

## Formal Task Assignment Document

### 2019 – 2022 SNOHOMISH COUNTY ON-CALL TASK ASSIGNMENT

Name of Project: PFAS Investigations  
Project Number: Airport  
Discipline: Engineering Services  
Task No.: TA #5 Completion Date: 12/31/2023

The COUNTY desires to authorize services pursuant to the AGREEMENT entered into with **Shannon & Wilson, Inc.**, and executed on December 24, 2018, as amended by Supplement No. 1 on June 18, 2019, as amended by Supplement No. 2 on August 25, 2020, as amended by Supplement No. 3 on August 15, 2021, and identified as Agreement No. **OCC19/1-7.8(BG)**, On-Call Consultant Services for **Environmental Site Assessment**.

All provisions in the AGREEMENT remain in effect except as expressly modified by this TASK ASSIGNMENT, and are incorporated herein by reference.

### ATTACHED TO THIS TASK ASSIGNMENT


- Scope of Work
- Cost Estimate with Total Hours to Perform Work
- Items unique to the project not included in the AGREEMENT and which are to be reimbursed at cost with no markup.

The **Total Amount Authorized** under this TASK ASSIGNMENT, inclusive of all fees and other costs is **\$199,144.48**. **No other payment shall be allowed unless a TASK ASSIGNMENT Supplement for changed Scope of Work has been signed and authorized before work is performed.**

All work under this TASK ASSIGNMENT shall be performed pursuant to the terms, conditions, specifications, and limitations contained in the AGREEMENT.

If you concur with this TASK ASSIGNMENT and agree to the items as stated above, please sign and date in the appropriate spaces below and return to the COUNTY for final action.

**Agnes Tirao**  
Digitally signed by Agnes Tirao  
Date: 2022.03.10 16:29:51  
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Consultant Signature

  
Klein, Kenneth  
2022.04.20 12:19:35 -07'00'  
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Approving Authority

<b>COUNCIL USE ONLY</b>	
Approved	<u>4/20/2022</u>
ECAF #	<u>2022-0309</u>
MOT/ORD	<u>Motion 22-141</u>

March 10, 2022

Mr. Andrew Rardin  
Paine Field/Snohomish County Airport  
3220 100th Street SW, Suite A  
Everett, WA 98204-1303

RE: PROPOSAL AND COST ESTIMATE FOR PER- AND POLYFLUOROALKYL  
SUBSTANCES INVESTIGATIONS, PAINE FIELD/SNOHOMISH COUNTY AIRPORT,  
EVERETT, WASHINGTON

Dear Mr. Rardin:

This letter presents our proposal for completing a Per- and Polyfluoroalkyl Substances (PFAS) investigation at two sites located at the Paine Field/Snohomish County Airport (Paine Field) in Everett, Washington. This proposal has been revised (previously submitted on February 22, 2022) to remove the enclosure titled Important Information About Your Geotechnical/Environmental Proposal.

## BACKGROUND

Paine Field is evaluating two areas for potential PFAS contamination. One area is downgradient of a hangar where multiple fire suppression system releases have occurred. The other area is at and around a pit used for fire training practice that is being considered for redevelopment (Figure 1).

## Per- and Polyfluoroalkyl Substances Emergence

In the early 2000s, PFAS compounds were identified as contaminants of emerging concern. PFAS compounds are a group of man-made fluorinated organic chemicals that have been used since the 1950s. The compounds, which repel oil and water, have been used in various products, including carpet and clothing treatments, coatings for paper and cardboard, nonstick cookware, waterproof clothing membranes, wire casing, tubing, plumbing thread seal tape, and within fire-fighting foam that is called aqueous film forming foam (AFFF) and used to fight liquid hydrocarbon fires (U.S. Environmental Protection Agency [EPA], 2017<sup>1</sup>).

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<sup>1</sup> U.S. Environmental Protection Agency (EPA), 2017, Technical fact sheet – perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA): Technical fact sheet prepared by the EPA Office of Land and Emergency Management (5106P), EPA 505-F-17-001, November.

Perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) which are components of AFFF are the two most studied PFAS compounds because they were produced in the largest amounts. PFAS are persistent within the environment and resistant to environmental degradation processes (EPA, 2017). The EPA has not yet established maximum contaminant levels for PFAS compounds; however, the EPA has set a Lifetime Health Advisory (LHA) Level for PFOS and PFOA (either separately or combined) of 70 nanograms per liter (ng/L). According to EPA guidance, the LHA Level is a threshold for health concern in groundwater used for drinking water and is not enforceable.

Effective January 1, 2022, the Washington State Department of Health issued State Action Levels (SALs) for five PFAS compounds in drinking water.<sup>2</sup> The SALs “define a level in daily drinking water expected to be without appreciable health effects even in sensitive populations. They are comparable to a health advisory level or maximum contaminant level goal in the federal Safe Drinking Water Act” (2021). These levels are as follows:

- 15 nanograms per liter (ng/L) PFOS
- 10 ng/L PFOA
- 65 ng/L perfluorohexanesulfonic acid (PFHxS)
- 9 ng/L perfluorononanoic acid (PFNA)
- 345 ng/L perfluorobutanesulfonic acid (PFBS)

The Washington State Department of Ecology (Ecology) has not set cleanup levels for PFAS; however, as of October 2021, Ecology has determined that PFAS meet the definition of a persistent compound under Washington's dangerous waste criteria; therefore, PFAS are regulated as a Washington State hazardous substance.<sup>2</sup>

## Site Descriptions

Investigations are proposed at two Paine Field areas referred to herein as the BFGoodrich (Aviation Technical Services [ATS]) AFFF Releases site and the Former Fire Pit and Adjacent Field site. Figure 1 shows the location of the two areas within Paine Field and Figures 2 and 3 show each site in greater detail.

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<sup>2</sup> Washington State Department of Ecology (Ecology), 2021, Focus on PFAS, publication 21-09-060, prepared by Ecology, October.

## BFGoodrich (Aviation Technical Services) Aqueous Film Forming Foam Releases Site

The area proposed to be investigated at the BFGoodrich (ATS) AFFF Releases site is a drainage ditch located adjacent to and southwest of Falcon Drive and Navajo Road to the south of Hangar 3. Approximate site boundaries are presented in Figure 2. In the 1990s, fire suppression systems within Hangar 3 and Hangar 1 (north-northeast of Hangar 3) were inadvertently triggered on multiple occasions. When these events occurred, AFFF was released within the hangars. The foam reportedly flowed overland and via drainage pipes to the site.

## Former Fire Pit and Adjacent Field Site

The Former Fire Pit and Adjacent Field site is in the southwest corner of Paine Field (Figure 3). The area is generally bounded by a paved access road to the west and north, West Perimeter Road to the east, and Taxiways K-5 and K-6 to the south. Beyond the paved access road to the west is a grassy field area bounded by a fence to the west. Beyond the fence, the surface elevation drops by approximately 40 feet to a paved Paine Field access road and a drainage ditch. Mukilteo Speedway lies beyond the access road to the west.

The Former Fire Pit was an approximately 1- to 2-foot deep oval earthen (unlined) depression extending approximately 40 feet wide by 80 feet long.<sup>3</sup> The Former Fire Pit was used by multiple fire departments for training exercises including the Snohomish County Airport Fire Department, Boeing Fire Department, the Snohomish County District 1 and 11 Fire Departments, and potentially others. During training activities, water and petroleum fuel or other flammable liquids were added to the pit and set on fire. AFFF was used to extinguish the fire.

The field located adjacent to, and northeast of, the Former Fire Pit currently features a large approximately triangular-shaped mound (with faces to the south, east, and northwest) as shown in Figure 3. From historical aerial photographs, the mound was not present until approximately 2007 to 2009. During certification events, AFFF was sprayed onto the field and later the mound (primarily from Taxiway K-5) to demonstrate that appropriate pressure requirements could be achieved. The field and mound were used intermittently for Federal

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<sup>3</sup> Washington State Department of Ecology (Ecology), 2007, No Further Action Determination under WAC 173-340-515(5) for the following Hazardous Waste Site, name: SCA Former Fire Pit, address: Snohomish County Airport, Everett, WA, facility/site no. 49626114: letter prepared by Ecology, Northwest Regional Office, Toxics Cleanup Program, Bellevue, Wash., June 27.

Aviation Authority crash truck certification events between approximately 2000 and 2018. Because the mound was not present prior to 2007 to 2009, AFFF may have been sprayed onto the field below the mound's current location.

## Previous Environmental Studies

### BFGoodrich (Aviation Technical Services) Aqueous Film Forming Foam Releases Site

It is our understanding that no investigations have been completed to evaluate whether releases that occurred at the BFGoodrich (ATS) AFFF Releases site resulted in PFAS contamination.

### Former Fire Pit and Adjacent Field Site

In 1989, surface water within the Former Fire Pit was sampled and analyzed for dissolved petroleum hydrocarbons, volatile organic compounds (VOCs), and metals. Free phase petroleum hydrocarbons were present within the Former Fire Pit. Foaming was reported by the laboratory during the VOCs analysis.

In 1998, surface water, soil, and groundwater samples were collected for petroleum hydrocarbons, VOCs, and metals analysis. Total petroleum hydrocarbons (TPH) within the diesel and oil ranges (TPH-D and TPH-O) and lead were measured above Model Toxics Control Act (MTCA) Method A cleanup levels at the time.

In 2006, approximately 170 cubic yards of soil was excavated from the Former Fire Pit and disposed of offsite. The remediation was conducted to address the TPH-D, TPH-O, and lead impacts previously identified in soil. Confirmation soil samples indicated that the TPH-D, TPH-O, and lead-impacted soil had been removed to levels below the MTCA Method A cleanup levels at the time. The area was backfilled following the excavation. Ecology issued a No Further Action letter for the Former Fire Pit.

In 2018, an investigation was completed at and within the vicinity of the Former Fire Pit to evaluate for the presence of PFAS in soil and groundwater (CDM Smith, 2018<sup>4</sup>). Six borings were completed using direct-push technology. The borings included one boring within the

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<sup>4</sup> CDM Smith, 2018, Former fire pit PFAS investigation, Snohomish County Airport, Everett, Washington: Report prepared by CDM Smith, Bellevue, Wash., for Snohomish County Public Works, Everett, Wash., project no. 19947-230030, October 29.

footprint of the Former Fire Pit, four borings completed adjacent to the Former Fire Pit (located between 40 to 60 feet to the north, east, south, and west), and one boring completed in the inferred downgradient direction (located approximately 200 feet west of the Former Fire Pit).

Soil samples were collected from depths of 4.5 feet below ground surface (bgs), 10 feet bgs, and 16 feet bgs from the boring completed within the Former Fire Pit (FP1). Groundwater samples were taken from boring FP1 and from the borings located to the north (FP2) and east (FP3) of the Former Fire Pit. Groundwater was not encountered within borings FP4 through FP6, believed to be due to the investigation taking place during the dry season (mid-August).

The soil samples contained several PFAS compounds with PFOS detected at the highest concentrations. PFOS was detected at 716 nanograms per gram (ng/g), 165 ng/g, and 645 ng/g within the 4.5 feet bgs, 10 feet bgs, and 16 feet bgs samples, respectively.

Like soil, several PFAS compounds were detected in the groundwater samples with PFOS detected at the highest concentrations. Groundwater samples taken from FP1, FP2, and FP3 contained PFOS at concentrations of 33,300 ng/L, 4,970 ng/L, and 1,310 ng/L, respectively. PFOA was detected at concentrations of 348 ng/L, 508 ng/L, and 115 ng/L within the groundwater samples taken from FP1, FP2, and FP3, respectively. In addition to PFOS and PFOA, PFHxS was detected within groundwater samples taken from FP1, FP2, and FP3 at concentrations of 5,680 ng/L, 5,430 ng/L, and 2,250 ng/L, respectively. The groundwater PFOS and PFOA detections exceeded the EPA LHA Level of 70 ng/L and the three detected PFAS chemicals exceed the State SAL.

## Site Geology and Hydrogeology

### BFGoodrich (Aviation Technical Services) Aqueous Film Forming Foam Releases Site

It is our understanding that investigations within the vicinity of the BFGoodrich (ATS) AFFF Releases site have not been completed to evaluate geologic conditions. However, geological conditions may not be too dissimilar to those described below.

### Former Fire Pit and Adjacent Field Site

During the 1998 investigations within the vicinity of the Former Fire Pit, the geology was described as consisting of an upper fill layer extending to depths between 16 and 24 feet bgs

overlying a lower fill layer, which extended to depths between 19 and 42 feet bgs. The upper fill layer was “variable in consistency” and was “composed of very loose to loose, moist to wet silty sand with some gravel, cobbles, and occasional organics and wood debris” (CDM Smith, 2018). The lower fill layer was similar to the upper fill layer, but was observed to be “loose to medium dense, saturated silty sand with some gravel and cobbles, but with less organics and wood debris” (CDM Smith, 2018). Till, weathered and unweathered, was observed below the lower fill. The till was described as “a native soil deposit composed of dense to very dense, moist to wet sand and silty sand with some gravel and cobbles, and occasional lenses of clean sand” (CDM Smith, 2018).

During the 2018 investigations, weathered till was observed within five of the six explorations beginning at depths ranging from 21 to 23.5 feet bgs. Within the boring without observed till, refusal occurred at 20 feet bgs.

Perched groundwater has been observed between depths of 12.5 and 24 feet bgs within the vicinity of the Former Fire Pit and is believed to fluctuate with precipitation. Groundwater flow direction is believed to be to the west (CDM Smith, 2018). During the 2018 investigation, groundwater was encountered within three of the six explorations at depths of approximately 19 feet bgs.

The presence and location of an aquifer below the till (referred to as the lower aquifer) below the site is unknown. The lower aquifer was encountered at 90 feet bgs at 0.6 miles to the east of the site during an investigation at Paine Field.<sup>5</sup> For the purposes of this proposal, depth to the lower aquifer is anticipated to be approximately 90 to 145 feet bgs.

## PROJECT OBJECTIVES

### BFGoodrich (Aviation Technical Services) Aqueous Film Forming Foam Releases

This investigation will be completed with the objective of evaluating whether PFAS contamination is present in shallow soils within the drainage area resulting from the AFFF releases from Hangars 3 and 1. The investigation will be limited in nature and will not attempt to delineate the contamination, if encountered.

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<sup>5</sup> Landau Associates, 2019, Interim Remedial Investigation Data Report, TECT Aerospace Leasehold, Snohomish County Airport/Paine Field, Everett, Washington: Report prepared by Landau Associates Edmonds, Wash., project no. 0222057.010, for Snohomish County Airport, Everett, Wash., December 31.

## Former Fire Pit and Adjacent Field Site

PFAS contamination has been identified within soil and groundwater at the Former Fire Pit. Groundwater samples taken from FP2 and FP3, located to the north and east of the Former Fire Pit (inferred upgradient direction) contained elevated concentrations of PFAS compounds, potentially suggesting an upgradient source.

The objectives of the proposed investigation at the Former Fire Pit and Adjacent Field site are:

- Evaluate if PFAS soil contamination is present in soil located near the Former Fire Pit (not sampled in 2018).
- Evaluate if PFAS soil contamination is present within the field and mound located to the northeast of the Former Fire Pit.
- Evaluate flow direction of perched groundwater within the vicinity of the Former Fire Pit.
- Evaluate if PFAS contamination in perched water extends offsite.
- Evaluate if PFAS contamination is present in the aquifer underlying the Former Fire Pit.

## SCOPE OF SERVICES

Our proposed scope of services includes the following tasks:

- Task 1 – Badging
- Task 2 – BFGoodrich (Aviation Technical Services) AFFF Releases Site Investigation and Reporting
- Task 3 – Former Fire Pit and Adjacent Field Site Phase I Site Investigation
- Task 4 – Former Fire Pit and Adjacent Field Phase II Site Investigation
- Task 5 – Former Fire Pit and Adjacent Field Reporting
- Task 6 – Legal Support
- Task 7 – Grant Application Support
- Task 8 – Project Management, Coordination, and Administration

### Task 1 – Badging

Access to Paine Field requires that at least one team member obtain a security badge and act as escort for additional staff and subcontractors that are brought onto the property. The



badged team member must always be able to observe (line of sight) the escorted personnel. To provide flexibility in the field, we have assumed that three staff will obtain security badges (Air Operations Area type).

## Task 2 – BFGoodrich (ATS) Aqueous Film Forming Foam Releases Site Investigation and Reporting

Task 2 includes review of drainage drawings provided by Paine Field staff and collection of shallow soil samples from six locations (BFG-HA1 through BFG-HA6) within the study area. Since the releases occurred about 20+ years ago, sampling will target shallow soil at drainpipe outfalls where sediment may have been deposited from outfalls and at low areas where liquid may collect and infiltrate. Soil will be collected from directly below surface vegetation (or 6 inches below the recently deposited sediment) at each location. Soil will be collected at 1 foot depth at two locations. If observed during soil sample collection, water will be sampled from a drainage pipe outfall and surface water will be sampled from the downstream extent of the drainage area to evaluate for back diffusion of PFAS from sediment to surface water. Water samples will be collected by dipping the sample jar to capture the air/water interface, since PFAS may concentrate at that interface.

Sampling will be completed by a two-person crew using hand tools. Proposed exploration locations are shown in Figure 2; however, locations may be adjusted based on field observations (e.g., location of outfalls and depressions) and review of the drainage drawings. The purpose of each proposed exploration and sample details are summarized in Table 1.

Samples will be submitted to Eurofins TestAmerica under standard chain of custody procedures. Samples will be analyzed for PFAS (standard list of 18 analytes) by method 537 (modified) with a standard turnaround time of 15 days. Quality assurance/quality control (QA/QC) samples will be collected at a frequency of 10% (one soil and one water) and will also include one equipment blank (rinsate).

On receipt of the laboratory data generated during this task, we will review the data relative to the project standards. The data will be flagged with quality control-related symbols, if necessary and uploaded to the Shannon & Wilson database. We assume there will be 1 laboratory report.

We will be provided in a draft letter report (provided electronically) that will be finalized following your review and incorporation of your comments. The report will include a summary of methods and observations, exploration map, analytical laboratory report, a

quality assurance/quality control (QA/QC) assessment, and conclusions. The report will be factual and not provide recommendations. The report will be separate from the Former Fire Pit and Adjacent Field report.

### Task 3 – Former Fire Pit and Adjacent Field Phase I Investigation

Task 3 includes coordination and completion of field activities. Task 3 field activities will require up to seven site mobilizations. The visits will be to:

1. Mark the proposed explorations for utility locating purposes;
2. Facilitate delivery of a port-o-let to the site (necessary to ensure badged team members can maintain line of sight of escorted personnel);
3. Install groundwater monitoring wells, complete explorations, and collect analytical samples;
4. Develop groundwater monitoring wells;
5. Survey and sample groundwater monitoring wells;
6. Facilitate removal of the port-o-let from the site; and
7. Facilitate removal of waste soil and water from the site.

Where feasible, site mobilizations will be combined.

It is our understanding that The Boeing Company (Boeing) leases a portion of the site or property located adjacent to the site and that access must be coordinated with Boeing (Paine Field to provide contact information) so that activities will not conflict with their operations. We will coordinate site access with Paine Field and Boeing prior to commencing field activities. We assume that an access agreement with Boeing is complete, and a new access agreement is not required for this work.

### Field Activities and Analytical Testing

We propose to complete 16 explorations to collect soil and groundwater samples. Activities will be completed by a two-person sampling crew and a drill crew. The explorations include:

- Ten explorations (FP-P1 through FB-P10) will be completed using direct push drilling.
- Three additional direct push explorations to 25 feet depth will be completed as groundwater monitoring wells (FP-MW1, FP-MW2, and FP-MW3).

- One exploration (up to 145 feet depth, depending on the depth where the lower aquifer is encountered) will use sonic drilling and will be completed as a groundwater monitoring well (FP-MW4) to collect groundwater samples from the aquifer.
- Two explorations (FP-HA1 and FP-HA2) will be undertaken using hand-augers.

Proposed exploration locations are shown in Figure 3. The purpose of each proposed exploration and sample details are summarized in Table 2. Exploration locations will be marked in advance to allow for public utility marking (One Call). In addition, a private locating company will be subcontracted to clear each proposed exploration of conductible utilities. Locations may be moved based on the presence of utilities or obstructions.

The monitoring wells will be 1-inch-diameter pre-pack installations, except for the deep monitoring well, which will be a 2-inch-diameter pre-pack installation. If groundwater is not encountered within 145 feet bgs, the deep monitoring well will be omitted. The groundwater monitoring wells will be developed at least 24 hours following installation and will be sampled at least 24 hours following development. A licensed surveyor (APS Survey & Mapping) will be subcontracted to survey the newly installed wells.

As shown in Table 2, boring and sample depth intervals vary depending on in situ conditions. Since PFAS may concentrate at interfaces, soil samples will target directly below surface vegetation, layers where organics are encountered, the depth of the water table, or changes in lithology. Up to three soil samples will be collected at each exploration. In the absence of observed interfaces as previously described, soil samples will be collected directly below surface organics at 8 and 16 feet bgs. The two most shallow samples from each location will be submitted for PFAS analysis. The deepest sample will be held, pending results of initial testing.

We will collect up to four samples of perched groundwater from the probe borings. The water will be collected from temporary sampling points placed within the borings. The temporary sampling points will be removed after groundwater is collected.

We will collect up to one groundwater sample from each permanent monitoring well (four samples total). The wells will be developed prior to sampling.

Samples will be submitted to Eurofins TestAmerica under standard chain-of-custody procedures. Samples will be analyzed for PFAS (standard list of 18 analytes) by method 537 (modified) with a standard turnaround time. QA/QC samples will include field duplicate samples to be collected at a frequency of 10% (five soil and one water sample) and equipment blank samples (one per equipment set up).

On receipt of the laboratory data generated during this task, we will review the data for QA/QC relative to the project standards. The data will be flagged with quality control-related symbols, if necessary and uploaded to the Shannon & Wilson database and provided in tables in the report (Task 5). We assume there will be no more than 4 laboratory reports.

### Investigation-Derived Waste

Sampling activities will generate IDW, including soil, purge water, and decontamination water. Soil and water IDW will be placed into Washington State Department of Transportation drums, labeled, and left on site, pending receipt of analytical test result. Shannon & Wilson will coordinate with you to determine an appropriate temporary IDW storage location.

PFAS-contaminated waste may be regulated as Washington State-only dangerous waste due to persistence. Wastes containing halogenated organic compounds, such as PFAS, at concentrations above 100 milligrams per kilogram are designated as Washington State-only dangerous waste.<sup>6</sup> Washington State dangerous waste is required to be removed for disposal within 90 days.

We assume that the Phase I field activities will generate no more than 7 drums of soil and 3 drums of water and that the waste will not be designated as Washington State dangerous waste. If practicable, we will combine the waste removal mobilization for both the Phase I and II field activities following completion of Phase II field activities. We assume the waste will be disposed of at Waste Management's facility in Arlington, Oregon as non-hazardous waste.

### Task 4 – Former Fire Pit and Adjacent Field Phase II Investigation

The Phase II investigation approach will be developed following completion of Phase I investigation activities and receipt of laboratory analytical data. Task 4 includes coordination, completion of field activities, and investigation-derived waste (IDW) pick-up/disposal. Following evaluation of the Phase I investigation findings, the team will meet (via conference call) with you to discuss the results of the Phase I investigation and the proposed scope for the Phase II investigation. The conference call is included within Task 8.

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<sup>6</sup> Washington State Department of Ecology (Ecology), 2021, Section 9.1.2 Washington State Rules, PFAS Chemical Action Plan, prepared by Ecology, publication 21-04-048, November.

For cost estimating purposes, we have assumed that the Phase II investigation will require the same level of effort, analysis, and drilling as the Phase I investigation.

## Task 5 – Former Fire Pit and Adjacent Field Reporting

Following completion of Tasks 3 and 4, Shannon & Wilson will complete a report documenting the investigation at the Former Fire Pit. The report will be issued electronically as a draft and will be finalized after one round of comments. It will include maps, cross sections, analytical laboratory reports, a QA/QC assessment, conclusions, and recommendations. We will provide one paper copy and one disc. We assume no Ecology interaction/involvement and no Environmental Information Management System upload are required.

## Task 6 – Legal Support

We will provide support for legal services provided by others. Support activities may include preparation of figures and tables, environmental historical research, review of technical information, and other support activities. We will not provide legal counsel or other legal services. The cost estimate for this task assumes only limited work will be required at this time.

## Task 7 – Grant Application Support

We will provide support for grant application activities that may be pursued by Snohomish County. Support activities may include completing applications, preparation of figures and tables, environmental historical research, review of technical information, and other support activities.

## Task 8 – Project Management, Coordination, and Administration

Our Task Project Manager, Ryan Peterson, will be the point of contact for questions and requests by Paine Field. As Task Project Manager, Mr. Peterson will actively monitor budgets and progress to enable project completion in accordance with the proposed scope, schedule, and budget.

This task also includes participation in two conference calls and one meeting with you. The purpose of the conference calls and meeting is to discuss the results of the investigations and to discuss next steps for potential site redevelopment of the Former Fire Pit.

## ESTIMATED SCHEDULE AND FEE

Shannon & Wilson is prepared to begin this project within one week of Notice to Proceed. The schedule will be dependent on subcontractor availability and time of year (field investigations will be scheduled to occur when perched groundwater is expected to be present).

Our estimated fee for the above scope of services is approximately \$199,144.48. A detailed cost estimate is enclosed as Table 3. Our services will be performed on a time-and-expense basis and the cost estimate includes our labor and expenses for the services described in this proposal. These services will be performed in accordance with the terms and conditions of our on-call contract for geotechnical and environmental services with Snohomish County (Agreement No. OCC19/1-7.8[BG]).

This proposal provides our recommended scope of services based on our project understanding. We appreciate your confidence in Shannon & Wilson and look forward to our continued work with you and others at Snohomish County. Please call Ryan Peterson at (206) 695-6673 if you have any questions regarding this proposal.

Sincerely,

SHANNON & WILSON



Ryan Peterson, PE  
Environmental Engineer/Project Manager



Agnes Tirao, PE  
Senior Associate/Contract Manager

KRF:MDN:ACT:MJS/rbp

- Enc. Table 1 – BFGoodrich (ATS) AFFF Releases Site Investigation Sampling Summary
- Table 2 – Former Fire Pit and Adjacent Field Site Phase 1 Investigation Sampling Summary (2 pages)
- Table 3 – Cost Estimate (3 pages)
- Figure 1 – Vicinity Map
- Figure 2 – BFGoodrich (ATS) AFFF Releases Site Plan and Exploration Plan
- Figure 3 – Former Fire Pit and Adjacent Fields Site and Exploration Plan
- Subcontractor Cost Estimate – APS Survey & Mapping

**Table 1 - BFGoodrich (ATS) AFFF Releases Site Investigation Sampling Summary**

Exploration Designation	Location / Purpose	Matrix	Depth (feet bgs)	Sample Count	Comment
BFG-HA1	At drainpipe outfalls where sediment may have been deposited from outfalls	Soil	0.5 and 1.0	2	Soil will be collected from 6 inches below the recently deposited sediment and 1 foot depth.
BFG-HA2		Soil	0.5	1	Soil will be collected from 6 inches below the recently deposited sediment.
BFG-HA3		Soil	0.5	1	Soil will be collected from 6 inches below the recently deposited sediment.
BFG-HA4	At low points where liquid may collect and infiltrate	Soil	0.5 and 1.0	2	Soil will be collected from directly below vegetation and 1 foot depth.
BFG-HA5		Soil	0.5	1	Soil will be collected from directly below vegetation.
BFG-HA6		Soil	0.5	1	
BFG-HA100	Duplicate soil sample for QA/QC	Soil	N/A	1	Duplicate soil sample.
BFG-SW1	Water from drainage pipe outfall, if present. Collect directly from the drainage pipe.	Water	N/A	1	Collect water from the air/water interface.
BFG-SW2	Surface water from the downstream extent of the drainage area.	Water	N/A	1	Collect water from the air/water interface.
BFG-SW100	Duplicate water sample for QA/QC, if water samples are collected.	Water	N/A	1	Duplicate water sample, if surface water is present.
BFG-EB	Equipment Blank (rinsate) for QA/QC	Water	N/A	1	Sample of rinsate poured over decontaminated field equipment prior to collection of environmental samples.
Total Number of Analyzed Samples:				13	

NOTES:

<sup>1</sup> Samples to be analyzed for PFAS (standard list of 18 analytes) by method 537 (modified).

bgs = below ground surface; PFAS = Per- and Polyfluoroalkyl Substances



**Table 2 - Former Fire Pit and Adjacent Field Site Phase 1 Investigation Sampling Summary**

Exploration Designation	Location	Purpose of Exploration	Exploration Method	Feet bgs	Count	Soil Samples <sup>1</sup> Comment	Water Samples <sup>1</sup> Comment
FP-P1				Up to 20	3		
FP-P2	Northeast of mound	Evaluate for presence of PFAS soil contamination in the field to the northeast of the mound resulting from fire truck certification events. If present, evaluate vertical extent.		Up to 25 <sup>2</sup>	3	Note 3	Collect grab groundwater sample from the borehole.
FP-P3				Up to 25 <sup>2</sup>	3		Collect grab groundwater sample from the borehole.
FP-P4	Center of mound	Evaluate for presence of PFAS soil contamination in the mound resulting from fire truck certification events.		to mound "bottom"	3	Grab sample from 6 to 12 inches, at mound center, and above the mound bottom.	
FP-P5	Southwest of mound	Evaluate for presence of PFAS soil contamination in the field to the southwest of the mound resulting from fire truck certification events. If present, evaluate vertical extent.		Up to 25 <sup>2</sup>	3		Collect grab groundwater sample from the borehole.
FP-P6	Southwest of mound		Direct push boring	Up to 20	3		
FP-P7	Northwest of Former Fire Pit	Evaluate for presence of PFAS soil contamination to the north/northwest of the Former Fire Pit. If present, evaluate vertical extent.		Up to 20	3		
FP-P8	North of Former Fire Pit			Up to 20	3	Note 3	
FP-P9	West of Former Fire Pit	Evaluate for presence of PFAS soil contamination to the west of the Former Fire Pit. If present, evaluate vertical extent.		Up to 20	3		
FP-P10	East of Former Fire Pit	Evaluate for presence of PFAS soil contamination to the east of the Former Fire Pit. If present, evaluate vertical extent.		Up to 25 <sup>2</sup>	3		Collect grab groundwater sample from the borehole.
FP-HA1	East of mound	Evaluate for shallow PFAS soil contamination at the base of the mound.	Hand auger	2	1	Grab sample from 6 to 12 inches.	
FP-HA2	South of mound			2	1		
FP-MW1	West of Former Fire Pit	Evaluate for presence of PFAS soil contamination to the west of the Former Fire Pit. If present, evaluate vertical extent. Install 1-inch-diameter groundwater monitoring well to support evaluation of perched groundwater gradient and contamination.		Up to 25 <sup>2</sup>	3		Collect sample from developed monitoring well
FP-MW2	Downgradient from the Former Fire Pit	Evaluate for presence of PFAS soil contamination downgradient of the Former Fire Pit. If present, evaluate vertical extent. Install 1-inch-diameter groundwater monitoring well to support evaluation of perched groundwater gradient and contamination.	Direct push boring			Note 3	
FP-MW3				Up to 25 <sup>2</sup>	3		Collect sample from developed monitoring well
				Up to 25 <sup>2</sup>	3		Collect sample from developed monitoring well

**Table 2 - Former Fire Pit and Adjacent Field Site Phase 1 Investigation Sampling Summary**

Exploration Designation	Location	Purpose of Exploration	Exploration Method	Feet bgs	Count	Soil Samples <sup>1</sup> Comment	Count	Water Samples <sup>1</sup> Comment	
FP-MW4	Downgradient from the Former Fire Pit	Install 2-inch-diameter groundwater monitoring well up to 145 feet bgs to evaluate for PFAS contamination in the aquifer.	Sonic boring	Up to 25 <sup>2</sup>	0	Note 3	1	Collect sample from developed monitoring well	
FP-P100 through FP-P104					5	Duplicate soil samples for QA/QC	0		
FP-MW100					0		1	Duplicate water sample for QA/QC	
FP-EB					0		2	Equipment Blank (insate) for QA/QC. One for peristaltic pump and one for bladder pump.	
Total Number of Analyzed Samples:							46	11	

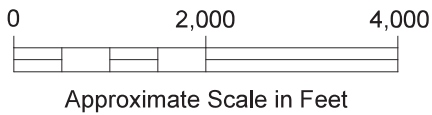
NOTES:


<sup>1</sup> Samples to be analyzed for PFAS (standard list of 18 analytes) by method 537 (modified).

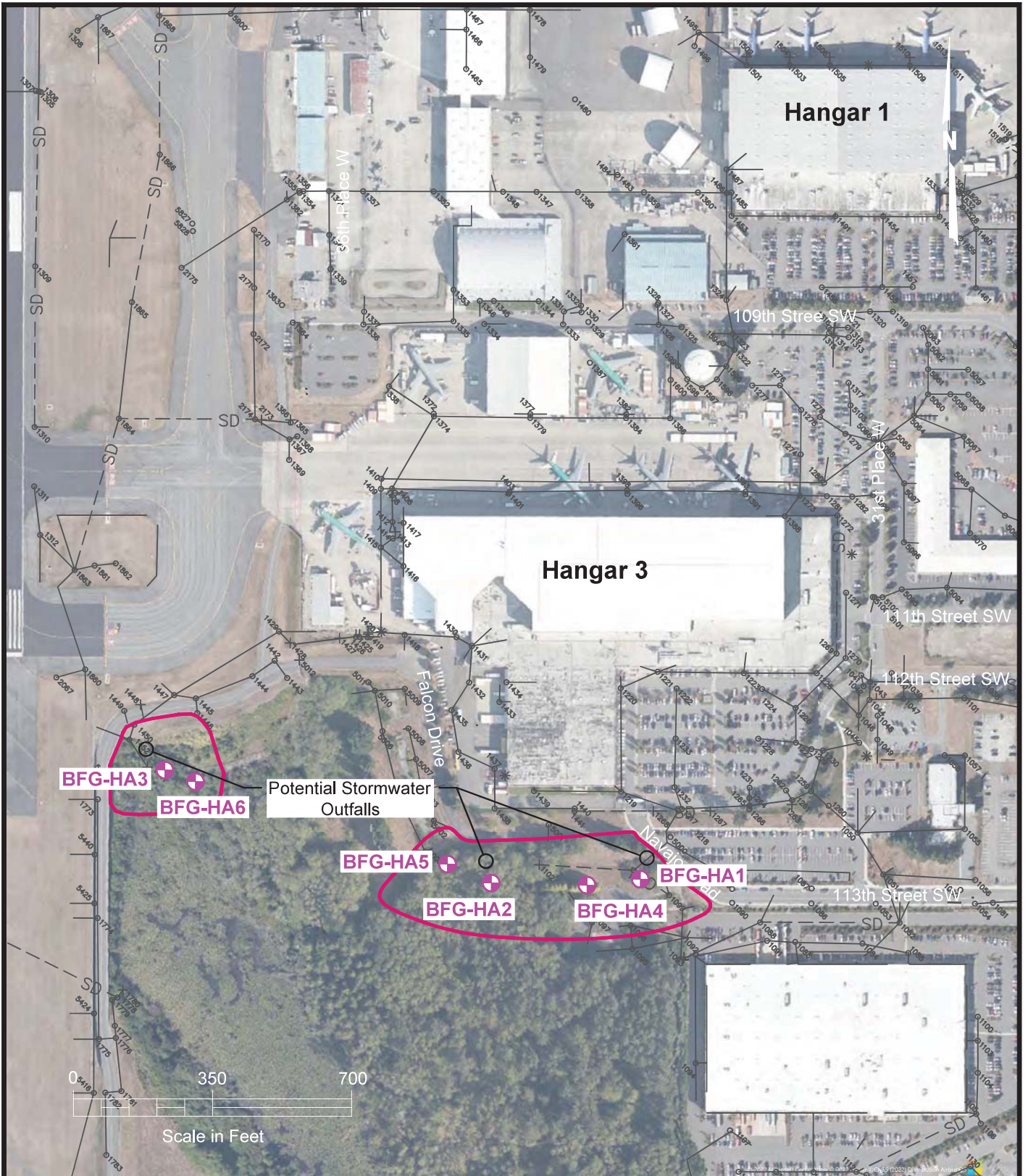
<sup>2</sup> Boring completed to depth of up to 25 feet bgs or to native till, whichever is shallower.

<sup>3</sup> Soil samples will target directly below surface vegetation, layers where organics are encountered, the depth of the water table, or changes in lithology. Up to 3 soil samples will be collected at each exploration. In the absence of observed interfaces as previously described, soil samples will be collected at directly below surface organics, 8 feet bgs, and 16 feet bgs.

bgs = below ground surface; PFAS = per- and polyfluoroalkyl substances



PFAS Investigations Paine Field/Snohomish County Airport Everett, Washington	
<b>VICINITY MAP</b>	
March 2022	102986-P
 <b>SHANNON &amp; WILSON, INC.</b> <small>GEOLOGICAL AND ENVIRONMENTAL CONSULTANTS</small>	<b>FIG. 1</b>



**LEGEND**

**BFG-HA1** 

Proposed Exploration Designation and Approximate Location



Approximate Site Boundary

**NOTE**

Figure adapted from file *StormDmg 2016.dwg* received 01/27/2022.

PFAS Investigations  
Paine Field/Snohomish County Airport  
Everett, Washington

**BFGOODRICH  
(ATS) AFFF RELEASES  
SITE AND EXPLORATION PLAN**

March 2022

102986-P



PFAS Investigations  
Paine Field/Snohomish County Airport  
Everett, Washington

**FORMER FIRE PIT  
AND ADJACENT FIELDS  
SITE AND EXPLORATION PLAN**  
March 2022 102986-P

**SHANNON & WILSON, INC.**  
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

**FIG. 3**

**LEGEND**

- FP-P1 Proposed Direct Push Designation and Approximate Location
- FP-HA1 Proposed Hand Auger Designation and Approximate Location
- ⊕ FP-MW1 Proposed Well Designation and Approximate Location
- Approximate Site Boundary
- Inferred Direction of Perched Groundwater Flow

Scale in Feet

0 300 600

**FIG. 3**



March 10, 2022

Ryan Peterson  
Shannon & Wilson  
400 North 34<sup>th</sup> Street, Suite 100  
Seattle, WA 98103  
Email: [Ryan.Peterson@shanwil.com](mailto:Ryan.Peterson@shanwil.com)  
Direct: (206) 695-6673

**Exploratory Survey Proposal - Revised**  
**Subject Property: Paine Field - 3220 100<sup>th</sup> St. SW, Everett**  
**Project Name: Paine Field Fire Pit**  
**Client/Contractor Job #: 102986**  
**APS Project #: 3291.002**

## **INTRODUCTION**

Thank you for the opportunity to provide this proposal for surveying services for the above-referenced project. Based on preliminary research of recorded documents, we have identified a scope of work and an estimated cost for your project. Our surveying services will be provided contingent upon the following:

- The client is the authorized agent of the property owner.
- The client will provide right of entry onto the property.
- In some cases, the cutting of brush or small trees is necessary to complete the field survey.

## **SCOPE OF WORK**

This scope of work is based on the typical requirements for an Exploratory Survey based on our experience with similar projects. The cost of the standard Exploratory Survey is delineated in the fee section of this proposal.

### **Survey Control Plan:**

- APS will control the survey using the monumentation surrounding the site and establishing NAD83/2011 Washington State Plane Coordinates, North Zone, expressed in US Survey Feet. Also, the control will be based on elevations expressed in NAVD88/2012B.

### **Data Collection:**

- APS will capture the horizontal and vertical locations of twenty-two (22) exploration designations as shown under Exhibit A of this proposal.

### **Deliverables:**

- APS will provide Client with coordinate values for the field located twenty-two exploration designations, provided in csv-point number, northing, easting, elevation, and description format.

### **Additional Work and Changes in Scope of Work**

Additional work requested by the Client, Client Representative, Contractor or Engineer or arising from inaccurate or incomplete information furnished by the Client, Client Representative, Contractor or Engineer is not included in this fee. It is further understood that if there are Client, Client Representative, Contractor or Engineer initiated changes and/or additional governmental requirements that are not covered in the Scope of Work, these changes will be approved in an amendment prior to performing work.

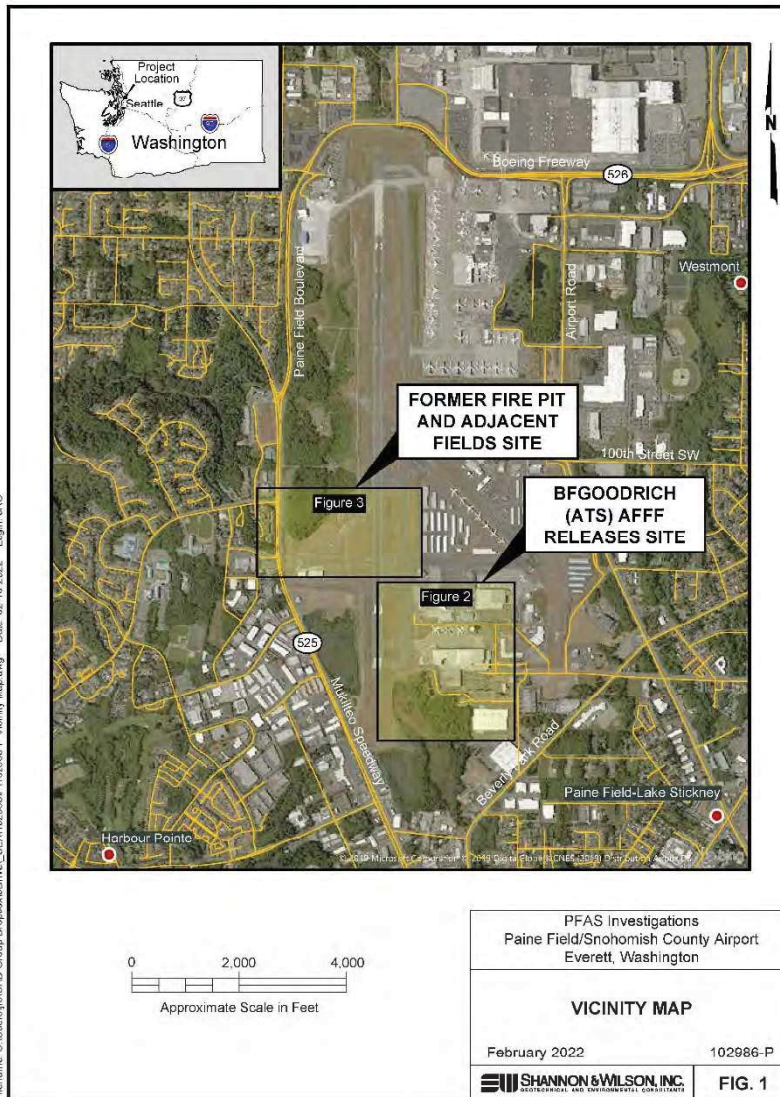
### **Re-Staking**

Any re-staking shall be paid for by Client as extra work outside of the scope in this contract unless it is necessary because of the act of omission of APS Survey & Mapping, Inc. Re-staking shall be approved in an amendment prior to performing work.

### **Other Services**

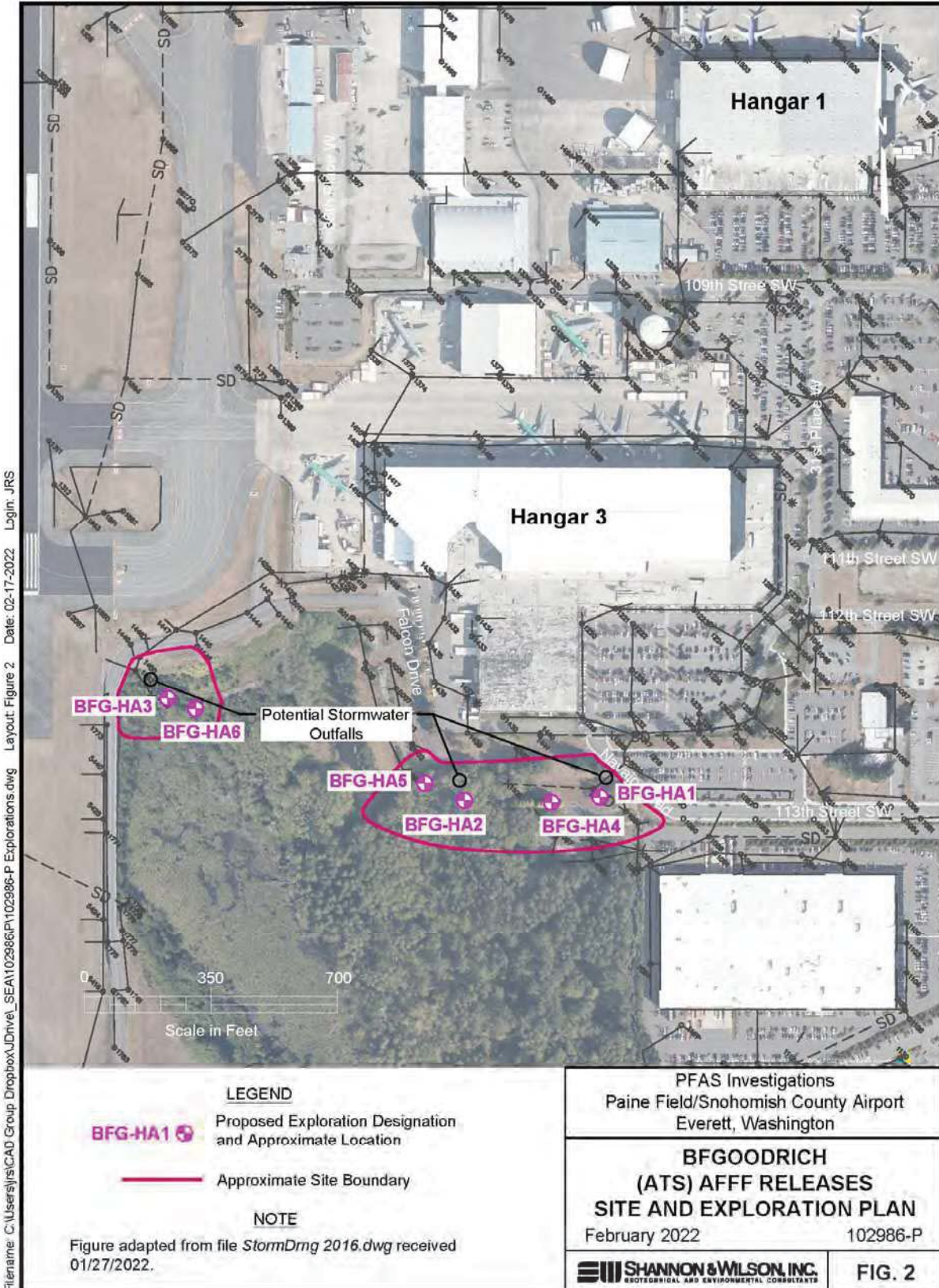
Other services of other professionals, such as traffic consultant, architect, soils, or environmental consultants shall be enlisted as necessary with the Client's approval. Fees for other services shall be approved in an amendment prior to performing work.

**EXHIBIT A – EXPLORATORY VICINITY MAP AND POINT LOCATIONS**



Filename: C:\Users\jst\CAD Group Projects\A\Drawn\_SEA\102986-P\_Vicinity Map.dwg Date: 02-10-2022 Login: LRS



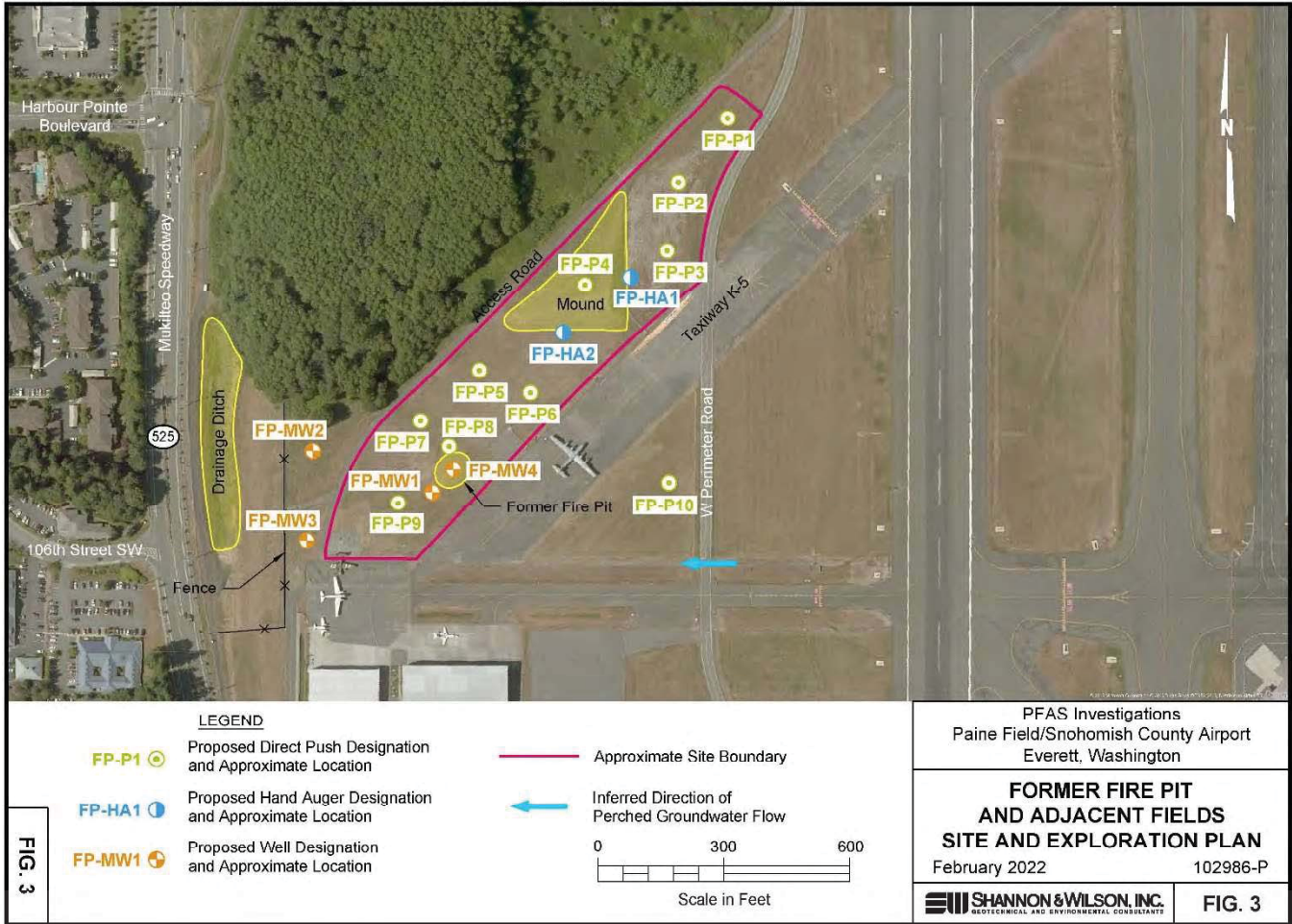


Filename: C:\Users\jrs\CAD Group\Dropbox\JDN\vel\_SEA1102986\PI102986-P Explorations.dwg Layout: Figure 2 Date: 02-17-2022 Login: JRS





Filename: C:\Users\jrs\CAD Group DropBox\Drive\_SEA\102986\PI\102986-P Explorations.dwg Layout: Figure 3 Date: 02-03-2022 Login: JRS



**PROJECT SCHEDULE**

Once we have received Notice to Proceed, the field work and data processing will be completed within approximately 25 business days.

**BILLING SCHEDULE**

The time and material incurred will be billed monthly. Client shall process all fees and costs invoiced by the Consultant within 30 days

**FEES**

We propose to provide these services on a time and material basis. The tables below identify the estimated fees for the scope of services as outlined above.



**Exploratory Survey:**

Task	Personnel	Budgeted Hours	Hourly Rate	Cost	
Research, Oversight, Review	Principal Surveyor	2	✓ \$159.44	\$318.88	✓
Management, Correspondence, Deliverables	Survey Team/Project Manager	2	✓ \$125.84	\$251.68	✓
Field Survey	Party Chief	10	✓ \$132.74	\$1,327.40	✓
Field Survey	Instrument Person	10	✓ \$81.78	\$817.80	✓
Data Processing	Survey Technician	2	✓ \$113.45	\$226.90	✓
<b>SUBTOTAL</b>				<b>\$2,942.66</b>	
<b>Fee Summary Table and Total Fee Calculation</b>					
<b>Work Item</b>				<b>Item Total</b>	
Exploratory Survey				\$2,942.66	
<b>Total Project Fee</b>				<b>\$2,942.66</b>	

We appreciate the opportunity to provide you with this proposal for requested services. If you have any questions, please feel free to contact us at any time.

Regards,

Sam Ward, PLS, CFedS  
 Principal Surveyor  
[samw@apssm.com](mailto:samw@apssm.com)



### Table 3 - Cost Estimate

<b>Date:</b>	February 14, 2022
<b>For:</b>	Snohomish County
<b>Project:</b>	PFAS Investigations, Paine Field/Snohomish County Airport

<b>TASK 1 - Badging</b>			
<b>Job Classification</b>	<b>Hours</b>	<b>Billing Rate</b>	<b>Total</b>
Senior Professional Staff	12	\$150.51	\$1,806.12
Professional Staff I - II	6	\$90.94	\$545.64
TASK 1 Labor:			\$2,351.76 ✓

<b>TASK 2 - BFGoodrich (ATS) AFFF Releases Site Investigation and Reporting</b>			
<b>Job Classification</b>	<b>Hours</b>	<b>Billing Rate</b>	<b>Total</b>
Officer	3	\$244.00	\$732.00
Senior Associate / Contract Manager	4	\$201.74	\$806.96
Senior Professional Staff	28	\$150.51	\$4,214.27
Professional Staff I-II	52	\$90.94	\$4,728.88
Drafter Technical Services I-IV	4	\$83.86	\$335.44
Senior Office Services	3	\$113.02	\$339.07
TASK 2 Labor:			\$11,156.63 ✓

<b>TASK 3 - Former Fire Pit and Adjacent Field Phase I Investigation</b>			
<b>Job Classification</b>	<b>Hours</b>	<b>Billing Rate</b>	<b>Total</b>
Officer	3	\$244.00	\$732.00
Senior Associate / Contract Manager	5	\$201.74	\$1,008.70
Senior Professional Staff	76	\$150.51	\$11,438.75
Professional Staff I-II	98	\$90.94	\$8,912.12
Senior Office Services	2	\$113.02	\$226.05
TASK 3 Labor:			\$22,317.62 ✓

<b>TASK 4 - Former Fire Pit and Adjacent Field Phase II Investigation</b>			
<b>Job Classification</b>	<b>Hours</b>	<b>Billing Rate</b>	<b>Total</b>
Officer	3	\$244.00	\$732.00
Senior Associate / Contract Manager	5	\$201.74	\$1,008.70
Senior Professional Staff	76	\$150.51	\$11,438.75
Professional Staff I-II	104	\$90.94	\$9,457.76
Senior Office Services	2	\$113.02	\$226.05
TASK 4 Labor:			\$22,863.26 ✓

### Table 3 - Cost Estimate

<b>Date:</b>	February 14, 2022		
<b>For:</b>	Snohomish County		
<b>Project:</b>	PFAS Investigations, Paine Field/Snohomish County Airport		
<b>TASK 5 - Former Fire Pit and Adjacent Field Reporting</b>			
<b>Job Classification</b>	<b>Hours</b>	<b>Billing Rate</b>	<b>Total</b>
Officer	7	\$244.00	\$1,708.00
Senior Associate / Contract Manager	19	\$201.74	\$3,833.06
Senior Professional Staff	32	\$150.51	\$4,816.31
Professional Staff I-II	62	\$90.94	\$5,638.28
Drafter Technical Services	10	\$83.86	\$838.60
Senior Office Services	6	\$113.02	\$678.15
		TASK 5 Labor:	\$17,512.40
<b>TASK 6 - Legal Support</b>			
Officer	10	\$244.00	\$2,440.00
Senior Associate / Contract Manager	37	\$201.74	\$7,464.38
		TASK 6 Labor:	\$9,904.38
<b>TASK 7 - Grant Application Support</b>			
<b>Job Classification</b>	<b>Hours</b>	<b>Billing Rate</b>	<b>Total</b>
Officer	10	\$244.00	\$2,440.00
Senior Associate / Contract Manager	20	\$201.74	\$4,034.80
Senior Professional Staff	23	\$150.51	\$3,461.73
		TASK 7 Labor:	\$9,936.53
<b>TASK 8 - Project Management, Coordination, and Administration</b>			
<b>Job Classification</b>	<b>Hours</b>	<b>Billing Rate</b>	<b>Total</b>
Officer	8	\$244.00	\$1,952.00
Senior Associate / Contract Manager	8	\$201.74	\$1,613.92
Senior Professional Staff	20	\$150.51	\$3,010.20
Professional Staff I-II	2	\$90.94	\$181.88
Senior Office Services	12	\$113.02	\$1,356.30
		TASK 8 Labor:	\$8,114.29
		<b>Total Labor:</b>	<b>\$104,156.86</b> ✓

### Table 3 - Cost Estimate

<b>Date:</b>	<b>February 14, 2022</b>
<b>For:</b>	<b>Snohomish County</b>
<b>Project:</b>	<b>PFAS Investigations, Paine Field/Snohomish County Airport</b>

<b>REIMBURSABLES</b>				
	<b>Type</b>	<b>Quantity</b>	<b>Unit Cost</b>	<b>Total</b>
	Badging Fee (AOA type) (Task 1)	3	\$25.00	\$75.00
	Sampling Equipment/Supplies <sup>2</sup> (Task 2)	1	\$35.00	\$35.00
	Laboratory (per quote) <sup>1</sup> (Task 2)	1	\$3,912.50	\$3,912.50
	Port-o-Let (per week) (Task 3)	1	\$334.45	\$334.45
	Private Utility Locator (per hour) (Task 3)	4	\$100.00	\$400.00
	Driller for Probing (per quote) (Task 3)	1	\$13,329.72	\$13,329.72
	Driller for Sonic Core (per quote) (Task 3)	1	\$18,490.32	\$18,490.32
	Sampling Equipment/Supplies <sup>2</sup> (Task 3)	1	\$1,112.00	\$1,112.00
	Laboratory (per quote) <sup>1</sup> (Task 3)	1	\$17,187.50	\$17,187.50
	IDW Disposal (per quote) (Task 3)	1	\$1,821.80	\$1,821.80
	Port-o-Let (per week) (Task 4)	1	\$334.45	\$334.45
	Private Utility Locator (per hour) (Task 4)	4	\$100.00	\$400.00
	Driller (per quote) (Task 4)	1	\$13,329.72	\$13,329.72
	Sampling Equipment/Supplies <sup>2</sup> (Task 4)	1	\$1,112.00	\$1,112.00
	Laboratory (per quote) <sup>1</sup> (Task 4)	1	\$17,187.50	\$17,187.50
	IDW Disposal (per quote) (Task 4)	1	\$1,821.80	\$1,821.80
	Mileage (per mile)	1890	\$0.58	\$1,096.20
	Reproduction	650	\$0.10	\$65.00
<b>Total Reimbursables:</b>				<b>\$92,044.96</b> ✓

<b>SUBCONSULTANTS</b>				
	<b>Name</b>	<b>Cost</b>	<b>Multiplier</b>	<b>Total</b>
	APS Survey & Mapping <sup>3</sup>	\$2,942.66	1	\$2,942.66
<b>Total Subconsultants:</b>				<b>\$2,942.66</b>

<b>TOTAL ESTIMATED COST</b>	<b>\$199,144.48</b> ✓
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PREPARED BY:  
 Shannon & Wilson, Inc.  
 400 North 34th Street, Suite 100  
 Seattle, Washington 98103



**NOTES:**

- <sup>1</sup> Samples to be analyzed for PFAS (standard list of 18 analytes) by method 537 (modified).
  - <sup>2</sup> Sampling equipment/supplies costs includes use of equipment (pumps, water level indicator, water quality meters, generator) and
  - <sup>3</sup> Cost estimate for surveying includes surveying for Tasks 3 and 4.
- bgs = below ground surface; IDW = investigation-derived waste; PFAS = Per- and Polyfluoroalkyl Substances