SUBMITTED TO:
Alaska Department of Transportation & Public Facilities Central Region
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FINAL R1

GENERAL WORK PLAN ADDENDUM

DOT&PF Statewide PFAS Addendum 005-DLG-01 Initial Site Characterization

DILLINGHAM, ALASKA

SHANNON & WILSON

May 2021

Shannon & Wilson No: 102581-008

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Robert Burgess - Comments on:
Initial Site Characterization Work Plan Addendum for ADOT&PF Dillingham Airport Sitewide PFAS

Comment No.	Page	Section	Comment / Recommendation	Response
1.	13	4.2.1 (and 5.6)	The text notes that drill cuttings will be containerized only if PID field screening or visual and olfactory evidence indicate that petroleum contaminants may be present, and that soils that do not exceed PID screening thresholds will be returned to the borings that they came from. Because of the expected heterogeneity of soils, unknown distribution of PFAS in the subsurface, and lack of available field screening methods for PFAS, the DEC recommends containerizing all drill cuttings until PFAS results are received, and sealing boreholes with bentonite to avoid creating preferential pathways for contaminant flow. It may still be advisable to segregate suspected petroleum contamination. Note that spreading soil cuttings on the ground surface may result in spreading PFAS at the surface if soil or water from saturated cuttings contains contaminants.	In a follow up email, DEC indicated unsaturated soil from the vadose zone, downgradient from suspected AFFF release areas, can be spread on the ground surface. The Addendum has been revised accordingly (Sections 4.2.1, 4.2.3, 4.3.1, and 5.6).
2.	16	4.3.1	Because high spatial heterogeneity of soil types is expected, and soil types are expected to include clays or other low-permeability soils, please take extra care to prevent the creation of preferential pathways by ensuring competent annular seals are in place through any potentially confining layer. Is a continuous confining layer expected to be present throughout the site?	While we expect to encounter clay and other confining layer/s during drilling, it is unknown if the low-permeability unit is continuous. Section 4.3.1 has been revised to include annular space seals.
3.	17	4.3.1	Why will one of the nests on Kanakanak Road have only two wells instead of three?	An explanation has been added to the text.
4.	17	4.3.1	Text states that all wells will have 5-foot screens. The DEC recommends 10 foot screens on shallow wells that span the top of the water table in order to account for variations in groundwater elevation (which the background information notes can be several feet), if the larger screen size will not result in screens being placed in silt.	The original addendum proposed 5-foot screens because tightly packed silts are expected near the groundwater surface. The shallow target zone wells will be screened for 10 feet if the silt-rich unit is absent.
5.	19	4.4.1	Why are surface water-samples being submitted for PFAS analysis only? Please consider adding petroleum-related analytes to a subset of surface water samples, particularly those near fire training areas where fuels are known to have been used to ignite fires.	The revised addendum adds petroleum surface water samples.
6.	19	4.4.2	Same comment as above, but with respect to sediment samples.	The revised addendum adds petroleum sediment samples.
7.	24	5.6	To clarify transport requirements: in this case the DEC can approve the transport of containerized IDW to an off-site storage facility via approval of this work plan addendum, prior to receipt of analytical results. A *Contaminated Media Transport and Treatment or Disposal Approval Form* should be submitted before IDW is moved from the secure storage location and after waste characterization results are received.	Noted.
8.	3	Apx. A (CSM)	Because petroleum related compounds, including VOCs, may be present at the site, please label the Inhalation of Outdoor Air pathway as complete.	Appendix A and Section 3.4 have been updated.

Jim Rypkema, Wastewater Discharge Authorization Program, DEC Division of Water – Comments on:
Initial Site Characterization Work Plan Addendum for ADOT&PF Dillingham Airport Sitewide PFAS, Section 5.6, Investigation-Derived Waste Management

Comment No.	Page	Section	Comment / Recommendation	Response
1.	24	5.6	It is preferred to discharge filtered monitoring well purge water from the Dillingham Airport to land, rather than a ditch or drainage outfall leading to waters of the U.S.	The text has been revised accordingly.

Submitted To: Alaska Department of Transportation & Public Facilities Central Region
P.O. Box 196900
Anchorage, Alaska 99519
Attn: Michael Cook, C.M. and Sammy Cummings

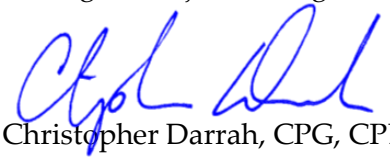
Subject: FINAL R1 GENERAL WORK PLAN ADDENDUM, DOT&PF STATEWIDE PFAS ADDENDUM 005-DLG-01
INITIAL SITE CHARACTERIZATION, DILLINGHAM, ALASKA

Shannon & Wilson prepared this Work Plan Addendum on behalf of the Alaska Department of Transportation & Public Factifies (DOT&PF). This Addendum is a supplement to the *DOT&PF Statewide PFAS General Work Plan Revision 1* (GWP), submitted July 2020. The services proposed in this GWP Addendum, 005-DLG-01, describe the plan for initial site characterization activities associated with per- and polyfluoroalkyl substances (PFAS) at the Dillingham Airport (DLG). This document has been revised in accordance with comments received from the Alaska Department of Environmental Conservation (DEC) on April 23, 2021. This revised addendum supersedes the version submitted to DEC on March 23, 2021.

The scope of services was specified in our proposal dated May 28, 2020, authorized on July 27, 2020 by NTP 2-6 under Professional Services Agreement Number 25-19-013 *Per- and Polyfluorinated Substances (PFAS) Related Environmental & Engineering Services*.

This GWP Addendum was prepared and reviewed by:

Marcy Nadel
Geologist, Project Manager



Christopher Darrah, CPG, CPESC
Vice President, Contract Manager

DHF:MDN:KRF:CBD/kdm

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ACRONYMS

AAC	Alaska Administrative Code
AFFF	aqueous film forming foam
ARFF	Aircraft Rescue and Firefighting
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and total xylenes
COPC	contaminant of potential concern
CSM	Conceptual Site Model
CSPP	Construction Safety and Phasing Plan
DEC	Alaska Department of Environmental Conservation
DLG	Dillingham Airport
DNR	Alaska Department of Natural Resources
DOT&PF	Alaska Department of Transportation & Public Facilities
DRO	diesel range organics
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
GAC	granular activated carbon
GRO	gasoline range organics
GWP	General Work Plan
IDW	investigation-derived waste
LHA	Lifetime Health Advisory
LOD	limit of detection
mg/kg	milligram per kilogram
MW	monitoring well
PAH	polycyclic aromatic hydrocarbons
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	photoionization detector
POC	point of contact
PPE	personal protective equipment
ppm	parts per million
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RRO	residual range organics
SSHP	Site Safety and Health Plan
WELTS	Well Log Tracking System
µg/L	microgram per liter

1 INTRODUCTION

This Addendum, 005-DLG-01, is a supplement to the *DOT&PF Statewide PFAS General Work Plan Revision 1* (GWP). In collaboration with the GWP, this Addendum provides guidance for initial site characterization activities for per- and polyfluoroalkyl substances (PFAS) at and near the Dillingham Airport (DLG) in Dillingham, Alaska (Figure 1, Exhibit 1-1).

Shannon & Wilson prepared the GWP and this Addendum in general accordance with the Alaska Department of Environmental Conservation's (DEC's) March 2017 *Site Characterization Work Plan and Reporting Guidance for Investigation of Contaminated Sites and* DEC's October 2019 *Field Sampling Guidance*. If additional site characterization activities are required that are not covered in the GWP or are deviations from the GWP, they will be described in this Addendum.

This Addendum also includes a preliminary conceptual site model (CSM) in Appendix A and Site Safety and Health Plan (SSHP) in Appendix B. Shannon & Wilson will follow their internal *Guidance for Field Work During the COVID-19 Pandemic* (April 2020) and other guidelines for field work conducted during the COVID-19 pandemic.

Exhibit 1-1 below provides site-specific information associated with the DLG.

Exhibit 1-1: Airport Information

Airport Name	Dillingham Airport
Airport Code:	DLG
DEC File No. / Hazard ID:	2540.38.023 / 26971
Airport Address:	803 Airport Road, Dillingham, Alaska 99576
DOT&PF Region:	Central
DOT&PF Regional POC:	Michael Cook, C.M.
DOT&PF PFAS POC:	Sammy Cummings
Airport Type:	Current Part 139 Airport
Airport Coordinates (Lat/Long):	59.043470, -158.510496

POC = point of contact

2 BACKGROUND

General background information relating to sites covered under the GWP is included in Section 1.1 of the GWP. Background information specific to the DLG is detailed below.

2.1 History of AFFF Use

The DOT&PF Crash and Fire Rescue program used aqueous film-forming foam (AFFF) for training, systems testing, and during Federal Aviation Administration (FAA) inspections at the DLG for many years. According to DOT&PF, during inspections a small amount of AFFF is discharged so an inspector can visually check the foam. Water is then used for the remainder of the inspection. The historical record we reviewed for this addendum provided a general understanding but not a precise timeline or specific locations of AFFF use at the DLG. The AFFF discharged for FAA systems testing was along the length of the runway depending on the year, but particularly towards the south end of the runway (Figure 2).

On July 5, 2019, DOT&PF personnel released an estimated ten gallons of AFFF three-percent solution in response to an aircraft incident in the middle portion of the runway (Figure 2). DOT&PF does not have records of other previous AFFF emergency response at the DLG. Additional detail can be found in Section 3.2.

The City of Dillingham (City) also has AFFF response capabilities, and AFFF may have been used for emergency response at fires outside of the airport property. In 2007, the City fire department responded to an electrical fire at the Windmill Grille, located at Kanakanak Road and Gauthier Way. It is unknown if AFFF was used in response to this fire.

As part of spill response for historic petroleum releases at the airport, petroleum-contaminated soil was removed from locations within the DOT&PF lease lot area and transported to locations on and off airport property for stockpiling and landfarming (see Section 2.3). The excavated petroleum-contaminated soil was not sampled for PFAS; however, it is possible these activities have distributed PFAS within the airport vicinity.

2.2 Previous PFAS Investigations

In December 2018, DEC sampled nine wells for PFAS near the DLG. Analytical results received on January 17, 2019, indicated that one well exceeded applicable action levels. These results triggered a water supply well search and sampling effort by Shannon & Wilson. The well search area revealed residential and commercial water supply wells on and around the DLG property (Figure 3). Shannon & Wilson sampled a total of 97 water

supply wells from February 2019 to February 2020; some wells were sampled multiple times.

The well search and sampling effort identified PFAS contamination exceeding the U.S. Environmental Protection Agency (EPA) Lifetime Health Advisory (LHA) level in two wells southwest from the lease lot area and one residence off Kanakanak Road (Figure 3). In addition, two water supply wells in the lease lot area and two wells south and southwest of the DLG had PFAS results exceeding the former DEC "sum of 5" action level for drinking water. Impacted properties include houses, an apartment building, a church serving as a community water source, and several businesses. Many of these occupants are receiving interim bottled water deliveries. Resampling of select water supply wells occurred in November 2019, February 2020, September 2020, and December 2020, and is ongoing.

2.3 Site-Wide Petroleum Contamination Investigation

Documented fuel releases have occurred in the past within the DLG lease lot area at the former Yute Air (now Everts Air) building (DEC file number 2540.38.009), the Alaska Airlines/Pen Air building (DEC file number 2540.38015), the former Mark Air (now Grant Aviation) building (DEC file number 2540.38.006), and the DOT&PF Maintenance Facility (DEC file number 2540.38.020). In 2006, DEC led a site-wide groundwater sampling effort at the DLG to characterize the various petroleum releases within the lease lot area. In May 2006, Shannon & Wilson installed and sampled eleven groundwater monitoring wells (MWs) at the project site and sampled one existing MW and several drinking water wells for petroleum analytes (Figure 4). One of the MWs, MW3, contained diesel range organics (DRO) in exceedance of the DEC cleanup level. A previously installed MW, designated Lynden 1, contained gasoline range organics (GRO) and benzene in exceedance of the DEC cleanup levels. In 2007, Shannon & Wilson returned to resample a subset of the MWs and drinking water wells. The results from the 2007 sampling were consistent with the previous year, and petroleum contaminants were not detected in on-site drinking water. Groundwater at the site appeared to flow in multiple directions to the north, northwest, and south-southwest. The report concluded that the petroleum-impacted groundwater plume did not appear to extend beyond the airport property boundary and appeared to be limited to the main apron area in the vicinity of the Alaska Airlines/Pen Air and the Lynden Air buildings.

2.3.1 Yute Air

The former Yute Air site is currently listed by DEC as closed with institutional controls. In 1993, a 1,500-gallon aviation gasoline spill occurred when a pipe ruptured at the terminal. Approximately 1,000 gallons of fuel were recovered from the spill area, and in 1996 about

250 cubic yards of soil was excavated from the spill area and stockpiled on a private property east from the airport (Figure 3). Contaminants of concern exceeded DEC cleanup levels at the excavation limits; however, test pits around the perimeter of the excavation found lower levels of contaminants. In 2008 the excavation was backfilled to construct a parking lot. In 2011, the stockpiled soil was transported to the former Instrument Landing System site north of the lease lot area to be landfarmed (Figure 3). The stockpile liner on private property appeared to have been compromised. Soil samples collected below the liner indicated petroleum contamination had leaked through, though field screening readings indicated the extent was limited.

2.3.2 Alaska Airlines/Pen Air

The Alaska Airlines/Pen Air hangar is listed by DEC as an active contaminated site. In December 1992, 1,200 gallons of aviation fuel was spilled from a tanker truck inside the hangar. The fuel entered a floor drain connected to an open-ended pipe that discharged to the gravel pad west of the hangar. Site characterization activities in 2012 and 2013 indicated that petroleum-contaminated soil remained from approximately three and a half to seven feet below ground surface (bgs) and in shallow groundwater at about seven feet bgs. In 2014, Shannon & Wilson performed the interim removal action which included excavating about 1,320 cubic yards of soil and placing it in an on-site landfarm. Benzene was detected above the DEC cleanup level in one sample collected from the south sidewall of the excavation at about 11 to 12 feet bgs, but other contaminants of concern were not detected above applicable DEC cleanup levels. In 2015, the landfarmed material was determined to be below DEC cleanup levels and was used to backfill the excavation. Groundwater and soil samples from borings and MWs installed in 2015 suggest contaminant concentrations have declined compared to previous years.

2.3.3 Mark Air

The former Mark Air site is currently listed by DEC as closed with institutional controls. In 2004, petroleum-contaminated soil was encountered during removal of a 500-gallon underground storage tank. The tank appeared to be in good condition when it was removed. Approximately 75 cubic yards of contaminated soil were removed and landspread on a non-specified vacant area within the airport fence. Due to existing structures and utilities, further excavation of contaminated soil was not possible. Perched groundwater was encountered during the tank removal.

2.3.4 DOT&PF Maintenance Facility

The DOT&PF Maintenance Facility site is currently listed by DEC as an active contaminated site. In April 2013, two 20 to 50-gallon surface releases of diesel fuel were discovered on the north side of the storage building. In September 2013, Michael Foster & Associates, Inc. excavated some of the contaminated soil down to about nine feet bgs. Excavation of contaminated soil was limited by the storage tanks and existing infrastructure. As a result, contaminants of concern remain above DEC cleanup levels along the west portion of the excavation. The excavated soil was transported to a landfarm, presumably located on airport property.

2.4 Geology and Hydrology

Dillingham is located at the confluence of the Nushagak and Wood Rivers, at the northernmost point of Nushagak Bay within Bristol Bay. Dillingham lies on a glacial moraine and outwash-mantled lowland with wide expanses of wetlands and lakes. Irregularly shaped rolling hills, including those in the water supply well sampling area, are typically 50 to 100 feet high.

The Dillingham Airport is in the relatively flat floodplain of the Nushagak River. The terrain is characterized as low rolling hills and muskeg underlain with peat bogs. The Dillingham airport lease lot area is within a muskeg swamp. Surface water is often present across the native ground surface, which is approximately 10 to 12 feet below the runway and embankment.

The area is underlain by a complex sequence of primarily fine-grained glacial, fluvial, and marine sediments that are several hundred feet thick. The subsurface consists of unconsolidated deposits of silt, sand, gravel, and boulders. These deposits are overlain with an intermingled, variable thickness of silt and organic silt at the surface. Although permafrost was not noted in water supply well logs reviewed for this addendum, Dillingham lies within the sporadic permafrost zone (Hopkins, 1955). Depth to bedrock is unknown and estimated at over 200 feet (Mertie, 1938).

As part of an unrelated project to support the design of DLG runway improvements, Shannon & Wilson advanced over 25 soil borings at the DLG and along Wood River Road in March and April 2019. Wood River Road is adjacent to the northern half of the runway, north of well search and sampling areas. Boring depths ranged from 16.5 to 41.5 feet bgs. During drilling we encountered 12 to 15.5 feet of fill in most runway area borings. In five test holes on the western edge of the runway the fill was between two and five feet thick. The fill was underlain by native fine-grained materials, organic-rich material, and occasional

granular soils. The fine-grained materials were dominated by silt; however, field staff also encountered silt with sand, clayey silt, and clay. The Wood River Road borings found approximately two feet of organic silt at the surface, overlying silt or clay for the remainder of the boring. Two of the four borings found native granular material consisting of silty sand with gravel at 19 and 35 feet bgs, respectively.

Groundwater was observed at a wide range of depths, between 15 and 30 feet bgs. Groundwater was generally perched atop fine-grained soils over peat. Water levels can fluctuate by several feet seasonally during periods of high precipitation or rapid snow melt. In low-lying neighborhoods groundwater may be as shallow as seven feet bgs.

Shannon & Wilson reviewed water supply well logs obtained from property owners and the Alaska Department of Natural Resources (DNR) Well Log Tracking System (WELTS). The logs describe interbedded sands, silts, and clays consistent with the soil borings summarized above. Several logs identify perched groundwater on top of silt or clay layers. Clay layers were encountered between three and 55 feet in thickness. Silt and clay, where present, likely impede the movement of PFAS-containing groundwater near the DLG.

Property owners and local drillers report wells with high mineral content and sulfur odor, and wells with clear water from a range of depths near the DLG. This suggests there may be multiple, localized water-bearing zones supplying water supply wells.

In 2006, Shannon & Wilson installed 11 groundwater MWs in the lease lot area as part of a DEC site-wide petroleum investigation (Section 2.3). Due to tightly packed silts, multiple different, localized groundwater flow directions were indicated with west to northwest flow for most of the site and south-southwest flow in the southwest portion of the site. Based on the review of information from previous Shannon & Wilson reports, DNR WELTS, and other Dillingham-area sources, it is Shannon & Wilson's opinion that groundwater flow direction may vary within the study area. The DEC drinking water protection areas database indicates that regional groundwater flow near the DLG is variable, but generally to the south.

2.5 Project Objectives and Scope

The project objective is to understand the extent of PFAS contamination resulting from historic use of AFFF by the DOT&PF at the DLG. DOT&PF's PFAS investigation to-date has been limited primarily to groundwater used as a drinking water source. Many of these water supply wells are of unknown depths and may or may not share connected water-bearing zones.

This Addendum describes methods used to identify PFAS source areas and evaluate the horizontal and vertical extent of PFAS contamination in soil, sediment, groundwater, and surface water on and off the airport property. In addition to PFAS, this effort will investigate the possible presence of petroleum contaminants at former fire training areas. DOT&PF personnel may have ignited petroleum in the training areas to practice using AFFF for fire suppression. Refer to Section 3.3 for specific contaminants of potential concern (COPCs) and Exhibit 5-1 for proposed samples and analyses.

The scope for this initial site characterization effort includes:

- collecting analytical surface and subsurface soil samples from near the DLG runway and potential AFFF release areas;
- sampling existing groundwater MWs (Figure 4);
- obtaining information on subsurface hydrogeologic conditions including silt and clay confining layers;
- constructing, developing, and sampling MW clusters near potential AFFF release areas and within the off-site PFAS plume; and
- collecting analytical surface water and sediment samples from DLG drainage ditches, ponds, and/or creeks.

The proposed locations for surface soil, surface water, and sediment samples are presented in Figure 5. Locations for soil boring and groundwater samples are presented in Figures 6 and 7.

3 SITE AND PROJECT DESCRIPTION

3.1 Site Location and Boundaries

The DLG is located at 803 Airport Road in Dillingham, Alaska. The airport is approximately one mile west of downtown Dillingham, at the northernmost point of Nushagak Bay within Bristol Bay. Figure 1 shows the property boundaries for land owned by the DOT&PF. DOT&PF leases numerous lots for use as terminals, hangars, and other businesses. The DOT&PF lease lot area is west of the runway, which is oriented north-northeast to south-southwest (Figure 4). The geographic coordinates of the primary DLG Taxiway B are latitude 59.0434, longitude -158.5104.

3.2 Potential Sources of Contamination

General information regarding potential sources of contamination at DOT&PF sites covered under the GWP is included in Section 2.1 of the GWP.

Specific potential sources of PFAS contamination at the DLG are as follows. These AFFF release sites are shown in Figure 2.

- Two former Aircraft Rescue and Firefighting (ARFF) training or burn areas at the north end of the lease lot area.
- A former ARFF training area near the southwest end of the runway.
- FAA-required AFFF systems testing along the runway, particularly to the south and at the southwest end.
- A small July 2019 emergency response release on the runway.

Specific potential sources of petroleum contamination at the DLG are as follows.

- Petroleum-contaminated soil and groundwater resulting from historic fuel releases along the western edge of the runway apron near the Alaska Airlines/Pen Air, Everts Air, and Grant Aviation buildings (Figure 4).
- Former ARFF training areas.
- Emergency response areas where AFFF was used.

3.3 Contaminants of Potential Concern and Regulatory Levels

General information regarding COPCs and regulatory levels is included in Section 2.2 of the GWP. The primary COPCs for this project are the PFAS compounds perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA). DEC's *Field Sampling Guidance* (2019) also identifies GRO, DRO, residual range organics (RRO), benzene, toluene, ethylbenzene, and xylenes (BTEX), and polycyclic aromatic hydrocarbons (PAHs) as COPCs at ARFF training areas.

Dillingham has an annual average precipitation of 25 inches per year (Western Region Climate Center). To evaluate analytical data, soil results will be compared to 18 Alaska Administrative Code (AAC) 75.341 *Tables B1 Method Two – Migration to Groundwater and B2, Method Two – Under 40-Inch Zone – Migration to Groundwater*. Groundwater and surface water samples will be compared to Alaska's 18 AAC 75.341 *Table C, Groundwater Human Health Cleanup Level*. The current cleanup levels and analytical reporting limits for the site COPCs are summarized in Exhibit 3-1.

Exhibit 3-1: COPCs, Regulatory Limits, and Laboratory Detection Limits

Method	Analyte	Soil Limit[a] (mg/kg)	Water Limit[b] (µg/L)	Laboratory LODs[c]	
				Soil (mg/kg)	Water (µg/L)
PFAS Analytes					
537.1M	PFOS	0.0030	0.40	0.000500	0.00200
	PFOA	0.0017	0.40	0.000200	0.00200
Petroleum Analytes					
AK101	GRO	300	2,200	1.25	50
AK102	DRO	250	1,500	10	300
AK103	RRO	11,000	1,100	50	250
EPA 8021 (BTEX)	Benzene	0.022	4.6	0.0125	0.5
	Toluene	6.7	1,100	0.0125	0.5
	Ethylbenzene	0.13	15	0.0125	0.5
	Xylenes (Total)	1.5	190	0.0375	1.5
EPA 8270D-SIM (PAH)	1-Methylnaphthalene	0.41	11	0.0125	0.025
	2-Methylnaphthalene	1.3	36	0.0125	0.025
	Acenaphthene	37	530	0.0125	0.025
	Acenaphthylene	18	260	0.0125	0.025
	Anthracene	390	43	0.0125	0.025
	Benzo(a)anthracene	0.70	0.30	0.0125	0.025
	Benzo[a]pyrene	1.9	0.25	0.0125	0.01
	Benzo[b]fluoranthene	20	2.5	0.0125	0.025
	Benzo[g,h,i]perylene	15,000	0.26	0.0125	0.025
	Benzo[k]fluoranthene	190	0.80	0.0125	0.025
	Chrysene	600	2.0	0.0125	0.025
	Dibenzo[a,h]anthracene	6.3	0.25	0.0125	0.01
	Fluoranthene	590	260	0.0125	0.025
	Fluorene	36	290	0.0125	0.025
	Indeno [1,2,3-c,d] pyrene	65	0.19	0.0125	0.025
	Naphthalene	0.38	1.7	0.0100	0.05
	Phenanthrene	39	170	0.0125	0.025
	Pyrene	87	120	0.0125	0.025

Notes:

a. 18 AAC 75 Table B2. Method Two - Petroleum Hydrocarbon Soil Cleanup Levels – Under 40-Inch Zone - Migration to Groundwater or Table B1. Method Two - Soil Cleanup Levels Table - Migration to Groundwater.

b. 18 AAC 75 Table C. Groundwater Cleanup Levels.

c. February 2020 LODs from SGS North America, Inc. for petroleum and PAH analyses. November 2020 LODs from Eurofins TestAmerica, Sacramento for PFAS analyses.

BTEX = benzene, toluene, ethylbenzene, and total xylenes; LOD = limit of detection; mg/kg = milligram per kilogram; µg/L = microgram per liter; PAH = polycyclic aromatic hydrocarbons; PFAS = per- and polyfluoroalkyl substances; SIM = selective ion monitoring

This Addendum does not address water supply well samples. However, we will discuss PFOS and PFOA MW results in the context of the EPA LHA in addition to DEC groundwater cleanup levels where MWs are near residential drinking water wells.

3.4 Conceptual Site Model

A CSM describes potential pathways between a contaminant source and possible receptors (i.e., people, animals, and plants) and is used to determine who may be at risk of exposure. We completed a draft DEC *Human Health Conceptual Site Model Graphic Form and Scoping Form* based on our current understanding of site conditions. The CSM was completed for PFAS and petroleum compounds, including VOCs as contaminants of concern. These forms are included in Appendix A of this Addendum.

The draft CSM will be revised following the receipt of analytical data and presented in the site characterization report. Potentially affected media include contaminated soil, groundwater, surface water, sediment, and biota. Potential complete human exposure pathways include:

- incidental soil and groundwater ingestion;
- dermal absorption of contaminants from soil, groundwater, or surface water;
- inhalation of fugitive dust;
- ingestion of groundwater (i.e. water supply wells);
- inhalation of outdoor air;
- direct contact with sediment; and
- ingestion of wild or farmed foods.

3.5 Project Team

Chris Darrah is Shannon & Wilson's Principal-in-Charge and Kristen Freiburger is Project Manager for the DOT&PF Statewide PFAS contract. Marcy Nadel will serve as the Environmental Lead for the DLG site and will be Shannon & Wilson's primary point of contact (POC). Shannon & Wilson's project team also includes other State of Alaska Qualified Environmental Professionals to support the various field and reporting tasks required to achieve the project objectives. The project team and their associated responsibilities are summarized in Exhibit 3-2 below.

Exhibit 3-2: Project Team

Affiliation	Responsibility	Representative	Contact Number
DOT&PF	Client – Regional POC	Michael Cook, C.M.	(907) 269-0767
	Client – Statewide PFAS POC	Sammy Cummings	(907) 888-5671
DEC	Regulatory agency POC	Robert Burgess	(907) 451-2153
Shannon & Wilson	Principal-in-charge	Chris Darrah	(907) 458-3143
	Statewide Project Manager	Kristen Freiburger	(907) 458-3146
	Dillingham Project Manager	Marcy Nadel	(907) 458-3150
Eurofins TestAmerica, Sacramento	PFAS analytical laboratory services	David Alltucker	(916) 374-4383
SGS North America, Inc.	Additional analytical laboratory services	Jennifer Dawkins	(907) 474-8656
Subcontractors	Soil borings and MW installation	GeoTek Alaska, Inc. or Discovery Drilling, Inc.	(907) 569-5900 or (907) 569-5900
	Surveying	Lounsbury & Associates, Inc. or Southwest Alaska Surveying	(907) 373-5775 or (907) 272-5451

POC = point of contact; MW = monitoring well

3.6 Project Schedule and Submittals

Section 2.5 of the GWP provides general information regarding project schedules (i.e. the general order of occurrence of site characterization activities) and associated submittals.

Shannon & Wilson is coordinating with DOT&PF staff to schedule the site characterization effort to begin in mid to late June 2021. The schedule is subject to change pending DEC approval of this revised Addendum, project funding, FAA 7460-1 airspace permit approval, and following guidance by the City of Dillingham, Alaska Department of Health and Social Services, and U.S. Centers for Disease Control and Prevention regarding the COVID-19 pandemic.

Laboratory analysis will be requested on a standard 14-day turnaround time. After field work is complete, a Site Characterization Report will be prepared documenting the results of the sampling event. The report will include Shannon & Wilson's field observations, analytical results with a discussion of data quality, photo documentation, figures showing sample locations, an updated CSM, a description of deviations from the approved Addendum (if applicable), and our conclusions and recommendations.

The anticipated schedule is outlined below:

- Addendum submitted to DEC – March 23, 2021

- DEC comments received – April 23, 2021
- Revised Addendum submittal to DEC – late May 2021
- DEC approval received – early June 2021
- Addendum implementation (field activities) – June and July 2021
- Draft Report Submittal – within 60 days of receipt of analytical results
- Final Report Submittal – within 30 days of receiving DEC comments on the Draft Report

4 SITE CHARACTERIZATION ACTIVITIES

The following sections describe the site characterization activities to be conducted at and near the DLG. General information regarding site characterization activities is described in Section 3.2 of the GWP. Sampling procedures, analytical laboratories, and analytical methods are described in Section 5 of this Addendum. A Quality Assurance Program Plan (QAPP) is included in Section 6. Proposed sample locations are presented in Figures 5 through 7.

4.1 Pre-investigation Activities

Pre-investigation tasks for this project are outlined in the following sections. These tasks include obtaining applicable permits and checking for utilities prior to drilling.

4.1.1 Site Access

Shannon & Wilson will complete a *City of Dillingham Travel Notification Form* and follow applicable travel restrictions related to the COVID-19 pandemic. Samplers may be required to obtain a molecular COVID test prior to travel.

Shannon & Wilson has prepare a Construction Safety and Phasing Plan (CSPP) related to sampling activities on and near active runways and taxiways. A draft CSPP was submitted to the Regional Safety & Airport Security Officer, Airport Manager, and other DOT&PF personnel for review in April 2021. The CSPP was revised according to their comments. Advancing soil borings near the DLG runway also requires a FAA 7460 airspace permit. Shannon & Wilson submitted the revised CSPP and 7460 permit to the FAA on April 30, 2021, 45 days before the anticipated drilling start date.

Additionally, Shannon & Wilson will coordinate with DOT&PF Leasing to obtain a building permit for planned sampling activities within the lease lot area. Shannon & Wilson will prepare traffic control plans for off-site MW installation occurring in a DOT&PF road

right-of-way. None of the proposed MW locations are located in a City of Dillingham road right-of-way. Finally, Shannon & Wilson will obtain owner permission to access sampling locations on private property.

Two Shannon & Wilson staff members and one driller will obtain DLG-issued identification badges with a non-movement driver training endorsement. The badge holders will be permitted in the lease lot area and other areas outside the runway and taxiway safety areas. These individuals will return their identification badge upon completion of the field effort. Shannon & Wilson is not aware of other required permits or authorizations for conducting this field effort. DOT&PF will provide an escort to access sample locations within movement areas.

4.1.2 Utility Locates

Utility clearance will be coordinated by contacting the State of Alaska Digline, Inc., the DLG airport manager, and other identified owners of buried utilities. DOT&PF will be responsible for locating, identifying, and marking buried utilities that belong to DOT&PF. Buried electrical and/or communication lines operated by the FAA will be located by FAA personnel prior to drilling.

A map of anticipated drilling locations will be provided to the Alaska Digline and airport manager no later than 10 days prior to planned activities. Shannon & Wilson assumes utility companies, the FAA, and DOT&PF staff will provide information regarding utilities in the proposed investigation areas and will mark utilities close to drilling areas.

4.2 Soil Characterization Activities

Soil characterization activities for this project include surface and subsurface soil-sample collection, as described in the following sections. General information regarding soil characterization activities are described in Section 3.2.2 of the GWP. Soil sampling procedures are presented in Sections 4.2 and 4.4 of the GWP. Field-screening procedures are presented in Section 4.3 of the GWP.

4.2.1 Soil Field-Screening

Shannon & Wilson will field-screen soil borings and surface soil near the former fire training areas using a photoionization detector (PID). Each five-foot boring interval will be screened, from the surface until the groundwater table is encountered. Drill cuttings will be segregated if field-screening results are greater than 20 parts per million (ppm), or if visual and olfactory observations suggest the presence of hydrocarbon contamination. This soil

will be considered potentially contaminated with petroleum contaminants and held pending PFAS, petroleum, and PAH analytical results.

Refer to Sections 4.2.3 and 5.6 for further discussion of soil drill cuttings.

4.2.2 Surface Soil

Shannon & Wilson will collect 30 surface soil samples for PFAS analysis:

- three from the edge of the pavement nearest the 2019 emergency response site;
- eight samples from each of the two unpaved former ARFF training areas;
- two from the edge of the pavement near the former ARFF training area by Taxiway A;
- four along the DLG runway;
- one off Sutherland Road; and
- four next to the Windmill Grille along Kanakanak Road.

These locations are depicted in Figure 5. Samples near the runway may be collected from gravel in the runway apron adjacent to the pavement, gravel in a low-lying area near the runway, or native soil bordering the runway apron. Surface soil samples will be collected from just below vegetation, if present. If we are denied access to a location that is on private property, we will move the sample location to within a DOT&PF right-of-way, as close as possible to the original location.

The locations for the samples collected from each unpaved ARFF training area will be determined using a grid. The dimensions of the grid will be determined based on the known approximate AFFF discharge area. If the AFFF discharge area is unknown, we will establish a 60-foot by 60-foot grid area, with cells 20 feet by 20 feet, to sample in the presumed location of AFFF discharge. We will collect one field-screening and PFAS sample from each cell. Surface samples will be collected from eight cells and a soil boring will be advanced in the ninth. We will select one sample with the highest PID reading from each grid area for analysis of GRO, DRO, RRO, and BTEX in addition to PFAS. The surface soil sample with the highest PID reading will be submitted for PAH analysis.

4.2.3 Soil Borings

The drilling subcontractor will advance soil borings at up to 14 locations, ten of which will be completed as MWs (Figure 6 and Figure 7). The soil borings completed as MWs will become the deepest well for each MW cluster, up to 80 feet bgs. Each MW cluster will contain up to three wells. Each soil boring will be sampled for PFAS. Locations for the MW borings are described in Section 4.3.1. The drilling subcontractor will collect soil cores

continuously using MacroCore technology, if possible. If the soil formation prevents the collection of continuous samples, the drilling contractor will deploy augers and collect samples every 10 feet using a split spoon sampler.

The four borings not completed as MWs will terminate at or just below the groundwater table, anticipated to be up to 30 feet bgs depending on local topography. Locations are described as follows:

- two borings within the AFFF systems testing areas at the northeast (Figure 7) and southwest (Figure 6) ends of the runway;
- a boring within the former fire training area at the northeast corner of the airport lease lot area (Figure 6); and
- one boring on the west side of the runway within the former fire training area near the southwest end (Figure 6).

In the nine soil borings on airport property (including MW locations), PFAS samples will be collected from the surface just below vegetation, if any, approximately half-way between the surface and groundwater table or at a change in lithology, at the groundwater interface, and within the screened interval of the shallowest MW. Preference will be given to more organic-rich material (e.g. peat or organic silt layer) and changes in soil type. In the five soil borings off airport property, PFAS samples will only be collected from the groundwater interface and screened interval. These samples will be used to characterize soil drill cuttings for disposal. Additional soil characterization samples may be required.

In addition to PFAS soil samples, up to two samples will be submitted for GRO, DRO, RRO, BTEX, and PAH (at a rate of 10 percent) analysis from each of the three soil borings advanced at ARFF training areas. AFFF systems testing areas are not considered to be a risk for hydrocarbon contamination. One sample for petroleum analytes will be collected from the groundwater interface at each boring. A second sample will be collected from the interval with the highest PID reading over 20 ppm, or other indication of potential contamination, if applicable. If PID field screening readings exceed 20 ppm in other soil borings, petroleum samples will be collected for disposal characterization.

Shannon & Wilson field staff will log the soil types encountered during drilling and collect between one and three analytical soil samples from each boring. Depths will be identified for each analytical sample on the field form.

Soil generated from on-site soil borings and MW installation will be containerized pending the receipt of analytical results. Soil cuttings from each drilling location will be stored separately. Saturated soil from below the water table generated during off-site MW

installation will be containerized. The precise volume of soil will depend on subsurface conditions. If the soil formation allows for direct-push sampling at all of the MWs, up to 20 55-gallon drums of soil will be generated. If the drillers are required to deploy augers, up to 85 drums of soil will be generated. The container/s will be stored at a secure off-site location pending analytical results. The results will be used to determine waste disposal requirements as described in Section 5.6.

4.3 Groundwater Characterization

Groundwater characterization activities for this project include installing and sampling long-term groundwater MWs in clusters of up to three wells each. General information regarding groundwater characterization activities are described in Section 3.2.3 of the GWP. MW installation, development, and sampling procedures are presented in Section 4.6 of the GWP. Proposed groundwater sample locations are presented in Figures 6 and 7.

4.3.1 Monitoring Wells

The drilling contractor will install ten clusters of groundwater MWs on and around the DLG property. The MW locations are described as follows:

- Near the northwest corner of the airport lease lot;
- Near Taxiway A;
- Near the southwest end of the airport lease lot, next to Airport Road;
- On the east side of the runway near Martin Street;
- At the intersection of Airport Road and Airport Spur Road;
- West of the intersection of Airport Road and Emperor Way;
- Toward the southwest end of the runway, adjacent to the runway; and
- Two well clusters along Kanakanak Road near the intersection of Wood River Road and Kanakanak Road (Figure 7).

Shannon & Wilson will also sample three existing MWs owned by DOT&PF, shown in Figure 4 and described as follows:

- along the south end of the lease lot (MW7, screened 15 to 25 feet bgs);
- along the east end of the lease lot (MW11, screened 20 to 30 feet bgs); and
- in the middle of the lease lot near the U.S. Fish and Wildlife Service hangar (MW6, screened 10 to 20 feet bgs).

Shannon & Wilson expects the hydrology and geology within the DLG study area will show high spatial heterogeneity, making it difficult to standardize MW screen depths for the clustered wells. Drilling is likely to encounter tightly packed silts and clay that impede the movement of PFAS-containing groundwater. Shannon & Wilson will not install a MW screened entirely in silt, which is anticipated near the soil surface. Where MWs are installed through densely packed silts, clay, or other low permeability soils, the annular space will be sealed with bentonite.

Near the lease lot area, each cluster will have up to two deeper wells, while existing MWs in the lease lot area will be used to characterize near-surface groundwater. These on-site well clusters will have one MW screen set near the lower limit of the shallow target zone, estimated to be anywhere from 20 to 50 feet bgs, and one MW screen set to span the top of the deeper target zone. For example, if a clay layer is encountered from 40 to 60 feet bgs, the MWs will be screened from 35 to 40 feet and 60 to 65 feet bgs. The second MW will be set no deeper than 80 feet bgs. Figures 6 and 7 note the anticipated number of wells per cluster.

One of the two Kanakanak Road MW clusters will also have two wells, screened at the top and near the bottom of the shallow target zone. The purpose of the MW cluster near Kanakanak Road and Gauthier Way is to provide additional information on the potential for a secondary PFAS source. A nearby water supply well whose combined PFOS and PFOA concentration exceeds the EPA LHA is reportedly 36 feet deep. The next-highest PFAS concentrations in the area are in wells reportedly 32 to 35 feet and 50 feet deep, south of Kanakanak Road. These four wells have combined PFAS concentrations above 25 percent of the former DEC action level. Other water supply wells in the area have reported well depths of 30 to 60 feet bgs. At other locations, each cluster will have up to three wells. The MW screens will be set near the top of the shallow target zone, near the bottom, and within the deeper target zone based on observations during drilling. Silt-rich soils are anticipated near the groundwater surface. The shallowest MW will be set in a conductive, water-bearing formation. If groundwater is encountered at 10 feet bgs but tightly packed silts extend to 20 feet bgs, the shallow MW will be screened from 20 to 25 feet. If tightly packed silts are absent, the shallow target zone well will be screened for 10 feet spanning the water table. The well screens for the three MWs will be spaced at least 10 feet apart.

The annual space of each MW will be filled with sand surrounding the screened interval, bentonite chips or grout, pea gravel, and/or natural slough as described in the DEC Monitoring Well Guidance (2013). At a minimum, a bentonite seal will be placed at least two feet above the screened interval, spanning low-permeability soils or potential confining layers, and near the ground surface.

The newly installed MWs will be developed prior to sampling to remove sediment and verify proper hydraulic connection with the aquifer. To allow time for annular-seal materials to set, field staff will begin development no sooner than 24 hours after installation is complete. Field staff will sample each of the MWs for PFAS and the shallowest ARFF training area MWs for petroleum compounds (up to three samples). Additional petroleum samples will be collected if a hydrocarbon odor or sheen is observed during sampling.

It is possible that the existing MWs have been damaged or destroyed since their installation, in which case we may decide to sample an alternate, nearby existing MW or install a new well as outlined in Exhibit 4-1 below. The goal of this task is to characterize groundwater in three zones: near-surface (<20 feet bgs), shallow (>20 feet bgs, up to 50 feet bgs), and deep (>50 feet bgs, up to 80 feet bgs).

Exhibit 4-1: Monitoring Well Installation Decision Matrix

Location	Method	Alternate 1	Alternate 2	Alternate 3
Near Lease Lot Area	Sample existing near-surface MWs	If chosen MW is destroyed/missing, locate nearest existing well	If alternate existing MW cannot be located, install a third shallow well at nearby MW cluster	If no groundwater <20 feet bgs, omit well
	Screen at bottom of shallow target zone, just above confining layer	If water-bearing formation is continuous, screen from 45 to 50 feet bgs	If there is no GW from 20 to 50 feet bgs, but there is water at <20 feet bgs, install well at shallower depth or locate nearby existing MW to sample	If no groundwater <50 feet, omit well. Consider moving to an alternate location
	Screen within deeper target zone or within 80 feet bgs	If dense silt/clay terminates at 50 to 80 feet, install well just below unit	If water-bearing formation is continuous to 80 feet, install well at 75 to 80 feet bgs	--
Outside of Lease Lot Area	Screen at first encountered water-bearing unit, up to 20 feet bgs	If silt-dominant unit is present near the surface, screen for 5 feet just below silt	If silt-dominant unit is absent, screen for 10 feet spanning the groundwater surface	If no groundwater <20 feet bgs, omit well
	See above for second and third MWs			–

Notes:

Zone depth intervals are estimated based on publicly available information on existing wells, previous site characterization at the DLG, and water supply well survey responses.

bgs = below ground surface; MW = monitoring well

Shannon & Wilson will share the results of MW sampling on the lease lot with DOT&PF leasing and relevant DLG tenants. MW purge and development water will be filtered through granular activated carbon (GAC) and disposed of in accordance with Section 5.6.

4.3.2 Groundwater Gradient Survey

Shannon & Wilson will subcontract a professional surveyor to conduct a vertical and horizontal survey of the newly installed MWs and up to three existing wells. Latitude and longitude information will be reported to the nearest 0.1 foot and top-of-casing elevation will be reported to the nearest 0.01 foot. Water level elevation data collected from the wells will be used to calculate the localized groundwater gradient using the hydraulic gradient calculator available at the EPA's *On-line Tools for Site Assessment Calculation* website. Survey information and the calculated groundwater gradient will be included in the site characterization report.

Field staff will install water level data loggers in five of the MWs for at least three days to determine if the tide influences groundwater levels and flow direction. Shannon & Wilson will deploy Solinst Leveloggers below the static water level to measure absolute pressure (water pressure and atmospheric pressure) and a Solinst Barologger at the ground surface to record changes in atmospheric pressure.

4.4 Surface Water Characterization

General information regarding surface water characterization and sediment sample collection activities are described in Section 3.2.4 of the GWP. Surface water and sediment sampling procedures are presented in Sections 4.7 and 4.8 of the GWP, respectively.

4.4.1 Surface Water Sampling

Shannon & Wilson will collect up to nine surface water samples from DLG drainage ditches, culverts, ponds, and creeks. Surface water samples will be collected at least 72 hours after a rain event, if possible, to prevent potential dilution effects. Tentative sample locations are shown in Figure 5. If standing water is not present in the drainage ditches or ponds identified in the figure, field staff will find nearby locations or omit these samples. The surface water samples will be submitted for determination of PFAS, BTEX, GRO, DRO, and RRO. The water sample from north of the lease lots will also be submitted for PAHs.

Surface water samples will be collected from the following locations at the DLG:

- from the northeast end of the runway near outfall G;
- on the west side of the runway near Taxiway B;
- on the east side of the runway, between the runway and Kanakanak Road near outfall D and E;
- southwest of the lease lot area between outfalls B1 and B2;

- north of the lease lot area near outfall A2;
- west of the runway near the 2019 AFFF emergency response location;
- between the southwest end of the runway and Kanakanak Road; and
- from outfall C to the estuary southwest from the airport.

4.4.2 Sediment Sampling

Shannon & Wilson will collect up to nine sediment samples from the locations listed above. Sediment will be collected from within the culvert nearest each surface water sample, if it is accessible (Figure 5). These samples will be submitted for determination of PFAS, BTEX, GRO, DRO, and RRO. The sediment sample from north of the lease lots will also be submitted for PAHs.

5 SAMPLING AND ANALYSIS PLAN

This section describes the analytical sampling approach for investigating contamination associated with the DLG. A DEC-qualified sampler will collect and handle the samples for projects covered under this GWP and collect required quality control (QC) samples in accordance with DEC's *Field Sampling Guidance*. Field personnel will document field activities with notes and photographs as well as applicable field forms (Appendix B of the GWP), as detailed in Section 5.2 of the GWP.

Analytical laboratories and methods employed as a part of this Addendum are identified in Section 5.3. Sample containers, preservation methods, and holding times are included in Section 5.4. Equipment decontamination procedures are outlined in Section 5.5. Investigation-derived waste (IDW) management is described in Section 5.6.

5.1 Sample Collection Methods

The sampling effort described in this Addendum will be conducted in general accordance with the GWP. The following sections contain supplemental information and exceptions to the general Sampling and Analysis Plan found in Section 4 of the GWP.

5.1.1 Drilling Method and Monitoring Well Construction

Use of a Geoprobe® Model 6620, 6712, or 66 series direct push/auger is anticipated for drilling the soil borings. The drilling contractor will use a direct-push sampling system equipped with a two- or three-inch MacroCore for the soil borings terminating at or just below the groundwater table. The driller will use either a direct push or hollow stem auger

method to install the deeper MWs. Well screens will be five feet or 10 feet in length, with a 0.010-inch slot size, with a sand pre-pack. The drilling contractor will not install MWs in densely packed silts or interbedded silty material.

The MWs will be completed using flushmount monuments. The off-site MWs will be marked using reflective carsonite markers. DOT&PF will use caution during snow plowing to avoid damaging the monuments.

5.1.2 Developing and Sampling Monitoring Wells with Low Recharge

If groundwater recharge into the MWs is not adequate to sustain continuous pumping during development, MWs will be developed by purging the well dry, allowing it to refill with groundwater, surging the well for approximately 10 minutes, then purging the well dry again.

Wells with low recharge will be sampled by purging one well casing volume, then waiting for the water level to recover before sampling. Shannon & Wilson will purge low recharge MWs using a peristaltic pump, or with a submersible pump using the lowest possible flow rate. If full well-recovery exceeds one hour, samples can be collected when the well has recharged to 80-perent of its pre-purged volume. Field staff will record a minimum of one round of the water quality parameters as described in Section 4.5.3 of the GWP.

5.1.3 Surface Water and Sediment Sampling

Surface water and sediment samples will be collected from shallow standing water bodies using a new, PFAS-free disposable transfer container or hand tools such as a trowel or shovel. We anticipate the water depth will be less than two feet. Field staff will remove vegetation or plant matter prior to collecting the sediment samples.

5.2 Analytical Sample Summary

An analytical sample summary is detailed in Exhibit 5-1, below. More information regarding QC samples can be found in Section 6.2.

Exhibit 5-1: Analytical Sample Summary

	Matrix	Location Type	PFAS (EPA 537.1M)	GRO / DRO / RRO (AK101 / AK102 / AK103)	BTEX (EPA 8260)	PAH (EPA 8270D-SIM)
Number of Samples	Surface Soil*	Along Runway	7 +1 DUP	Up to 5 if PID >20ppm		Up to 1 if PID >20ppm
		Fire Training Areas	16 + 1 DUP + 2 FB + 1 EB	2 + 1 DUP		1 + 1 DUP
		Near Sutherland and Kanakanak Roads	5 + 1 DUP	-	-	-
	Soil Borings	AFFF Release Areas	20 + 3 DUPs + 1 FB	2 + 1 DUP, up to 6 if PID >20ppm		1 + 1 DUP
		Other MWs on Airport Property	16 + 3 DUPs	If PID >20 ppm		
		MWs off Airport Property	10 + 1 DUP	If PID >20 ppm		
	Groundwater	New MWs near AFFF Release Areas	7 + 2 DUP + 2 EB	3 + 2 DUP + 2 EBs		1 + 1 DUP + 1 EB
		Other New MWs	18 + 3 DUPs + 3 EBs	If hydrocarbon odor or sheen observed		
		Existing MWs	3 + 1 DUP + 1 EB	If hydrocarbon odor or sheen observed		
	Surface Water	Drainage Ditch, Culvert, or Muskeg	9 + 1 DUP + 1 EB	9 + 1 DUP	9 + 1 DUP	1+ 1 DUP
	Sediment	Drainage Ditch, Culvert, or Muskeg	9 + 1 DUP + 1 EB	9 + 1 DUP	9 + 1 DUP	1+ 1 DUP
	Filtered Water	GAC Effluent	1	-	-	-

Notes:

*Surface soil section includes samples collected using hand tools, surface soil samples will also be collected from soil borings.

Laboratory quality control samples are not included in these totals. Table assumes all potential samples will be collected.

DUP = field duplicate sample; EB = equipment blank sample; FB = field blank sample; PFAS = per- and polyfluoroalkyl substances; EPA = U.S. Environmental Protection Agency; GRO = gasoline range organics; DRO = diesel range organics; RRO = residual range organics; BTEX = benzene, toluene, ethylbenzene, and total xylenes; PAH = polycyclic aromatic hydrocarbons; SIM = selective ion monitoring

5.3 Sample Containers, Preservation, and Holding Times

General information regarding sample containers, preservation, and holding times is described in Section 4.12 of the GWP. Specific information is provided in Exhibit 5-2, below, for the analytical methods employed for this project.

Exhibit 5-2: Sample Containers, Preservation, and Holding Time Requirements

Analyte	Method	Media	Container and Volume	Preservation	Holding Time
PFAS	EPA 537.1M	Water	2 x 250 mL HDPE	0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction
		Soil	4-oz HDPE	0 °C to 6 °C	
GRO	AK101	Water	3 x 40-mL VOA vials (no headspace)	HCl to <4 0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction
		Soil	Pre-weighed 4-oz amber glass jar with septa	25mL MeOH 0 °C to 6 °C	
DRO	AK102	Water	2 x 250-mL amber glass	HCl to <4 0 °C to 6 °C	7 days to extraction, analyzed within 40 days of extraction
		Soil	4-oz amber glass jar	0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction
RRO	AK103	Water	2 x 250-mL amber glass	HCl to <4 0 °C to 6 °C	7 days to extraction, analyzed within 40 days of extraction
		Soil	4-oz amber glass Jar	0 °C to 6 °C	14 days to extraction, analyzed within 40 days of extraction
BTEX	EPA 8260	Water	3 x 40-mL VOA vials (no headspace)	HCl to <4 0 °C to 6 °C	14 days
		Soil	Pre-weighed 4-oz amber glass jar with septa	25mL MeOH 0 °C to 6 °C	
PAHs	EPA 8270D-SIM	Water	2 x 250-mL amber glass	0 °C to 6 °C	7 days to extraction, analyzed within 40 days of extraction
		Soil	4-oz amber glass jar		14 days to extraction, analyzed within 40 days of extraction

Notes:

BTEX = benzene, toluene, ethylbenzene, and total xylenes; °C = degrees Celsius, DRO = diesel range organics, EPA = U.S. Environmental Protection Agency, GRO = gasoline range organics, HDPE - high density polyethylene, HCl = hydrochloric acid, mL = milliliter, oz = ounce, PAH = polycyclic aromatic hydrocarbons, PFAS = per- and polyfluoroalkyl substances, RRO = residual range organics, SIM = selective ion monitoring, VOA = volatile organic analysis

5.4 Analytical Laboratories and Methods

The GRO, DRO, RRO, BTEX, and PAH soil and water samples will be submitted to SGS North America, Inc. in Anchorage, Alaska. The PFAS soil, water, and sediment samples will

be submitted to Eurofins TestAmerica of Sacramento, California. Based on the DEC Technical Memorandum issued on October 2, 2019, PFAS analysis will report the 18 PFAS compounds defined in the EPA Method 537.1.

5.5 Equipment Decontamination

Equipment decontamination procedures are described in Section 4.14 of the GWP. Shannon & Wilson and the drilling subcontractor will use water from the City of Dillingham water system or DOT&PF's secondary well for decontamination. PFOS and PFOA were not detected in March 2019 pre- and post-treatment samples collected by Shannon & Wilson from the City of Dillingham water plant (though perfluorohexanesulfonic acid was detected at an estimated concentration of 1.1 ng/L in the pre-treatment sample). PFOS, PFOA, and four other PFAS compounds were not detected in a February 2019 water sample from the DOT&PF well used for filling fire trucks. Please note, a different well supplies the DOT&PF office building.

5.6 Investigation-Derived Waste Management

IDW will consist of soil cuttings, MW development and purge water, decontamination rinsate water, and disposable sampling equipment.

Most soil generated from advancing soil borings and installing MWs will be containerized pending the receipt of analytical results. Should local conditions warrant it for borings drilled off-site, unsaturated soil from above the groundwater table can be spread in the immediate surroundings of the boring location unless field observations (i.e. visual staining, odor, sheen, or PID readings greater than 20 ppm) suggest the presence of petroleum contamination. The soil drill cuttings will be placed in supersacks, open-top 55-gallon steel drums, or Resource Conservation and Recovery Act-compliant locking-lid buckets. Saturated soil will be placed in 55-gallon drums to avoid possible leaking during transportation.

We understand DOT&PF will not allow containerized soil cuttings, purge water, and/or decontamination rinsate water to be temporarily stored at DLG pending analytical results and off-site treatment or disposal. Therefore, Shannon & Wilson's subcontractor will transport containers of these wastes to Dillingham Mini Storage or a similar secure, off-site location. DEC has indicated approval of this Addendum will allow the transportation of potentially contaminated soil off airport property for temporary storage pending receipt of analytical results. Shannon & Wilson will coordinate contaminated media disposal following the receipt of analytical results. Should off-site disposal be required, Shannon &

Wilson will prepare a *Contaminated Media Transport and Treatment or Disposal Approval Form* for DEC review and approval.

Liquids will be filtered using three in-line five-gallon GAC units and discharged to the ground surface south of the lease lot areas (Figure 8). The GAC units will be stored in Dillingham for future project use. Silty MW development water will be filtered using a 5-micron or 10-micron filter or will be allowed to settle prior to GAC filtration. Decontamination water containing detergent will be discharged to the ground surface or DOT&PF shop sump without filtration. A GAC-effluent sample will be collected following the completion of the sampling event. Should field staff encounter free-phase petroleum product, the impacted groundwater will be containerized and stored off-site pending the receipt of analytical results. Other IDW will primarily consist of disposable sampling equipment (nitrile gloves, plastic soil core liners, pump tubing, etc.). These items will be disposed of at an on-site dumpster and ultimately the Dillingham Landfill.

5.7 Anticipated Deviations from the General Work Plan

Monitoring wells installed in silty soil may not be able to be purged continuously. Alternative well development and sampling procedures for wells with low recharge are described in Section 5.1.2 of this Addendum. Depending on the soil types encountered, MW specifications such as screen size, sand pack, and other details may be modified from those described in the GWP. MW installation details are described in Section 5.1.1.

6 QUALITY ASSURANCE PROJECT PLAN

This QAPP is intended to guide field activities and data assessment, and ensure sampling and documentation are effective, laboratory data are usable, and the information acquired is of high quality and reliable. Shannon & Wilson will be responsible for conducting data reduction, evaluation, and reporting under this QAPP. A general QAPP is provided as Section 5 of the GWP. Additionally, a Data-Validation Program Plan which describes the procedures for qualifying analytical data in a consistent manner is included as Appendix C to the GWP. The following sections describe specific procedures to be followed during sampling at the DLG.

6.1 Quality Assurance Objectives

Data quality objectives are detailed in Section 5.1 of the GWP. Numeric QA objectives for this project are presented in Exhibit 6-1, below.

Exhibit 6-1: Quality Assurance Objectives for Analytical Samples

Analyte	Method	Matrix	Precision	Accuracy	Completeness
PFAS	EPA 537.1M	Water	±30%	(analyte dependent)	85%
		Soil	±50%	(analyte dependent)	85%
GRO	AK101	Water	±30%	60-120%	85%
		Soil	±50%	60-120%	85%
DRO	AK102	Water	±30%	60-120%	85%
		Soil	±50%	60-120%	85%
RRO	AK103	Water	±30%	60-120%	85%
		Soil	±50%	60-120%	85%
BTEX	8260	Water	±30%	(analyte dependent)	85%
		Soil	±50%	(analyte dependent)	85%
PAH	8270D-SIM	Water	±30%	(analyte dependent)	85%
		Soil	±50%	(analyte dependent)	85%

Notes:

1 The primary COPCs for projects conducted under this GWP Addendum are PFAS, specifically PFOS and PFOA. However, Appendix F of DEC's Field Sampling Guidance (2019) identifies the following additional COPCs for sites associated with fire training facilities, fires, and facilities where AFFF was used: GRO, DRO, RRO, BTEX, and PAHs.

BTEX = benzene, toluene, ethylbenzene, and xylenes; COPC = contaminant of potential concern, DRO = diesel range organics, EPA = U.S. Environmental Protection Agency, GRO = gasoline range organics, PAH = polycyclic aromatic hydrocarbons, PFAS = per- and polyfluoroalkyl substances, RRO = residual range organics, SIM = selective ion monitoring

6.2 Field Quality Control Samples

The field quality assurance/quality control (QA/QC) program for this project includes the collection of the following QA/QC samples, as described below.

6.2.1 Field Duplicate Samples

Field duplicate sample collection procedures are described in Section 5.4.1 of the GWP. Refer to Exhibit 5-1 for number of field duplicates for each matrix. Shannon & Wilson made the following assumptions when determining the appropriate number of field duplicate samples:

- Surface soil samples will be collected over two days;
- Soil borings will be advanced and sampled over approximately 24 days; consequently, it is impractical to collect one field duplicate per day. Subsurface soil sample duplicates will be collected at a minimum frequency of 10 percent;
- The new MWs will be developed and sampled over a five-day period;
- Existing MWs will be sampled on the same day; and

- Surface water and sediment samples will be collected on the same day.

The duration of the field sampling effort may be shorter or longer than anticipated.

6.2.2 Matrix Spike/Matrix Spike Duplicate Samples

Matrix spike and matrix spike duplicate samples will not be collected for this project. However, the laboratories may report QC samples collected from other projects not associated with this Addendum to meet their reporting requirements.

6.2.3 Trip Blank Samples

Trip blank samples are described in Section 5.4.3 of the GWP. Shannon & Wilson will store volatile soil and water samples in separate coolers and submit one trip blank sample per cooler with volatile samples.

6.2.4 Equipment Blank Samples

Equipment blank sample collection procedures are described in Section 5.4.4 of the GWP. Field staff will collect one submersible pump equipment blank sample each day the pump is used, after the final water sample of the day. Field staff will collect one soil and one sediment sample equipment blank by pouring laboratory supplied PFAS-free water down the length of the hand auger, shovel, or other reusable equipment and collecting the rinsate in sample bottles. Rinsate samples are not required when disposable materials are used.

6.2.5 Field Blank Samples

Field blank sample collection procedures are described in Section 5.4.5 of the GWP. Field blank samples are needed for areas with potential for PFAS-containing particulate matter to enter samples (i.e. high-contamination areas, windy/dusty conditions, etc.). One field blank sample will be collected during soil sampling at each of the three ARFF primary training areas. Field blank samples will not be collected during MW sampling because this activity will take place at the same locations as soil sampling.

6.2.6 Temperature Blank Samples

Temperature blanks are described in Section 5.4.6 of the GWP.

6.3 Laboratory Quality Control Samples

Laboratory quality control samples are described in Section 5.5 of the GWP.

6.4 Laboratory Data Deliverables

Laboratory data deliverables are described in Section 5.6 of the GWP.

6.5 Data Reduction, Evaluation, and Reporting

Data reduction, evaluation, and reporting are discussed in Section 5.7 of the GWP.

7 REFERENCES

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0 0.5 1

Miles

LEGEND

Airport Boundary

N

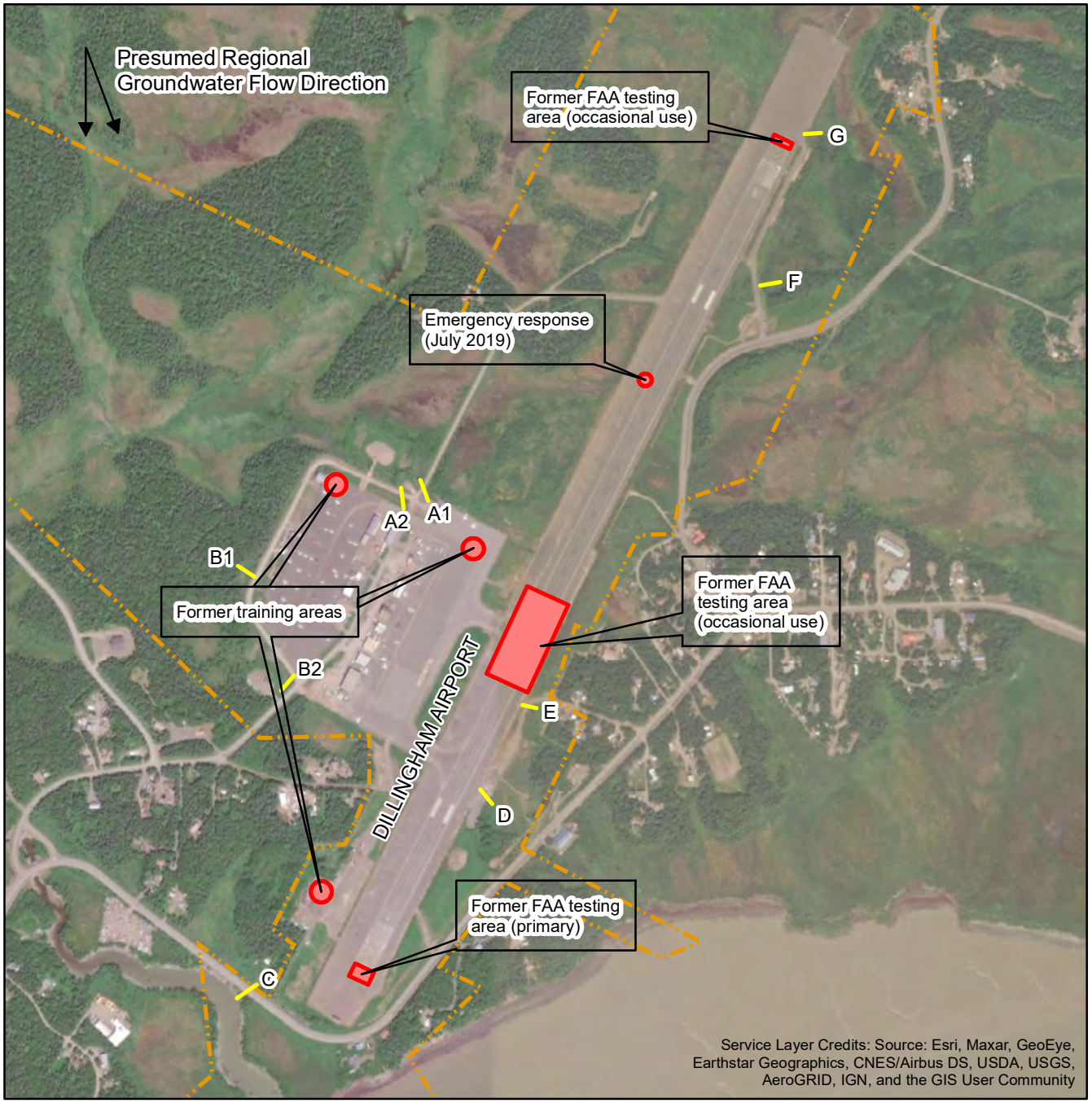
Dillingham Airport
GWP Addendum 005-DLG-01
Dillingham, Alaska

VICINITY MAP

May 2021 102581-008

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1



LEGEND

- Aircraft Rescue and Firefighting (ARFF) Site
- Drainage Outfall
- Airport Boundary

0 1,000 2,000

Feet

N

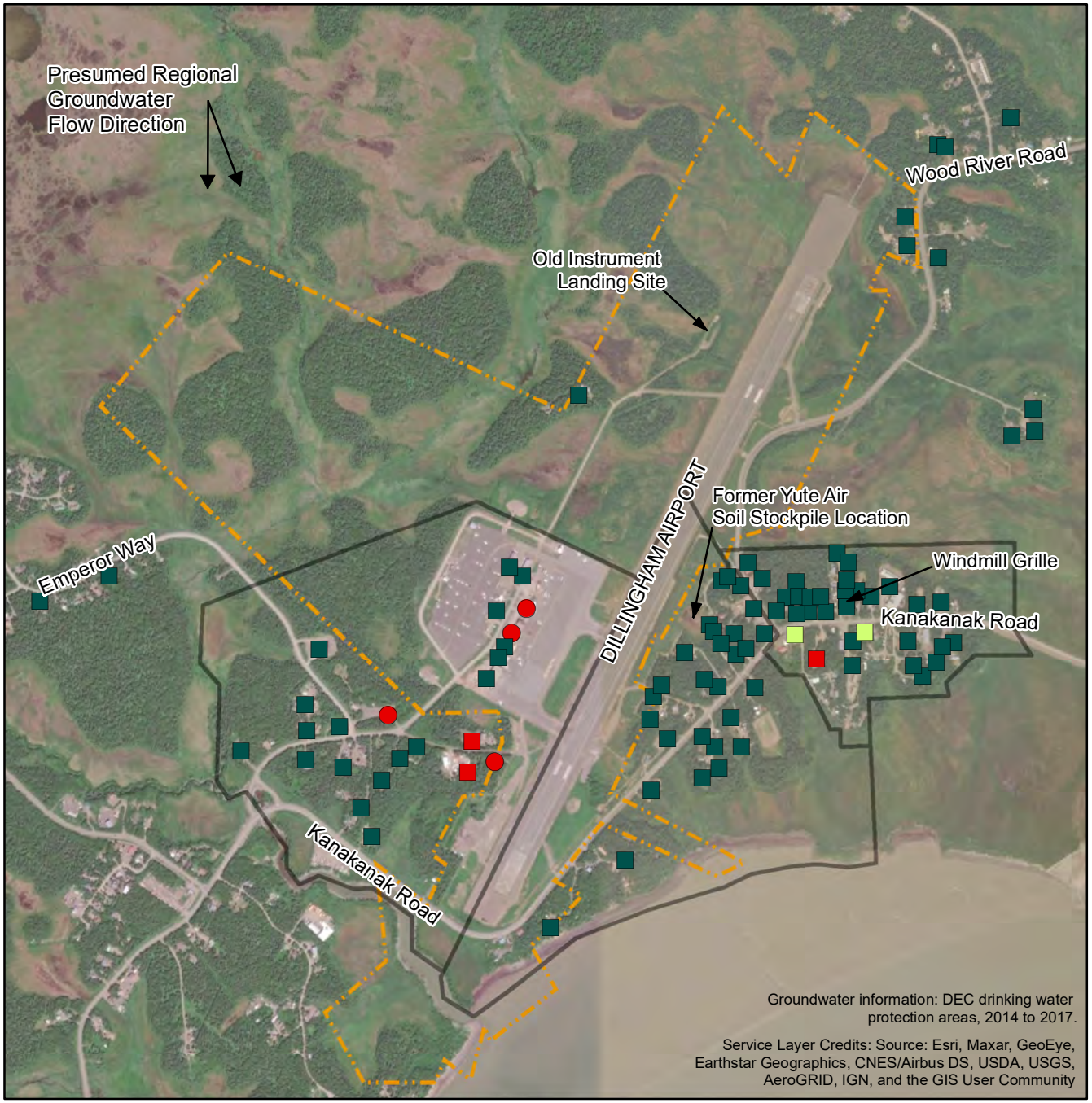
Dillingham Airport
GWP Addendum 005-DLG-01
Dillingham, Alaska

AFFF RELEASE LOCATIONS AND SITE DRAINAGE

May 2021 102581-008

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 2



LEGEND

- Sum of PFOS + PFOA ≤ 17 nanograms per liter (ng/L)
- 18 to 69 ng/L
- ≥ 70 ng/L (over EPA advisory)
- Property considered affected before April 2019, compared to former DEC action level*
- Well Search Areas
- Airport Boundary

0 0.25 0.5
Miles

N

*Sum of PFOS, PFOA, PFHxS, PFHpA and PFNA

Dillingham Airport
GWP Addendum 005-DLG-01
Dillingham, Alaska

HIGHEST REPORTED WATER SUPPLY WELL ANALYTICAL RESULTS

May 2021 102581-008

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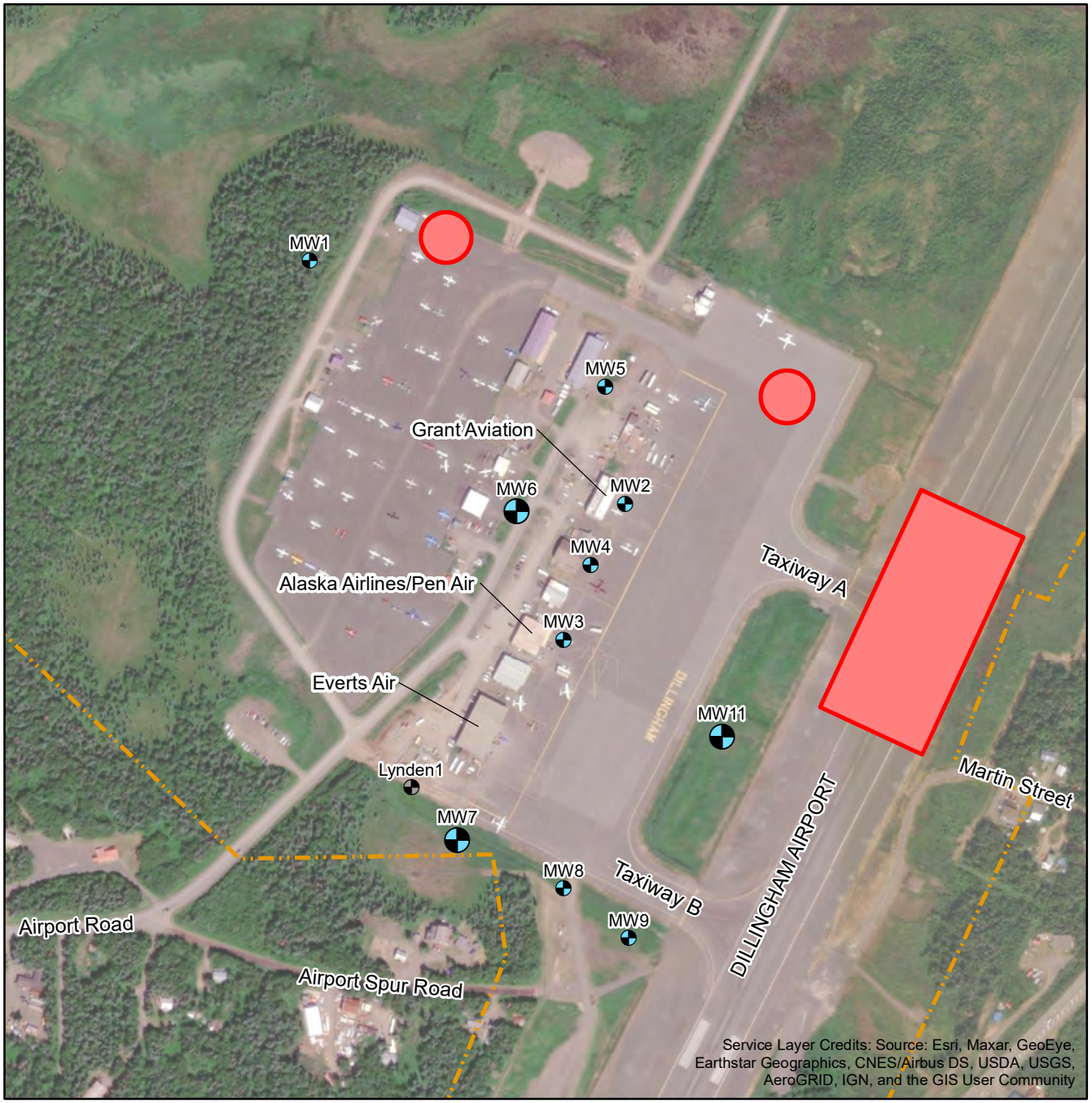
Figure 3



LEGEND

- Existing Monitoring Well to be Sampled (Installed 2006)
- Existing Monitoring Well (Installed 2006)
- Former Lynden 1 Monitoring Well (Destroyed 2008)
- Aircraft Rescue and Firefighting (ARFF) Site
- Airport Boundary

N

0 500 1,000

Feet

Dillingham Airport
GWP Addendum 005-DLG-01
Dillingham, Alaska

LEASE LOT AREA SITE MAP

May 2021 102581-008

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GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 4

LEGEND

Aircraft Rescue and Firefighting (ARFF) Site

Drainage Outfall

Airport Boundary

Proposed Sample Locations

Surface Water and Sediment

Surface Soil

Surface Soil Sample Grid

0 1,000 2,000

Feet

N

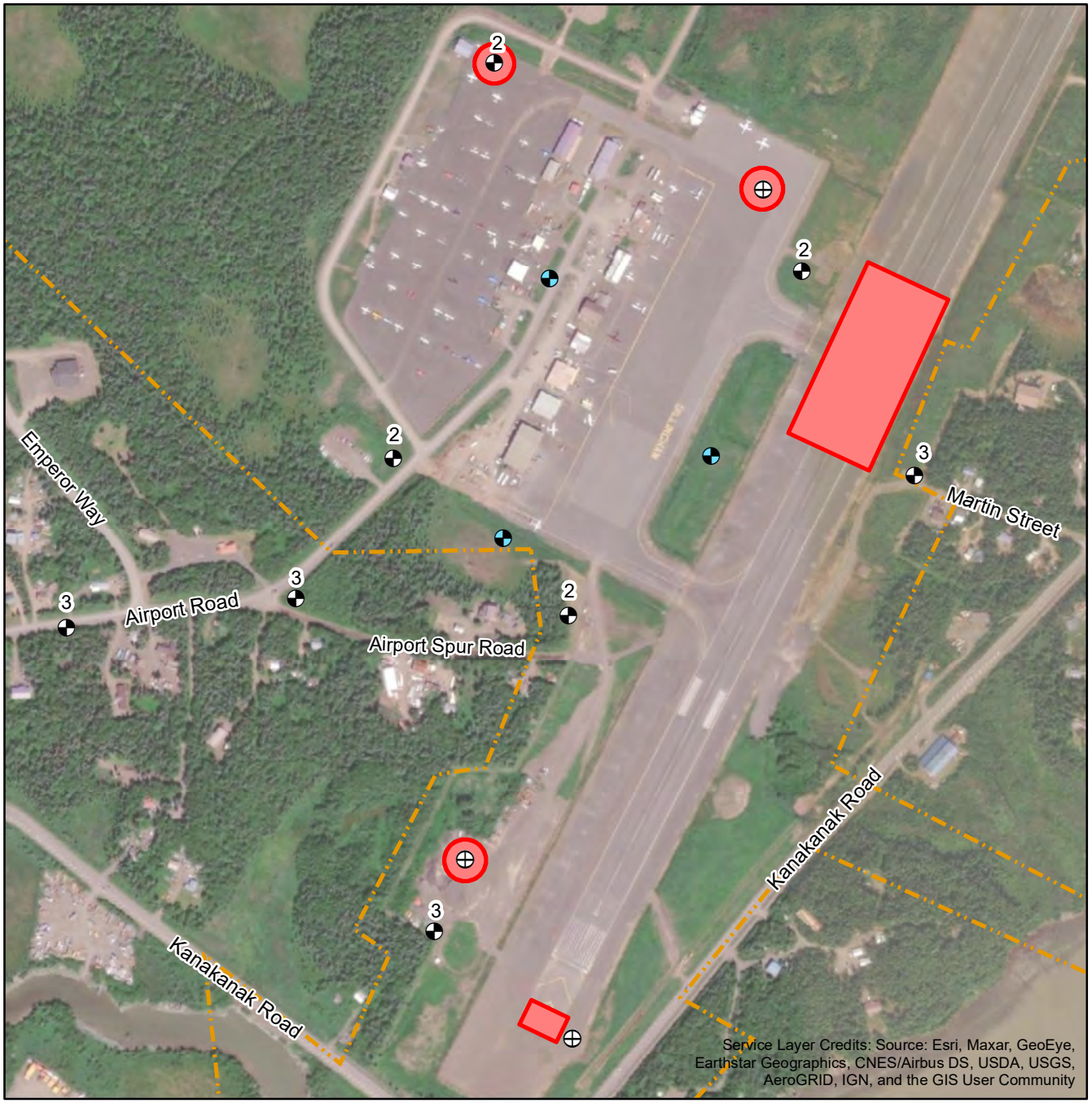
Dillingham Airport
GWP Addendum 005-DLG-01
Dillingham, Alaska

SURFACE SOIL, SURFACE WATER, AND SEDIMENT SAMPLE LOCATIONS

May 2021 102581-008

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 5



LEGEND

- Proposed Soil Boring
- Monitoring Well Nest
- Existing Monitoring Well Planned for Sample
- Aircraft Rescue and Firefighting (ARFF) Site
- Airport Boundary

*Note: Monitoring well nest locations are annotated with the number of wells per nest.

0 500 1,000
Feet

N

Dillingham Airport
GWP Addendum 005-DLG-01
Dillingham, Alaska

PROPOSED SOIL BORING AND MONITORING WELL LOCATIONS - LEASE LOT AREA

May 2021 102581-008

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 6

LEGEND

- Proposed Soil Boring
- Monitoring Well Nest
- Aircraft Rescue and Firefighting (ARFF) Site
- Airport Boundary

*Note: Monitoring well nest locations are annotated with the number of wells per nest.

0 500 1,000
Feet

N

Dillingham Airport
GWP Addendum 005-DLG-01
Dillingham, Alaska

PROPOSED SOIL BORING AND MONITORING WELL LOCATIONS - EAST

May 2021 102581-008

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 7

LEGEND

Airport Boundary

0 1,000 2,000

Feet

N

Dillingham Airport
GWP Addendum 005-DLG-001
Dillingham, Alaska

PURGE WATER DISCHARGE LOCATION

May 2021 102581-008

SHANNON & WILSON, INC.
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Figure 8

APPENDIX A: DRAFT CONCEPTUAL SITE MODEL

Appendix A

Draft Conceptual Site Model

CONTENTS

Appendix A - Human Health Conceptual Site Model
Scoping Form and Standardized Graphic

Site Name: Dillingham Airport

File Number: 2540.38.023

Completed by: Shannon & Wilson, Inc.

Introduction

The form should be used to reach agreement with the Alaska Department of Environmental Conservation (DEC) about which exposure pathways should be further investigated during site characterization. From this information, summary text about the CSM and a graphic depicting exposure pathways should be submitted with the site characterization work plan and updated as needed in later reports.

General Instructions: Follow the italicized instructions in each section below.

1. General Information:

Sources *(check potential sources at the site)*

- ☐ USTs
- ☐ ASTs
- ☐ Dispensers/fuel loading racks
- ☐ Drums
- ☐ Vehicles
- ☐ Landfills
- ☐ Transformers
- ☒ Other: AFFF discharge for testing, training, and emergency response

Release Mechanisms *(check potential release mechanisms at the site)*

- ☒ Spills
- ☒ Leaks
- ☒ Direct discharge
- ☐ Burning
- ☐ Other:

Impacted Media *(check potentially-impacted media at the site)*

- ☒ Surface soil (0-2 feet bgs*)
- ☒ Subsurface soil (>2 feet bgs)
- ☐ Air
- ☒ Sediment
- ☒ Groundwater
- ☒ Surface water
- ☒ Biota
- ☐ Other:

Receptors *(check receptors that could be affected by contamination at the site)*

- ☒ Residents (adult or child)
- ☒ Commercial or industrial worker
- ☒ Construction worker
- ☒ Subsistence harvester (i.e. gathers wild foods)
- ☒ Subsistence consumer (i.e. eats wild foods)
- ☒ Site visitor
- ☒ Trespasser
- ☒ Recreational user
- ☐ Farmer
- ☐ Other:

* bgs - below ground surface

2. Exposure Pathways: *(The answers to the following questions will identify complete exposure pathways at the site. Check each box where the answer to the question is "yes".)*

a) Direct Contact -

1. Incidental Soil Ingestion

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site-specific basis.) ☒

If the box is checked, label this pathway complete: Complete

Comments:

PFAS and/or petroleum compounds may be present in surface soil at former AFFF training areas in the lease lot area and the southwest end of the runway. PFAS may be present in surface soil near the AFFF systems testing areas along the runway.

2. Dermal Absorption of Contaminants from Soil

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Can the soil contaminants permeate the skin (see Appendix B in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

PFOA and PFOS may be present in surface soil at the site. According to the Alaska Department of Health and Social Services, PFOS and PFOA are not appreciably absorbed through the skin. However, Appendix B of the DEC 2017 Guidance on Developing CSMs includes both PFOS and PFOA. We consider dermal exposure to these compounds to be insignificant for the purposes of this CSM.

b) Ingestion -

1. Ingestion of Groundwater

Have contaminants been detected or are they expected to be detected in the groundwater, or are contaminants expected to migrate to groundwater in the future? ☒

Could the potentially affected groundwater be used as a current or future drinking water source? Please note, only leave the box unchecked if DEC has determined the groundwater is not a currently or reasonably expected future source of drinking water according to 18 AAC 75.350. ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

PFOS and PFOA have been detected in residential and commercial drinking water wells on-site and off-site at concentrations exceeding the EPA advisory level.

2. Ingestion of Surface Water

Have contaminants been detected or are they expected to be detected in surface water, or are contaminants expected to migrate to surface water in the future? ☒

Could potentially affected surface water bodies be used, currently or in the future, as a drinking water source? Consider both public water systems and private use (i.e., during residential, recreational or subsistence activities). ☐

If both boxes are checked, label this pathway complete: Incomplete

Comments:

The airport is constructed in a flat muskeg area. Surface water runoff from the airport is diverted into drainage ditches, the surrounding muskeg, and a creek. Surface water is not a drinking water source.

3. Ingestion of Wild and Farmed Foods

Is the site in an area that is used or reasonably could be used for hunting, fishing, or harvesting of wild or farmed foods? ☒

Do the site contaminants have the potential to bioaccumulate (see Appendix C in the guidance document)? ☒

Are site contaminants located where they would have the potential to be taken up into biota? (i.e. soil within the root zone for plants or burrowing depth for animals, in groundwater that could be connected to surface water, etc.) ☒

If all of the boxes are checked, label this pathway complete: Complete

Comments:

PFOS and PFOA have the potential to bioaccumulate and could be taken up by plants, fish, and birds. Residents fish in the nearby estuary in Nushagak Bay to the south and east. Residents could also harvest plants and berries around the airport. Contaminated well water could be used for gardening.

c) Inhalation-

1. Inhalation of Outdoor Air

Are contaminants present or potentially present in surface soil between 0 and 15 feet below the ground surface? (Contamination at deeper depths may require evaluation on a site specific basis.) ☒

Are the contaminants in soil volatile (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Complete

Comments:

Petroleum compounds including VOCs could be present in surface soil at former AFFF training areas.

2. Inhalation of Indoor Air

Are occupied buildings on the site or reasonably expected to be occupied or placed on the site in an area that could be affected by contaminant vapors? (within 30 horizontal or vertical feet of petroleum contaminated soil or groundwater; within 100 feet of non-petroleum contaminted soil or groundwater; or subject to "preferential pathways," which promote easy airflow like utility conduits or rock fractures) ☐

Are volatile compounds present in soil or groundwater (see Appendix D in the guidance document)? ☒

If both boxes are checked, label this pathway complete: Incomplete

Comments:

The fire training areas with potential for petroleum contamination are greater than 30 feet from the closest occupied buildings. PFAS contaminants are not volatile.

3. **Additional Exposure Pathways:** *(Although there are no definitive questions provided in this section, these exposure pathways should also be considered at each site. Use the guidelines provided below to determine if further evaluation of each pathway is warranted.)*

Dermal Exposure to Contaminants in Groundwater and Surface Water

Dermal exposure to contaminants in groundwater and surface water may be a complete pathway if:

- Climate permits recreational use of waters for swimming.
- Climate permits exposure to groundwater during activities, such as construction.
- Groundwater or surface water is used for household purposes, such as bathing or cleaning.

Generally, DEC groundwater cleanup levels in 18 AAC 75, Table C, are deemed protective of this pathway because dermal absorption is incorporated into the groundwater exposure equation for residential uses.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

Some residential and commercial drinking water wells on and near the airport property in Dillingham have PFOS and PFOA in exceedance of the EPA advisory level.

Inhalation of Volatile Compounds in Tap Water

Inhalation of volatile compounds in tap water may be a complete pathway if:

- The contaminated water is used for indoor household purposes such as showering, laundering, and dish washing.
- The contaminants of concern are volatile (common volatile contaminants are listed in Appendix D in the guidance document.)

DEC groundwater cleanup levels in 18 AAC 75, Table C are protective of this pathway because the inhalation of vapors during normal household activities is incorporated into the groundwater exposure equation.

Check the box if further evaluation of this pathway is needed: ☐

Comments:

PFAS compounds are not volatile.

Inhalation of Fugitive Dust

Inhalation of fugitive dust may be a complete pathway if:

- Nonvolatile compounds are found in the top 2 centimeters of soil. The top 2 centimeters of soil are likely to be dispersed in the wind as dust particles.
- Dust particles are less than 10 micrometers (Particulate Matter - PM_{10}). Particles of this size are called respirable particles and can reach the pulmonary parts of the lungs when inhaled.

DEC human health soil cleanup levels in Table B1 of 18 AAC 75 are protective of this pathway because the inhalation of particulates is incorporated into the soil exposure equation.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

Inhalation of fugitive dust could be an exposure pathway if PFAS is present in exposed surface soil, such as in the locations of the unpaved fire training areas or along the margins of the runway.

Direct Contact with Sediment

This pathway involves people's hands being exposed to sediment, such as during some recreational, subsistence, or industrial activity. People then incidentally ingest sediment from normal hand-to-mouth activities. In addition, dermal absorption of contaminants may be of concern if the the contaminants are able to permeate the skin (see Appendix B in the guidance document). This type of exposure should be investigated if:

- Climate permits recreational activities around sediment.
- The community has identified subsistence or recreational activities that would result in exposure to the sediment, such as clam digging.

Generally, DEC direct contact soil cleanup levels in 18 AAC 75, Table B1, are assumed to be protective of direct contact with sediment.

Check the box if further evaluation of this pathway is needed: ☒

Comments:

Direct contact with sediment is unlikely at present but could be a future exposure pathway during drainage construction/repair activities.

4. Other Comments *(Provide other comments as necessary to support the information provided in this form.)*

HUMAN HEALTH CONCEPTUAL SITE MODEL GRAPHIC FORM

Site: Dillingham Airport
File Number 2540.38.023

Completed By: Shannon & Wilson, Inc.
Date Completed: 5/12/21

***Instructions*: Follow the numbered directions below. Do not consider contaminant concentrations or engineering/land use controls when describing pathways.**

(1) *Check the media that could be directly affected by the release.*

(2) *For each medium identified in (1), follow the top arrow and check possible transport mechanisms. Check additional media under (1) if the media acts as a secondary source.*

Media	Transport Mechanisms
☑ Surface Soil (0-2 ft bgs)	Direct release to surface soil — check soil
	☑ Migration to subsurface — check soil
	☑ Migration to groundwater — check groundwater
	☑ Volatilization — check air
	☑ Runoff or erosion — check surface water
	☑ Uptake by plants or animals — check biota
	☑ Other (list): runoff to sediment
☐ Subsurface Soil (2-15 ft bgs)	Direct release to subsurface soil — check soil
	☐ Migration to groundwater — check groundwater
	☐ Volatilization — check air
	☐ Uptake by plants or animals — check biota
	☐ Other (list):
☐ Ground-water	Direct release to groundwater — check groundwater
	☐ Volatilization — check air
	☐ Flow to surface water body — check surface water
	☐ Flow to sediment — check sediment
	☐ Uptake by plants or animals — check biota
	☐ Other (list):
☑ Surface Water	Direct release to surface water — check surface water
	☐ Volatilization — check air
	☑ Sedimentation — check sediment
	☑ Uptake by plants or animals — check biota
	☐ Other (list):
☐ Sediment	Direct release to sediment — check sediment
	☐ Resuspension, runoff, or erosion — check surface water
	☐ Uptake by plants or animals — check biota
	☐ Other (list):

(3) *Check all exposure media identified in (2).*

(4) *Check all pathways that could be complete. The pathways identified in this column **must** agree with Sections 2 and 3 of the Human Health CSM Scoping Form.*

(5) *Identify the receptors potentially affected by each exposure pathway: Enter "C" for current receptors, "F" for future receptors, "C/F" for both current and future receptors, or "I" for insignificant exposure.*

Current & Future Receptors

Exposure Media	Exposure Pathway/Route	Residents (adults or children)	Commercial or industrial workers	Site visitors, trespassers, or recreational users	Construction workers	Farmers or subsistence harvesters	Subsistence consumers	Other
☑ soil	☑ Incidental Soil Ingestion	C/F	C/F	C/F	C/F	C/F		
	☑ Dermal Absorption of Contaminants from Soil	I	I	I	I	I		
	☑ Inhalation of Fugitive Dust	C/F	C/F	C/F	C/F			
☑ groundwater	☑ Ingestion of Groundwater	C/F	C/F	C/F	C/F			
	☑ Dermal Absorption of Contaminants in Groundwater	C/F	C/F	C/F	C/F			
	☐ Inhalation of Volatile Compounds in Tap Water							
☑ air	☑ Inhalation of Outdoor Air		C/F	C/F	C/F			
	☐ Inhalation of Indoor Air							
	☐ Inhalation of Fugitive Dust							
☑ surface water	☐ Ingestion of Surface Water							
	☑ Dermal Absorption of Contaminants in Surface Water	I	I	I	I	I		
	☐ Inhalation of Volatile Compounds in Tap Water							
☑ sediment	☑ Direct Contact with Sediment		F		F	C/F		
☑ biota	☑ Ingestion of Wild or Farmed Foods					C/F	C/F	

APPENDIX B: SITE SAFETY AND HEALTH PLAN

Appendix B

Site Safety and Health Plan

CONTENTS

APPENDIX B: SITE SAFETY AND HEALTH PLAN

Shannon & Wilson prepared this Site Safety and Health Plan (SSHP) for the initial site characterization activities at the Dillingham Airport (DLG). The purpose of this SSHP is to protect the health and safety of field personnel from physical and chemical hazards associated with work at this site.

The provisions of this plan apply to Shannon & Wilson personnel who will potentially be exposed to safety and/or health hazards during this investigation. Shannon & Wilson employees are covered under its Corporate Safety and Health Program. The general safety and health requirements described in that program will be met. Each Shannon & Wilson employee on the site will sign the personal acknowledgement form documenting they have read and understand this SSHP and agree to abide by its requirements. A copy of this SSHP will be kept on-site throughout the duration of sampling operations.

SITE HAZARD ANALYSIS

There are two categories of hazards that may occur during the field work: potential chemical exposure hazards and physical hazards associated with site characterization activities. These hazards are discussed below.

Chemical-Exposure Hazards

Contaminated soil and water may be encountered during site exploration activities. PFAS are believed to be the primary contaminants of potential concern and may be encountered in soils and water at unknown concentrations. Petroleum compounds may also be encountered in soil or groundwater.

Shannon & Wilson personnel will implement skin protection whenever they are in contact with potentially contaminated soil or water. Field personnel will wear work gloves or nitrile gloves as needed, and other Level D personal protective equipment (PPE) as needed. Field personnel will not require respiratory protection based on the current understanding of site conditions and scope of services.

Physical Hazards

Primary physical hazards associated with site characterization activities include drilling equipment and other heavy equipment; temperature stress; lifting, slipping, tripping, falling; insects and animals; and noise hazards. The best means of protection against accidents related to physical hazards are careful control of equipment activities in the planned work area and use of experienced and safety- and health-trained field personnel.

Field personnel will not enter confined spaces for site characterization activities, nor will they enter trenches or excavations greater than four feet in depth.

Drilling Activities and Heavy Equipment

Drill rigs have lots of moving parts and are very loud. Field personnel will wear proper PPE including appropriate hearing protection. A safe distance will be kept from the drill rig and field personnel will be aware of drill rig operations and crew movements. Practice good housekeeping around the work areas. Know where the drill rig's emergency shut-off switch(es) are located in order to shut the rig down in an emergency situation.

Underground utilities are present at the site. Utility locates will be requested by Shannon & Wilson prior to conducting any ground penetrating work.

DOT&PF personnel or DLG tenants may use heavy equipment near or in Shannon & Wilson work areas. Personnel will exercise caution when working around heavy equipment and maintain a safe distance from moving equipment. Eye contact will be made with the operator prior to entering the work area, and personnel within the work area will remain within sight of the operator at all times.

Temperature Stress

The field effort discussed in this Addendum will occur in the summer. In Alaska, cold, wet, and/or windy conditions are possible at any time of year. Cold stress or injury due to hypothermia will be guarded against by wearing appropriate clothing, having warm shelter available, scheduling rest periods, adequate hydration, and self-monitoring physical and mental conditions. Heat stress injury in the event of warm weather will be guarded against using similar precautions.

Lifting Hazards

Moving coolers of soil samples or other heavy objects presents a lifting hazard. Personnel will use proper lifting techniques and obtain assistance when lifting objects weighing more than 40 pounds.

Slips, Trips, and Falls

The most common hazards on a job site are typically slips, trips, and falls. These hazards will be reduced through the following practices:

- Personnel will stay alert.

- All access-ways will be kept free of materials, supplies, and obstructions at all times.
- Tools and other materials will be located so as not to cause tripping or other hazards.
- Personnel should be aware of potential tripping hazards associated with vegetation, debris, and uneven ground.
- Personnel should be aware of limitations imposed by work clothing and PPE.

The project site may be inherently hazardous due to the potential presence of rain which can alter the character of the ground surface. The risk for slips, trips, and falls by site workers is increased due to wet; therefore, workers will use caution when walking at the site.

Insects and Animals

During the summer months, mosquitoes and other insects are common in areas predominantly covered with vegetation. Wearing PPE should be sufficient to protect site workers. Animals such as moose, bears, and other wildlife may be a hazard near vegetated areas around the airport. If a large animal approaches the site, workers should keep their distance or seek shelter in their vehicles.

Congested Areas

The site investigation may at times require field personnel to work adjacent to or in roadways. Field personnel will observe the speed and frequency of traffic proximal to the work site. Appropriate cones, barricades, or signs to secure the work area will be used when required. Shannon & Wilson will prepare and follow a traffic control plan for MW installation in a DOT&PF road right-of-way.

Noise Hazards

Noise is considered a probably physical hazard given the proximity of sample locations to an active airport runway. Hearing protection will be used as necessary by field staff when near heavy equipment, drill rigs, or other loud equipment. Disposable earplugs will be used to reduce noise levels. Disposable earplugs will have the capacity to reduce noise by at least 30 decibels (dB), and below the Occupational Safety and Health Administration permissible exposure limit (eight-hour time weighted average) of 85 dB.

Other Hazards

The virus that causes COVID-19 is anticipated to remain a health and safety concern in summer 2021. Site-specific policies related to COVID-19 prevention and mitigation are outlined in the *COVID-19 SSHP Supplement, Dillingham Airport* attached to this SSHP.

Biological, ionizing radiation, and other hazards are not expected to be present. However, be aware of the surroundings and maintain safe work practices in accordance with Shannon & Wilson's Corporate Health & Safety Plan.

PERSONAL RESPONSIBILITIES, TRAINING, AND MEDICAL SURVEILLANCE

Below is a summary of the assignment of responsibilities, training requirements, and medical surveillance information for Shannon & Wilson personnel.

Assignment of Responsibilities

Shannon & Wilson personnel are responsible for understanding and complying with the requirements of this SSHP. Following is a list of responsibilities of all Shannon & Wilson personnel working on the site:

- Review and follow this SSHP.
- Attend and participate in safety meetings.
- Take appropriate action as described in this SSHP regarding accidents, fires, or other emergency situations.
- Take all reasonable precautions to prevent injury to themselves and their fellow workers.
- Perform only those tasks they believe they can do safely, and immediately report any accidents or unsafe conditions to Shannon & Wilson's Project Manager or Office Health and Safety Manager.
- Halt work, by themselves or by others, when they observe an unsafe act or potentially unsafe working condition.
- Report accidents, illnesses, and near-misses to the local contact and to Shannon & Wilson's Fairbanks office Health and Safety Manager.

Personnel Training

Shannon & Wilson personnel performing activities on this site and under this plan have completed the appropriate training requirements specified in 29 CFR 1910.120(e). Each individual has completed an annual eight-hour refresher-training course and/or initial 40-hour training course within the last year.

A personal acknowledgement form will be completed by field personnel prior to commencing field activities. This acknowledgment form will document that they have read and understand this SSHP.

Medical Surveillance Program

All field personnel performing activities on this site covered by this SSHP have undergone baseline and annual physical/medical examinations as part of Shannon & Wilson's Corporate Health and Safety Program. All field personnel are active participants in Shannon & Wilson's Medical Monitoring Program or in a similar program, which complies with 29 CFR 1910.120(f).

PERSONAL PROTECTIVE EQUIPMENT

PPE will be required during field work. PPE selection will be based primarily on work-task requirements and potential exposure. Field personnel will use Level D protective equipment during normal work activities, as needed. Personnel are trained in the use of PPE that is, or may be, required. Level D PPE includes:

- standard work clothes or cotton overalls;
- reflective, high-visibility safety vest;
- safety-toe boots;
- safety glasses;
- hearing protection (on-hand if needed);
- gloves; and,
- hard hat.

Disposable nitrile gloves will be worn during any activity that may require dermal contact with potentially contaminated media.

DECONTAMINATION PROCEDURES

Equipment decontamination procedures are necessary for any reusable equipment that contacts contaminated soil and/or water. Decontamination procedures will consist of a rinse with non-phosphate-based detergent, a second rinse with plain tap water, and a final rinse with laboratory-certified PFAS-free water. Sampling equipment and PPE that is expendable will be disposed of at the site or in a landfill off-site.

Shannon & Wilson will conduct all site characterization activities in Level D PPE. Personnel decontamination will consist of the following:

- At the conclusion of site work each day, disposable PPE (likely limited to nitrile gloves) will be placed in trash bags for off-site disposal.

- Employees will wash their hands and face with soap and water before eating, drinking, smoking, or applying cosmetics.

ACCIDENTS AND EMERGENCIES

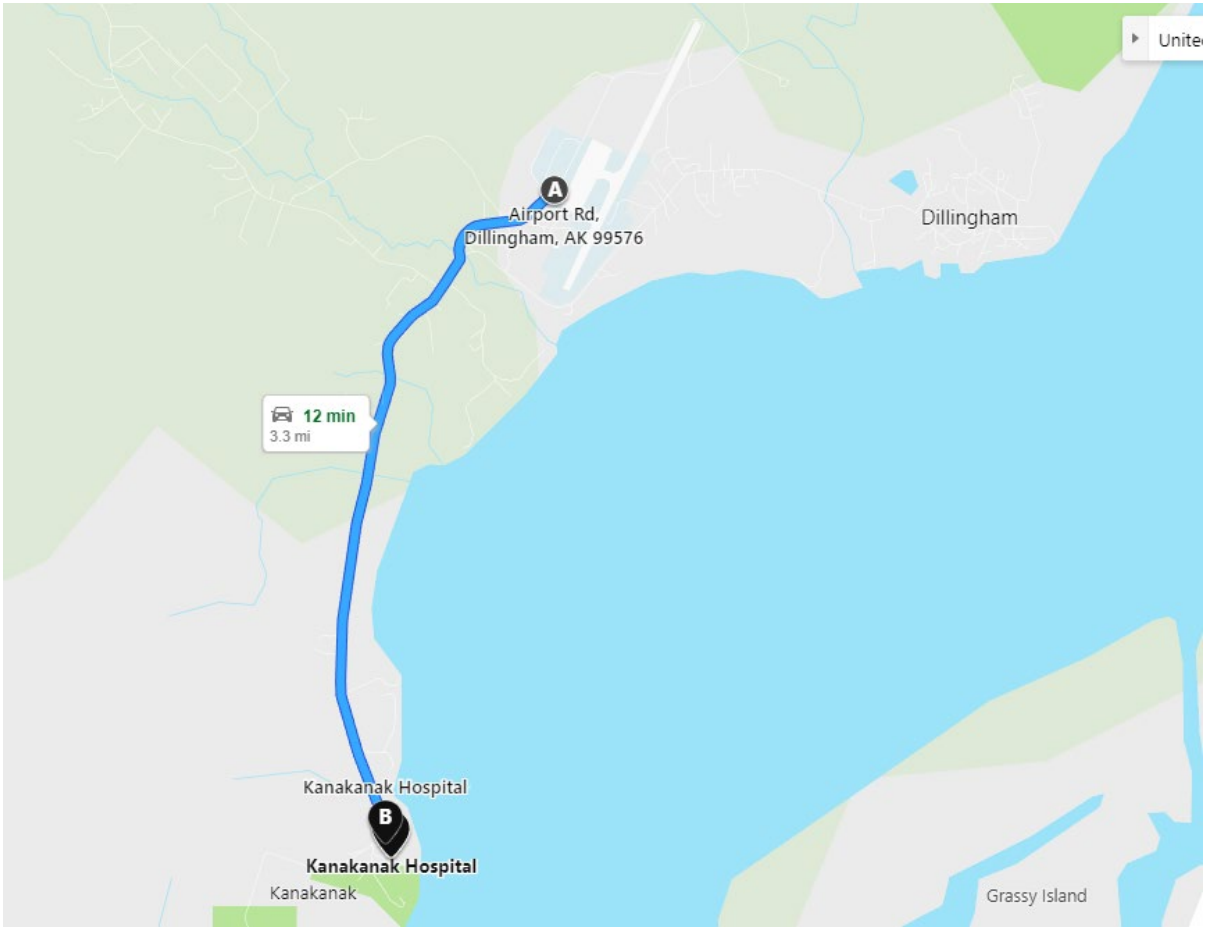
Shannon & Wilson field personnel are current in first aid and cardiopulmonary resuscitation (CPR) training. At a minimum, the following site safety equipment and first aid supplies shall be available in the field:

- PPE and clothing specialized for known site hazards;
- first aid kit, including first aid booklet;
- portable eye wash;
- clean water in portable containers; and
- other decontamination supplies.

The primary emphasis of any health and safety plan is accident prevention. If an injury or illness occurs during the course of field work, the severity of the problem will dictate the level of response. Minor injuries or illness will be addressed with basic first aid measures as recommended by a registered nurse through Shannon & Wilson's corporate Medcor service (1-800-775-5866).

More serious injuries will require assistance from the medical staff at the Kanakanak Community Health Clinic located at 6000 Kanakanak Road in Dillingham, Alaska. The Clinic emergency room is open 24 hours per day. The telephone number for the Kanakanak Community Health Clinic is (907) 842-5201. Field phones will be kept easily accessible in case of an emergency.

Exhibit B-1: Directions from Dillingham Airport to Kanakanak Community Health Clinic



Shannon & Wilson's Corporate Health and Safety Program requires accident reporting when there is a site-related accident, near-miss incident, or medical emergency. If an employee is treated by medical personnel, the medical attendant will complete an Incident Medical Treatment Documentation form. Completion of an Alaska Department of Labor Report of Occupational Injury or Illness is also required within 10 days for any work-related injury or illness.

GENERAL SITE SAFETY REQUIREMENTS

The following measures are designed to augment the specific health and safety guidelines provided in this plan:

- Field personnel should avoid contact with potentially contaminated surfaces such as: walking through puddles or pools of liquid; kneeling on the ground; or leaning, sitting, or placing equipment on contaminated soil or containers.
- Field personnel will be familiar with procedures for initiating an emergency response.

- Hazard assessment is a continual process; personnel must be aware of their surroundings and any chemical/physical hazards present.
- Personnel in the exclusion area shall be the minimum number necessary to perform work tasks in a safe and efficient manner.
- The use of contact lenses is prohibited; soft lenses may absorb irritants, and all lenses concentrate irritants.
- Equipment contacting potentially contaminated soil or water must be decontaminated or properly discarded before leaving the site.

Field personnel will be familiar with the physical characteristics of the work site including wind direction, site access, and location of communication devices and safety equipment.

SITE SAFETY AND HEALTH PLAN PERSONAL ACKNOWLEDGEMENT FORM

DOT&PF STATEWIDE GENERAL WORK PLAN

ADDENDUM 005-DLG-01: DILLINGHAM AIRPORT INITIAL SITE CHARACTERIZATION R1

I have reviewed this document and understand its contents and requirements. A copy of the above-referenced document has been made available to me. I agree to abide by the requirements of this Site Safety and Health Plan.

_____	_____	_____
Signature	Name (printed)	Date
_____	_____	_____
Signature	Name (printed)	Date
_____	_____	_____
Signature	Name (printed)	Date
_____	_____	_____
Signature	Name (printed)	Date
_____	_____	_____
Signature	Name (printed)	Date

COVID-19 SITE-SPECIFIC HEALTH AND SAFETY PLAN SUPPLEMENT, DILLINGHAM AIRPORT

This Site-Specific Health and Safety Plan (SSHSP) supplement has been prepared for Shannon & Wilson, Inc. personnel performing field work for the Dillingham Airport (DLG) under Department of Transportation & Public Facilities (DOT&PF) Professional Services Agreement Number 25-19-1-013 and related projects. This document describes health and safety protocols taken in response to the COVID-19 pandemic, and supplements the following, existing documents.

- Dillingham PFAS Residential Sampling Job Safety Analysis Worksheet dated February 15, 2019 (102519)

Applicability and Purpose

Shannon & Wilson has prepared this SSHSP for site characterization activities in Dillingham Alaska. Most field work will take place at the DLG and in the neighborhoods adjacent to the DLG. The purpose of this SSHSP is to protect the health and safety of field personnel from physical, chemical, and biological hazards associated with work at this site.

Field Activities

Employees will not report to work if they are experiencing symptoms of COVID-19. *Guidance for Field Work During the COVID-19 Pandemic* and *COVID-19 Best Practices Guidelines* are enclosed. Field staff will screen themselves for COVID-19 symptoms included in the attachment daily. Should staff begin to feel ill after reporting to work, they will immediately report their symptoms and self-isolate. Individuals with COVID-19 symptoms will be quarantined in their own homes before travel, or in a private hotel room after travel.

Staff will conduct daily safety meetings for work involving special safety considerations, such as drilling groundwater monitoring wells. Safety meeting attendees and subject matter will be documented using the enclosed *Daily Meeting Log* or in other field notes. Meeting attendees do not need to sign the log, to avoid passing paperwork back and forth.

Cloth masks, nitrile gloves, eye protection, emergency medical supplies, and other personal protective equipment are located in Shannon & Wilson's equipment room. A first aid kit will be available in the field.

Emergency Contacts

Contact information for project personnel is listed below.

Name	Organization	Contact Number
Marcy Nadel, Project Manager	Shannon & Wilson, Inc., 2355 Hill Road, Fairbanks, AK 99709	(907) 458-3150 or 322-9156
Kristen Freiburger, Contract Manager		(907) 458-3146 or 750-0679
Chris Darrah, Principal-in-Charge		(907) 458-3143 or 347-7468
Rachel Willis, field staff		(907) 458-3123 or 843-1781
Kasey Montoto, Office Assistant		(907) 458-3113
Jon Taylor, Dillingham Airport Manager	DOT&PF	(907) 842-5511
Sammy Cummings, PFAS Coordinator		(907) 888-5671

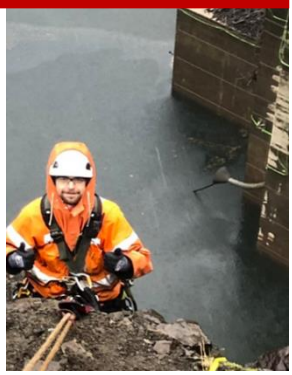
Medical and emergency contract information is listed below.

Organization	Address	Contact Number
Kanakanak Hospital	5000 Kanakanak Road, Dillingham, AK 99576	(907) 842-5201 For COVID-related clinical issues (907) 842-9440
Medcor Service	N/A	1-800-775-5866

COVID-19 BEST PRACTICES GUIDELINES

This document outlines best practices and guidelines for Shannon & Wilson employees performing work duties in the office, in the field, and while traveling. These best practices are in addition to all other policies and practices in place.

REMEMBER: If you are experiencing any symptoms (cough, fever, and/or shortness of breath) or if you or anyone you live with have tested positive, just stay at home – unless seeking medical treatment. Be sure to call your doctor's office before heading in as they may have specific instructions.



Wash your hands	Wash hands with water and soap for at least 20 seconds. If water and soap are not available, hand sanitizer should be used.
Avoid shaking hands when greeting people	Just don't do it, COVID-19 can spread the disease for up to 14 days without symptoms showing. Don't risk it, consider other options to greet people: wave, smile, just say hello.
Cough and sneeze into your bent elbow, or a tissue	Be sure to dispose of used tissues immediately, and then wash/sanitize your hands.
Try to resist touching your eyes, nose, and mouth	This is one way that COVID-19 spreads. Feel free to remind folks you see doing this not to.
Practice social distancing	Stay at least 6 feet from others. Hold virtual meetings instead of in-person; hold smaller meetings if that helps with limits on virtual meeting tools. Be sure to wipe down phones as well. Minimize visiting coworkers' workspaces.
Perform routine environmental cleaning	Routinely clean all frequently touched surfaces: clean your work areas when you arrive and leave the office, countertops, and doorknobs. If you are renting a car, wipe down the steering wheel and car components.
Plan for the unexpected	Try to keep food, and bottled water available. As businesses close and shift to pick up only practices, expect delays in receiving products and orders.




TIPS FOR FIELD WORK

- Limit crew sizes where possible and practice social distancing (i.e. remain 6 feet apart).
- Disinfect equipment and shared surfaces (restrooms, chairs, shared vehicle surfaces, etc.) at the beginning and end of each shift with Lysol or a bleach solution.
- Don't carpool to worksites if possible.
- Hold any briefings or meetings in open spaces to allow for proper distancing.
- Avoid common areas.
- Bring a jug of water and soap if you do not have access to a sink.
- Plan for additional PPE: wear safety glasses to help remind you to not touch your eyes, use gloves as needed and change between tasks to prevent cross-contamination to clean surfaces.
- Keep food and water available for yourself and don't share food.

Field Checklist

When packing/prepping for work in the field, consider adding these items to your existing list and contact your Office Manager if you need any assistance gathering any of these supplies:

☐ Water and soap to wash hands	☐ Thermometer
☐ Gloves	☐ Additional food and water
☐ Hand sanitizer (containing at least 60% alcohol)	☐ Clear sandwich bag to put your phone in during use
☐ Tissues	☐ Additional PPE (e.g., respirator) as needed

TIPS FOR SUBCONTRACTORS

- Request subs complete daily self-screening for COVID-19 symptoms before reporting for work.
- Request subs do not report for work if they are symptomatic.
- Include subs in tailgate meetings so they are informed of Shannon & Wilson's COVID-19 controls.

TIPS FOR HOTEL ACCOMODATIONS

- Use single occupancy accommodations, e.g., Airbnb or apartments, over shared spaces like hotels.
- Verify, that there is a process in place in line with Shannon & Wilson's COVID-19 controls.
- When entering your room/rental, clean all surfaces/counters with sanitizing wipes, especially areas used frequently for food prep.
- When booking, you can request a room that hasn't been used recently, 3 days at least.
- Clean your own room, with your own supplies, instead of using housekeeping. Most hotels will not enter if you place the Do Not Disturb sign on the door.
- Avoid shared spaces, like restaurants – try room service instead. You can ask them to leave it outside your door to limit contact.
- Practice social distancing in communal areas such as reception, vending, business center.
- Avoid buffets (usually breakfast) where multiple people may be handling the same serving utensils or standing close together in a line.
- Bring your own food (favorite snacks, protein bars, etc.) in case expected food options close.
- Bring extra necessities, as they may become unavailable at the hotel, due to demand.
- S&W will provide safety and sanitizing options as requested by the employee.

DAILY MEETING LOG

Project: Dillingham DOT&PF Airport Date: _____

S&W Project #: 102581 Time: _____

Weather: _____

Job Location: _____

Job Description: _____

HAZARD IDENTIFICATION/DOCUMENTATION			
Has Safety Plan been reviewed and acknowledged by field personnel?	☐ Yes	☐ No	☐ N/A
Has Work Plan/scope been reviewed by field personnel?	☐ Yes	☐ No	☐ N/A
Have changed conditions been addressed and discussed?	☐ Yes	☐ No	☐ N/A
Does the Safety Plan need to be updated?	☐ Yes	☐ No	☐ N/A
Is the Safety Plan on site?	☐ Yes	☐ No	☐ N/A
Are directions to nearest medical facility on site?	☐ Yes	☐ No	☐ N/A
Is Fall Protection Plan on site?	☐ Yes	☐ No	☑ N/A
Is Respiratory Protection Plan on site?	☐ Yes	☐ No	☑ N/A
Is Confined Entry Plan on site?	☐ Yes	☐ No	☑ N/A
Is Traffic Control Plan on site?	☐ Yes	☐ No	☑ N/A
Other Plans:			

PPE			
Safety Toe Boots	☐ Yes	☐ No	☐ N/A
Safety Glasses	☐ Yes	☐ No	☐ N/A
High Visibility Vest/Equivalent	☐ Yes	☐ No	☐ N/A
Hard Hat	☐ Yes	☐ No	☐ N/A
Gloves	☐ Yes	☐ No	☐ N/A
Face Shield	☐ Yes	☐ No	☑ N/A
Respirator	☐ Yes	☐ No	☑ N/A
Other PPE:			

Selected Task/Topic*	Potential Hazards	Safe Job Practices/Mitigation

*For a full list of tasks and associated hazards anticipated for this project refer to the site specific safety plan.

Equipment on site: _____

My signature below confirms that the site specific safety plan, project specific hazards, and mitigation have been discussed and that I understand them.

Print Name	Signature	Badge	Date
	--	--	
	--	--	
	--	--	
	--	--	
	--	--	
	--	--	

IMPORTANT INFORMATION

Important Information

About Your Environmental Report

IMPORTANT INFORMATION

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining

IMPORTANT INFORMATION

your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims

IMPORTANT INFORMATION

being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland