.026	**0.12**	**0.0093**	**0.26**	**0.020**	< 0.0045	< 0.0045	< 0.0045
NDS-MW04	Farallon	4/16/2020	NDS-MW04-200416	77.0	< 0.0040	0.0013 J	< 0.0092	**0.0026** J	0.0012 J	**0.0076**	< 0.0040	< 0.0040	< 0.0040	< 0.0040
	Farallon	7/15/2020	NDS-MW04-200715		< 0.0039	0.00092 J	< 0.0092	**0.0026** J	0.00078 J	**0.0043**	< 0.0039	< 0.0039	< 0.0039	< 0.0039
	Farallon	10/28/2020	NDS-MW04-102820	78.0	0.00066 J	0.00065 J	< 0.0092	**0.0018** J	0.00072 J	0.0033 J	< 0.0045	< 0.0045	< 0.0045	< 0.0045
NLS-MW02	Farallon	9/2/2022	NLS-MW02	75.0	0.01 J	0.021	< 0.046	**0.084**	**0.0082**	**0.13**	< 0.02	< 0.02	0.0043 J	< 0.02
	Farallon	12/13/2022	NLS-MW02-121322[H]		0.01	0.015	0.022	**0.091**	**0.0077**	**0.11**	0.0028 J	< 0.0045	0.0025 J	< 0.0045
	Farallon	3/2/2023	NLS-MW02-030223	75.0*	0.0057	0.017	0.022	**0.068**	**0.0063**	**0.11**	0.0027 J	< 0.0045	0.0035 J	< 0.0045
	Farallon	5/12/2023	NLS-MW02-051223	75.0	0.0036 J	0.013	0.015	**0.053**	**0.0050**	**0.084**	0.0027 J	< 0.0044	0.0023 J	< 0.0044
MTCA Method B Groundwater Cleanup Levels[3]					**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.

[1]Depth in feet below ground surface.

[2]Samples collected in 2016 analyzed by U.S. Environmental Protection Agency (EPA) Method 537; samples collected in 2018 and later analyzed by EPA Method 537 Modified.

[3]Washington 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.

[4]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.

[5] Monitoring well sampled on 1/12/23 and 3/2/23 using a QED MP15 CO2 controller with teflon bladder, sampled on 5/12/2023 using a PFAS free rated Solinst 408 valve pump and high pressure nitrogen controller.

COI = City of Issaquah

Farallon = Farallon Consulting, L.L.C.

Geosyntec = Geosyntec Consultants, Inc.

H = sample analyzed outside of holding time; results are estimates

J = result is an estimate

NE = not established

PFAS = per- and poly-fluoroalkyl substances

* indicates the sample intake depth was not reported; value represents the center of the well screen when fully saturated or center of water column when screen was not fully saturated.

Table 9
Summary of Data Gaps and Scope of Work
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Location	Location Details	Task Element	Representative Sample		QA/QC Samples			Total Samples
			Sample Type	Sample Count	Trip Blanks	Equipment Blanks	Duplicates	
EFR HQ Source Area	Paved asphalt area	8 borings to 15ft bgs	Soil	24	2	2	2	30
	Stormwater detention basin	1 boring to 15ft bgs 1 boring/well to 15ft bgs	Soil	6	1	1	1	9
IVES Source Area	Shallow Monitoring Wells	9 wells to 25-30ft bgs	Soil	5	1	1	1	8
	West Playfield AFFF Training Area	75x75' grid shallow hand auger sampling	Soil	25	2	2	2	31
		4 borings to 15ft bgs	Soil	12	1	1	1	15
	Dodd Field AFFF Training Area	75x75' grid shallow hand auger sampling	Soil	22	2	2	2	28
		4 borings to 15ft bgs	Soil	12	1	1	1	15
EFR HQ IVES Site Groundwater Plume	Car Fire Locations	Not warranted	Soil	--	--	--	--	--
	Stream gauging locations STR-01, STR-02, STR-04, STR-05, and east of existing monitoring well COI-MW08	2 semi-annual sediment sampling events	Sediment	10	2	2	2	16
	Stream gauging locations STR-01, STR-02, and STR-04	2 semi-annual sediment porewater sampling events	Porewater	6	2	2	2	12
		2 semi-annual surface water sampling events	Surface Water	6	2	2	2	12
	proximate to monitoring well COI-MW02	Shallow Monitoring Well (20-30ft bgs)	--	--	--	--	--	--
	west of monitoring well COI-MW05	Shallow Monitoring Well (20-30ft bgs)	--	--	--	--	--	--
	west of monitoring well COI-MW05	Intermediate Monitoring Well (90ft bgs)	--	--	--	--	--	--
	proximate to the COI-TW01 well cluster	Intermediate Monitoring Well (90ft bgs)	--	--	--	--	--	--
	proximate to well cluster COI-MW02	Deep Monitoring Well (130ft bgs)	--	--	--	--	--	--
	proximate to well cluster COI-MW06	Deep Monitoring Well (130ft bgs)	--	--	--	--	--	--
	EFR HQ IVES Site monitoring wells	2 semi-annual groundwater monitoring events at 63 existing monitoring wells and 16 proposed monitoring wells	Groundwater	158	20	16	16	210

APPENDIX A
AGREED ORDER NO. DE23250

REMEDIAL INVESTIGATION WORK PLAN
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

State of Washington
Department of Ecology

In the Matter of Remedial Action by:
Eastside Fire & Rescue and City of Issaquah
Agreed Order
No. DE 23520

To: Chief Ben Lane
Eastside Fire & Rescue
175 Newport Way NW
Issaquah, WA 98027

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

1. Introduction

The mutual objective of the State of Washington, Department of Ecology (Ecology), Eastside Fire & Rescue (EFR) 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 requires EFR and the City (collectively referred to as the PLPs) to conduct remedial investigations (RIs) and feasibility studies (FSs) per WAC 173-340-350, WAC 173-340-351, and WAC 173-204-550, and conduct an interim action. 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 PLPs agree 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 PLPs 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 EFR HQ IVES site (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, 175 Newport Way NW (EFR Headquarters) and 555 NW Holly St (IVES/Dodd Fields), in Issaquah, as shown in the Location Diagram (Exhibit A).

4.2 Parties

Refers to the State of Washington, Department of Ecology, Eastside Fire & Rescue (EFR), and the City of Issaquah (the City).

4.3 Potentially Liable Persons (PLP(s))

Refers to EFR and 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 PLPs:

5.1

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

- EFR Headquarters: 175 Newport Way NW, Issaquah (parcel 2824069165 at latitude 47.53229, longitude -122.04431)
- IVES/Dodd Fields: 555 NW Holly Street, Issaquah (parcel 2824069012 at latitude 47.53664, longitude -122.04536).

5.2

EFR conducted firefighting training exercises with aqueous film-forming foam (AFFF) containing perfluorooctane sulfonate (PFOS) and additional per- and poly-fluorinated alkyl substances (PFAS) at EFR Headquarters and IVES/Dodd Fields. EFR has stated it conducted training exercises with AFFF consistent with industry standards to effectively prepare for first response to emergent hazards.

5.3

The City is a member of EFR and the City conducted firefighting training exercises at IVES/Dodd Fields prior to the formation of EFR. The City's training included use of aqueous film-forming foam containing PFOS and additional PFAS.

5.4

Between 2018 and the present, EFR in consultation with the City and Ecology has conducted initial site characterization sampling of soil and groundwater at the Site and a pilot study at EFR Headquarters. 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.
- Per- and Poly-Fluoroalkyl Substances Pilot Test Summary Report, 175 Newport Way Northwest, Issaquah, Washington. Farallon Consulting. July 29, 2022.

5.5

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.

5.6

At each EFR Headquarters and IVES/Dodd Fields, PFOS and additional PFAS have been detected in soil and in groundwater at concentrations exceeding MTCA cleanup levels.

5.7

The groundwater plume emanating from EFR Headquarters extends approximately 1,500 feet north to IVES/Dodd Fields, which contributes to the plume. The co-mingled plume then extends approximately 2,500 feet north to a drinking water well operated by the City (COI-PW04), under certain pumping conditions. The entire length of the plume beginning at EFR Headquarters and extending to at least COI-PW04 is part of the EFR HQ IVES Site.

6. Ecology Determinations

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

6.1

EFR 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

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).

6.3

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.

6.4

Based upon credible evidence, Ecology issued a PLP status letter to EFR dated January 11, 2023, pursuant to RCW 70A.305.040, .020(26), and WAC 173-340-500 for the source areas at EFR Headquarters and IVES/Dodd Fields. By letter dated March 27, 2023, EFR, jointly with the City, voluntarily waived its rights to notice and comment and accepted Ecology's determination that EFR is a PLP under RCW 70A.305.040. Ecology issued a PLP determination letter dated December 11, 2023, naming EFR as a PLP for the EFR HQ IVES Site.

6.5

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 for the source areas at EFR Headquarters and IVES/Dodd Fields. By letter dated March 27, 2023, the City, jointly with the EFR, voluntarily waived its rights to notice and comment and accepted Ecology's determination that the City is a PLP under RCW 70A.305.040 for IVES/Dodd. The City indicated that they had not trained at EFR Headquarters, but the comingled plume from EFR Headquarters and IVES/Dodd Fields makes the City a PLP for the entire EFR HQ IVES Site. Ecology issued a PLP determination letter dated November 14, 2023, naming the City as a PLP for the EFR HQ IVES Site.

6.6

Pursuant to RCW 70A.305.030(1), .050(1), Ecology may require PLPs 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.

6.7

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. The PLPs will complete an interim action at the EFR HQ property as described in Exhibit C, Interim Action Summary. Conducting the Interim Action prior to completion of the Site-wide FS presents an opportunity to remediate the largest identified release to date more expeditiously and at less cost than would be the case if the remedy was completed later. Based on these circumstances, Ecology has determined that an interim action is warranted under WAC 173-340-430.

7. Work to be Performed

Based on the Findings of Fact and Ecology Determinations, it is hereby ordered that the PLPs 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 PLPs will complete Remedial Investigations, Feasibility Studies, submit a detailed Interim Action Work Plan (IAWP), and then implement the Interim Action in accordance with the Ecology-approved plan, 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

To effectuate the work to be performed under this Order in the most efficient manner, certain PLPs may elect to take the lead in performing various aspects of the work required under this Order. Language in this Order, and the exhibits attached hereto, may reflect this agreement among the PLPs. However, the PLPs remain strictly, jointly, and severally liable for the performance of any and all obligations under this Order. In the event the party identified as a lead should fail to timely and properly complete performance of all or any portion of its work, all PLPs must perform that remaining work, if any.

7.3

If the PLPs learn 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 PLPs, 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.

7.4

The PLPs 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:

7.4.1

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

7.4.2

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

7.4.3

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.

7.4.4

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

7.4.5

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.

7.4.6

A list of deliverables for the upcoming month.

7.5

All plans or other deliverables submitted by the PLPs 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 PLPs shall take any action required by such deliverable.

7.6

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 additional interim action under this Order. If the Parties are in agreement concerning the additional interim action, the Subject PLPs shall prepare and submit to Ecology an Interim Action Work Plan, 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 Subject PLPs shall not conduct the interim action until Ecology approves the Interim Action Work Plan. Upon approval by Ecology, the Interim Action Work Plan becomes an integral and enforceable part of this Order, and [Subject PLP(s)] is required to conduct the interim action in accordance with the approved Interim Action Work Plan. Ecology reserves its authority to require additional interim action(s) under a separate order or other enforcement action under RCW 70A.305, or to undertake the interim action(s) itself.

7.7 If Ecology determines that the PLPs have failed to make sufficient progress or failed to implement the remedial action, in whole or in part, Ecology may, after notice to the PLPs, perform any or all portions of the remedial action or at Ecology's discretion allow the PLPs opportunity to correct. In an emergency, Ecology is not required to provide notice to the PLPs, or an opportunity for dispute resolution. The PLPs 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 requirements of this Order under Section 10 (Enforcement).

7.8

Except where necessary to abate an emergency situation or where required by law, the PLPs shall not perform any remedial actions at the Site 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 PLPs 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.

7.9

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 PLPs 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 $44,806.63 in remedial action costs related to the Site as of 10/31/2024. For all Ecology costs incurred, the PLPs 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
brec461@ECY.WA.GOV

The project coordinator for the PLPs 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 PLPs, 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 PLPs 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 PLPs 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 PLPs' 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 PLPs. Ecology or any Ecology authorized representative shall give reasonable notice before entering any Site property owned or controlled by the PLPs unless an emergency prevents such notice. All persons who access the Site 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 PLPs shall make best efforts to secure access rights for those properties within the Site not owned or controlled by the PLPs 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 PLPs 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 PLPs 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 PLPs, or take independent action, in obtaining such access and/or use restrictions. Ecology reserves the right to seek payment from the PLPs 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 PLPs 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 PLPs shall allow Ecology and/or its authorized representative to take split or duplicate samples of any samples collected by the PLPs pursuant to implementation of this Order. The PLPs shall notify Ecology seven (7) days in advance of any sample collection or work activity at the Site. Ecology shall, upon request, allow the PLPs 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 PLPs 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 PLPs 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 PLPs 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 PLPs that do not receive prior Ecology approval, the PLPs 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 PLPs 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 PLPs' 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 PLPs 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 PLPs 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 PLPs withhold any requested Records based on an assertion of privilege, the PLPs 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 PLPs 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 PLPs elect to invoke dispute resolution the PLPs 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 PLPs 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 PLPs' 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 PLPs may then request regional management review of the dispute. The PLPs 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 PLPs' 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 PLPs' 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 PLPs to demonstrate to the satisfaction of Ecology that the request for such 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 PLPs 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 PLPs.

8.10.2.2 Required review and approval by PLP governing body (e.g. Board of Directors) 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 PLPs.

8.10.3

Ecology shall act upon the PLPs' written request for extension in a timely fashion. Ecology shall give the PLPs 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 PLPs' 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 PLPs. 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 PLPs 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 a 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 PLPs to cease such activities for such period of time as it deems necessary to abate the danger. The PLPs shall immediately comply with such direction.

In the event the PLPs determine that any activity being performed at a Site under this Order is creating or has the potential to create a danger to human health or the environment, the PLPs may cease such activities. The PLPs 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 PLPs shall provide Ecology with documentation of the basis for the determination or cessation of such activities. If Ecology disagrees with the PLPs' cessation of activities, it may direct the PLPs to resume such activities.

If Ecology concurs with or orders a work stoppage pursuant to this section, the PLPs' 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 PLPs 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 PLPs regarding remedial actions required by this Order, provided the PLPs comply with this Order.

Ecology nevertheless reserves its rights under RCW70A.305, including the right to require additional or different remedial actions at a 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 a Site.

By entering into this Order, the PLPs do not admit to any liability for the Site. Although the PLPs are committing to conducting the work required by this Order under the terms of this Order, the PLPs 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 PLPs 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 PLPs' transfer of any interest in all or any portion of the Site, and during the effective period of this Order, the PLPs 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 PLPs shall notify Ecology of said transfer. Upon transfer of any interest, the PLPs 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 PLPs 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 PLPs have 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 PLPs, Ecology will document in writing if they are applicable to actions carried out pursuant to this Order, and the PLPs must implement those requirements.

8.15.2 Relevant and Appropriate Requirements.

All actions carried out by the PLPs 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 being applicable to the actions required by this Order. If relevant and appropriate requirements are identified by Ecology or the PLPs, Ecology will document in writing if they are applicable to actions carried out pursuant to this Order and the PLPs must implement those requirements.

8.15.3

Pursuant to RCW 70A.305.090(1), the PLPs 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 PLPs 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 PLPs have 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 PLPs 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 PLPs shall be responsible to contact the appropriate state and/or local agencies. If Ecology so requires, the PLPs 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 PLPs and on how the PLPs must meet those requirements. Ecology shall inform the PLPs in writing of these requirements. Once established by Ecology, the additional requirements shall be enforceable requirements of this Order. The PLPs 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 PLPs 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 PLPs agree 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 PLPs, their officers, employees, agents, or contractors in entering into and implementing this Order. However, the PLPs 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 PLPs' receipt of written notification from Ecology that the PLPs have completed the remedial activity required by this Order, as amended by any modifications, and that the PLPs have 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 Site.

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

Eastside Fire & Rescue

Ben Lane
Fire Chief
175 Newport Way NW

Issaquah, WA 98027
425.677.3554

Effective date of this Order: February 24, 2025

City of Issaquah

DocuSigned by:
Mary Lou Pauly
CEFF9F863CD7468...

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

City Clerk Attestation: DocuSigned by: Tisha Gieser FE989FA7135144C...

State of Washington
Department of Ecology

Kimberly Wooten PhD

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

Exhibit A —Site Location

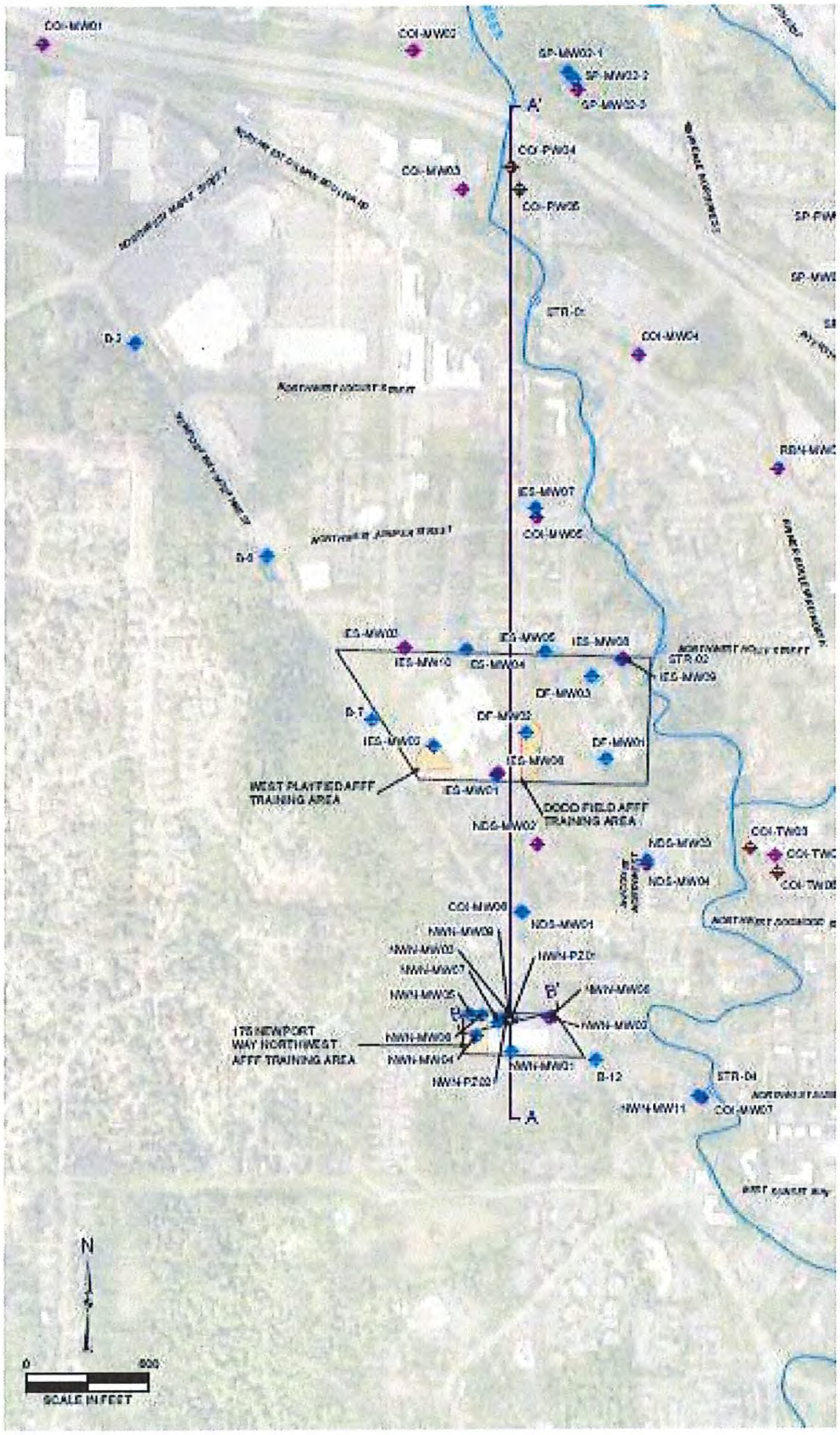

Exhibit B —Scope of Work and Schedule

Scope of Work

Purpose

The work under this Agreed Order (AO) involves completing Remedial Investigations (RIs), Feasibility Studies (FSs), conducting an Interim Action, and conducting additional interim actions if required or agreed to by Ecology. A RI and FS will be conducted for the Eastside Fire and Rescue Headquarters Issaquah Valley Elementary School Site (EFR HQ IVES Site), which comprises two previously identified source areas: EFR HQ and IVES/Dodd Fields and the underlying comingled groundwater plume that extends from the EFR HQ to the City of Issaquah production well COI-PW04. The purpose of the RI and FS and any interim action for the EFR HQ IVES Site is to provide sufficient data, analysis, and evaluations to enable Ecology to select cleanup alternatives for the source areas and for the comingled groundwater plume emanating from the source areas.

The PLPs 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 eight major tasks as follows:

Task 1. EFR HQ Interim Action Work Plan
Task 2. EFR HQ Interim Action
Task 3. EFR HQ IVES RI Work Plan
Task 4. EFR HQ IVES RI
Task 5. EFR HQ IVES Feasibility Study
Task 6. SEPA Compliance
Task 7. Public Participation
Task 8. Additional Interim Action(s) (if required)

Task 1. EFR HQ Interim Action Work Plan

The PLPs will prepare and submit for Ecology approval an Agency Review Draft Interim Action Work Plan (IAWP) for EFR HQ with detail commensurate with the work to be performed, as described in Exhibit C, Interim Action Summary.

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 PLPs will also submit a copy of the Health and Safety Plan for the project.

The PLPs shall prepare two (2) copies of the Agency Review Draft IAWP, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology for review. The PLPs shall incorporate Ecology's comments and resubmit to Ecology. The PLPs 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 PLPs shall prepare two (2) copies of the Final IAWP, including one electronic copy each in Word (.doc) and Adobe (.pdf) formats, and submit them to Ecology. Once approved by Ecology, the PLPs will implement the interim action according with the approved schedule.

Task 2. EFR HQ Interim Action

PLPs will implement the interim action in accordance with the Final IAWP. Upon successful completion of the work, an Agency Review Draft Interim Action Report will be prepared as a separate deliverable. The PLPs 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 PLPs 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.

Task 3. EFR HQ IVES RI Work Plan

The PLPs 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 PLPs 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, 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 PLPs 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 PLPs 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 PLPs shall prepare two (2) copies of the Agency Review Draft 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 4. EFR HQ IVES Remedial Investigation

The PLPs 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, preliminary Sediment Management Standards (SMS) cleanup standards, 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 approved SAP and QAPP must be communicated to Ecology immediately and documented as required by Ecology.

The PLPs 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 PLPs shall compile the results of the site investigation into an Agency Review Draft RI Report. The PLPs 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 PLPs shall combine the RI report with the FS report (Task 5). The remainder of the report preparation process is described in Task 5.

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 5. EFR HQ IVES Feasibility Study

The PLPs shall use the information obtained in the RI to prepare an Agency Review Draft Feasibility Study Report (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 PLPs 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 PLPs shall combine the EFR HQ IVES RI (Task 4) 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 PLPs 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 6. Groundwater Modeling

The PLPs shall be responsible for evaluating groundwater fate and transport of PFAS throughout the Lower Issaquah Valley 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 7. SEPA Compliance

The PLPs 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 PLPs shall be responsible for the preparation of Draft and Final Environmental Impact Statements. The PLPs 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 8. Public Participation

The PLPs shall support Ecology in presenting the Public Review Draft RI Report and the Public Review Draft FS Reports and SEPA evaluations at one public meeting or hearing each for EFR HQ and IVES/Dodd (two public meetings or hearings). The PLPs 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 PLPs shall prepare an Agency Review Draft Responsiveness Summary that addresses public comments. The PLPs 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 PLPs 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 9. Additional 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 PLPs and approved by Ecology, the PLPs 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 sediments or other 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 PLPs 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 PLPs will also submit a copy of the Health and Safety Plan for the project. The PLPs 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 PLPs 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 PLPs 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 PLPs 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 PLPs 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 PLPs 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 PLPs 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 PLPs 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	15th day of the month beginning after effective date of Agreed Order
Interim Action	
Agency Review Draft IAWP	60 days following effective date of Agreed Order
Public Review Draft IAWP	45 days following Ecology's comments on the Agency Review Draft IAWP
Final IAWP	45 days following receipt of public comments on the Public Review Draft IAWP
Agency Review Draft Interim Action Report	60 days following completion of the interim action
Final Interim Action Report	30 days following Ecology's comments on the Agency Review Draft Interim Action Report
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 Work Plan
Completion of RI Field Work	18 months following completion of Final RI WP
Agency Review Draft RI Report	45 days following receipt of final laboratory data

Schedule Continues on Next Page

Feasibility Study	
Agency Review Draft FS Report	60 days following receipt of final Ecology comments on Agency Review Draft RI Report
RI/FS 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.

Exhibit C —Interim Action Summary

Purpose

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.

The PLPs will complete an evaluation of an Interim Action, which may include removal of contaminated soil at Eastside Fire and Rescue (EFR) Headquarters and/or expansion of a permeable reactive barrier in the subsurface or similar groundwater treatment system. Conducting an interim action prior to completion of the Site-wide FS presents an opportunity to remediate this area more expeditiously and at less cost than if the remedy was completed at a later time.

Scope

The PLPs will prepare an Interim Action Work Plan (IAWP) as described in Task 1 of Exhibit B, Scope of Work and Schedule of the Agreed Order. The IAWP will include the following information:

- Description of the interim action including its purpose, general requirements, and relationship to the (final) cleanup action (to the extent known);
- Summary of relevant Remedial Investigation information, including locations and depths of per- and poly-fluorinated alkyl substance (PFAS) soil contamination at EFR Headquarters;
- Evaluation of the estimated costs of excavation, transportation, and disposal and the mass of PFAS removed for each cell to at least three different depths including the seasonal low water table associated with each major component of the interim action;
- Information regarding design and construction requirements, a proposed schedule, and personnel roles and responsibilities;
- Identification of any data gaps related to the design of the interim action and, if applicable, a sampling and analysis plan to fill the data gaps;
- Required plans for sampling and analysis, quality assurance, and compliance monitoring;
- Permitting and cultural resource consultation requirements.

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Certificate Of Completion

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Tisha Gieser TishaG@issaquahwa.gov City Clerk City of Issaquah Security Level: Email, Account Authentication (None) **Electronic Record and Signature Disclosure:** Not Offered via DocuSign	DocuSigned by: Tisha Gieser FE989FA7135144C... Signature Adoption: Uploaded Signature Image Using IP Address: 146.129.251.131	Sent: 2/14/2025 1:18:49 PM Viewed: 2/14/2025 1:19:37 PM Signed: 2/14/2025 1:19:42 PM

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Envelope Summary Events	Status	Timestamps
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Envelope Updated	Security Checked	2/14/2025 1:05:52 PM
Envelope Updated	Security Checked	2/14/2025 1:05:52 PM
Certified Delivered	Security Checked	2/14/2025 1:19:37 PM
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You may contact us to let us know of your changes as to how we may contact you electronically, to request paper copies of certain information from us, and to withdraw your prior consent to receive notices and disclosures electronically as follows:
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To let us know of a change in your email address where we should send notices and disclosures electronically to you, you must send an email message to us at gust@issaquahwa.gov and in the body of such request you must state: your previous email address, your new email address. We do not require any other information from you to change your email address.

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APPENDIX B
SAMPLING AND ANALYSIS PLAN

REMEDIAL INVESTIGATION WORK PLAN
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

FARALLON CONSULTING

Sampling and Analysis Plan

Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site 175 Newport Way Northwest and 555 Northwest Holly Street Issaquah, Washington

Farallon PN: 1754-008

September 5, 2025

Prepared by:

Sarah Snyder
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Prepared for:
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and
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Submitted by:
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TABLE OF CONTENTS

FIGURES

TABLES

ATTACHMENTS

ACRONYMS AND ABBREVIATIONS

AO	Agreed Order No. DE 23520
AFFF	aqueous film-forming foam
ALS	ALS Environmental
bgs	below ground surface
°C	degrees Celsius
City	City of Issaquah
Ecology	Washington State Department of Ecology
EFR	Eastside Fire and Rescue
EPA	U.S. Environmental Protection Agency
EQuIS database	EQuIS environmental data management system database
Farallon	Farallon Consulting, L.L.C.
HQ	Headquarters
IVES	Issaquah Valley Elementary School
μg/l	micrograms per liter
MTCA	Washington State Model Toxics Control Act Cleanup Regulation
NWN	Newport Way Northwest
PFAS	per- and poly-fluorinated alkyl substances
PFOS	perfluorooctane sulfonate
PLPs	potentially liable persons
QA/QC	quality assurance/quality control
RCW	Revised Code of Washington
RIWP	Remedial Investigation Work Plan
SAP	Sampling and Analysis Plan
SOPs	standard operating procedures
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 Eastside Fire and Rescue (EFR) and the City of Issaquah (the City) for the EFR Headquarters (HQ) and Issaquah Valley Elementary School (IVES) Site (Site) (Figure 1). EFR and the City were identified as the potentially liable persons (PLPs) 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 23520 (AO) between the Washington State Department of Ecology (Ecology) and the PLPs.

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 EFR HQ Source Area at 175 Newport Way Northwest and IVES Source Area at 555 Northwest Holly Street in Issaquah, Washington (collectively referred to as the Source Areas). The confirmed releases have impacted shallow groundwater at the Source Areas. The City withdraws groundwater from production wells at locations down-gradient of the Site and a completed exposure pathway for groundwater has been confirmed. Ecology believes the actions required by the AO are in the public's interest.

AFFF training was performed at two locations on the EFR HQ Source Area (Figures 2 and 3):

- An area that currently is covered with lawn near the fire hydrant on the north-central portion (Median Strip AFFF Training Area); and
- The western gravel-surfaced area of the EFR Headquarters Property (Newport Way Northwest [NWN] AFFF Training Area).

AFFF training was performed at two locations on the IVES Source Area (Figures 2 and 4):

- An area that currently is covered with lawn on the southern area of the west playfield at IVES (West Playfield AFFF Training Area); and
- An area that currently is covered with lawn, trees, turf, and asphalt along the western side of Dodd Field (Dodd Field AFFF Training Area).

The Median Strip AFFF Training Area, NWN AFFF Training Area, West Playfield AFFF Training Area, and Dodd Field AFFF Training Area are collectively referred to as the AFFF Training Areas. The Source Areas are shown on Figure 2, Figure 3 shows the EFR HQ Source Area plan, and Figure 4 shows the IVES Source Area plan.

This SAP has been prepared in accordance with the Washington State Model Toxics Control Act, Chapter 70A.305 if 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 PLPs;
- 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.

- Adequately characterize the nature and extent of impacts to surface water, sediment, and sediment pore water, if any, caused by groundwater transport from the 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 Figures 2, 5, and 6. 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 EFR HQ Source Area

- Drill up to eight borings to 15 feet below ground surface (bgs) within the paved asphalt area of the EFR HQ Source Area (Figure 5). Collect three soil samples per boring for analysis of PFAS at depths of 5, 10, and 15 feet bgs. Quality assurance/quality control (QA/QC) samples will include two trip blanks, two duplicate samples, and two equipment blanks.

- Drill up to two borings to 15 feet bgs within the stormwater detention basin at the EFR HQ Source Area (Figure 5). Collect three soil samples per boring for analysis of PFAS at depths of 5, 10, and 15 feet bgs. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank. One of the borings in the stormwater detention basin will be completed as a shallow monitoring well, installed to a depth of approximately 15 to 20 feet bgs, with a stickup monument.

2.1.2 IVES Source Area

- Install up to nine shallow monitoring wells to a depth of approximately 25 to 30 feet bgs using a sonic drill rig (Figure 6). Collect three soil samples at each location at depths of 5, 10, and 15 feet bgs. Five 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.

- Hand auger at up to 17 locations to a depth of approximately 1.5 feet bgs within the West Playfield AFFF Training Area on an approximately 75- by 75-foot grid (Figure 6). 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 by EPA Method 1633: four locations within the West Playfield AFFF Training Area and four additional locations within the West Playfield most likely to be used by children during play and/or with 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. QA/QC samples will include two trip blanks, two duplicate samples, and two equipment blanks.
  - Drill up to four borings to 15 feet bgs within the West Playfield 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 for analysis of PFAS at depths of 5, 10, and 15 feet bgs. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank.
- Hand auger at up to 14 locations to a depth of approximately 1.5 feet bgs within the Dodd Field AFFF Training Area on an approximately 75 x 75-foot grid (Figure 6). 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 by EPA Method 1633: four locations within the Dodd Field AFFF Training Area and four additional locations within Dodd Field most likely to be used by children during play and/or with 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. QA/QC samples will include two trip blanks, two duplicate samples, and two equipment blanks.
  - Drill up to four borings to 15 feet bgs within the Dodd 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 for analysis of PFAS at depths of 5, 10, and 15 feet bgs. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank.

2.1.3 Site Groundwater

- Install up to two shallow monitoring wells to depths of approximately 20 to 30 feet bgs proximate to monitoring well COI-MW02 and east of monitoring well COI-MW05 (Figure 2). No soil samples will be collected during monitoring well installation.
- Install up to two intermediate monitoring wells to depths of approximately 90 feet bgs west of monitoring well COI-MW05 and proximate to the COI-TW01 well cluster (Figure 2). No soil samples will be collected during monitoring well installation.
- Install up to two deep monitoring wells to depths of approximately 130 feet bgs at well clusters COI-MW02 and COI-MW06 (Figure 2). No soil samples will be collected during monitoring well installation.
- Perform up to two semi-annual groundwater monitoring events at all existing (63 each) and newly proposed (up to 16 each) Site monitoring wells (Figure 2). QA/QC samples will include ten trip blanks, eight duplicate samples, and eight equipment blanks per event.

2.1.4 Site Sediment

- Perform up to two semi-annual sediment sampling events using hand tools (i.e., sediment sampler, hand auger, and shovel) at up to five locations in the East and Main forks of Issaquah Creek (Figure 2). Sediment samples will be collected at four existing stream gauging locations, including STR-01, STR-02, STR-04, and STR-05; and east of existing monitoring well COI-MW08. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank per event.

2.1.5 Site Sediment Porewater

- Perform up to two semi-annual sediment porewater sampling events at three locations along the streambank along the Main fork of Issaquah Creek (Figure 2). Temporary drive-point piezometers will be installed and removed to allow for sampling during both events. Sediment porewater samples will be collected at three existing stream gauging locations, including STR-01, STR-02, and STR-04. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank per event.

2.1.6 Site Surface Water

- Perform up to two semi-annual surface water sampling events at three locations along the Main fork of Issaquah Creek (Figure 2). Surface water samples will be collected using a swing sampler and laboratory grade PFAS-free sample containers. Surface water samples will be collected at three existing stream gauging locations, including STR-01, STR-02, and STR-04. QA/QC samples will include one trip blank, one duplicate sample, and one equipment blank 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 PLPs 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

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

Chief Ben Lane
Eastside Fire and Rescue
175 Newport Way Northwest
Issaquah, Washington 98027
Telephone: 425-313-3201
Email: BLane@ESF-R.ORG

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 EQuIS environmental data management system database (EQuIS 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, groundwater, surface water, sediment, and sediment porewater 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 Figures 2, 5, and 6. 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 or direct push 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 existing stream gauging locations on the Main 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.

3.2.3 Surface Water Sampling

Surface water sampling events will include collecting grab surface water samples at existing stream gauging locations STR-01, STR-02, and STR-03 using a swing sampler and laboratory grade PFAS-free sample containers (Figure 2). Surface water sampling will be performed in accordance with Ecology SOP Environmental Assessment Program (EAP) 015 (Attachment A) and the procedures detailed below.

- Carefully remove the lid from a PFAS-free laboratory-supplied sample bottle and attach the bottle to the swing sampler using rope or zip ties. A new auxiliary sample container will be used for each sample location.
- Maneuver the sample collection bottle facing the flow of the water with the mouth of the bottle pointing in the upstream direction beneath the water surface. The sample will be collected from a turbulent section in the central part of the flow, while avoiding touching the sides or bottom of the stream.
- Fill each laboratory sample bottle nearly to the top of the bottle shoulder or per laboratory instructions, from the auxiliary sample container; do no rinse or overfill the laboratory sample bottles

Surface water samples will be collected in accordance with Section 2.1 (Scope of Work). Surface water samples will be collected and handled in accordance with the requirements of SOP EAP015 (Attachment A), and as described in Section 5 (Sample Handling) and Section 7 (Field Documentation). Surface water 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.

3.2.4 Sediment Sampling

Sediment sampling events will include collecting grab sediment samples at four existing stream gauging locations (STR-01, STR-02, STR-04, and STR-05) and east of existing monitoring well COI-MW08 (Figure 2). Sediment sampling will be performed in accordance with Farallon SOP SD-01 (Attachment A).

Sediment samples will be collected in accordance with Section 2.1 (Scope of Work). Sediment samples will be collected and handled in accordance with SOP SD-01 (Attachment A) and as described in Section 5 (Sample Handling) and . Farallon will record observations and field data on Field Report forms as described in Section 7, Field Documentation.

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

3.2.5 Sediment Porewater Sampling

Sediment porewater sampling events will include collecting grab sediment porewater samples at existing stream gauging locations STR-01, STR-02, and STR-03 using a temporary drive-point piezometer (Figure 2). Sediment porewater sampling will be performed in accordance with U.S. Environmental Protection Agency (EPA) Region 4 SOP – Porewater Sampling (Attachment A) and the procedures detailed below.

- Temporary drive-point piezometers will be installed and removed to allow for sampling. Piezometers will not be reused between sample locations.
- PFAS-free sample tubing will be attached to the temporary drive-point piezometer prior to installation. The tubing will be extended through the side hole in the tubing by-pass to protect the tubing during installation. The piezometer will be manually installed to the target depth of approximately 1 foot using a slide hammer and drive head assembly.
- The sample tubing will be inserted inside the peristaltic pump tubing and the other end to the piezometer tubing.
- Prior to sample collection, air and surface water will be purged from the piezometer and sample tubing by purging porewater equal to the approximate volume of the sampler and tubing plus an additional 10 percent. Purge volume will be documented on the Field Report form discussed in Section 7 (Field Documentation).
- Porewater samples will be collected directly from the sample tubing.

Sediment porewater samples will be collected in accordance with Section 2.1 (Scope of Work). Sediment porewater samples will be collected and handled in accordance with the requirements of EPA SOP – Porewater Sampling (Attachment A), and as described in Section 5 (Sample Handling) and Section 7 (Field Documentation). Sediment porewater 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., IES-B01, NWN-MW01, or IES-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 IVES Source Area boring B01 at a depth of 5 feet bgs on September 1, 2025 would be assigned the identifier IES-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., IES-MW11) and the sample date (e.g., 090125).

For example, the groundwater sample collected from IVES Source Area monitoring well MW11 during a groundwater monitoring event on September 1, 2025 would be numbered IES-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.

3.4.3 Surface Water Sampling

The surface water samples collected from Issaquah Creek will be assigned a unique sample identifier that will include the sample media (e.g., SW), sample location (e.g., STR-01), and sample date (e.g., 090125).

For example, the surface water sample collected from location STR-01 during a monitoring event on September 1, 2025 would be numbered SW-STR01-090125. The sample identifier will be placed on the sample label, Field Report form, and Chain of Custody form. Field forms are provided in Attachment B.

3.4.4 Sediment Porewater Sampling

The sediment porewater samples collected along Issaquah Creek will be assigned a unique sample identifier that will include the sample media (e.g., PW), sample location (e.g., STR-01), and sample date (e.g., 090125)

For example, the sediment porewater sample collected from location STR-01 during a monitoring event on September 1, 2025 would be numbered PW-STR01-090125. The sample identifier will be placed on the sample label, Field Report form, and Chain of Custody form. Field forms are provided in Attachment B.

3.4.5 Sediment Sampling

The sediment samples collected along Issaquah Creek will be assigned a unique sample identifier that will include the sample media (e.g., SED), sample location (e.g., STR-01), and sample date (e.g., 090125)

For example, the sediment sample collected from location STR-01 during a monitoring event on September 1, 2025 would be numbered SED-STR01-090125. The sample identifier will be placed on the sample label, Field Report form, 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, groundwater, surface water, sediment, and sediment porewater 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 and Sediment 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 6ºC and protected from light or chilled at -20ºC is 90 days. Samples will be analyzed within the selected analytical methods' holding time.
- **Groundwater, Surface Water, and Sediment Porewater 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 6ºC is 28 days or chilled at -20ºC 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 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.)

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FIGURES

SAMPLING AND ANALYSIS PLAN
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

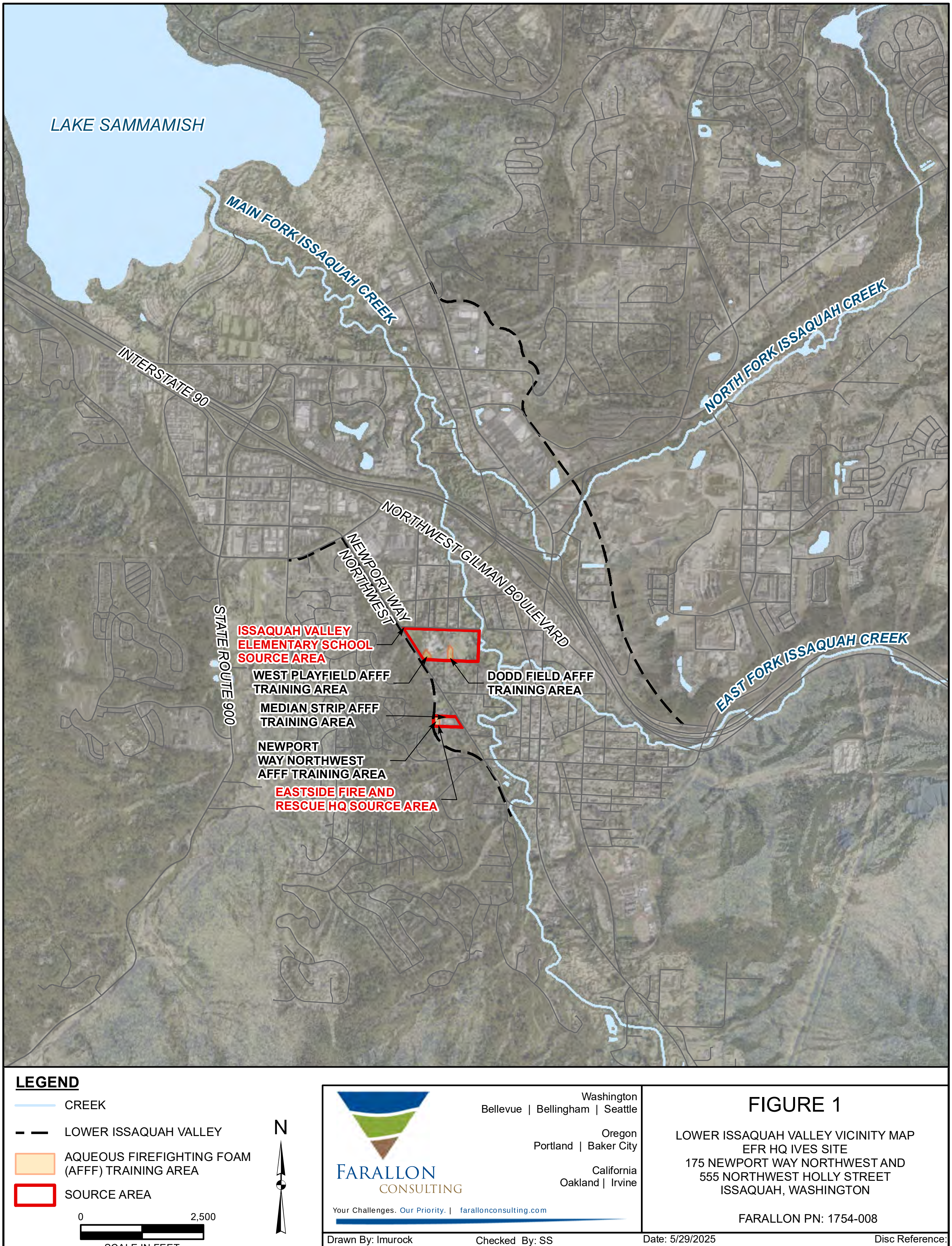

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FIGURE 1

LOWER ISSAQUAH VALLEY VICINITY MAP
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 5/29/2025 | Disc Reference:

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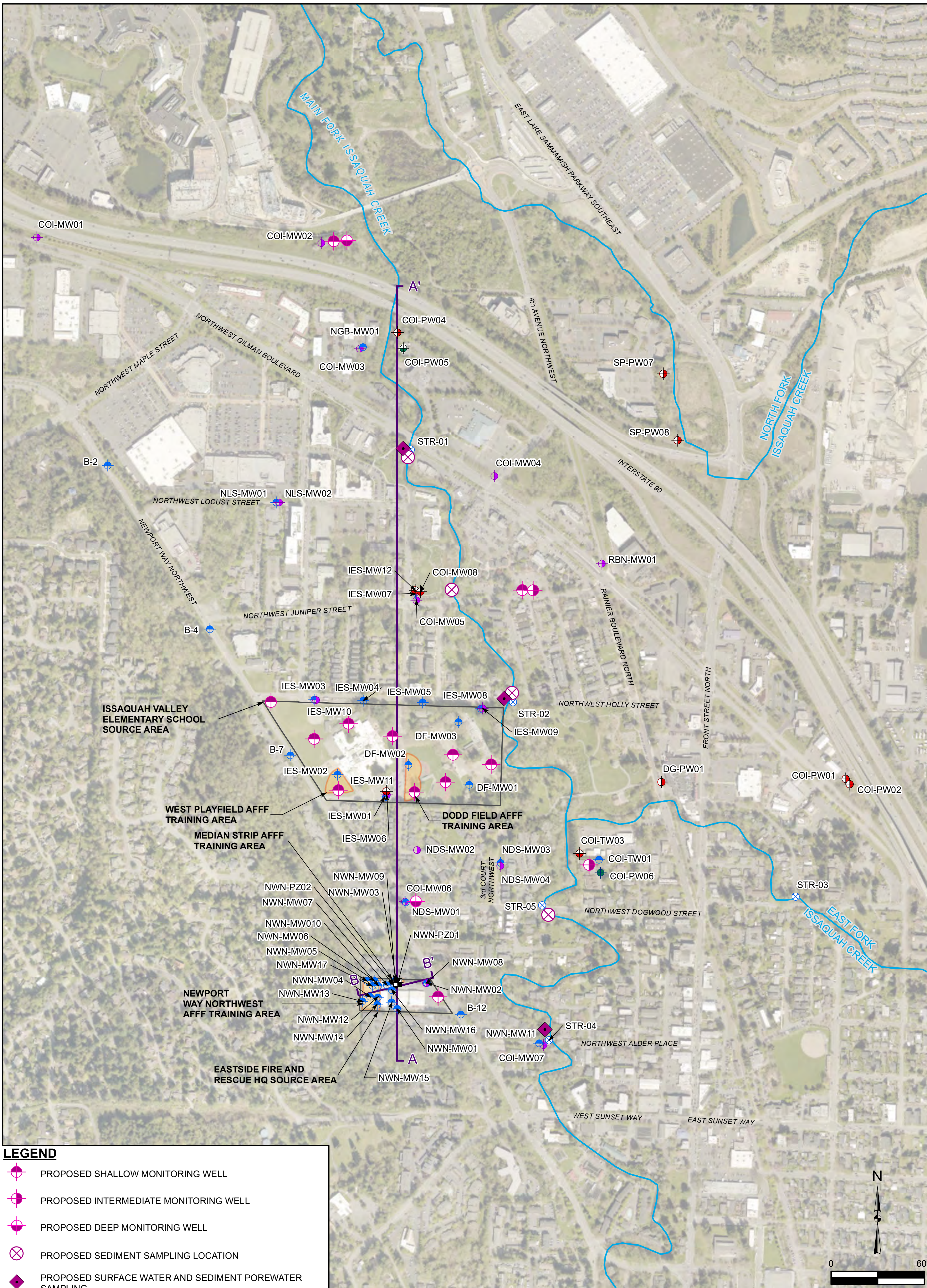

LEGEND

- PROPOSED SHALLOW MONITORING WELL
- PROPOSED INTERMEDIATE MONITORING WELL
- PROPOSED DEEP MONITORING WELL
- PROPOSED SEDIMENT SAMPLING LOCATION
- PROPOSED SURFACE WATER AND SEDIMENT POREWATER SAMPLING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- PIEZOMETER
- STREAM GAUGING STATION
- INTERMEDIATE PRODUCTION WELL
- DEEP PRODUCTION WELL
- PRODUCTION WELL
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- A A' LINE OF CROSS-SECTION

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

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

EFR HQ IVES SITE PLAN
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

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

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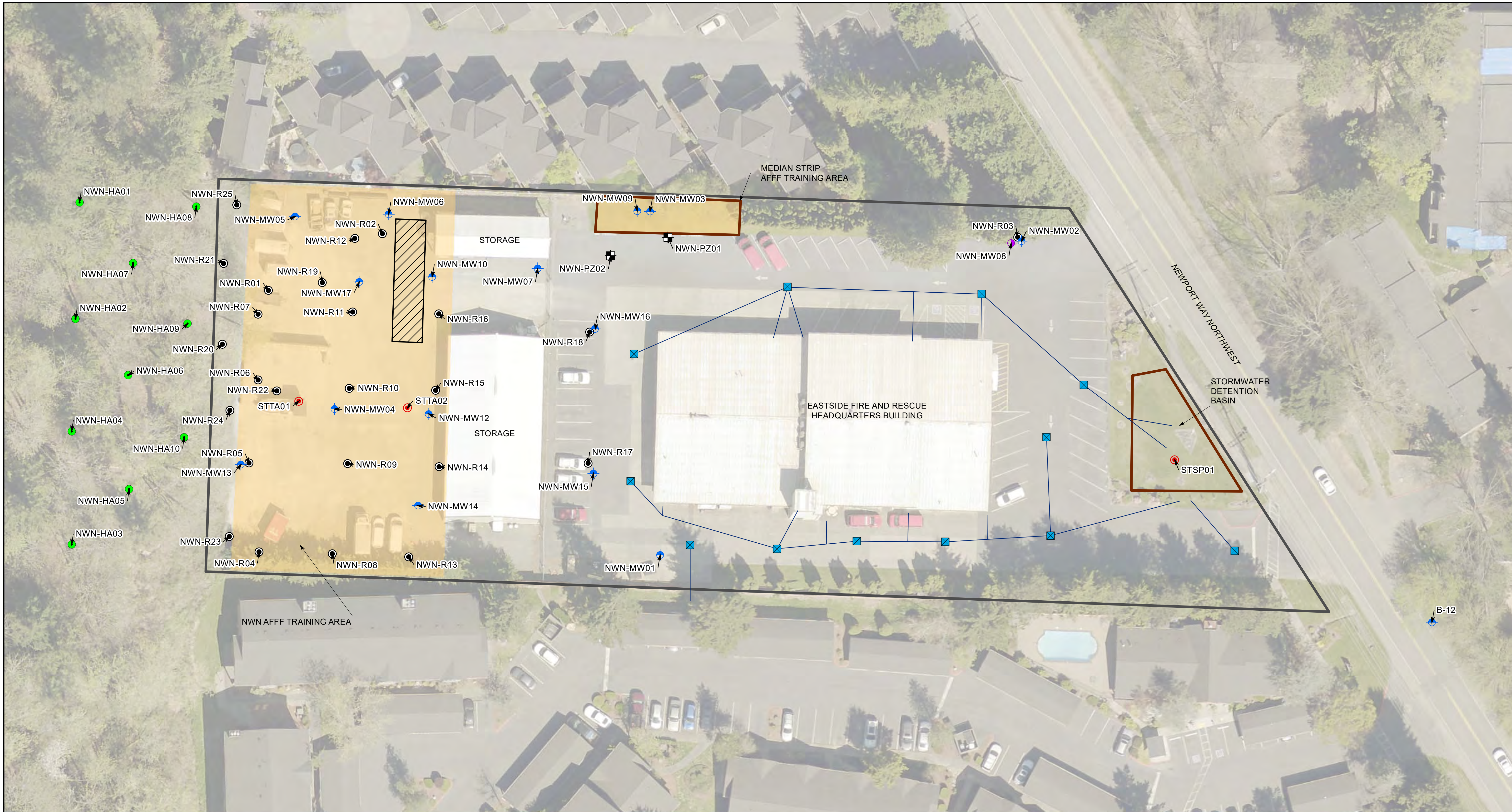

LEGEND

- HAND AUGER LOCATION
- BORING
- GEOSYNTEC SAMPLE
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- PIEZOMETER
- CATCH BASIN
- STORMWATER LINE
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

0 50
SCALE IN FEET

N

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FIGURE 3

EFR HQ SOURCE AREA PLAN
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 3/19/2025 | Disc Reference:

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LEGEND

- BORING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- TEST WELL
- FIRE HYDRANT
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- LISTED SITE

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

0 100
SCALE IN FEET

N

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FIGURE 4

IVES SOURCE AREA PLAN
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 3/19/2025 | Disc Reference:

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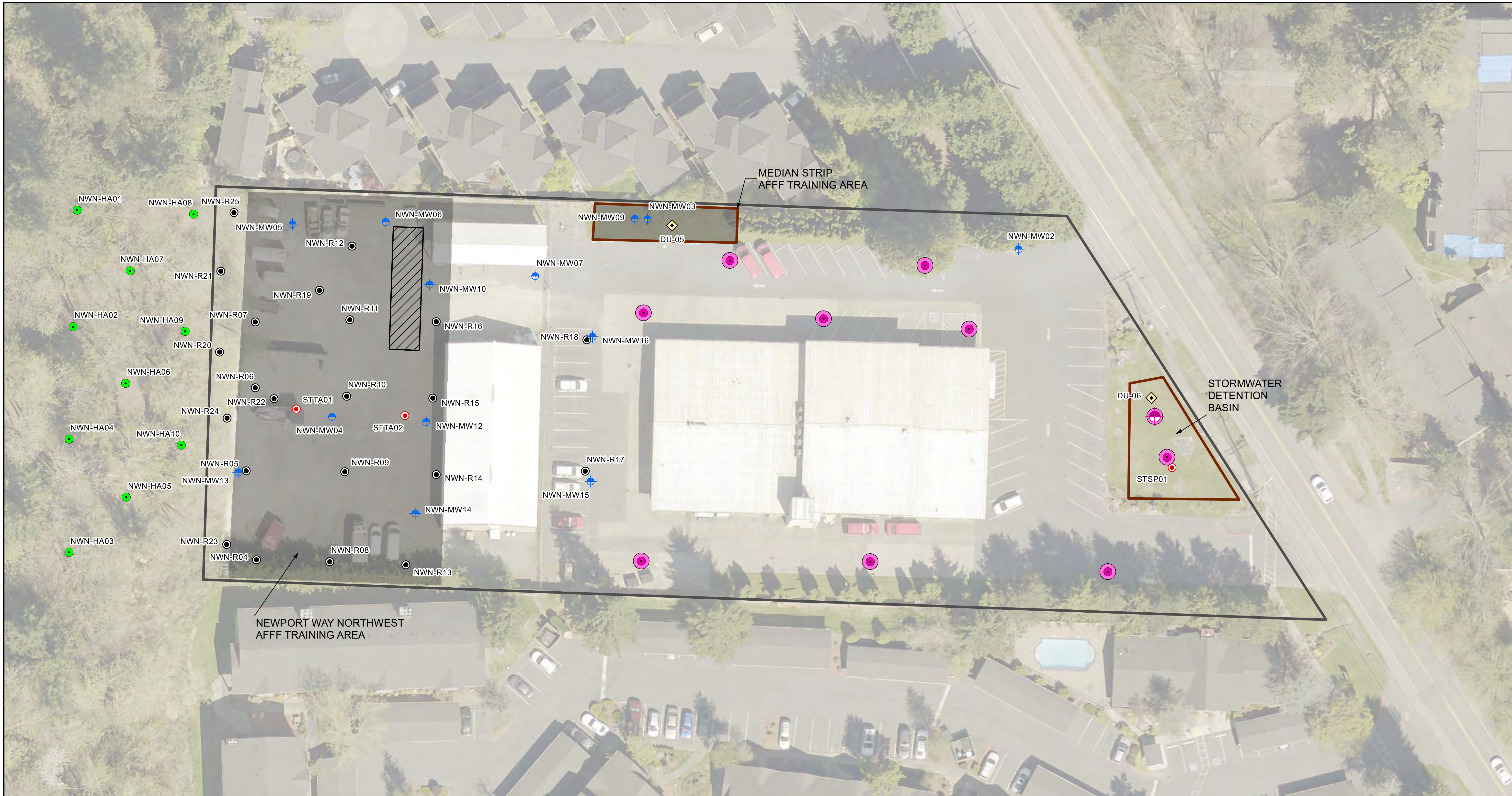

LEGEND

- PROPOSED BORING
- PROPOSED SHALLOW MONITORING WELL
- DECISION UNIT SAMPLE
- HAND AUGER LOCATION
- BORING
- GEOSYNTEC SAMPLE
- SHALLOW MONITORING WELL
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT (DU)
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

0 50
SCALE IN FEET

N

NOTES:
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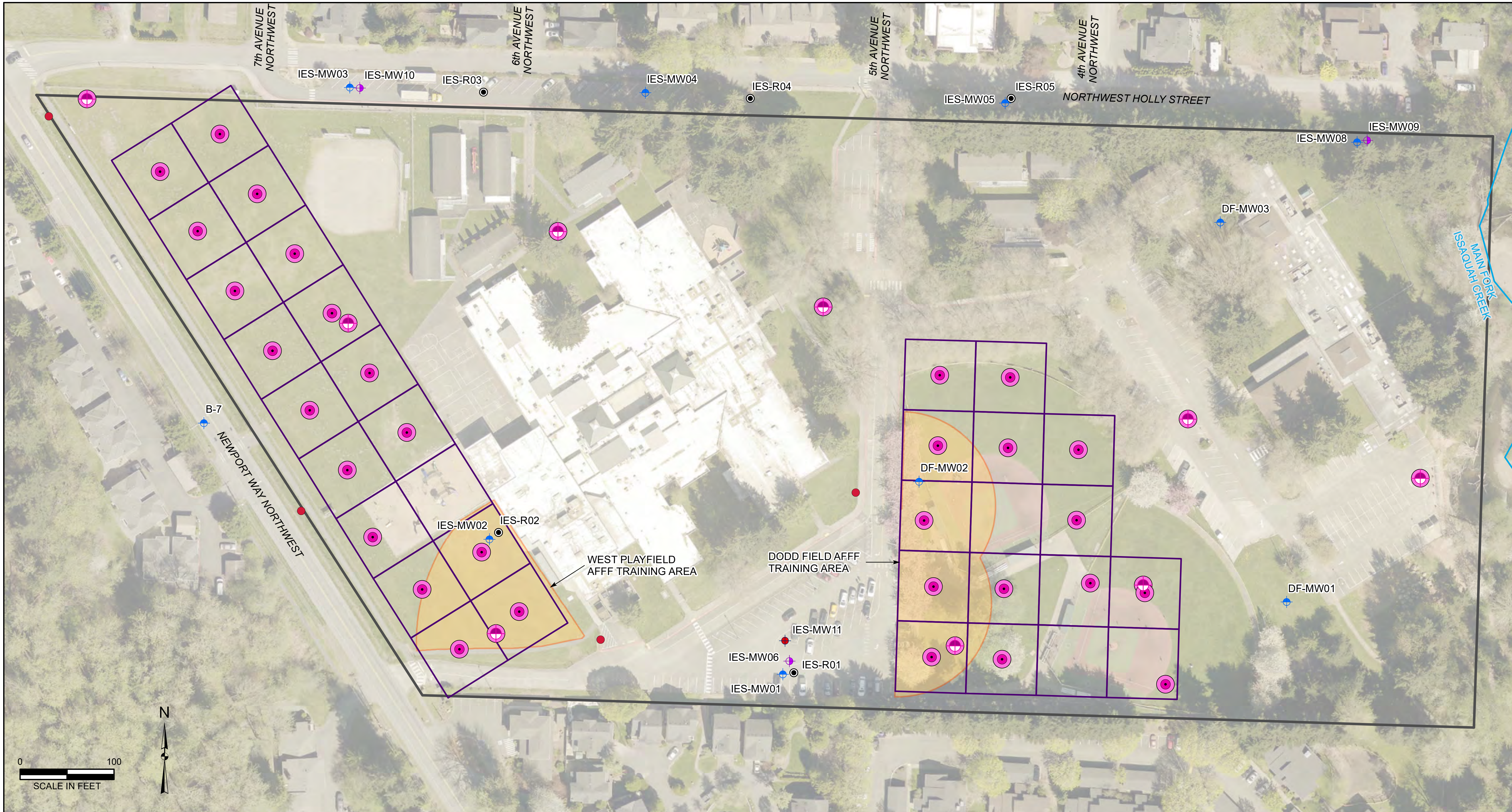
FIGURE 5
PROPOSED BORING AND MONITORING WELL LOCATIONS
EFR HQ SOURCE AREA
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND 555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON
FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 3/20/2025 | Disc Reference: Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-21_EFR-HQ_ProposedLocs.mxd



LEGEND

- PROPOSED HAND AUGER SAMPLING LOCATION
- PROPOSED SHALLOW MONITORING WELL
- BORING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- TEST WELL
- FIRE HYDRANT
- SAMPLING GRID (75'X75')
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL
PFAS = PER- AND POLYFLUOROALKYL SUBSTANCES

NOTE:
1. UP TO FOUR BORINGS WILL BE DRILLED AT THE WEST PLAYFIELD AND DODD FIELD AFFF TRAINING AREAS (UP TO 8 BORINGS TOTAL). BORING LOCATIONS WILL BE COORDINATED WITH ECOLOGY AND SELECTED BASED ON THE RESULTS OF THE HAND AUGER SAMPLING.

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

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FIGURE 6
PROPOSED BORING AND MONITORING WELL LOCATIONS
IVES SOURCE AREA
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON
FARALLON PN: 1754-008

Drawn By: jjones | Checked By: SS | Date: 9/2/2025 | Disc Reference: Q:\Projects\1754 EastsideFireRescue\008 Remedial Inv\001\Figure-22_IVES_ProposedLocs.mxd

TABLES

SAMPLING AND ANALYSIS PLAN
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

Table 1
Soil Screening Levels
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Constituent of Potential Concern	Soil Screening Levels						Maximum Reported Value (mg/kg)	Property	Sample Identification	Retained as Soil COPC
	Method B Direct Contact (mg/kg)[1]	Protection of Groundwater (mg/kg)[1]		Adjustment Factors	Proposed Soil Screening Level (mg/kg)					
		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	0.0000000026	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	0.000000022	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

[1]Washington 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
EFR HQ IVES Site
Issaquah, Washington
Farallon PN: 1754-008

Constituent of Potential Concern	Groundwater Screening Levels							
	Method B Groundwater Noncancer (µg/l)[1]	Federal Maximum Contaminant Levels (MCLs) (µg/l)[2]	Adjustment Factors: Laboratory Method Reporting Limit (µg/l)	Proposed Groundwater Screening Level (µg/l)	Reported Maximum Value (µg/l)	Property	Sample Identification	Retained as Groundwater COPC
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

[1]Washington 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, unless otherwise noted.

[2]U.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.

ATTACHMENT A
STANDARD OPERATING PROCEDURES

SAMPLING AND ANALYSIS PLAN
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

Standard Operating Procedure
EAP015, Version 1.4

Manually Obtaining Surface Water Samples

August 2021
Publication 21-03-208
[Recertified August 2019]

Purpose of this Document

The Washington State Department of Ecology develops Standard Operating Procedures (SOPs) to document agency practices related to sampling, field and laboratory analysis, and other aspects of the agency's technical operations.

Publication Information

This SOP is available on the Department of Ecology's website at
https://apps.ecology.wa.gov /publications/SummaryPages/2103208.html.

Ecology's Activity Tracker Code for this SOP is 15-072.

***Recommended citation*:**
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Original Author – Joe Joy (retired)
Date – 10/24/2006

Original Reviewer – Trevor Swanson
Date – 6/26/2013

Reviewer – Eiko Urmos-Berry
Date – 07/18/2019

Current Reviewer – Arati Kaza
Date – 08/06/2019

QA Approval – Arati Kaza, Ecology Quality Assurance Officer

Recertification Date – 08/06/2019

SIGNATURES AVAILABLE UPON REQUEST

The Washington State Department of Ecology's (Ecology's) Standard Operating Procedures (SOPs) are adapted from published methods, or developed by in-house technical and administrative experts. Their primary purpose is for internal Ecology use, although sampling and administrative SOPs may have a wider utility. Our SOPs do not supplant official published methods. Distribution of these SOPs does not constitute an endorsement of a particular procedure or method.

Any reference to specific equipment, manufacturer, or supplies is for descriptive purposes only and does not constitute an endorsement of a particular product or service by the author or by Ecology.

Although Ecology follows the SOP in most instances, there may be instances in which Ecology uses an alternative methodology, procedure, or process.

SOP Revision History

Revision Date	Revision History	Summary of Changes	Sections	Revisers
10/10/2006	1.0	Formatting; signatories	All	Bill Kammin
7/1/2010	1.1	Three-year review	All	Kammin
6/26/2013	1.2	Three-year review	All	Trevor Swanson
7/28/2016	1.3	Three-year review/recertification. Made quite a few changes to update references and links to manuals, SOPs, and websites.	All	Eiko Urmos-Berry
7/18/2019	1.4	Converted SOP to new template, updated Figure 1 photo, added alt text to all figures and photos, updated references and links, and fixed minor grammatical errors.	All	Eiko Urmos-Berry
8-9-2021	1.4	Applied Accessibility standards	All	Joan LeTourneau

1.0 Purpose and Scope

1.1 This document is the Environmental Assessment Program (EAP) Standard Operating Procedure (SOP) for manually obtaining surface water samples.

1.2 This includes procedures for collecting samples from lotic and lentic waterbodies, wastewater treatment plant access points, and outfalls, pipes, and drains. It also describes procedures for sampling while wading on beaches and from boats and bridges. This SOP does not describe the operation of unattended automated sampling devices, nor does it cover pelagic marine or groundwater sampling.

2.0 Applicability

2.1 This SOP should be followed when manually collecting samples from surface waters as described in section 1.2.

3.0 Definitions

3.1 Composite sample: A sample in one container comprised of discrete sub-samples collected spatially, temporally or both.

3.2 Grab sample: A sample collected during a very short time period at a single location.

3.3 Halocline: The depth where salinity increases rapidly over a relatively short depth interval in a manner similar to temperature in a thermocline.

3.4 Integrated sample: A sample comprised of continuously collected sub-samples from a water column or across a cross section of a waterbody - differentiated from a composite sample by the term ‘continuously collected.’

3.5 Intermediate sampling container: A temporary sampling container used to directly sample water and transfer it to the primary container. Often, 500 or 1000 mL polypropylene containers are used as intermediate containers to collect samples for transfer to smaller bottles, which often contain acids or other preservatives.

3.6 LAR: Laboratory Analysis Request form.

3.7 Lotic: Flowing water systems such as rivers and streams.

3.8 Lentic: Still water systems such as lakes and ponds.

3.9 MEL: Manchester Environmental Laboratory

3.10 Pelagic: Waters of open seas, oceans, or lakes that are not near the shore.

3.11 Thalweg: The line defining the points along the length of a river bed with the greatest volume of moving water.

3.12 Thermocline: A distinct layer in a waterbody in which temperature changes more rapidly with depth than it does in the layers above or below, usually at a rate of 1º C or more for each 1 meter of depth.

3.13 Thiosulfate: A chemical MEL puts into sampling containers to rapidly dechlorinate water samples, especially those taken at wastewater treatment facilities.

4.0 Personnel Qualifications/Responsibilities

4.1 All field staff must comply with the requirements of the EAP Safety Manual (Ecology, 2019). A full working knowledge of the procedures in Chapter 1 - General Field Work, especially the sections titled Working in Rivers and Streams, Working near Traffic and from Bridges, and Fall Protection, is expected. Sampling from a boat requires one person onboard to be a qualified boat operator and all persons onboard must be familiar with Chapter 3 of the EAP Safety Manual - Boating.

4.2 All field staff must be familiar with other standard procedures for sampling water quality parameters described in this SOP. Several water quality parameters have special sample pre-treatment, filtering, post-treatment, and collection procedures applicable to this SOP. If a vertically (depth) integrated sampler is to be used, field staff should read Isokinetic Depth-Integrated Sampling Methods, Chapter A4, section 4.1.3 (USGS, 2006).

4.3 The field lead directing sample collection must be knowledgeable of all aspects of the project's Quality Assurance Project Plan (QAPP) to ensure that credible and useable data are collected. All field staff should be briefed by the field lead or project manager on the sampling goals and objectives prior to arriving to the site.

4.4 All field staff must comply with EAP Procedure 1-15, *Minimizing the Spread of Aquatic Organisms* (EAP, 2010), found at:
http://teams/sites/EAP/EAPProcedures/01-15InvasiveSpecies.pdf
and SOP EAP070, *Minimizing the Spread of Aquatic Invasive Species* (Parsons et al, 2018) found at:
https://apps.ecology.wa.gov /publications/SummaryPages/1803201.html

4.5 This SOP pertains to all Natural Resource Scientists, Environmental Engineers, Environmental Specialists, Hydrogeologists, and Interns and Technicians in WA Department of Ecology's Environmental Assessment Program.

5.0 Equipment, Reagents, and Supplies

5.1 Equipment and Supplies

5.1.1 Intermediate sampling containers and devices (e.g., 500 or 1000 mL bottles, syringe for field filtering, stainless or Teflon dipper, depth integrated sampler, Van Dorn or Kemmerer sampler, appropriate ropes/cables/rods, mobile bridge crane or davit) (Figure 1).

Figure 1
Top (left to right): **Weighted sampler with bottles and dissolved oxygen bucket for bridge sampling; Kemmerer bottle.**
Bottom (left to right): **Van Dorn sampler; DH-76 depth integrated sampler with bottle.**

5.1.2 Sampling extension pole with sampling container attachment.

5.1.3 Glass or polypropylene bottle supplied by the laboratory with appropriate preservatives and filtering devices (Figure 2).

5.1.4 Safety equipment appropriate for the sampling sites: safety vests and lines, personal floatation devices (PFDs), bridge traffic control signs and cones, or boating safety equipment.

5.1.5 Latex gloves for hygienic protection; leather gloves for handling ropes and cables.

5.1.6 Anti-bacterial hand sanitizer or soap.

5.1.7 Coolers.

5.1.8 Ice (Regular, blue, or dry – depending on shipping method).

5.1.9 Deionized water.

5.1.10 Sample tags with sample numbers assigned by MEL

5.1.11 LAR forms.

5.1.12 Field notebook and pens.

5.1.13 Disinfection solutions, brushes, or other equipment necessary to minimize the spread of invasive species from site to site. See EAP Policy 1-15 for more information.

5.1.14 <u>Sampling containers</u>

- The most common containers for sampling surface waters in EAP are made of polypropylene or glass. The MEL manual (MEL, 2016) describes the type of bottle and volume of sample necessary to complete the laboratory analysis. The containers usually come directly from MEL and some may have chemicals to stabilize or neutralize the sample.

Figure 2: Sample containers commonly used for water samples.

- Check bottles for loose lids. Damaged or leaking containers should be recycled or discarded.
- Containers left over from previous projects should be closely inspected before using. Bottles with old or discolored preservative should be sent back to MEL for proper disposal. Fecal coliform sampling bottles, 500 and 1000 mL polypropylene bottles, and 500 mL Teflon metal sampling bottles (and associated Teflon vials with nitric acid preservative) should also be sent back to MEL for reuse. Most other bottles can be recycled or discarded as necessary. Check with MEL if there is a question on whether a bottle can be reused.
- Holding times for sterilized microbiological sample bottles are 6 months. MEL does not guarantee that bottles are sterile after 6 months. Check the MEL manual (MEL, 2016).
- For efficiency, some parameters can be combined into one container. Check the MEL manual (MEL, 2016).

6.0 Summary of Procedure

6.1 Pre-sampling Preparation

6.1.1 File an EAP Field Plan. This plan also includes a section to enter information pertaining to a Float Plan. Forms are available and should be posted on the EA Program SharePoint site at: http://teams/sites/EAP/Field%20Schedules/Forms/AllItems.aspx

6.1.2 Obtain proper sample bottles from the laboratory and arrange for sample analyses. MEL's sample container request and pre-sampling notification forms are available at http://teams/sites/EAP/manlab/LabUsers/SitePages/Home.aspx. MEL will provide lab sample numbers after forms are submitted.

6.1.3 Obtain ropes, extension poles, meters, and intermediate sampling devices through equipment check-out procedures.

6.1.4 Notify the laboratory at least two weeks prior to sampling, especially if special preparations are needed for your samples or the parameters have a short holding time.

6.1.5 Sampling on Thursday through Sunday must be pre-approved with the laboratory for bacteria and other analyses with short holding times.

6.1.6 If the range of concentrations can be estimated before sampling (from past samples or otherwise), inform the lab beforehand or write it on the sample tags so the proper set of dilutions can bracket the range.

6.1.7 If the water is extremely turbid (<25 mL can be filtered) the laboratory may need to modify its analytical method. Call the lab as soon as possible so they can prepare for adjustments.

6.1.8 Prior to collecting sample, prepare sample ID tags containing the project name, sample number, site, date, parameter, and space for time. Also, prepare a field lab book or page with similar information.

6.1.9 Pre-book air transportation for sample coolers if possible. For ground shipments, check on delivery times and last shipment times for the day.

6.2 General Considerations and Cautions

6.2.1 Never compromise your personal safety or that of a field partner to collect a water sample. Always plan ahead to avoid falling and drowning hazards.

6.2.2 If only one sample is taken from a site in a lotic system, collect it in, or as close as safely possible, to the thalweg or predominant downstream current. Avoid back eddies and side channels that would not be representative of the water quality affecting downstream sites. If stratification is present, consider sampling the strata individually.

6.2.3 If collecting samples along a transect while wading, set-up a tag line for safety and to help keep a straight transect.

6.2.4 If only one sample is taken from a site in a lentic or estuarine system, determine the most representative site to safely sample and achieve the goal of the project. Determine if stratification is present with a thermistor, salinometer, or by other means. If stratification is present, consider sampling the strata individually. Note the depth of the halocline or thermocline in the field notebook and the depth where a sample was collected.

6.2.5 Do not rinse a sterilized sample container or one that contains preservative.

6.2.6 Collect water samples after performing other field tasks if they cannot immediately be stored in a cool, dark place.

6.2.7 Be careful not to disturb sediment from the stream bed, particularly in slower moving waters. If sample contamination from stirred sediment is an issue, collect samples from the bank using a sampling extension pole while avoiding touching the stream bottom.

6.2.8 If sampling from a bridge, find the thalweg and determine if the current is too strong for a weighted sampling device to sink and obtain a representative sample.

6.2.9 If sampling from a boat, avoid gas and oil contamination. Collect the sample from near the bow while the boat moves upstream or upwind.

6.2.10 Before leaving the sampling site, inspect and clean all equipment (sampling devices, ropes, boots, etc.) to the level required by EAP070 – Minimizing the Spread of Invasive Species.

6.3 Direct Sampling

6.3.1 Remove stopper/lid from container just before sampling. Be careful not to contaminate the cap, neck, or the inside of the bottle with your fingers, wind-blown particles, or dripping water from your clothes, body, or overhanging structures.

6.3.2 If no preservative is present in the container, face upstream in lotic waters and upwind in lentic waters and proceed as follows:

6.3.3 Hold the container near its base, reach out in front of your body, and plunge it (mouth down) below the surface to about mid-water column. If the water is so shallow that this technique will disturb sediment and contaminate the sample, it may be necessary to collect a surface water sample. Make sure to note your change of methods, if any.

6.3.4 Fill the bottle to the appropriate level depending on the analyte to be tested.

6.3.5 Pour out a small volume if needed to create a headspace for mixing in the lab. Do not create a headspace for some analytes like volatile organics and alkalinity.

6.3.6 If an extension pole is used from a pier, dock, or from shore, securely attach the sample container (with its lid in place) to the holder with the clamps or bands. Remove the container lid, being careful not to contaminate the container, and follow the above procedure. Do not use this method for samples that already have preservative in the container; use methods outlined in 6.4 - Sampling with Intermediate Devices and Containers.

6.3.7 If preservative is present in the container and you can reach the water with your hand, use the following procedure:

6.3.8 Hold the container upright and place the lid over the mouth so that only a small area forms an opening (Figure 3).

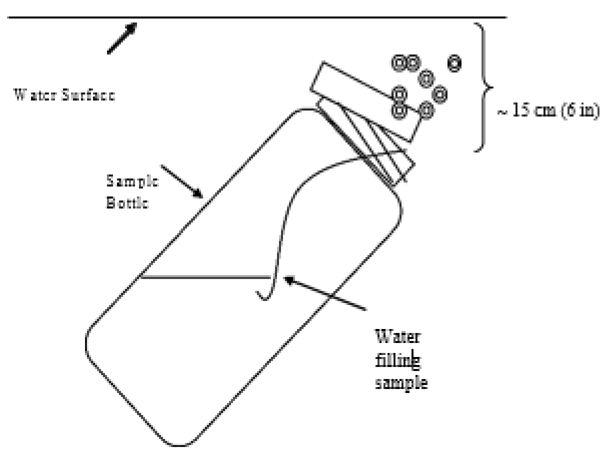

Figure 3: Illustration of the cap position of a sample container that already contains a preservative while filling with a sample.

6.3.9 Immerse the bottle about 15 cm (6 inches) under the water surface while holding the cap in position with your fingers as far away from the opening as possible.

6.3.10 Observe the rate the container is filling and remove it from the water before the headspace area is reached. If overfilling occurs, get a new sample container and repeat.

6.3.11 This procedure does not work well in fast moving, shallow water. Use procedures in section 6.4 if this is the case.

6.3.12 Sample free-falling water from drains, pipes, and outfalls by using an intermediate sampling device if necessary

6.3.13 Replace the lid of the container. Invert it several times to evenly mix any preservative with the sample.

6.3.14 Rinse any large amount of dirt or debris from the outside of the container.

6.3.15 Mark the time on the sample ID tag, and then attach it to the container. Place in appropriate storage.

6.4 Sampling with Intermediate Devices and Container

6.4.1 Triple rinse an intermediate container (Figure 1) with site water and pour the rinsate away from or downstream of the sampling location. If used in a contaminated environment (e.g. wastewater treatment plant, stormwater drain), it should be washed with soap and water and rinsed off-site before use. Some organic and micronutrient sampling procedures require acid and deionized water rinses as well. For especially turbid sites, be sure to inspect and rinse out any sediment or organic debris that may have collected at the bottom of the container. If there is any doubt, use a new and clean container to sample.

6.4.2 Fill the intermediate container with water following the technique described in 6.4.1 as closely as possible. Submerge the container to a depth that does not disturb bottom sediments, but also avoids sampling the surface layer.

6.4.3 For vertically (depth) integrated samples, raise and lower the sampler at a constant rate. If the sample container is overfilled or underfilled, dump the sample and adjust the transit rate or try a different nozzle size (USGS, 2006).

6.4.4 Kemmerer or Van Dorn bottles should be lowered to an appropriate depth and triggered with a messenger. Be aware that messengers may not work if the messenger is too light for the transit depth to the bottle.

6.4.5 Sticks and leaves can be removed from the bucket or dipper if contamination of the sample can be avoided. Gently mix the water in the intermediate container by swirling before pouring it into the sample containers if using an open-top container, or slowly inverting three times if using a closed-top container. From the intermediate container, carefully fill the sample containers, leaving adequate headspace as needed. Do not overfill. Put a note in the field notebook if you suspect that sand or other heterogeneous materials were not adequately represented in the sample.

6.4.6 Release the first 50 - 100 mL from the Kemmerer or Van Dorn sampler outlet before beginning to fill sample containers. Avoid contaminating the sample with your hands or with the outlet extension tube.

6.4.7 Securely replace the stopper/lid of each sample container. Invert several times to evenly mix preservative with the sample.

6.4.8 Rinse any large amount of dirt or debris from the outside of the container.

6.4.9 Attach the ID tag. Place in appropriate storage.

6.5 Samples Collected from Bridges

6.5.1 Follow the guidelines in the EAP Safety Manual chapter, Working near Traffic and from Bridges. Sample from the bridge only if all safety precautions are taken and the risk of injury is negligible.

6.5.2 Pick a spot on the downstream side of the bridge and observe the following:

- Make sure you are over the thalweg of the water body.
- Is the current too swift for the weight of your sampler? Do you have enough rope/rods/cables to break the water’s surface and overcome the downstream current velocity? Will you be able to pull a weighted bucket up against the force of the current?

- Are debris moving downstream or is there boat traffic moving upstream or downstream? If conditions warrant, post an observer with a clear view of upstream and downstream conditions.
- If you do not know the depth of water at the site, roughly measure it. This is so the sampling device will not disturb bottom sediments when deployed.
- Clear any loose debris from the bridge railing and make sure the path from the railing to the water's surface is clear of obstructions.

6.5.3 If the DH-76 or other vertical (depth) integrated sampling device is being used, measure both depth and velocity at the transect points on the bridge. Mark transect points or stretch a tape along the bridge for easier reference.

6.5.4 Assemble, secure, and untangle the sampler with ropes/rods/cables and keep feet and legs clear of all ropes/rods/cables. Be aware of bridge traffic.

6.5.5 If the DH-76 or other integrated sampling device is being used, install the correct nozzle size for the depth and velocities at the site.

6.5.6 Place a clean intermediate container or sterilized bottle into the sampler and secure carefully.

6.5.7 Remove the stopper/lid just before lowering the sampler-with-bottle down on the rope, and set it somewhere free of dirt or other sources of contamination.

6.5.8 Wear heavy duty gloves to protect your hands from rope burns. Lower the sampler in such a manner so as not to contaminate the open bottle with dirt or dripping water.

6.5.9 When approaching the water surface, lower the sampler to where the bottom of the sampler is touching the water surface. This will clean any debris on the bottom the sampler. If the sampler has a fin on it, the sampler will position itself with the flow. Then lower the sampler quickly to submerge and collect a sample.

Figure 4: Various methods of collecting water samples from bridges.

6.5.10 Keep the bottle submerged long enough for the container or bucket to fill.

6.5.11 For vertically (depth) integrated samples, raise and lower the sampler at a constant rate. If the sample container is overfilled or underfilled, dump the sample and adjust the transit rate or try a different nozzle size (USGS, 2006).

6.5.12 Be aware that if Kemmerer and Van Dorn bottles are being used from bridges and the river current is swift, the messenger may not be able to trigger the closing mechanism.

6.5.13 Pull up the sampler and bottle; be careful not to contaminate the sample with dirt or water from either the rope or bridge, or other sources of contamination.

6.5.14 Pour out a small amount of the sample to allow for the air space needed for proper mixing at the lab (unless bottle contains preservative).

6.5.15 Replace the stopper/lid.

6.5.16 Rinse any large amount of dirt or debris from the outside of the container.

6.6 Samples Collected from Wastewater/Point Source Effluent

6.6.1 Conduct a reconnaissance of potential sampling sites with assistance from facility personnel. Attend to all safety precautions. Avoid confined spaces.

6.6.2 Locate an appropriate sampling location representative of water being discharged to the receiving water body. In particular, the location should be below any chlorination or ultra-violet (UV) application.

6.6.3 Use a sampling extension pole or dipper (Figure 4) to collect samples without contacting the effluent with your hands. Wear protective clothing and gloves.


a)


b)

Figure 5: a) Dipper and extension pole used from a streambank. b) Syringe and filter used for dissolved nutrient samples

6.6.4 Note residual chlorine concentrations on lab sample tags.

6.6.5 If sampling bacteria at a facility that uses chlorine for disinfecting its effluent, order bottles with thiosulfate from MEL, to neutralize the chlorine

6.7 Samples Collected from Marine Water Bathing Beaches

6.7.1 (Taken from the Beach Environmental Assessment, Communication and Health (BEACH) program guidance). More beach sampling information is available from the Quality Assurance Project Plan: BEACH Program (Sargeant, Lowe, 2014 and Ruffner, 2019).

6.7.2 Wade into roughly 2.5 feet of water.

6.7.3 Fill a water bottle at sampling sites by following procedures 6.3 or 6.4, as appropriate. If possible, use a sampling extension pole (Figure 4) to avoid collecting disturbed sediment.

6.8 Sample Labeling and Storage

6.8.1 After collecting the sample, immediately loop the string attached to the proper sample tag over stopper/lid until secure. Make sure to attach sample tag beneath, not on top of, the aluminum foil cover of microbiology bottles, as the covers can be easily separated from the sample during transport and handling.

6.8.2 Check the tag to ensure accurate location and analytical information. Record the time the sample was collected on the tag and enter relevant data into the field notes. Use waterproof ink or pencil.

6.8.3 Place labeled sample bottle in a cooler with ice. It is important to cool most samples to 6˚C immediately and store them in the dark.

6.9 Sample Transport

6.9.1 Samples transported from the EAP Operations Center (OC) by MEL courier.

6.9.2 Pack samples in regular cubed or crushed ice. Deliver samples to walk-in cooler at EAP OC and leave Lab Analysis Requested (LAR) forms in the “Out” box near the walk-in cooler. Make sure the LAR form contains the project name, station names, sample numbers, date, times, and parameters. The LAR form is available at: http://teams/sites/EAP/manlab/LabUsers/SitePages/Home.aspx. Carbon copy forms can be requested from the MEL courier.

6.9.3 Samples shipped via air or ground freight service

6.9.4 If glass containers are shipped to MEL, make sure they are adequately wrapped in “bubble” packing material to prevent breakage. Pack samples using blue ice. Cool to 4˚C and store in dark cooler. In warmer weather (80˚F and above), use ten to twelve blue ice packs per cooler. In cooler weather (below 80˚F) use six to eight blue ice packs, to avoid freezing samples. If you have access to dry ice, you may use it to ship **frozen** samples only. Be sure to contain the dry ice in newspaper or cardboard and to use packing materials around the sample containers. Also, use a well sealed container and include blue ice to keep the dry ice cold.

6.9.5 Put LAR form in a waterproof bag or tape it to the inside of the cooler lid and tape coolers shut after inspection. For air shipments, coolers must first be inspected by TSA. Make sure that coolers are taped shut after inspection.

7.0 Records Management

7.1 Specifically list forms to be used and locations of files.

7.2 Each sample collection will be fully described in the field notebook with waterproof ink (e.g., date, time, location identification, sample laboratory identification number, sample type, analyses to be performed, and ancillary data). Entries will be kept neat and concise. Measures will be taken to avoid losing the field notebook.

7.3 Sample locations will be described in enough detail to find on an Environmental Information Management (EIM) System map cover. Otherwise, a global positioning system (GPS) unit will be used to record an accurate location. Coordinates will be recorded as per EIM requirements.

7.4 Information for each laboratory sample will be entered onto a LAR form when the samples are submitted to MEL or other analytical facility.

8.0 Quality Control and Quality Assurance

8.1 QA/QC procedures will be addressed thoroughly on a project-by-project basis in the QAPP for the project.

9.0 Safety

9.1 Identify products, supplies, reagents, and activities that pose a safety hazard of any kind. Refer to EAP HQ Safety Manual when appropriate.

9.2 All field staff must comply with the requirements of the EAP Safety Manual, especially Chapter 1 - General Field Work, which includes special circumstances like fall protection, working on bridges, and working in rivers and streams. Sampling from a boat requires one person onboard to be a qualified boat operator and all persons onboard must be familiar with Chapter 3 of the EAP Safety Manual, Boating.

9.3 For further field health and safety measures refer to the EAP Safety Manual: http://teams/sites/EAP/safety/FieldOpsandSafetyManual.docx

9.4 Heavy duty gloves will protect hands from rope burns when lowering intermediate sampling equipment from bridges. Care is necessary on bridges to keep lines, ropes, and cables clear of other equipment, legs, and traffic.

9.5 Preferably, latex gloves should be worn to avoid bacterial or chemical exposure while performing direct sampling. If gloves are not worn, hands should be cleaned using anti-bacterial soap or hand sanitizer after each sampling station. Before ingesting food or drink, dirty over-clothes should be changed and hands should be washed.

10.0 References

10.1 Ecology, 2019. Environmental Assessment Program Safety Manual. Washington State Department of Ecology. Olympia, WA. http://teams/sites/EAP/safety/FieldOpsandSafetyManual.docx

10.2 Environmental Assessment Program, 2010. EAP Policy 1-15: Minimize the Spread of Aquatic Invasive Species. Washington State Department of Ecology. Olympia, WA. http://teams/sites/EAP/EAPProcedures/01-15InvasiveSpecies.pdf

10.3 MEL, 2016. Manchester Environmental Laboratory Lab Users Manual Tenth Edition Environmental Assessment Program. Washington State Department of Ecology. Manchester, WA.

10.4 Parsons, J. et al., 2018. Standard Operating Procedures EAP070, Version 2.2: Minimize the Spread of Invasive Species, Environmental Assessment Program, Olympia, WA. 33 pp.
https://apps.ecology.wa.gov /publications/SummaryPages/1803201.html

10.5 Quality Assurance SharePoint site
http://teams/sites/eap/qualityassurance/default.aspx

10.6 Quality Assurance internet site:
https://ecology.wa.gov/About-us/How-we-operate/Scientific-services/Quality-assurance

10.7 Ruffner, J., 2018. Addendum to Quality Assurance Project Plan: Beach Environmental Assessment, Communication, and Health (BEACH) Program: Monitoring Washington State Marine Beaches. Environmental Assessment Program, Olympia, WA. 9 pp.
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10.9 U.S. Geological Survey, 2006. Collection of water samples (ver. 2.0): U.S. Geological Survey Techniques of Water-Resources Investigations, book 9, chap. A4, Sept. 2006.
http://pubs.water.usgs.gov/twri9A4/.

Region 4 U.S. Environmental Protection Agency Laboratory Services & Applied Science Division Athens, Georgia	
Operating Procedure	
Title: Pore Water Sampling	ID: LSASDPROC-513-R5
Issuing Authority: Field Services Branch Supervisor	
Effective Date: April 22, 2023	Review Due Date: May 12, 2024
Method Reference: N/A	SOP Author: Mel Parsons

Purpose

The purpose of this operating procedure is to describe the methods and considerations to be used when obtaining a pore water sample from soil or sediment.

Scope/Application

This document describes procedures generic to all pore water sampling methods to be used by field personnel when collecting and handling samples in the field. On the occasion that Laboratory Services and Applied Science Division (LSASD) personnel determine that any of the procedures described in this section are inappropriate, inadequate or impractical and that another procedure must be used to obtain a pore water sample, the variant procedure will be documented in the field logbook, along with a description of the circumstances requiring its use. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

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1 General Information

1.1 Documentation/Verification

This procedure was prepared by persons deemed technically competent by LSASD management, based on their knowledge, skills and abilities and has been tested in practice and reviewed in print by a subject matter expert. The official copy of this procedure resides on the LSASD local area network (LAN). The Document Control Coordinator is responsible for ensuring the most recent version of the procedure is placed on the LAN and for maintaining records of review conducted prior to its issuance.

1.2 General Precautions

1.2.1 Safety

Proper safety precautions must be observed when collecting pore water samples. Refer to the LSASD Safety, Health and Environmental Management Program Procedures and Policy Manual (most recent version) and any pertinent site-specific Health and Safety Plans (HASP) for guidelines on safety precautions. These guidelines, however, should only be used to complement the judgment of an experienced professional. When using this procedure, minimize exposure to potential health hazards through the use of protective clothing, eye wear and gloves. Address chemicals that pose specific toxicity or safety concerns and follow any other relevant requirements, as appropriate.

1.2.2 Procedural Precautions

The following precautions should be considered when collecting pore water samples:

- Special care must be taken not to contaminate samples. This includes storing samples in a secure location to preclude conditions which could alter the properties of the sample. Samples shall be custody sealed during long-term storage or shipment.

- Collected samples are in the custody of the sampler or sample custodian until the samples are relinquished to another party.

- If samples are transported by the sampler, they will remain under his/her custody or be secured until they are relinquished.

- Shipped samples shall conform to all U.S. Department of Transportation (DOT) rules of shipment found in Title 49 of the Code of Federal Regulations (49 CFR parts 171 to 179), and/or International Air Transportation Association (IATA) hazardous materials shipping requirements found in the current edition of IATA's Dangerous Goods Regulations.

- Documentation of field sampling is done in a bound logbook. Chain-of-custody documents shall be filled out and remain with the samples until custody is relinquished.

- All shipping documents, such as bills of lading, will be retained by the project leader and stored in a secure place.

1.2.3 Records

Information generated or obtained by LSASD personnel will be organized and accounted for in accordance with LSASD records management procedures found in LSASD Operating Procedure for Control of Records, LSASDPROC-002 (most recent version). Field notes, recorded in a bound field logbook, will be generated, as well as chain-of-custody documentation, in accordance with LSASD Operating Procedure for Logbooks, LSASDPROC-010 (most recent version), and LSASD Operating Procedure for Sample and Evidence Management, LSASDPROC-005 (most recent version).

2 Sampling Methodology

2.1 General

The pore water sampling techniques and equipment described in this procedure are designed to minimize effects on the chemical and physical integrity of the sample. If the procedures in this section are followed, a representative sample of the pore water should be obtained.

2.2 Collection Considerations

The physical location of the investigator when collecting a sample may dictate the equipment to be used. Wading is the preferred method for reaching the sampling location, particularly if the stream has a noticeable current (i.e., is not impounded). However, wading may disrupt bottom sediments causing biased results; therefore, the sampler should enter the area downstream of the sampling location and collect the sample facing upstream. If the stream is too deep to wade, the pore water sample may be collected from a platform such as a boat or by SCUBA diving. If sampling from a boat or in water deeper than the length of the sampler, extensions may be utilized. If SCUBA diving, all diving activity must be conducted in accordance with EPA's Diving Safety Manual, current version.

2.3 Summary of Procedure

Pore water is collected using a pore water extracting device (Figure 1). The most common type used by LSASD is the PushPoint™ sampler (M.H.E. Products 2003), made out of stainless-steel tubing. The sampling end of the pore water device is inserted into the sediment to the desired depth, and pore water is extracted using a syringe or peristaltic pump. The device is suitable for use only in fine-grained material (no gravel or cobble). Other similar devices may be used providing that the integrity of the sample is maintained, and no ambient surface water is allowed in contact with the sample.

2.4 Sampling Equipment

A PushPoint™ or similar sampler typically consists of a pointed tubular stainless-steel tube with a screened zone at one end and a sampling port at the other. The pointed end with the screened zone consists of a series of very fine interlaced machined slots to allow pore water to enter the sampler.

A removable guard rod adds rigidity to the sampler during sediment insertion. The length of the screened zone will depend on the site-specific study design. Depending on the data quality objectives (DQO) of the study, filters may be placed over the screened zone if additional screening is needed. Pore water is collected through the opposite end of the device by connecting flexible tubing and using a syringe or peristaltic pump to extract the sample. Teflon® tubing is the preferred tubing to be used for collecting pore water samples. However, other tubing may be used, depending upon the DQOs for the specific application.

There are many modifications that can be incorporated into the procedure to satisfy data quality objectives for a specific application. The procedures discussed in the following sections provide guidance on the basic operation of pore water sampling devices and issues to consider when collecting pore water.

An alternative system is available in LSASD inventory for use in soft sediments in water deeper than wading depth. A well screen and short riser approximately ¾" in diameter are threaded to fasten to the bottom of a custom flange. Internal threads on the screen accept a tubing adapter. The accompanying rimmed flange has a coupling with both top and bottom threads. The well screen is screwed into the bottom of the flange and Teflon® tubing is attached to the tubing adapter threaded into the well screen. For deployment, the tubing is then inserted through a PVC pipe or well casing which is then screwed into the upper threads of the flange. The entire assembly can be deployed in water up to ten feet of depth from a well anchored boat.

2.5 Pore Water Sampler Deployment Considerations

It is critical in the collection of pore water to avoid surface water intrusion. Water will flow in a path of least resistance. If space is created around the sides of the sampling end of the pore water device during deployment, surface water may flow down the outside of the device to the screened area and into the intended sample. Therefore, the pore water device should be used with a sampling flange (Figure 2), especially when collecting pore water near the sediment-surface water interface. If pore water is collected from deep in sediments, a flange may not be necessary. When inserted though the flange, the body of the pore water device should form a watertight seal to eliminate surface water intrusion during sample collection. Flanges should include an outer vertical cutting ring to enhance sealing. Flange systems can be augmented by flexible plastic sheeting of appropriate material. The sheeting can be weighted to conform to a stream bottom by objects obtained from other areas of the stream away from the sampling location. Several of the flanges in LSASD inventory have a threaded nut and washer to facilitate sealing the flange to a polyethylene sheet.

The flange can be made of any material that will not cross contaminate the intended sample. If both inorganic and organic analyses are required, the flange should be made of inert material such as stainless steel or Teflon®. The size of the flange depends on the volume of pore water to be collected. If large volumes of pore water are to be collected, use a large flange size. A useful estimate can be made for planning by taking the required water volume, tripling it to assume 33% porosity, and then calculating the dimensions of a cylinder of this volume, based upon the penetration depth of the sampler. The flange should cover at least this estimated volume. If it is not practical to use a large flange, then multiple devices may be deployed, and smaller volumes can be collected from several devices for a composite sample. If multiple devices are deployed, they should be spaced an appropriate distance apart so they will not interfere with one another.

In general, the volume of pore water that can be collected at a given location is limited. Collecting large volumes of pore water will ultimately result in the collection of water from the overlying water body. Often, minimum required volumes must be negotiated with the laboratory to limit the volumes withdrawn.

Where significant differences in parameters such as pH or conductivity exist between the surface water and pore water, a check can be made at the end of sampling to assess whether surface water intrusion has occurred by measuring the pore water parameters at the beginning and conclusion of sampling. Fluorescent dye tracing can also be used for this purpose.

2.6 Pore Water Collection

The flange is first placed at the desired sampling point with the push-point removed to allow any water to escape from under the flange. The flange rim should be carefully worked into the soil or sediment until the flange is flush with the surface. The pore water device should then be inserted through the compression adapter on the flange and into the soil or sediment as carefully as possible (Figure 2). When the sampler is inserted to the desired depth, the compression adapter should be tightened. The push-point's guard rod can then be withdrawn. Do not reinsert the guard rod into the sampler for any reason until the sampler has been cleaned (particles rolled between the two metal surfaces will lock the parts together and permanently damage the sampler.)

When deploying the pore water device, care must be taken not to disturb the sampling area. If the sampler is wading, the sampler should lean out and insert the pore water device as far as possible away from where the sampler is standing to reduce potential effects of the sampler on the integrity of the pore water sample. Depth of penetration of the pore water device depends on the objectives of the specific investigation.

After the pore water device has been successfully deployed, attach the sample tubing to the sampling port of the pore water device. Short pieces of Silastic® tubing can be used to splice Teflon® sample tubing to a push-point sampler, taking care to butt the tubing to the sampler at the center of the splice. Then attach the other end of the tubing to a sample withdrawing device, such as a syringe or a peristaltic pump (according to LSASD Operating Procedure for Pump Operation, LSASDPROC-203). Before collecting a pore water sample, be sure to purge out all air and surface water from the pore water sampler and sample tubing with the appropriate amount of pore water. This step can be accomplished by calculating the volume of the sampler and attached tubing and pumping this volume plus an additional 10 percent of pore water through the sampler and tubing prior to collecting the sample. If utilizing a syringe for collection, a three-way valve with a side syringe must be utilized for the surface water purge in order not to cross contaminate the sampling syringe.

2.6.1 Peristaltic Pump/Vacuum Jar Collection

The peristaltic pump/vacuum jug can be used for sample collection of organic or inorganic samples because it allows for the sample to be collected without coming in contact with the pump head tubing, maintaining the integrity of the sample. This is accomplished by placing a Teflon® transfer cap assembly onto the neck of a pre-cleaned standard 1-liter amber glass container (Figure 3). Teflon® tubing (¼-inch O.D.) connects the container to both the pump and the sample source. The pump creates a vacuum in the container, thereby drawing the sample into the container without it coming into contact with the pump head tubing.

Because the sample is exposed to a vacuum and is agitated as it enters the vacuum jug, this method cannot be used for collection of samples for volatile organic compounds. An alternative method for collecting volatile organics involves filling the Teflon® tubing with sample by running the pump for a short period of time. Once the tubing is full of water, the tubing is removed from the pore water sampler and, then pinched off at the pump in order to maintain the vacuum while it is being disconnected from the pump head tubing. The water is then allowed to carefully drain, by gravity, into the sample vials. Alternatively, without disconnecting the tubing from the pump head, the contained sample can be pushed out of the tubing, into the sample vials, by reversing the peristaltic pump at very low speed. Great care must still be taken with this method in order not to agitate the sample during the transfer process or to transfer water that has been in contact with the Silastic® tubing into the vials.

Because pore water is typically collected from an anaerobic environment, it is preferable, especially when collecting samples for nutrient analysis, to maintain the integrity of the sample by minimizing exposure to air. This can be accomplished by purging the sample container with an inert gas such as nitrogen or argon prior to sampling. In addition, if analyzing for nutrients or metals, the container can be pre-preserved in order to minimize exposure of the sample to ambient conditions.

An alternative, when collecting samples for metals, nutrients, or other sample analyses not affected by Silastic® tubing and when exposure to air is not a concern, is to collect the sample directly from the discharge of the pump head tubing after an adequate purge has been demonstrated. When collecting samples in this manner, there are several considerations of which to be aware. The pump head tubing (Silastic®, etc.) must be changed after each sample and a rinsate blank must be collected from a representative piece of the pump head tubing (only one blank per investigation). Also, precautions must be taken to ensure that the end of the discharge tubing is not allowed to touch the ground or other surface to ensure the integrity of samples collected in this manner.

2.6.2 Syringe

An alternative to using the pump and vacuum container is to use a syringe as the mechanism to draw the pore water through the sampling device. The tubing from the sampling port of the pore water device can be directly attached to a syringe with a three-way valve and a side syringe and the pore water sample can be manually withdrawn. The valve is first switched to the side syringe, which is used for purging air and any ambient surface water in the system prior to sampling. The volume to be purged is determined by the length and diameter of the sampling device and attached tubing. Once the sampler has been purged, the valve is switched to the sampling syringe and the sample is drawn into the syringe. The syringe can be used as the final sample container or the pore water can be transferred to another container, depending on project objectives and analytical requirements. This is the best method to use if the sample is to be collected underwater by SCUBA diving.

2.7 Quality Control

If possible, a control or background sample should be collected from a location not affected by the possible contaminants of concern and submitted with the other samples. In streams or other bodies of moving water, the control sample should be collected upstream of the sampled area. For impounded bodies of water, particularly small lakes or ponds, it may be difficult or inappropriate to obtain an unbiased control from the same body of water from which the samples are collected. In these cases, it may be appropriate to collect a background sample from a similar impoundment located near the sampled body of water if there is a reasonable certainty that the background location has not been impacted. Equipment blanks should be collected if equipment is field cleaned and reused on-site or, if necessary, to document that low- level contaminants were not introduced by pumps, bailers or other sampling equipment.

2.8 Specific Sampling Equipment Quality Assurance Techniques

All equipment used to collect pore water samples shall be cleaned as outlined in the LSASD Operating Procedure for Field Equipment Cleaning and Decontamination, LSASDPROC-205 (most recent version) or LSASD Operating Procedure for Field Equipment Cleaning and Decontamination at the FEC, LSASDPROC-206 (most recent version) and repaired, if necessary, before being stored at the conclusion of field studies. Cleaning procedures utilized in the field or field repairs shall be thoroughly documented in field records.

3 Special Sampling Considerations

3.1 Volatile Organic Compounds (VOC)

Pore water samples for VOC analysis must be collected in 40 ml glass vials with Teflon® septa. The vial may be either preserved with concentrated hydrochloric acid or they may be unpreserved. Preserved samples have a two-week holding time, whereas, unpreserved samples have only a seven day holding time. During most sampling events, preserved vials are used due to their extended holding time. In some situations, however, it may be necessary to use unpreserved vials. For example, if the surface water sample contains a high concentration of dissolved calcium carbonate, there may be an effervescent reaction between the hydrochloric acid and the water, producing large numbers of fine bubbles. This will render the sample unacceptable. In this case, unpreserved vials should be used, and arrangements must be confirmed with the laboratory to ensure that they can accept the unpreserved vials and meet the shorter sample holding times.

Samples for VOC analysis must be collected using either stainless steel or Teflon® equipment. Samples should be collected with as little agitation or disturbance as possible. The vial should be filled so that there is a meniscus at the top of the vial and absolutely no bubbles or headspace should be present in the vial after it is capped. After the cap is securely tightened, the vial should be inverted and tapped on the palm of one hand to see if any undetected bubbles are dislodged. If a bubble or bubbles are present, the vial should be refilled. Care should be taken not to flush any preservative out of the vial during topping off. If, after attempting to refill and cap the vial, bubbles are still present, a new vial should be obtained, and the sample should be re-collected.

3.2 Dissolved Metals Sample Collection

If a dissolved metals pore water sample is to be collected, an in-line filtration should be used. The use of disposable, high-capacity filter cartridges (barrel-type) or membrane filters in an in-line filter apparatus is preferred. The high-capacity, barrel-type filter is preferred due to the higher surface area associated with this configuration.

Potential differences could result from variations in filtration procedures used to process water samples for the determination of trace element concentrations. A number of factors associated with filtration can substantially alter "dissolved" trace element concentrations; these include filter pore size, filter type, filter diameter, filtration method, volume of sample processed, suspended sediment concentration, suspended sediment grain-size distribution, concentration of colloids and colloidally-associated trace elements, and concentration of organic matter. Therefore, consistency is critical in the comparison of short-term and long-term results. Further guidance on filtration may be obtained from Section 4.7.3 of the LSASD Groundwater Sampling Procedure (LSASDPROC-301).

3.3 Special Precautions for Pore Water Sampling

- A clean pair of new, non-powdered, disposable latex gloves will be worn each time a different location is sampled, and the gloves should be donned prior to handling sampling equipment. The gloves should not come in contact with the media being sampled and should be changed any time during sample collection when their cleanliness is compromised.
- All background or control samples shall be collected and placed in separate ice chests or shipping containers. Sample collection activities shall proceed progressively from the least suspected contaminated area to the most suspected contaminated area. Samples of waste or highly contaminated media must not be placed in the same ice chest as environmental (i.e., containing low contaminant levels) or background samples.
- If possible, one member of the field sampling team should take all the notes and photographs, fill out tags, etc., while the other members collect the samples.
- Samplers must use new, verified, certified clean disposable equipment, or pre-cleaned non-disposable equipment. Non-disposable equipment should be pre-cleaned according to procedures contained in LSASD Operating Procedure for Field Equipment Cleaning and Decontamination (LSASDPROC-205), for collection of samples for trace metals or organic compound analyses.

3.4 Sample Handling and Preservation Requirements

- Pore water will typically be collected using a peristaltic pump and placed directly into sampling containers. In some cases, a syringe may be used to collect the pore water and then either left in the syringe as the sample container or transferred into an appropriate container.
- During sample collection, if transferring the sample from a collection device, make sure that the device does not come in contact with the sample containers.
- Place the sample into appropriate, labeled containers. Samples collected for VOC analysis must not have any headspace (see Section 3.1).
- All samples requiring preservation must be preserved as soon as practically possible, soon after sample collection. If pre-preserved VOA vials are used, these will be preserved with concentrated hydrochloric acid prior to departure for the field investigation. For all other chemical preservatives, LSASD will use the appropriate chemical preservative generally stored in an individual single-use vial as described in the LSASD Operating Procedure for Field Sampling Quality Control (LSASDPROC-011). The adequacy of sample preservation will be checked after the addition of the preservative for all samples, except for the samples collected for VOC analysis. If it is determined that a sample is not acceptably preserved, additional preservative should be added to achieve adequate preservation. Preservation requirements for surface water samples are found in

the USEPA Laboratory Services Branch *Laboratory Operations and Quality Assurance Manual* (LOQAM).

Figure 1. Pore Water Sampling Device

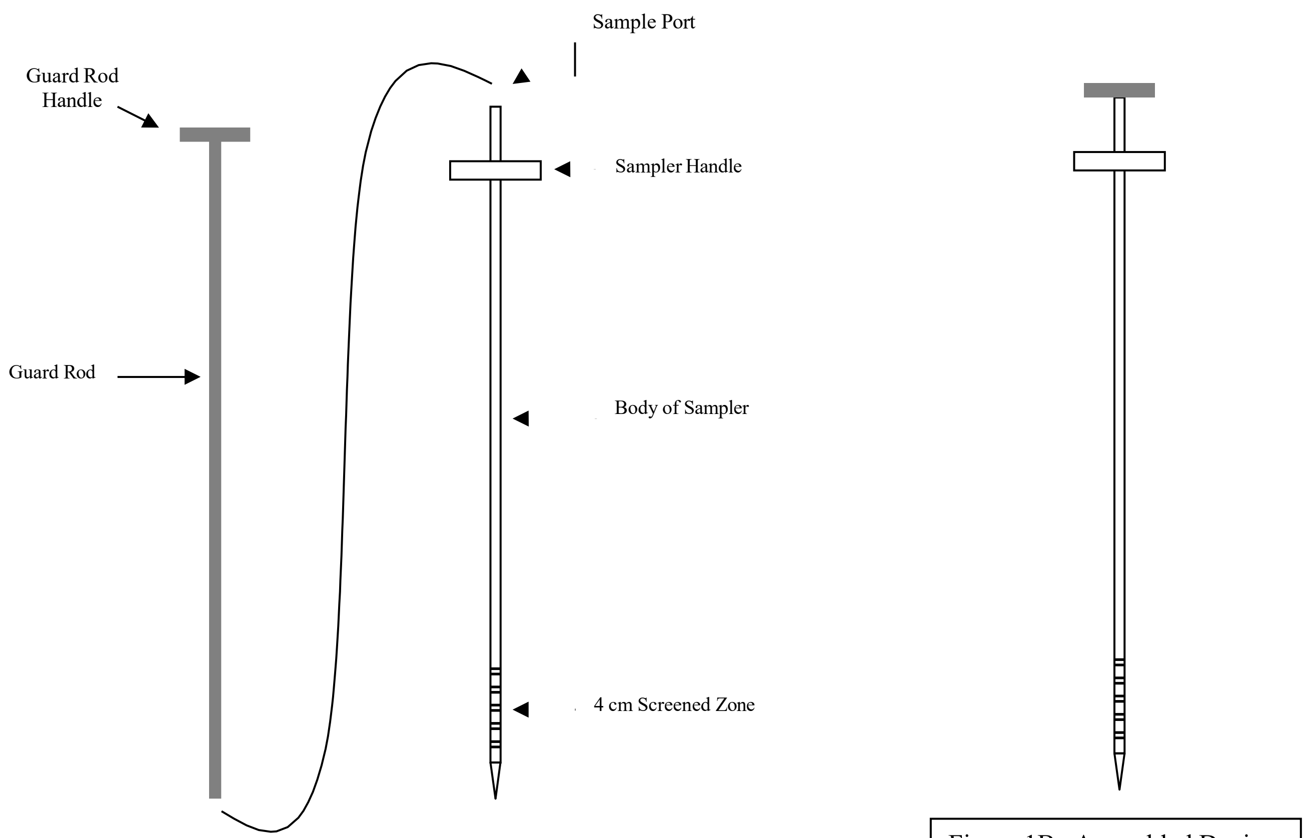


Figure 1A. Disassembled Device

Figure 1B. Assembled Device

Actual length and width of device will vary, depending on sampling needs and site conditions.
Note: cm = centimeter

Figure 2. Pore Water Sampler Deployment Using a Sampling Flange

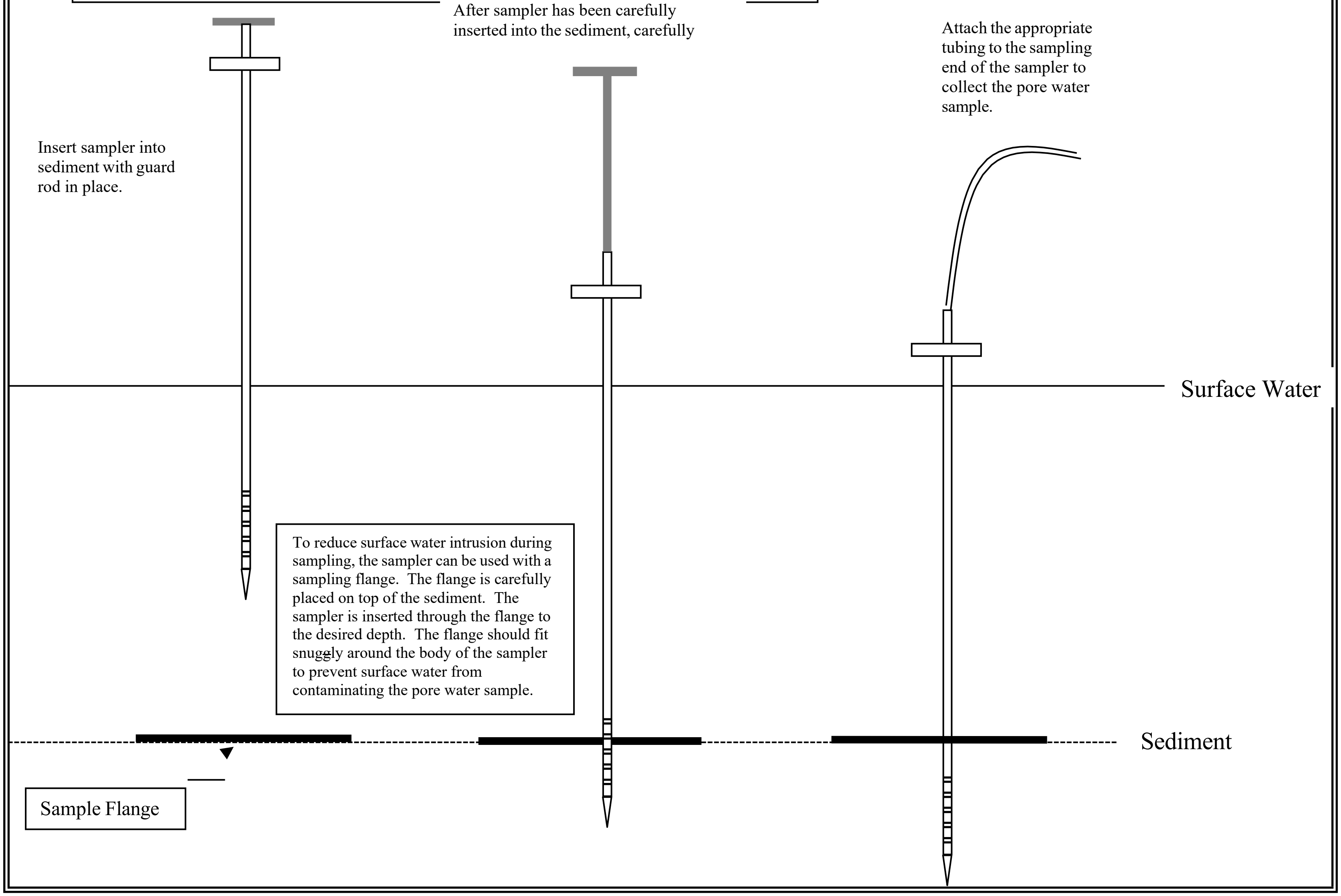
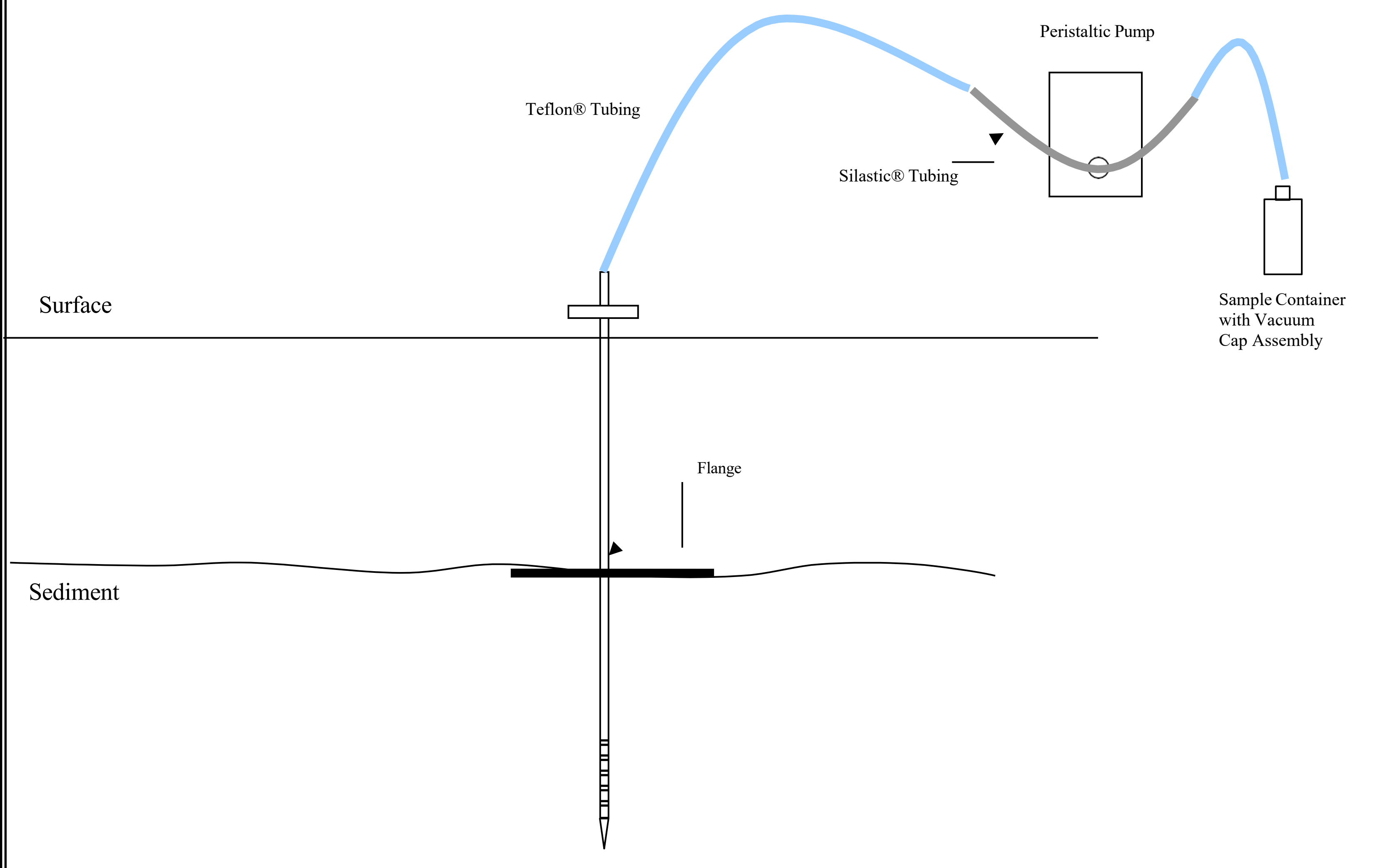


Figure 3. Pore Water Sampler Deployment Using a Peristaltic Pump to Sample



References

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M.H.E. Products. 2003. PushPoint Sampler (US Pat. # 6,470,967) Operators Manual and Applications Guide, Version 2.01. East Tawas, MI. http://www.mheproducts.com

LSASD Operating Procedure for Control of Records, LSASDPROC-002, Most Recent Version.

LSASD Operating Procedure for Sample and Evidence Management, LSASDPROC-005, Most Recent Version.

LSASD Operating Procedure for Logbooks, LSASDPROC-010, Most Recent Version.

LSASD Operating Procedure for Surface Water Sampling, LSASDPROC-201, Most Recent Version.

LSASD Operating Procedure for Pump Operation, LSASDPROC-203, Most Recent Version.

LSASD Operating Procedure for Field Equipment Cleaning and Decontamination, LSASDPROC-205, Most Recent Version.

LSASD Operating Procedure for Field Equipment Cleaning and Decontamination at the FEC, LSASDPROC-206, Most Recent Version.

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Title 49 Code of Federal Regulations, Pts. 171 to 179, Most Recent Version.

USEPA LSBLOQAM. Laboratory Services Branch Laboratory Operations and Quality Assurance Manual Region 4, Laboratory Services and Applied Science Division, Athens, GA. Most Recent Version.

USEPA SHEMP Safety, Health and Environmental Management Program Procedures and Policy Manual. Laboratory Services and Applied Science Division, Region 4, Athens, GA. Most Recent Version.

LSASD Operating Procedure for Field Sampling Quality Control, LSASDPROC-011, Most Recent Version.

USEPA. 2016. Diving Safety Manual, current version. US Environmental Protection Agency, Washington, DC.

Revision History

The top row of this table shows the most recent changes to this controlled document. For previous revision history information, archived versions of this document are maintained by the LSASD Document Control Coordinator on the LSASD local area network (LAN).

History	Effective Date
Replaced Chief with Supervisor; General formatting revisions.	April 22, 2023
LSASDPROC-513-R4, Pore Water Sampling, *replaces SESDPROC-513-R3.* Laboratory Services and Applied Science Division replaces Science and Ecosystem Support Division **Title Page:** Changed the Field Quality Manager from Hunter Johnson to Stacie Masters. **General:** Corrected typographical, grammatical, and/or editorial errors. Added language to clarify some procedures.	May 13, 2020
SESDPROC-513-R3, Pore Water Sampling, replaces SESDPROC-513-R2. **General:** Corrected any typographical, grammatical, and/or editorial errors. **Title Page:** Changed the Field Quality Manager from Bobby Lewis to Hunter Johnson. Updated cover page to represent SESD reorganization. John Deatrick was not listed as the Supervisor of the Field Services Branch	December 16, 2016
SESDPROC-513-R2, Pore Water Sampling, *replaces SESDPROC-513-R1.*	February 28, 2013
SESDPROC-513-R1, Pore Water Sampling, *replaces SESDPROC-513-R0.*	January 29, 2013
SESDPROC-513-R0, Pore Water Sampling, *Original Issue*	February 05, 2007

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.

<u>pH Calibration</u>

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

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

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

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

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

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

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

ORP Calibration

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

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

Conductivity Calibration

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

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

Dissolved Oxygen Calibration

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

The calibration process is now complete.

If needed, Turbidity 3-Point Calibration

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

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

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

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

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

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

YSI OPERATION

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

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

DOCUMENTATION

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

REFERENCES

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

Attachments: Attachment A, Figures
Attachment B, Field Forms

ATTACHMENT A
FIGURES

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

Farallon PN: [xxxx-xxx]

ATTACHMENT B
FIELD FORMS

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

Farallon PN: [xxxx-xxx]

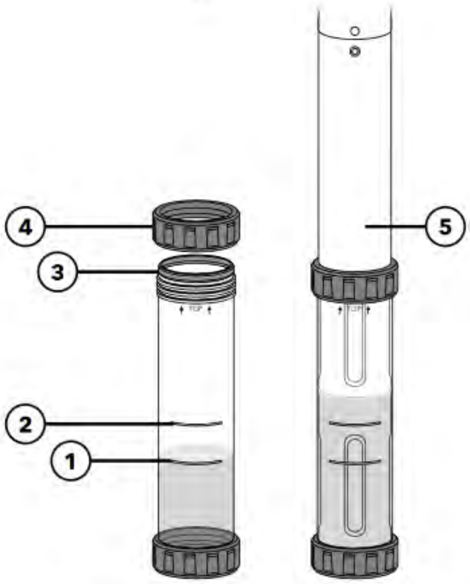


Figure 45 Calibration cup standard volume (4-port cable)

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

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

STANDARD OPERATING PROCEDURE GN-01
FIELD NOTE PROCEDURES

PURPOSE AND APPLICATION

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

GENERAL FIELD NOTE INSTRUCTIONS

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

ITEMS TO INCLUDE IN FIELD NOTES

At Start of Workday:

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

Upon Arrival at Site:

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

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

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

At End of Workday:

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

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

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

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

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

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

STANDARD OPERATING PROCEDURE (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:

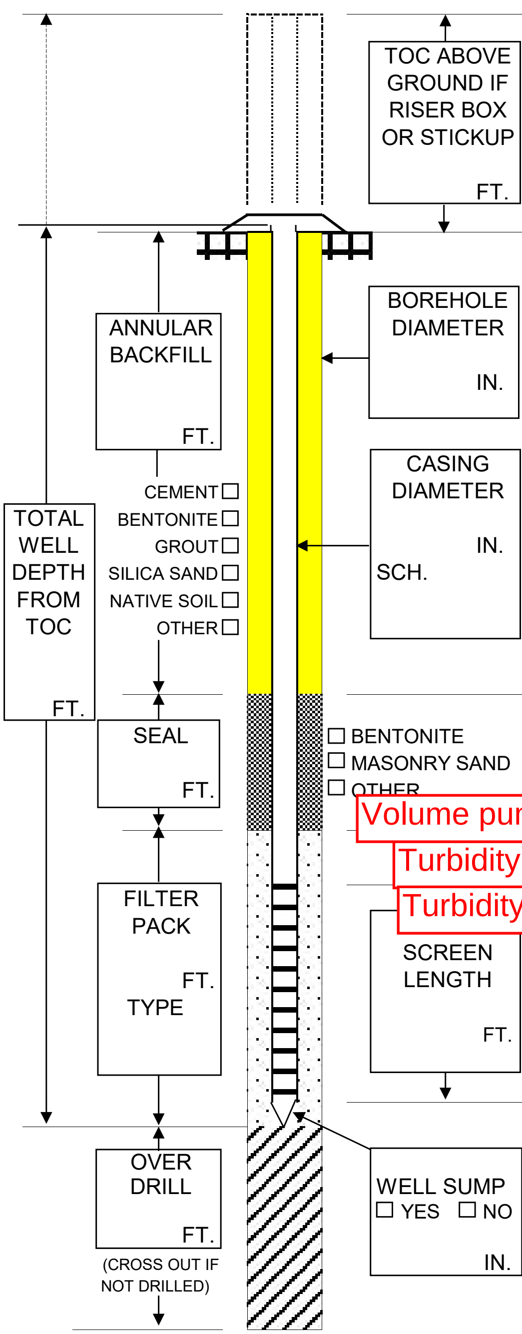
SEC: TWN: RGE: LAT: LONG:

DRILLING CO:

DRILL CREW:

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

WELL SCHEMATIC



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
Volume pumped ~~AMOUNT~~ ☐ 5 GAL ☐ 10 GAL ☐ OTHER ____ GAL
Turbidity ~~WATER~~ BEFORE: ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
Turbidity ~~WATER~~ AFTER: ☐ SILTY ☐ TURBID ☐ OPAQUE ☐ CLEAR
EVIDENT ODOR: ☐ YES ☐ NO TYPE

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

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:

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

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; <u>OR</u>
    - 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 gallons/cubic foot)

  Where:

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

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

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

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

Purging Procedures

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

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

Purging Requirements

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

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

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

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

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

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

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

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

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

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

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

Sample Collection

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

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

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

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

Post-Sampling

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

PROCEDURES FOR RECONNAISSANCE GROUNDWATER SAMPLING

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

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

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

DOCUMENTATION

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

REFERENCES

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

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

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

STANDARD OPERATING PROCEDURE SD-01

SURFACE SEDIMENT SAMPLING

PURPOSE AND APPLICATION

The purpose of this standard operating procedure (SOP) is to provide field staff with the methodology for collecting surface sediment samples from freshwater or marine environments for chemical, biological, and/or physical testing to ensure that representative samples are collected. For the purposes of this SOP, sediments are defined as mineral and organic materials beneath an aqueous layer of variable depth that has been present for a minimum of 6 consecutive weeks. The aqueous layer may be static water such as lakes, ponds, and impoundments; or flowing water such as rivers and streams. In tidally influenced bodies of water, sediments are present at or below the ordinary high-water mark.

Surface sediments typically are defined as sediments collected from the sediment-water interface to a depth of 10 centimeters below. The actual definition of surface sediments depends on the purpose of the sediment investigation, and any applicable regulatory criteria the data will be compared against.

The methodologies discussed in this SOP are applicable to collection of exposed surface sediment samples and collection of surface sediment samples in both flowing or standing water using a surface sediment sampling device (e.g., grab sampler). This SOP is generic in nature, and may be modified in whole or in part to meet the handling and analytical requirements of the contaminants of concern, and any constraints presented by site conditions or equipment limitations. Modifications to this SOP will be approved by the Project Manager, and documented in a site or field logbook. Modifications also will be discussed in reports summarizing the field activities.

EQUIPMENT AND SUPPLIES

Sediment samples may be collected using a variety of methods and equipment, depending on the depth of the aqueous layer, the type of sample required (e.g., disturbed versus undisturbed), contaminants present, and sediment type. Some of the supplies listed below may be provided by the vessel subcontractor. Consult project-specific plans for additional equipment and supplies that may be required. A general list of equipment and supplies typically required for sediment sampling is provided below:

- Sampling device:
  - For in-water sediments: Stainless steel hydraulic grab sampler, van Veen grab sampler, Ekman grab sampler, or Ponar grab sampler (refer to project-specific plans to select the most-appropriate grab sampler).
  - For exposed sediments: Stainless steel shovel or trowel and stainless steel spoons.

- Minimum equipment/supplies:
  - o Lines and pulleys for raising and lowering the sampler (if not provided by the sampling vessel).
  - o Differential global positioning system (GPS) unit.
  - o Weighted measuring tape or lead line (tape must be long enough to measure the depth from the water surface to the sediment surface, with sufficient weight attached to resist the pull of the water current).
  - o Flexible siphon hoses and stainless steel baster.
  - o Stainless steel ruler.
  - o Stainless steel bowls, trowels, and spoons (large and small).
  - o Decontamination supplies (e.g., three high-density polyethylene tubs or buckets, scrub brushes, Liquinox detergent, distilled/deionized water, small spray bottles, large garden sprayer, aluminum foil).
  - o Certified pre-cleaned sample containers, and sample labels.
  - o Camera, white board, and markers.
  - o First aid kit, cell phone, and personal protective equipment as described in the site Health and Safety Plan; nitrile gloves, safety goggles, and steel-toed boots are required as a minimum.
  - o Materials necessary to provide required documentation (e.g., project plans, waterproof Field Report forms, waterproof Surface Sediment Sampling Field Log forms, Chain of Custody forms, indelible black or blue ink pens).
- Sample shipping and transport supplies (e.g., sample shipping forms, thick resealable plastic bags [smaller bags for sample jars, and 1- to 2-gallon bags for ice], bubble wrap, coolers, large garbage bags to line the coolers, ice, permanent markers, strapping tape, clear tape and tape gun, custody seals).
- Other support equipment as needed (e.g., boat or floatation device, waders, sample coolers, duct tape, razor knives, garbage bags, paper towels, additional weights for lead line, marker buoy with weight and line).

DECONTAMINATION

Reusable equipment that will come into contact with sediment or be used to acquire sediment samples will consist of inert materials, and is to be decontaminated upon arrival at the site, between sediment samples collected, upon relocation at the site, and upon demobilization from the site, in accordance with SOP EQ-01.

PROCEDURES

Collection of In-Water Sediments

Several types of grab samplers are available for collection of surface sediment samples. It is important to choose a grab sampler that is capable of consistently collecting undisturbed sediment samples to the project-specific depth below the sediment surface without compromising the sample material. The grab sampler must create a minimal bow wake when descending, enclose the sample material with minimal disturbance, form a leak-proof seal during retrieval, and allow easy internal access to the sample from the top of the device. Although stainless steel grab samplers are preferred, grab samplers may be constructed of other contaminant-free materials such as aluminum, or may be treated with a non-contaminating coating such as Teflon. Grab samplers constructed of galvanized (zinc) or cadmium-plated steel should be used only when sediments will not be analyzed for metals, or when the presence of zinc or cadmium will not affect subsequent tests (e.g., benthic invertebrate enumeration). Record the specific sediment sampling equipment used at the site on the Surface Sediment Sampling Field Log form and the Field Report form.

Attach the grab sampler to a hydraulic or hand-powered winch, depending on the water depth and the weight of the grab sampler. Follow the procedures listed below for grab sample collection:

- Before the sampling vessel is maneuvered by the contracted vessel crew to the first target location, ensure that the field staff who will use the sampling equipment are familiar with the procedures and safety issues associated with its operation. Practice several deployments and retrievals as needed until field staff are familiar with the equipment and procedures.
- Decontaminate the grab sampler in accordance with SOP EQ-01 and project-specific plans.
- The contracted vessel crew will maneuver the sampling vessel to within 3 meters (or other project-specific distance requirement) of the target location using the vessel's navigation system. The vessel operator needs to maintain station positioning throughout the deployment and retrieval of the grab sampler, which can be achieved by "holding" the boat on station throughout sampler deployment and retrieval, or by anchoring the vessel using a three-point anchoring array.
- Prepare the grab sampler for deployment. If the grab sampler is manually operated, release the safety pin on the sampling arm for the jaw assembly as soon as the grab sampler is clear of the sampling vessel.
- Lower the grab sampler at a controlled speed of approximately 3 feet per second, with the winch line/hydro wire extending down from the top of the frame in a straight line. Water should pass freely through the closed upper screened doors of the sampling device upon its descent to minimize bow wake. Slow the descent of the grab sampler to 1 foot per second as it nears the bottom of the water body to minimize disturbance of surface sediments. **Never let the grab sampler free-fall** to the bottom, which could result in premature triggering, excessive bow wake, and disturbed surface sediments; or improper device orientation upon contact with the bottom sediment.

- As soon as the grab sampler reaches the bottom of the sediment surface, slowly close the jaws, and slowly raise the grab sampler off the bottom to ensure proper closure of the jaws, and to minimize spillage. Record the time, water depth, and differential GPS sample location coordinates on the Surface Sediment Sampling Field Log form. Once the grab sampler is clear of the bottom, its ascent speed can be increased to 3 feet per second. Maintain continuous retrieval of the grab sampler, minimizing disturbance, until the device is secured on board the vessel.
- Once the grab sampler has been secured on board the vessel, open its upper doors and examine the sample for acceptability, demonstrated by the following criteria:
  - The grab sampler exhibits minimal water leakage.
  - The grab sampler is not overfilled (i.e., sediment is not in contact with the upper doors of the grab sampler).
  - Overlying water is present.
  - The turbidity of overlying water is not excessive.
  - The sediment surface appears to be relatively undisturbed.
  - No anthropogenic (i.e., man-made) debris is present in the grab sampler.
  - The desired sample depth was achieved.
- If the above criteria have been met, carefully siphon off most of the overlying water using the flexible siphon hose, taking care to not siphon off any overlying fine-grained sediments. After most of the overlying water has been removed, use the stainless steel baster to remove any remaining overlying water, being careful not to contact the sediment surface.
- Take a photograph of the sediment in the grab sampler, including in the photograph notations on a white board documenting the station number, sample identifier, and time and date of collection.
- Use a decontaminated stainless steel ruler to measure the grab sampler penetration depth and desired sampling depth from the deepest portion of the grab sampler along the sidewall. Enter the penetration depth and any observations of sediment surface conditions on the Surface Sediment Sampling Field Log form.
- To prevent potential cross-contamination, do not collect sediments that have come into contact with the sidewalls of the grab sampler.
- If volatile organic compound (VOC) or sulfide compound analysis is required, immediately remove sample material for either of these analyses upon removing overlying water from the grab sampler, prior to homogenizing the sediment. Follow the procedures listed below for collection of VOC and/or sulfide discrete samples:
  - VOCs: With minimal disturbance to the sediment, use a decontaminated stainless steel spoon to collect samples by placing a representative amount of surface sediment from the desired sample depth into the laboratory-supplied VOC

container with no headspace, and seal it tightly. For plunger-type VOC samplers, follow the sample collection guidelines specified by the manufacturer or the analytical laboratory. Seal the samples immediately upon collection to reduce volatilization.

   - Sulfides: With minimal disturbance to the sediment, use a decontaminated stainless steel spoon to collect approximately 50 grams of sediment into a laboratory-supplied 120-milliliter (ml) glass container. Immediately pipet 5 ml of laboratory-supplied 2N zinc acetate preservative over the top of the sample, place the cap on the container, and shake vigorously. Ensure that the sample label indicates the addition of 2N zinc acetate preservative.

- Once VOC and sulfide subsamples have been collected, use decontaminated stainless steel utensils to remove remaining sediment from the desired sample depth from the grab sampler, and transfer to a stainless steel mixing bowl, taking care to not collect sediment that has come into contact with the sidewalls of the grab sampler.
- Take a photograph of the sediment in the stainless steel mixing bowl, including in the photograph notations on a white board documenting the station number, sample identifier, and time and date of collection.
- Document on the Surface Sediment Sampling Field Log form any additional observations and characteristics of the sediment depth interval collected.
- Homogenize the sediment in accordance with the procedures detailed in the Sample Homogenization section below.
- Refer to project-specific plans for procedures pertaining to disposal of any remaining sediment from the sample.
- Decontaminate the grab sampler before moving to the next sampling location.

Collection of Exposed Sediments

It may be necessary or more convenient to collect some surface sediment samples by land when they are exposed (e.g., low-tide) or if the project requires collection of sediment bank samples. Follow the instructions below for exposed surface sediment sample collection:

- Use the differential GPS to locate the target sampling location. Take care to approach the target location so as to not disturb the area of sediment to be sampled.
- Describe and characterize the undisturbed surface of the target sample location, including surrounding features that may impact the quality of sediment at the target location (e.g., debris, large rocks, sediment seeps). Note undisturbed surface characteristics on the Surface Sediment Sampling Field Log form. If sediment is not present at the target location, expose the sediment surface by clearing an approximately 1-foot-square area of large rocks, debris, and organic material (e.g., seaweed, plant matter) from the surface, if possible. Document any material removed from the target location on the Surface Sediment Sampling Field Log form.

- Excavate the sediment to a depth of 10 centimeters (or to the surface sediment depth specified in the project-specific plans) using a decontaminated stainless steel shovel, trowel, or large spoon.
- Use a decontaminated stainless steel ruler to confirm that the appropriate sampling interval is exposed.
- Take a photograph of the sediment from the test, including in the photograph notations on a white board documenting the station number, sample identifier, and time and date of collection.
- If volatile organic or sulfide compound analysis is required, remove sample material for either of these analyses immediately upon exposing the sediment depth interval for collection, prior to homogenizing the sediment. Follow the procedures listed below for collection of VOC and/or sulfide discrete samples:
  - VOCs: With a minimum of disturbance to the sediment, use a decontaminated stainless steel spoon to collect the samples by placing a representative amount of surface sediment from the desired sample depth into the laboratory-supplied VOC container with no headspace, and seal it tightly. For plunger-type VOC sample devices, follow the sample collection guidelines specified by the manufacturer or the analytical laboratory. Seal the samples immediately after collection to prevent volatilization.
  - Sulfides: With minimal disturbance to the sediment, use a decontaminated stainless steel spoon to collect approximately 50 grams of sediment into a laboratory-supplied 120-ml glass container. Immediately pipet 5-ml of laboratory-supplied 2N zinc acetate preservative over the top of the sample, place the cap on the container, and shake vigorously. Ensure that the sample label indicates the addition of 2N zinc acetate preservative.
- Once volatile and sulfide subsamples have been collected, remove the remaining undisturbed sediment from the desired sample depth using decontaminated stainless steel utensils, and transfer to a stainless steel mixing bowl.
- Take a photograph of the sediment in the stainless steel mixing bowl, including in the photograph notations on a white board documenting the station number, sample identifier, and time and date of collection.
- Document on the Surface Sediment Sampling Field Log form any additional observations and characteristics of the sediment depth interval collected.
- Homogenize the sediment according to the procedures presented in the following section.
- Refer to the project-specific plans for procedures pertaining to disposal of any remaining sediment sample material.
- Decontaminate the sample-collection equipment prior to moving to the next sampling location.

Sample Homogenization

Once a sufficient amount of sediment has been collected in the decontaminated stainless steel mixing bowl, thoroughly mix the sediment using a decontaminated stainless steel spoon until it is uniform in color and texture throughout.

If grain-size analysis is required, transfer an aliquot of the homogenized sediment directly into a laboratory-supplied sample jar for grain-size determination prior to removing any large rocks from the homogenized sediment. Once the grain-size sample has been collected, remove from the homogenized sediment any rocks greater than 0.5 inch in diameter, noting on the Field Report form the general characteristics, and the percentage contribution to the homogenized soil volume. Take a photograph of the larger material removed, if required by the project-specific sampling plan.

Fill the remaining laboratory-supplied certified pre-cleaned sampling containers with sediment. Fill the sample containers to just below the lip or shoulder, and tightly seal the container. If samples are to be frozen, leave approximately 1 inch of headspace in the sampling containers. Label the sample containers, place each into a resealable plastic bag, and place into a sampling cooler with ice. Record the sample information on a Chain of Custody form.

Record on the Field Report form any deviations from the project-specified sampling procedures or this SOP, or any obstacles encountered.

DOCUMENTATION

Document the sediment sampling activities on the Surface Sediment Sampling Field Log form, the Chain of Custody form, and the Field Report form.

REFERENCE

U.S. Environmental Protection Agency. 1997. *Recommended Guidelines for Sampling Marine Sediment, Water Column, and Tissue in Puget Sound*. Region 10. April.

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
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

Log of Boring:

Client:	**Date/Time Started:**
Project:	**Date/Time Completed:**
Location:	**Equipment:**
Farallon PN:	**Drilling Company:**
Logged By:	**Drilling Operator:**
	Drilling Method:

Sampler Type:
Drive Hammer (lbs.):
Depth of Water ATD (feet bgs):
Total Boring Depth (feet bgs):
Total Well Depth (feet bgs):

Depth (feet bgs)	Sample Interval	Lithologic Description Soil Constituents; Grain size; Color; Density; Moisture; Odor; Other	USCS	% Recovery	Blow Counts 8/8/8	PID (ppm*)	Sample ID	Well Construction Details
0								
_								
_								
_								
_								
5_								
_								
_								
_								
_								
10_								
_								
_								
_								
_								
15_								
_								
_								
_								
_								
20								

Notes

FARALLON CONSULTING

Washington
Issaquah | Bellingham | Seattle
Oregon
Portland | Baker City
California
Oakland | Irvine

FIELD REPORT

Page __ of ___

Date: _____________ **Project #:** ___________________________________ **Task #:**____________________

Project: ______________________________________**Site Address:** ___________________________________

Client: _______________________________________**Contractor:** _____________________________________

Weather: ____________________________________ **Temp:** ____

Equipment Used: ____

Project Manager: ____

Prepared By: _________________________________ **Reviewed By:** __________________________________

Comments:

FIELD REPORT (continued)

Page __ of ___

Project: _____________________________ Date: ___________ Project #: _____________ Task #:___

LOW-FLOW WELL PURGING AND SAMPLING DATA

		WELL NO:
DATE:	PROJECT NAME:	PROJECT NO:

WEATHER CONDITIONS:

WELL DIAMETER (IN.) ☐ 1 ☒ 2 ☐ 4 ☐ 6 ☐ OTHER ________________

SAMPLE TYPE: ☒ GROUNDWATER ☐ WASTEWATER ☐ SURFACE WATER ☐ OTHER

WELL DEPTH (TOC) FT.	DEPTH TO WATER BEFORE PURGING (TOC) FT.
LENGTH OF WATER FT.	CALCULATED ONE WELL VOLUME[1]: __ GAL.
DEPTH OF SAMPLE POINT FT.	ESTIMATED VOLUME PURGED GAL.

EQUIP. DECON. ☒ ALCONOX WASH ☐ LIQUINOX WASH ☐ DIST/DEION 1 RINSE ☐ DIST/DEION 2 RINSE ☐ OTHER

CONTAINER PRESERVATION: ☐ LAB PRESERVED ☐ FIELD PRESERVED

WATER ANALYZER: YSI Pro DSS	PUMP TYPE: Peristaltic	TUBING: 1/4" P.E.

ACTUAL TIME (min)	FLOW RATE (ml/min)	DEPTH TO WATER (feet)	TEMP ☐ °F ☒ °C 3%	SPECIFIC CONDUCT. (mS/cm) 3%	pH +/- 0.1	DISS. OXYGEN (mg/l) <0.5 mg/L or 10% for > 0.5 mg/L	TURBIDITY (NTU) <5 NTU or 10% for > 5 NTU	ORP (mV) +/- 10 mV	REMARKS (EVIDENT ODOR, COLOR, PID)
	INITIAL		--	--	--	--	--	--	

DEPTH TO WATER AFTER PURGING (TOC) FT.	SAMPLE FILTERED ☐ YES ☒ NO SIZE ______
NOTES:	SAMPLE TIME: ID#
	DUPLICATE ☐ TIME: ID#:
	EQUIP. BLANK: ☐ TIME: ID#:
	PREPARED BY:

[1] A 1 FOOT LENGTH OF WATER = 0.05 GAL IN 1" DIA. PIPE 0.17 GAL IN 2" DIA PIPE 0.65 GAL IN 4" DIA PIPE 1.5 GAL IN 6" DIA PIPE

MONITORING WELL CONSTRUCTION DATA

WELL/BORING NO:		
PROJECT NO:	PROJECT NAME:	PERMIT NO:
DATE:	SITE ADDRESS:	

WELL SITE LOCATION PLAN:

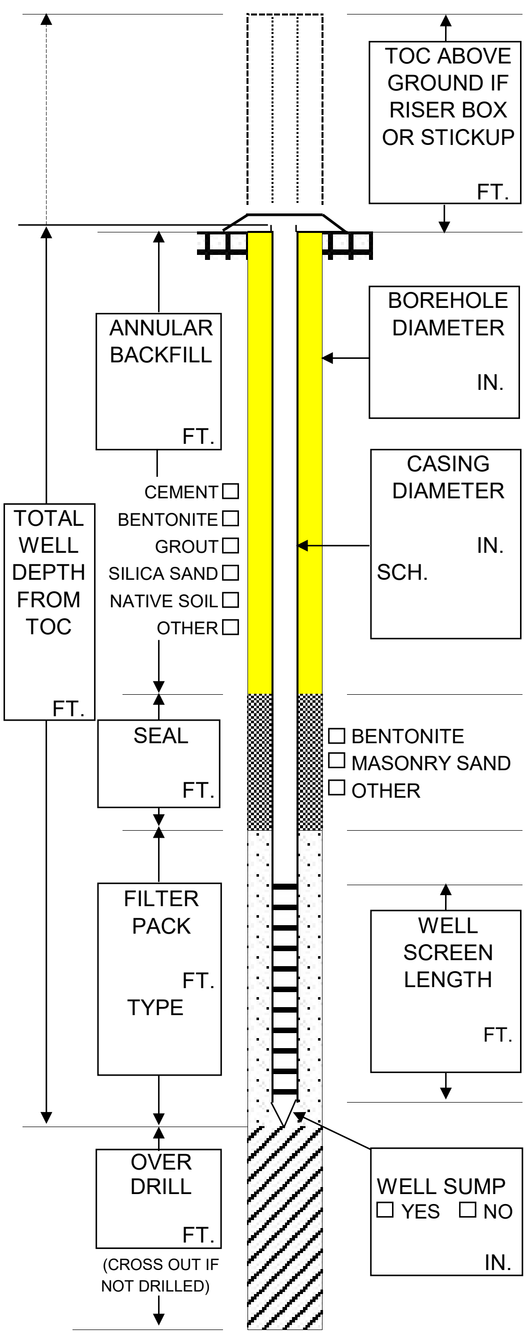
SEC: TWN: RGE: LAT: LONG:

DRILLING CO:

DRILL CREW:

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

WELL SCHEMATIC



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:

SOIL SAMPLE DATA

PROJECT NAME:	PROJECT NO:	SHEET OF

PROJECT LOCATION:

PID MODEL & SERIAL NO:	CALIBRATION DATE/STANDARD:

SAMPLE METHOD: ☐ SONIC ☐ HAND AUGER ☐ HOLLOW STEM ☐ SPLIT SPOON ☐ GEOPROBE ☐ BACKHOE BUCKET

EQUIP DECON:

LOCATION	DATE	SAMPLE NAME	DISCRETE OR COMPOSITE	DEPTH	TIME	STAINING	ODOR	PID	SHEEN	LITHOLOGIC DESCRIPTION/NOTES

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

WASTE INVENTORY TRACKING SHEET

Project Number: ______________________ **Page:** ________ **of** ________
Project Name: ______________________ **Project Manager:** ______________________
Project Address: ______________________ **Field Work Description:** ______________________
Prepared By: ______________________ **Waste Transporter:** ______________________
Inventory Date: ______________________ **Waste Disposal Location:** ______________________

Unique Container ID	Container Size	% Capacity Used	Contents (Soil/GW/Decon Water)/ Origin (Boring or Well ID)	Date(s) Accumulated	Labeling (Contents Under Test/ Haz/Non-Haz/Other-Specify)	Sampled (Y/N)	Comments / Drum Condition

NOTES:
Contents should be specified and include identification of well/boring, media, source, depth of soil (if applicable), and any other helpful information.
Container ID should be unique when compared against other nearby containers. Special waste labels may include flammable, corrosive, dangerous when wet, and/or oxidizer.
Location of Drums (sketch or describe):

FARALLON CONSULTING

Groundwater Level Measurement Summary Form

Date:		**Project Name:**
Project Number:	**Task:**	**Project Location:**
Equipment Used:		**Project Manager:**

Well ID	Time Opened	Time Measured	Depth to Water (feet)	Total Well Depth (feet)	Depth to NAPL (feet)	NAPL Thickness (feet)	Comments / Well Condition

Prepared By:

APPENDIX C
QUALITY ASSURANCE PROJECT PLAN

REMEDIAL INVESTIGATION WORK PLAN
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

QUALITY ASSURANCE PROJECT PLAN

Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

September 5, 2025

Prepared by:

Sarah Snyder, L.G.
Senior Geologist

Reviewed by:

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Principal Hydrogeologist

For:
Eastside Fire and Rescue
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City of Issaquah

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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 Eastside Fire and Rescue (EFR) Headquarters (HQ) and Issaquah Valley Elementary School (IVES) Site (Site) (Figure 1). EFR and the City of Issaquah (the City) were identified as the potentially liable persons (PLPs) 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 23520 (AO) between the Washington State Department of Ecology (Ecology) and the PLPs.

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 EFR HQ Source Area at 175 Newport Way Northwest and IVES Source Area at 555 Northwest Holly Street in Issaquah, Washington (collectively referred to as the Source Areas). The confirmed releases have impacted shallow groundwater at the Source Areas. The City withdraws groundwater from production wells at locations down-gradient of the Site and a completed exposure pathway for groundwater has been confirmed. Ecology believes the actions required by the AO are in the public's interest. Ecology believes the actions required by the AO are in the public's interest.

AFFF training was performed at two locations on the EFR HQ Source Area (Figures 2 and 3):

- An area that currently is covered with lawn near the fire hydrant on the north-central portion (Median Strip); and
- The western gravel-surfaced area of the EFR Headquarters Source Area (Newport Way Northwest [NWN] AFFF training area).

AFFF training was performed at two locations on the IVES Source Area (Figures 2 and 4):

- An area that currently is covered with lawn on the southern area of the west playfield at IVES (West Playfield AFFF Training Area); and

- An area that currently is covered with lawn, trees, turf, and asphalt along the western side of Dodd Field (Dodd Field AFFF Training Area).

The Median Strip AFFF Training Area, NWN AFFF Training Area, West Playfield AFFF Training Area, and Dodd Field 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:

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

Where:

RPD = relative percent difference

C_1 = the larger of the two duplicate results (i.e., the higher detected concentration)

C_2 = 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:

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

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.

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

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 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 Eastside Fire & Rescue, 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, sediment, sediment porewater, surface water, 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, sediment, sediment porewater, surface water, 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, sediment, sediment porewater, surface water, and groundwater samples if hold-time criteria permit;
- Re-sampling and analyzing soil, sediment, sediment porewater, surface water, 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

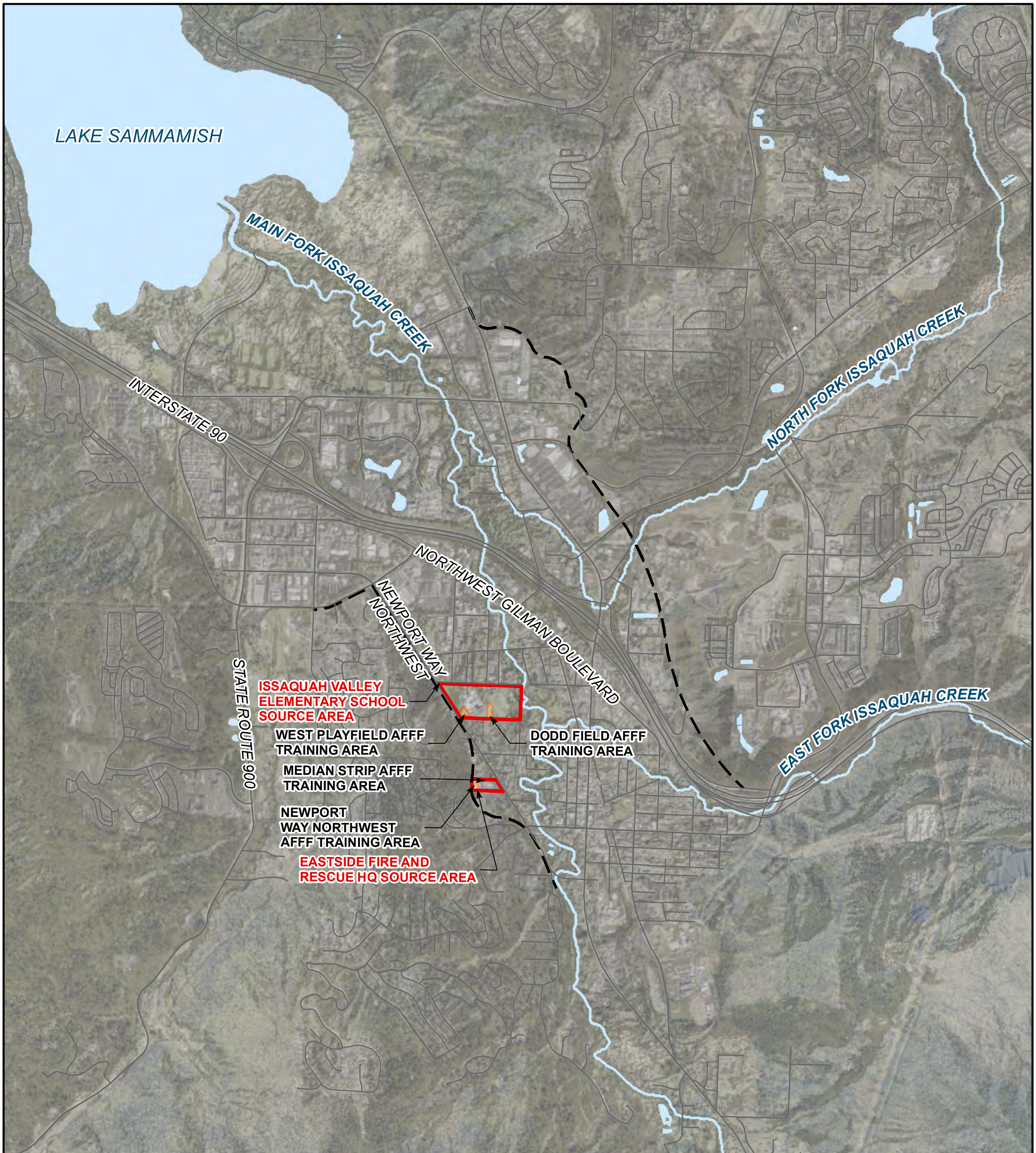
The Remedial Investigation Report will include a quality assurance section that summarizes data quality information. The summary will include:

- 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
Eastside Fire and Rescue Headquarters and
Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008



LEGEND

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

0 2,500
SCALE IN FEET

N

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FIGURE 1

LOWER ISSAQUAH VALLEY VICINITY MAP
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 5/29/2025 | Disc Reference:

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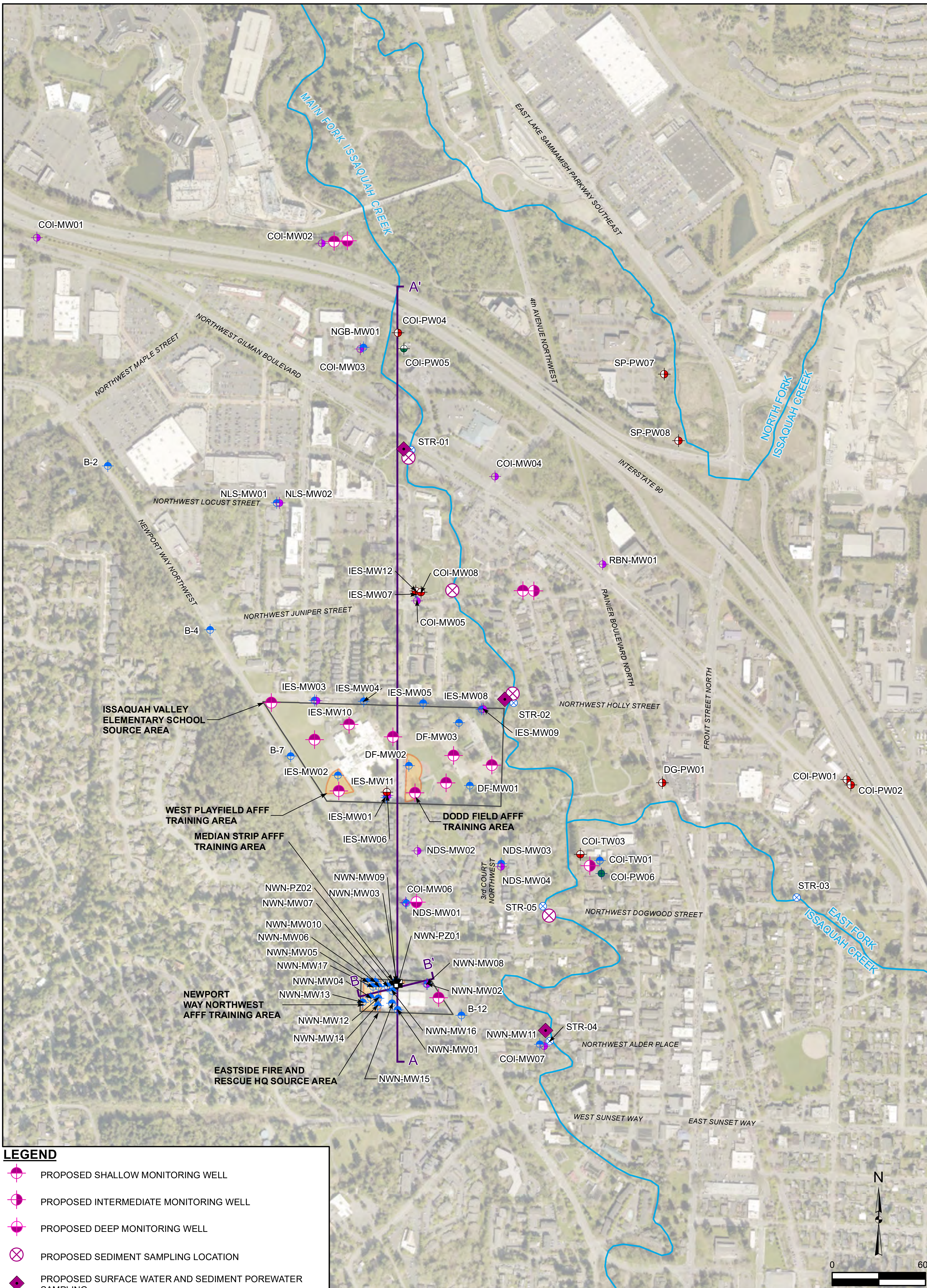

LEGEND

- PROPOSED SHALLOW MONITORING WELL
- PROPOSED INTERMEDIATE MONITORING WELL
- PROPOSED DEEP MONITORING WELL
- PROPOSED SEDIMENT SAMPLING LOCATION
- PROPOSED SURFACE WATER AND SEDIMENT POREWATER SAMPLING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- PIEZOMETER
- STREAM GAUGING STATION
- INTERMEDIATE PRODUCTION WELL
- DEEP PRODUCTION WELL
- PRODUCTION WELL
- LISTED SITE
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- A – A' LINE OF CROSS-SECTION

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

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

EFR HQ IVES SITE PLAN
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

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

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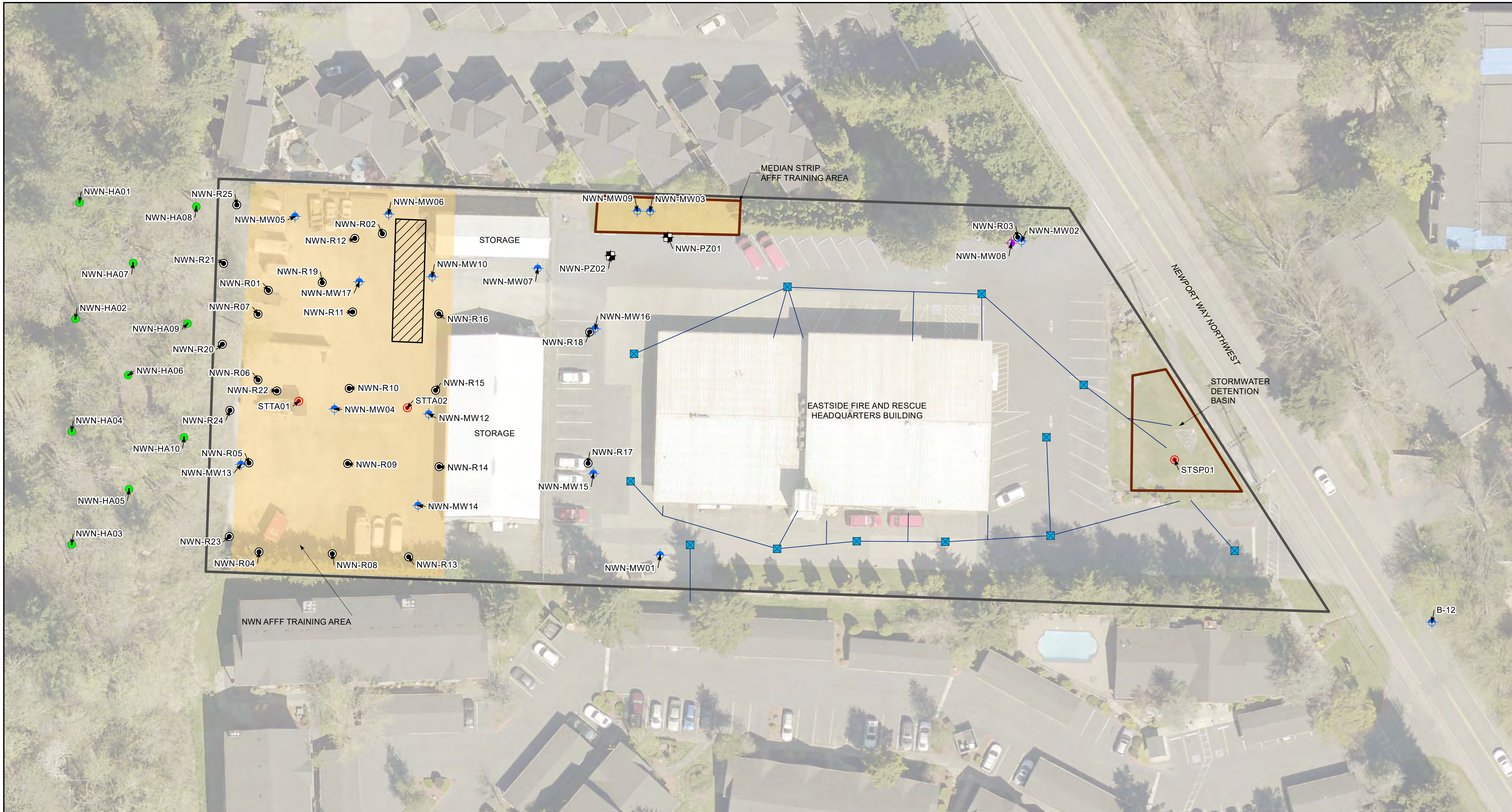

LEGEND

- HAND AUGER LOCATION
- BORING
- GEOSYNTEC SAMPLE
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- PIEZOMETER
- CATCH BASIN
- STORMWATER LINE
- PROPERTY BOUNDARY
- MULTI-INCREMENTAL SAMPLING DECISION UNIT
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- PILOT TEST PERMEABLE REACTIVE BARRIER

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

0 50
SCALE IN FEET

N

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FIGURE 3

EFR HQ SOURCE AREA PLAN
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 3/19/2025 | Disc Reference:
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LEGEND

- BORING
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- TEST WELL
- FIRE HYDRANT
- AQUEOUS FIREFIGHTING FOAM (AFFF) TRAINING AREA
- LISTED SITE

EFR HQ IVES = EASTSIDE FIRE & RESCUE HEADQUARTERS AND ISSAQUAH VALLEY ELEMENTARY SCHOOL

0 100
SCALE IN FEET

N

NOTES:
1. ALL LOCATIONS ARE APPROXIMATE.
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FIGURE 4

IVES SOURCE AREA PLAN
EFR HQ IVES SITE
175 NEWPORT WAY NORTHWEST AND
555 NORTHWEST HOLLY STREET
ISSAQUAH, WASHINGTON

FARALLON PN: 1754-008

Drawn By: lmurock | Checked By: SS | Date: 3/19/2025 | Disc Reference:

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APPENDIX D
HEALTH AND SAFETY PLAN

REMEDIAL INVESTIGATION WORK PLAN
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

FARALLON CONSULTING

SITE-SPECIFIC HEALTH AND SAFETY PLAN

PROJECT NO.:	1754-008	**START DATE:**	TBD
PROJECT NAME:	EFR HQ IVES Site – Remedial Investigation	**EXPECTED DURATION:**	1 year
PROJECT ADDRESS, CITY, STATE:	175 Newport Way Northwest and 555 Northwest Holly Street Issaquah, Washington	**CLIENT NAME:**	Eastside Fire & Rescue

.

PREPARED BY: Iris Hernandez

Print name

REVIEWED BY:

Sarah Snyder
Project Manager

Signature — Date: September 5, 2025

APPROVED BY:

Kevin Halpin
State Health and Safety Coordinator

Signature — Date: September 5, 2025

TABLE OF CONTENTS

ATTACHMENTS

1.0 CONTACT AND EMERGENCY INFORMATION

1.1 PROJECT CONTACTS

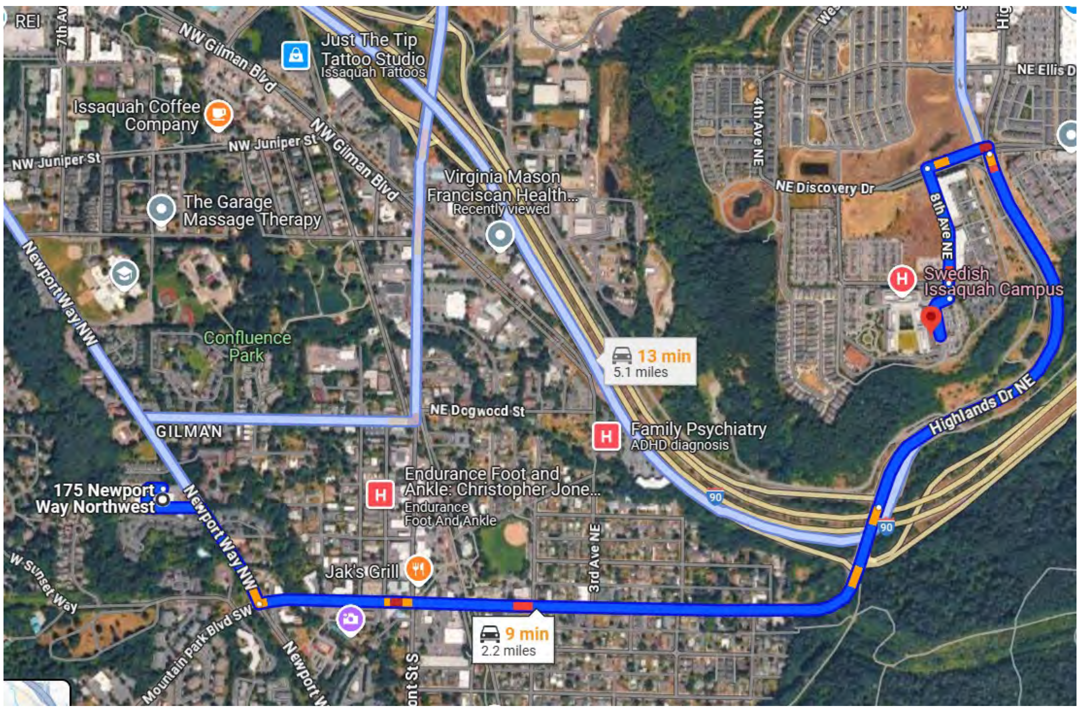
TITLE NAME	CONTACT INFORMATION	GENERAL PROJECT RESPONSIBILITIES
Site Health and Safety Officer Iris Hernandez	Cell: 509-520-8680	Implements HASP and conducts ongoing inspections of site conditions to identify visible or potential hazards. Initiates actions to mitigate or eliminate hazards. Provides health 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 Ben Lane (EFR) Julie Wartes (City of Issaquah)	Office: (425) 313-3201 Cell: (425) 677-3554 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



175 Newport Way NW
Issaquah, WA 98027

> Continue to Newport Way NW

51 sec (0.1 mi)

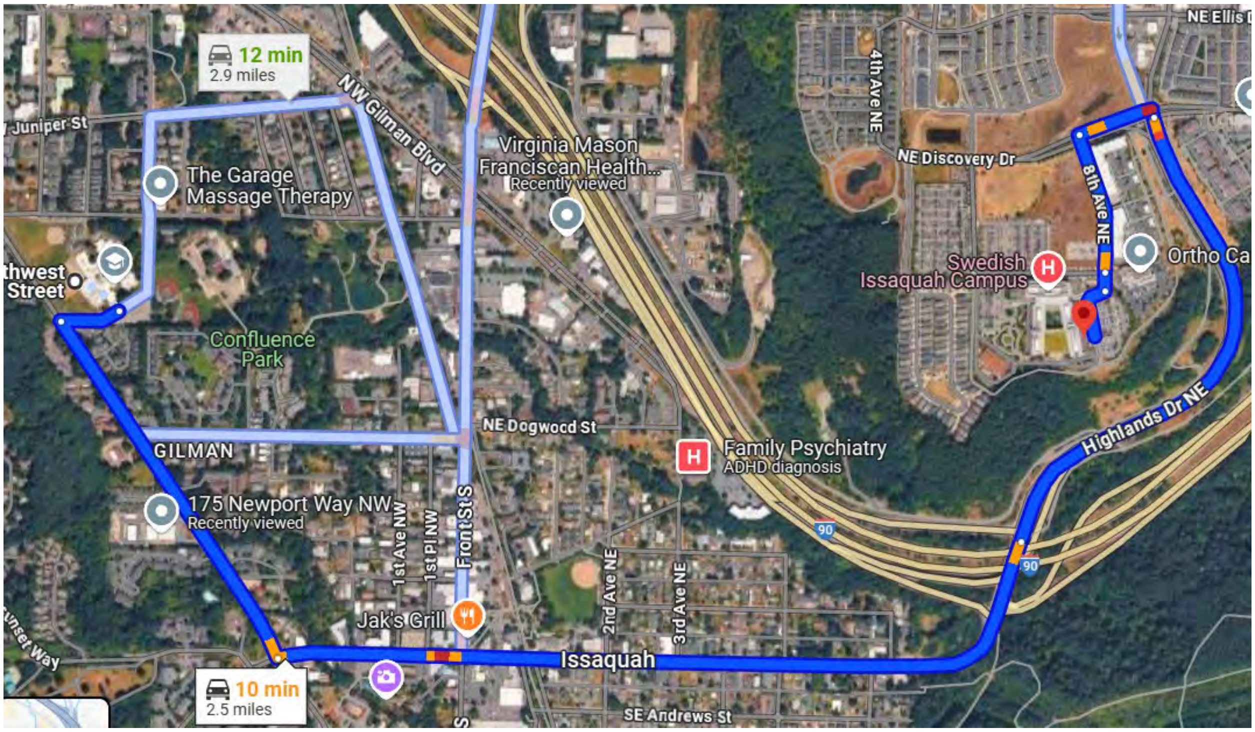
> Follow W Sunset Way and Highlands Dr NE to NE Discovery Dr

6 min (1.7 mi)

> Continue on NE Discovery Dr to your destination

3 min (0.3 mi)

Swedish Emergency Room - Issaquah
751 NE Blakely Dr, Issaquah, WA 98029



555 NW Holly St
Issaquah, WA 98027

↑ Head southwest toward Newport Way NW

39 sec (374 ft)

› Take W Sunset Way to NE Discovery Dr

6 min (2.1 mi)

› Continue on NE Discovery Dr to your destination

3 min (0.3 mi)

Swedish Emergency Room - Issaquah
751 NE Blakely Dr, Issaquah, WA 98029

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 locations are the parking lot in front of the main building for EFR HQ, and the field on the west side of the main school building for IVES, as marked by the red star in the figures 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.


NW Holly St
NW Holly St
6th
Newport Way NW
Academy-
School District Rd
555 NW Holly St
Recently viewed
Issaquah Valley
Elementary School
Recently viewed
Dodd Field
Google
School District Rd

2.0 PROJECT INFORMATION

2.1 SITE LOCATION AND CURRENT USE

The site is at 175 Newport Way Northwest and 555 Northwest Holly Street in Issaquah, Washington (herein referred to as the Site). The Site consists of King County Parcel No. 282406-9165, which is a 109,730-square-foot (2.52 acres) lot containing several fire station buildings and an office building used by Eastside Fire & Rescue (EFR). The Site also consists of King County Parcel 282406-9012, which is a 841,186-square-foot (19.3 acres) lot containing an elementary school and various smaller buildings.

2.2 SITE HISTORY

According to historical information reviewed by Farallon, EFR 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 known releases have impacted vadose zone soil at two source areas, the EFR Headquarters (HQ) Source Area at 175 Newport Way Northwest and the Issaquah Valley Elementary School (IVES) Source Area at 555 Northwest Holly Street; and impacted groundwater which is a source for the City of Issaquah's (City) drinking water.

AFFF training was performed at two locations on the EFR HQ Source Area:

- An area that currently is covered with lawn near the fire hydrant on the north-central portion (Median Strip); and
- The western gravel-surfaced area of the EFR Headquarters Property (Newport Way Northwest AFFF training area).

AFFF training was performed at two locations on the IVES Source Area:

- An area that currently is covered with lawn on the southern area of the west playfield at IVES (West Playfield AFFF Training Area); and
- An area that currently is covered with lawn, trees, turf, and asphalt along the western side of Dodd Field (Dodd Field 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 at the Site in accordance with the requirements of Agreed Order No.

DE 23520 between the Washington State Department of Ecology (Ecology), EFR, 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;
- Groundwater monitoring;
- Sediment sampling;
- Sediment porewater sampling; and
- Surface water sampling.

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: Sediment sampling, sediment porewater sampling, and surface water sampling

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;
- Vehicular traffic; and
- Heavy equipment traffic from current Site activity.

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;
- Use buddy system during surface water sampling;
- Wear hi-visibility vest and block work area with safety cones/barricades;
- Use traffic control for locations within roadways, as necessary;
- Communicate work areas with EFR staff while working on EFR HQ Source Area and keep line of sight toward drive lanes.

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:

- Perfluorobutanoic Acid (PFBA);
- Perfluorobutane Sulfonic Acid (PFBS);
- Perfluorohexanoic Acid (PFHxA);
- Perfluorohexane Sulfonic Acid (PFHxS);
- Perfluorooctanoic Acid (PFOA);
- Perfluorooctane Sulfonic Acid (PFOS);
- Perfluorononanoic Acid (PFNA);
- Perfluorodecanoic Acid (PFDA);
- 6:2 Fluorotelomer Sulfonic Acid (6:2 FTS); and
- Hexafluoropropylene Oxide Dimer Acid (HFPO-DA/GenX).

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	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. 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.
Action Levels if using PID only	10 parts per million (ppm) 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 10 ppm or greater, contact the project manager to discuss how to proceed.
Action Levels if using PID and colorimetric detector tubes	10 ppm 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 > 0.5 ppm for benzene or vinyl chloride and contact the project manager to discuss how to proceed. Stop work if PID reaches or exceeds 50 ppm above background in breathing zone and there is no discoloration of colorimetric detector tubes.
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
• Have an escape route and plan in mind. • Leave your belongings behind. • Keep your hands visible.	• Hide in an area out of the active shooter's view. • Block entry to your hiding place and lock the doors.	• 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

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✓ SHSO	Company Name	Name (Print)	Signature	Date

FARALLON CONSULTING

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		
☐ Site Check In	☐ First Aid Kit Location(s)	☐ Ear Plugs (if required)
☐ Proper ID/Safety Credentials	☐ Fire Extinguisher Location(s)	☐ Hand Protection (if required)
☐ Hard Hat	☐ Eye Wash Station	☐ Face Shield (if required)
☐ Safety Glasses	☐ Traffic Control (if needed)	☐ Respirator (if required)
☐ Orange Reflective Vest	☐ Safety Toe Boots	☐ ______________________

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	
☐ Head Count (No. of employees:)	☐ Chemical/Contaminant Hazards
☐ Emergency Response	☐ Health Hazards
☐ Who will...? (Provide names below.) Call 911: Alternate to call 911: Provide First Aid/CPR:	☐ Environmental Hazards ☐ Physical Hazards ☐ Slips, Trips, and Falls ☐ Utility Locates
☐ Emergency Exits/Rally Points/Hospital Route	☐ Utility/Product Shut-Off Valves/Switches
☐ Site Security and Exclusion Zone	☐ Near Miss Reporting (reminder to look)
☐ Vehicle/Equipment-Specific Safety Practices	☐ Incident Reporting (procedures and forms)
☐ Stop Work Authority	☐ Traffic Control
☐ Excavation Safety (if applicable)	☐ 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)	• 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	• 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	• See page 2 for OSHA Quick Card.
Heat stress	• See page 3 for OSHA Quick Card.
Lone worker	• 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	• Be aware of poisonous plants. • Apply insect repellant. • 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.

OSHA® QUICK CARD™

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® Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

OSHA 3156-02R 2014

OSHA® QUICK CARD™

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® Occupational Safety and Health Administration
U.S. Department of Labor
www.osha.gov (800) 321-OSHA (6742)

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

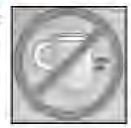
www.osha.gov (800) 321-OSHA (6742)

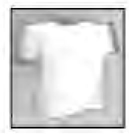
OSHA 3154-09R 2017

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.	• 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.	• 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 Steps	Potential Hazards	Preventive Measures
Gauge water levels and product thickness (where applicable) in well(s).	Exposure to chemicals and contaminants. Strain and repetitive motion. Slips, trips, or falls.	• 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.	Exposure to chemicals and contaminants. Strain and repetitive motion from bailing, pulling pumps, and carrying full containers of purge water. Slips, trips, or falls.	• 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.	Exposure to chemicals and contaminants. Contact with sample preservative (acid). Sample-container breakage. Slips, trips, or falls.	• 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.	Exposure to chemicals and contaminants. Strain and repetitive motion from carrying and lifting full containers of purge water. Slips, trips, or falls.	• 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 Steps	Potential Hazards	Preventive Measures
Clean the site; demobilize.	Vehicle and pedestrian traffic. Strain from lifting. Slips, trips, or falls.	• 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.	• 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.	• 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.	• 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 Steps	Potential Hazards	Preventive Measures
Coordinate drill rig setup; establish workstation and exclusion zone if needed.	Accident or injury from rig movement or equipment failure. Contact with overhead utilities or obstructions. Soft terrain. Unexpected rig movement. Slips, trips, or falls.	• 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.
Observe drilling activities. Includes clearing upper 5 feet of drilling location by air knife, Vactor truck, or hand auger.	Exposure to chemicals and contaminants. Eye injury from flying debris. Noise. Hitting an underground or overhead utility or other obstruction. Accident or injury from drill rig equipment failure or overturned rig. Strain and repetitive motion (if Farallon employee conducts hand-augering). Slips, trips, or falls.	• 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.

<table>
<tr><th>Job Steps</th><th>Potential Hazards</th><th>Preventive Measures</th></tr>
<tr><td>Evaluate soil cores and collect soil samples in accordance with sampling plan.

Include managing cuttings.

See separate JHA for groundwater sampling.</td><td>Exposure to chemicals and contaminants.

Contact with sample preservative (acid).

Sample-container breakage.

Strain from lifting and carrying soil cores and buckets.

Slips, trips, or falls.</td><td>• 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.</td></tr>
<tr><td>Observe borehole abandonment or monitoring well construction.</td><td>Exposure to chemicals and contaminants.

Eye injury from splashing or release of pressurized grout.

Strain from lifting bags of bentonite/grout (if Farallon employee is performing the backfill task).

Slips, trips, or falls.</td><td>• 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.</td></tr>
<tr><td>Manage investigation-derived waste.</td><td>Exposure to chemicals and contaminants.

Strain from lifting.

Slips, trips, or falls.</td><td>• 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).</td></tr>
</table>

Job Steps	Potential Hazards	Preventive Measures
Clean the site; demobilize.	Strain from lifting. Vehicle and pedestrian traffic. Slips, trips, or falls.	• 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.	• 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.	• 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.	• 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 Steps	Potential Hazards	Preventive Measures
Use hand tools to collect soil samples in accordance with sampling plan. Include managing cuttings.	Exposure to chemicals and contaminants. Strain and repetitive motion. Hitting an underground or overhead utility or other obstruction. Eye injury from flying debris. Contact with sample preservative (acid). Sample-container breakage. Strain from lifting and carrying soil cores and buckets. Slips, trips, or falls.	• 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.
Clean the site; demobilize.	Strain from lifting. Vehicle and pedestrian traffic. Slips, trips, or falls.	• 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.	• 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 ILDH – 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/m³	WA STEL – 0.6 mg/m³	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/m³) 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/m³	WA STEL – 1.5 mg/m³ NIOSH REL – 0.5 mg/m³ IDLH – 2.5 mg/m³	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/m³ TLV 0.5 – 1 mg/m³, depending on the species	WA STEL – 1.5 - 3 mg/m³ NIOSH REL – 0.001 mg/m³ NIOSH considers this material to be a carcinogen. IDLH – 5 mg/m³	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/m3 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/m3 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/m3	WA STEL – 10 mg/m3 NIOSH REL – 5 mg/m3	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/m3 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/m3 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

AIR MONITORING LOG

Date	Time	Location	Source/Area/ Breathing Zone	Instrument	Concentration/Units	Sampled by

CALIBRATION/CHECK LOG – AIR MONITORING EQUIPMENT

Date	Instrument/ Model No.	Serial No.	Battery Check OK?	Zero Adjust OK?	Calibration Gas (ppm)	Reading (ppm)	Leak Check	Performed By	Comments

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			

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

FARALLON CONSULTING

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: ☐ AM ☐ PM
Date Farallon notified of incident: Click or tap to enter a date.	Time Farallon notified: ☐ AM ☐ 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)	☐ None	
Non-Farallon Employee(s)	☐ None	

INCIDENT DESCRIPTION		
Location of Incident	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	☐ 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:	Name: Address: Phone No.:
Treated in Emergency Room: ☐ Yes ☐ No	Hospitalized Overnight as Inpatient: ☐ Yes ☐ No

INCIDENT REPORT FORM

MOTOR VEHICLE ACCIDENT (MVA) Please provide photos	☐ Not a Motor Vehicle Accident

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) ☐ 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

	Name (print)	Signature	Title	Date
Corporate Health and Safety Officer				

Distribution List: Group Manager of Farallon employee(s) involved in incident
Regional Operations Manager

ATTACHMENT 8

Near Miss Report Form

FARALLON CONSULTING

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.

FARALLON CONSULTING

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: Click or tap to enter a date.	Time of near miss: ☐AM ☐ PM
Near Miss Category: Choose an item.	
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:	Click or tap to enter a date.
		Time reported:	☐ AM ☐ 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
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

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): Eastside Fire & Rescue – RI Location: 175 Newport Way NW, Issaquah, WA

Project Lead/Organization: Sarah Snyder / Farallon Consulting County: King

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		Alternate Contact	
Name:	Sarah Snyder	Name:	Jon Klem
Organization:	Farallon Consulting	Organization:	WA State Dept of Ecolog
Phone:	(717) 395-0268	Phone:	(206) 556-5584
Email:	ssnyder@farallonconsulting.com	Email:	jon.klem@ecy.wa.gov

Ecology Contacts (completed by Ecology Project Manager)

Ecology Project Manager		Alternate or Cultural Resource Contact	
Name:		Name:	
Program:		Program:	
Phone:		Phone:	
Email:		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:	Muckleshoot Indian Tribe	Tribe:	Suquamish Tribe
Name:	Laura Murphy	Name:	Stephanie Trudel
Title:	Archaeologist	Title:	THPO
Phone:	(253) 876-3272	Phone:	(360) 394-8533
Email:	laura.murphy@muckleshoot.nsn.us	Email:	strudel@Suquamish.nsn.us
Tribe:	Snoqualmie Indian Tribe	Tribe:	Tulalip Tribes
Name:	Adam Osbekoff	Name:	Richard Young
Title:	Compliance Manager	Title:	Cultural Resources Manager
Phone:	NA	Phone:	(425) 239-0182
Email:	adam@snoqualmietribe.us	Email:	ryoung@tulaliptribes-nsn.gov

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:	Ecology
Name:	Vance Atkins, LG, LHG
Title:	Hydrogeologist 4
Phone:	425-324-1438
Email:	VATK461@ECY.WA.GOV

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: Dr. Matthew Lacy; 206-731-3232, Ext 4
   - Local Law Enforcement main name and phone: Issaquah Police Department; 425-837-3200
   - Local Non-Emergency phone number (911 if without a non-emergency number): 425-837-3200
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)

Informational Resources

DAHP (https://dahp.wa.gov)

Washington State Archeology (DAHP 2003)
(https://dahp.wa.gov/sites/default/files/Field%20Guide%20to%20WA%20Arch_0.pdf)

Association of Washington Archaeologists (https://www.archaeologyinwashington.com)

Potentially Interested Tribes

Interactive Map of Tribes by Area
(https://dahp.wa.gov/archaeology/tribal-consultation-information)

WSDOT Tribal Contact Website
(https://wsdot.wa.gov/tribal/TribalContacts.htm)

11. ADDITIONAL INFORMATION

Please add any additional contact information or other information needed within this IDP.

Step E.4 Tribal Contacts Cont.
Tribe: Duwamish Tribe
Name: Nancy Sackman
Title: Cultural Preservation Officer
Phone: NA
Email: preservationdept@duwamishtribe.org

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.

Right, from Top to Bottom: *Coins, token, spectacles and Montgomery Ward pitchfork toy discovered during Seattle Smith Cove shantytown (45-KI-1200) excavation.*

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.*

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 45KI924, 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...

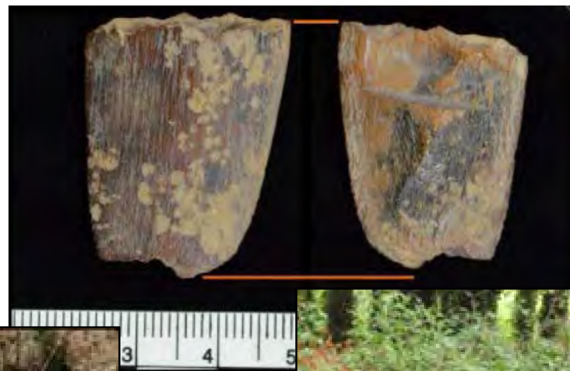
Potential human remains.

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!*

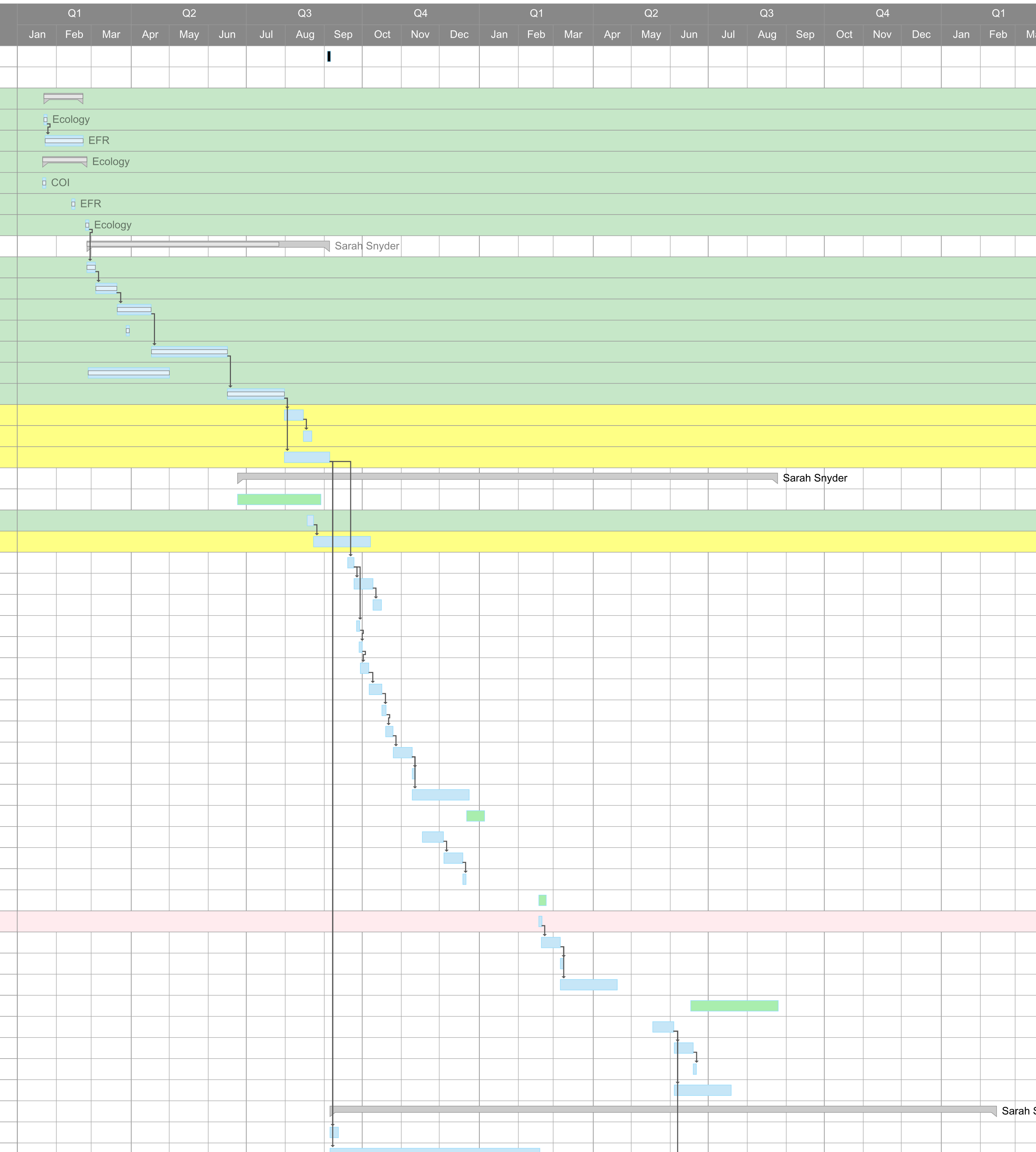
APPENDIX F
PRELIMINARY PROJECT SCHEDULE

REMEDIAL INVESTIGATION WORK PLAN
Eastside Fire and Rescue Headquarters and Issaquah Valley Elementary School Site
175 Newport Way Northwest and 555 Northwest Holly Street
Issaquah, Washington

Farallon PN: 1754-008

EFR HQ IVES Site - Preliminary Remedial Investigation Schedule
Draft - Issued for Agency Review

Task Name	Start	Finish	Schedule Notes	% Complete	Status
Current Date	09/03/25	09/03/25			
Grant Execution	01/22/25	02/21/25		100%	Complete
Final Grant Execution	01/22/25	01/22/25		100%	
Submit previous costs	01/23/25	02/21/25		100%	
AO Execution	01/21/25	02/24/25		100%	Complete
City Council Meeting	01/21/25	01/21/25		100%	
EFR Board Meeting	02/13/25	02/13/25		100%	
Final AO Execution	02/24/25	02/24/25		100%	
RIWP	02/25/25	09/04/25		79%	In Progress
Draft Outline	02/25/25	03/03/25		100%	Complete
Draft Annotated Outline	03/04/25	03/20/25	PLP Extension - Original schedule 3/13/25	100%	Complete
Ecology Review of Annotated Outline	03/21/25	04/16/25	Ecology Extension - Original schedule 4/3/25	100%	Complete
Submit Existing Boring Logs to Ecology	03/28/25	03/28/25		100%	Complete
Agency Review Draft RIWP	04/17/25	06/15/25		100%	Complete
Past EIM Data Due to EIM Coordinator	02/26/25	04/30/25	Completed ahead of schedule.	100%	Complete
Ecology Review	06/16/25	07/30/25		100%	Complete
Right-of-way Permit Application Submittal to COI	07/31/25	08/14/25	PLP Extension - Access Coordination	0%	In Progress
Right-of-way Permit Application Due to EAGL	08/15/25	08/21/25		0%	In Progress
Final RIWP	07/31/25	09/04/25	Original schedule during Labor Day weekend	0%	In Progress
Remedial Investigation	06/24/25	08/24/26		0%	Not Started
2025 IVES Summer Break	*06/24/25*	*08/28/25*		*0%*	
IVES & Dodds Field MW Installation - HARD SCHEDULE	08/18/25	08/22/25	Only window for sonic drilling at IVES	0%	Complete
IVES Draft Boring Logs Due to EAGL	08/23/25	10/06/25			In Progress
IVES & Dodds Field Shallow Soil Investigation	09/19/25	09/23/25		0%	
Lab TAT for Shallow Soil Sampling	09/24/25	10/08/25		0%	
Ecology Coordination for IVES & Dodds Field Borings	10/09/25	10/15/25		0%	
EFR HQ Borings - Asphalt	09/26/25	09/27/25		0%	
EFR HQ Borings/Well Install - Stormwater Basin	09/28/25	09/28/25		0%	
Site Plume - COI-MW05 Area Shallow and Intermediate Well Installation	09/29/25	10/05/25		0%	
Site Plume - COI-MW02 Area Shallow and Deep Well Installation	10/06/25	10/15/25		0%	
Site Plume - COI-TW01 Area Intermediate Well Installation	10/16/25	10/18/25		0%	
Site Plume - COI-MW06 Area Deep Well Installation	10/19/25	10/24/25		0%	
Lab TAT for Drilling Activities	10/25/25	11/08/25		0%	
Lab Reports Due to EAGL	11/09/25	11/09/25		0%	
Draft Boring Logs, Tables, and Figures Due to EAGL	11/09/25	12/23/25		0%	
2025-2026 IVES Winter Break 1	*12/22/25*	*01/04/26*	*No sampling permitted*	*0%*	
Groundwater, Surface Water, Pore Water, and Sediment Sampling Event	11/17/25	12/03/25		0%	
Lab TAT for GW, SW, PW, sed sampling	12/04/25	12/18/25		0%	
Lab Reports Due to EAGL	12/19/25	12/19/25		0%	
2026 IVES Winter Break 2	*02/17/26*	*02/22/26*		*0%*	
IVES & Dodds Field Borings	02/17/26	02/18/26		0%	
Lab TAT for Drilling Activities	02/19/26	03/05/26		0%	
Lab Reports Due to EAGL	03/06/26	03/06/26		0%	
Draft Boring Logs, Tables, and Figures Due to EAGL	03/06/26	04/19/26		0%	
2026 IVES Summer Break (Approx. Return Date)	*06/17/26*	*08/24/26*		*0%*	
Groundwater, Surface Water, Pore Water, and Sediment Sampling Event	05/18/26	06/03/26		0%	
Lab TAT for GW, SW, PW, sed sampling	06/04/26	06/18/26		0%	
Lab Reports Due to EAGL	06/19/26	06/19/26		0%	
IDW Manifests Due to EAGL	06/04/26	07/18/26		0%	
Remedial Investigation Report	09/05/25	02/13/27		0%	Not Started
Draft RI Outline	09/05/25	09/11/25		0%	
Draft Annotated Outline	09/05/25	02/17/26		0%	



Task Name	Start	Finish	Schedule Notes	% Complete	Status
Agency Review Draft RI Report	06/04/26	07/18/26		0%	
Ecology Review	07/19/26	09/01/26		0%	
Public Review Draft RI Report	09/02/26	10/16/26		0%	
Public Comment Period	10/17/26	11/30/26		0%	
Final RI Report	12/01/26	01/14/27		0%	
EIM Data Submittal	01/15/27	02/13/27			