FINAL SITE INSPECTION REPORT OF AQUEOUS FILM-FORMING FOAM AREAS AT KING SALMON DIVERT, KING SALMON, ALASKA

Ayuda USACE Contract No. W9128F-15-D-0028, Task Order 0003

Auxilio USACE Contract No. W9128F-16-D-0015, Task Order W9128F18F0151

June 2020

Prepared for:

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Table of Contents

Figures

Tables

Appendices

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List of Acronyms and Abbreviations

µg/kg	microgram(s) per kilogram
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AFB	Air Force Base
AFFF	aqueous film-forming foam
Auxilio	Auxilio Management Services
Ayuda	Ayuda Companies
bgs	below ground surface
BRAC	Base Realignment and Closure
CAC	Combat Alert Cell
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFS	Current Fire Station
CH	clay high plasticity
CH2M	CH2M HILL
CoC	chain of custody
CSM	conceptual site model
DO	dissolved oxygen
DoD	Department of Defense
DPT	direct-push technology
DRO	diesel-range organics
DT45	dual-tube 4.5-inch
EA	EA Engineering, Science, and Technology, Inc.
EB	equipment blank
ECF	electrochemical fluorination
EPA	[U.S.] Environmental Protection Agency
ERP	Environmental Restoration Program
ESC	Eskimo Creek
Eurofins	Eurofins Lancaster Laboratories Environmental, LLC
FFS	Former Fire Station
FT001	Fire Training Area 1
FT002	Fire Training Area 2
FT004	Fire Training Area 4
FTA	fire training area
GAC	granular activated carbon
GPS	global positioning system
GRO	gasoline-range organics
GW	gravel well-graded

HDPE	high-density polyethylene
IDQTF	Intergovernmental Data Quality Task Force
IDW	investigation-derived waste
J	estimated concentration
KSD	King Salmon Divert
LCMS-MS	liquid chromatography-mass spectrometry and tandem mass spectrometry
LDC	Laboratory Data Consultants, Inc.
LHA	lifetime health advisory
LHP	Former Landfarm and Holding Ponds
LOD	limit of detection
LTM	long-term monitoring
mil	one thousandth of an inch
ML	silt low plasticity
mL	milliliter(s)
MS	matrix spike
mS/cm	milliSiemen(s) per centimeter
MSD	matrix spike duplicate
MW	monitoring well
N/A	not applicable
ng/L	nanogram(s) per liter
No.	number
NRC	NRC Alaska/U.S. Ecology
NTU	nephelometric turbidity unit
OIT	Organic Incineration Technology
ORP	oxidation-reduction potential
PA	preliminary assessment
PAH	polycyclic aromatic hydrocarbon
PARCCS	precision, accuracy, representativeness, completeness, comparability, and sensitivity
PFAS	per- and poly-fluoroalkyl substances
PFBS	perfluorobutane sulfonate
PFHpA	perfluoroheptanoic acid
PFHxS	perfluorohexanesulfonate
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PID	photoionization detector
POL	petroleum, oil, and lubricants

PVC	polyvinyl chloride
PVS	Paug-Vik Services
PWS	performance work statement
QA	quality assurance
QCSR	quality control summary report
QSM	*Quality Systems Manual for Environmental Laboratories,* Version 5.1
RA-O	remedial action objective
RAPCON	radar approach control
RCRA	Resource Conservation and Recovery Act
RFC	Red Fox Creek
RRO	residual-range organics
RSL	Regional Screening Level
RTK	real time kinetic
SAIC	Science Applications International Corporation
SI	site inspection
SL	screening level
SO	soil
SOP	standard operating procedure
SP	sand poorly graded
STA	Spray Test Area
SU	standard units
SVOC	semivolatile organic compound
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TPH	total petroleum hydrocarbons
U.S.	United States
UCMR	Unregulated Contaminant Monitoring Rule
UFP-QAPP	Uniform Federal Policy-Quality Assurance Project Plan
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
VOC	volatile organic compound
WS	worksheet
WTP	Wastewater Treatment Plant

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1.0 INTRODUCTION

This Site Inspection (SI) Report for aqueous film-forming foam (AFFF) areas at King Salmon Divert (KSD), Alaska has been prepared by CH2M HILL (CH2M) under contract to Ayuda Companies (Ayuda) and Auxilio Management Services (Auxilio). This SI has been performed under Ayuda Contract No. W9128F-15-D-0028, Task Order 0003, Option 5, and Auxilio Contract number (No.) W9128F-16-D-0015, Task Order W9128F18F0151, for the United States Army Corps of Engineers (USACE), Omaha District.

A preliminary assessment (PA) of AFFF areas was prepared for KSD in 2018 (USAF, 2018a) to evaluate the potential for a release of per- and polyfluoroalkyl substances (PFAS) at 20 areas that could have impacted surface and subsurface soil, surface water, sediment, or groundwater at the KSD. Of these areas, 9 were recommended for closure with no further investigation because of site history or previous limited sampling for PFAS (that confirmed the absence of PFAS above applicable cleanup levels), and 6 were recommended for SIs. The remaining 5 areas had limited sampling that confirmed the presence of PFAS above Alaska Department of Conservation (ADEC) migration to groundwater cleanup levels or U.S. Environmental Protection Agency (USEPA) Regional Screening Levels (RSLs) or Lifetime Health Advisories (LHAs); these areas were also recommended for further investigation (USAF, 2018a). All 11 areas are included within the scope of this SI for KSD.

The purpose of this SI is to evaluate whether a release of AFFF-derived PFAS has occurred to soil (surface and subsurface), surface water, sediment, and groundwater as a result of historical AFFF use at the following 11 KSD AFFF areas: Building 160 (Combat Alert Cell [CAC]), Former Building 152 (Former Fire Station), Building 300 (Current Fire Station), Spray Test Area, Building 617 (Wastewater Treatment Plant), Eskimo Creek, Red Fox Creek, the Fire Training Areas (FTAs) [Fire Training Area 1 (FT001), Fire Training Area 2 (FT002), and Fire Training Area 4 (FT004)], and the Former Landfarm and Holding Ponds. The SI was completed in accordance with the installation-specific Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) addendum, which identified the installation-specific requirements for the sampling and analysis of environmental media to assess the presence of PFAS, particularly perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutane sulfonate (PFBS) (Ayuda et al., 2019). The installation-specific UFP-QAPP Addendum was prepared as an addendum to the Programmatic UFP-QAPP that provides guidance for preliminary assessments and site inspections of AFFF areas at multiple U.S. Air Force (USAF) installations (Ayuda, 2018). The Programmatic UFP-QAPP covers the programmatic aspects applicable to SI options contained in the performance work statement (PWS) (USACE, 2017).

To meet project objectives, this SI was conducted consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and applicable state regulatory agencies and USEPA regions. The UFP-QAPP followed USEPA guidance (EPA QA/R-5 [USEPA, 2001], EPA QA/G5 [USEPA, 2002], UFP-QAPP Manual [Intergovernmental Data Quality Task Force {IDQTF}, 2005]) and the U.S. Department of Defense (DoD) *Quality Systems Manual for Environmental Laboratories* (QSM), Version 5.1. The UFP-QAPP also complies with the general requirements contained in U.S. Army Engineering Manual 200-1-3 (USACE, 2001) and was prepared in accordance with the guidance provided in the Optimized UFP-QAPP Worksheets (WS) (IDQTF, 2012).

1.1 Per- and Polyfluoroalkyl Substances Background and Screening Levels

PFAS are a class of compounds used in many consumer and industrial products, including nonstick cookware, food packaging, waterproof clothing, fabric stain protectors, lubricants, paints, and firefighting foams such as AFFF. AFFF was used by the military (including at USAF installations) for fire-training

exercises, in building fire suppression systems, and to extinguish fires. PFAS are particularly useful agents in AFFF because of their unique characteristic of inducing surface flow across burning petroleum, allowing water to form a layer on top of burning debris or liquid petroleum, which extinguishes the fire.

The PFAS used in AFFF have historically been manufactured by two processes: electrochemical fluorination (ECF) and telomerization. ECF-based AFFF contains and degrades into PFOS, which is considered persistent and bioaccumulative. Telomer-based AFFF does not contain or break down into PFOS and is not considered persistent or bioaccumulative. However, the USEPA has indicated that some telomer-based fluorochemicals can break down in the environment into PFOA, which is considered persistent and bioaccumulative (Fire Fighting Foam Coalition, 2014).

The chemical structures of PFAS make these compounds resistant to environmental degradation. PFOS and PFOA are persistent in the human body and the environment (USEPA, 2016a and 2016b). PFAS have potential human health effects, as reflected in ADEC's soil human health migration to groundwater and groundwater cleanup levels for PFOS and PFOA (ADEC, 2018a), as well as the LHA levels for PFOS and PFOA and the RSL for PFBS (USEPA, 2016a, 2016b, and 2019).

From the early 1970s until 2002, DoD purchased and used AFFF-containing PFOS and PFOA for firefighting and firefighting training. Older training facilities were often not constructed to prevent firefighting foams and combustion products from infiltrating into the environment. Per DoD Instruction 4715.18, Emerging Contaminants (DoD, 2009), and the *Interim Air Force Guidance on Sampling and Response Actions for Perfluorinated Compounds at Active and BRAC* [Base Realignment and Closure] *Installations* (USAF, 2012), the USAF is conducting SIs to confirm the release of and then delineate emerging contaminants such as PFAS at those areas where a reasonable basis exists to suspect a release associated with USAF activities at an installation. DoD Instruction 4715.18 was updated as of 31 August 2018 (DoD, 2018).

The USEPA has required monitoring of six PFAS in public drinking water systems since 2013 (USEPA, 2012) under the Unregulated Contaminant Monitoring Rule, which requires public water systems to collect samples and analyze for the presence of unregulated contaminants. The USEPA has issued drinking water LHA levels for two PFAS—PFOS (USEPA, 2016a) and PFOA (USEPA, 2016b)—but there are currently no federally established maximum contaminant levels for these compounds. The USEPA has also derived an RSL for PFBS (USEPA, 2019). ADEC has established cleanup levels for PFOS and PFOA for human health and migration to groundwater (for soil), as well as for groundwater (ADEC, 2018a).

Environmental media samples were analyzed for 18 PFAS compounds by Method 537.1.1 (modified) DoD QSM 5.1, Table B-15-compliant liquid chromatography-mass spectrometry and tandem mass spectrometry [LCMS-MS] (see Programmatic UFP-QAPP WS #15 [Ayuda, 2018]). All soil and sediment samples were also analyzed for moisture content as the results are reported on a dry-weight basis. However, only concentrations of PFOS, PFOA, and PFBS are used for evaluating whether a release of AFFF-derived PFAS occurred. Applicable regulatory limit or screening level values for PFOA, PFOS, and PFBS are included in WS #11 of the installation-specific UFP-QAPP for KSD (Ayuda et al., 2019). **Table 1-1** summarizes the current levels and their basis.

Table 1-1 presents USEPA soil RSLs to the ADEC soil cleanup levels found in 18 Alaska Administrative Code (AAC) 75. The table also presents USEPA groundwater and tap water LHA concentrations to the ADEC groundwater cleanup levels found in 18 AAC 75. Per the *Action Levels for PFAS in Water and Guidance on Sampling Groundwater and Drinking Water* technical memorandum (ADEC, 2018b) and the *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* memorandum (DoD, 2019), the USAF considers a release to be confirmed when exceedances of the Project Screening

Level (SL), shaded gray in **Table 1-1,** are identified. The USEPA SLs and the ADEC cleanup levels were compared and the lowest value was selected as the Project SL. Risk-based values have not yet been established for PFAS other than PFOS, PFOA, and PFBS.

1.2 Installation Background

KSD is a closed USAF installation ("divert" indicates that emergency landings can be made there) in Bristol Bay Borough, Alaska (**Figure 1-1**). Construction of KSD began in the 1930s. The airfield was completed and turned over to the U.S. Army in 1941, serving as an advanced staging base and fuel stop for aircraft during World War II. After the war, the installation was turned over to the Federal Aviation Administration and eventually transferred to state ownership in 1959. From the 1960s to 1980s, KSD served as a radar site and a Forward Operating Base supporting aircraft on alert. In 1994, the USAF withdrew all remaining permanent military personnel and aircraft from KSD, and the installation is currently operated by Chugach Support Services. Several noncontiguous land parcels are still associated with KSD, including the Main Cantonment area, an area east of the (roughly) north-south runway, and numerous smaller areas of former miscellaneous use. The airfield continues to serve as the airport for the town of King Salmon.

1.3 Site Inspection Scope

The SI was conducted per USEPA guidance for performing SIs under CERCLA (USEPA, 1992). Each area at KSD has been inspected separately, although some sampling locations are used for more than one area (i.e., when a sample location is upgradient of one area but downgradient of another area). SI activities at KSD areas involved collection of environmental media samples to evaluate whether a release of PFOS, PFOA, or PFBS has occurred in soil (surface and subsurface), surface water, sediment, and groundwater. The sampling event was coordinated with USACE, USAF personnel, and tenants, as required. Health and safety requirements and procedures were followed in accordance with the installation-specific health and safety plan (CH2M, 2019).

Surface soil, subsurface soil, surface water, sediment, and groundwater samples were collected at the investigation areas. Not all media were sampled at each area. To obtain subsurface soil and groundwater analytical samples, soil borings were advanced at the investigation areas (the Combat Alert Cell, Former Fire Station, Spray Test Area, Current Fire Station, Wastewater Treatment Plant, FTAs [FT001, FT002, and FT004], and Former Landfarm and Holding Ponds) using direct-push technology (DPT). Groundwater monitoring wells were installed within some of the borings.

Monitoring well installation and development and collection of analytical samples for environmental media was done in accordance with Ayuda and CH2M standard operating procedures (SOPs), which are in general accordance with the USACE *Geology Supplement to the Scope of Services* (USACE, 2018) and ADEC's *Field Sampling Guidance* (ADEC, 2017). Following collection of analytical samples, investigation-derived waste (IDW) was managed in accordance with the implementation guidance for AFFF-related waste streams under the process for "Soil/Water suspected to contain other regulated contaminants."

Additional objectives of the SI were to determine local groundwater elevations and assess the hydraulic gradient and groundwater flow direction at each area. This was done through measurement of groundwater levels within the new and existing groundwater monitoring wells at each area, which were positioned in a pattern to capture hydraulic gradient and flow direction. Following installation, the new groundwater monitoring wells were surveyed by an Alaska-licensed professional surveyor.

This SI Report characterizes environmental conditions at the area, confirms whether a release of PFAS occurred, and evaluates the potential for exposure to human receptors.

1.4 Report Organization

This SI Report is organized as follows:

- **Section 1.0 (Introduction)** summarizes the installation background, project objectives, and scope of work, and media SLs used to evaluate if a release has occurred.
- **Section 2.0 (Installation and Site Descriptions)** describes the installation and each AFFF area location, installation and Site history, and previous investigations at the AFFF areas.
- **Section 3.0 (Field Activities and Findings)** describes the field activities related to the investigation and sample collection at each area.
- **Section 4.0 (Building 160 [Combat Alert Cell] – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the conceptual site model (CSM) at the Combat Alert Cell.
- **Section 5.0 (Former Building 152 [Former Fire Station] – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the CSM at the Former Fire Station.
- **Section 6.0 (Spray Test Area – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the CSM at the Spray Test Area.
- **Section 7.0 (Building 300 [Current Fire Station] – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the CSM at the Current Fire Station.
- **Section 8.0 (Building 617 [Wastewater Treatment Plant] – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the CSM at the Wastewater Treatment Plant.
- **Section 9.0 (Eskimo Creek – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the CSM at Eskimo Creek.
- **Section 10.0 (Red Fox Creek – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the CSM at Red Fox Creek.
- **Section 11.0 (Fire Training Area 1 [FT001] – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the CSM at FT001.
- **Section 12.0 (Fire Training Area 2 [FT002] – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the CSM at FT002.
- **Section 13.0 (Fire Training Area 4 [FT004] – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the CSM at FT004.
- **Section 14.0 (Former Landfarm and Holding Ponds – Exposure Pathways and Updated CSM)** discusses the potential exposure pathways and updates to the Former Land Farm and Holding Ponds.
- **Section 15.0 (Summary and Conclusions)** provides a summary of the overall SI results and potential exposure pathways.
- **Section 16.0 (References)** includes details of all cited references.

Figures and tables are included at the end of the document. Appendices are provided after the figures and tables, as follows:

- **Appendix A** contains the daily quality control reports.
- **Appendix B** contains the daily tailgate safety meeting forms.
- **Appendix C** contains the surveyor's report, containing the coordinates, surface elevation, and top-of-casing elevation of each installed groundwater monitoring well.
- **Appendix D** contains field documentation, including drilling logs, monitoring well construction diagrams, well development data sheets, water level measurement forms, groundwater sampling logs, and sample collection field sheets.
- **Appendix E** contains a photographic log of activities performed at KSD.
- **Appendix F** contains the project quality control summary report, analytical results, and data validation report.
- **Appendix G** contains the bill of lading and IDW manifest, certificate of disposal and ADEC transport forms.

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2.0 INSTALLATION AND SITE DESCRIPTIONS

2.1 Preliminary Assessment

A PA was performed at KSD in 2016 to identify locations of potential releases of AFFF to the environment. PA activities included assessment of 20 areas, including FTAs, hangars, fire stations, emergency response locations, and other buildings where use, release, or storage of AFFF may have occurred. Limited sampling for PFAS in soil, surface water, sediment, and groundwater was conducted in 2013 (AECOM, 2014) and in 2015 and 2016 (PVS, 2018). In addition, some limited PFAS sampling has been conducted in association with other monitoring events at KSD. Where available, results of previous investigations are included in the AFFF-area-specific sections of Section 2.3, Site Descriptions, and on the figure for each AFFF area.

The PA identified 20 areas, with 9 areas recommended for closure with no further investigation because of site history or previous limited sampling for PFAS (that confirmed the absence of PFAS above applicable cleanup levels); those areas are not discussed in this document. Of the remaining 11 areas, 6 areas were recommended for SIs: Building 160 (Combat Alert Cell), Building 152 (Former Fire Station), Spray Test Area, Building 300 (Current Fire Station), Building 617 (Wastewater Treatment Plant), and Eskimo Creek. A further 5 areas where limited PFAS sampling confirmed the presence of PFAS above applicable regulatory levels were recommended for further investigation, including Red Fox Creek, the FTAs (FT001, FT002, and FT004), and the Former Landfarm and Holding Ponds.

All 11 of the areas recommended for SIs and further investigation in the PA report (USACE, 2018) were investigated under this SI. **Table 1-2** summarizes the AFFF areas and selection rationale for SIs. The following are summaries and operational histories of the 11 areas to be investigated at KSD.

2.2 Hydrogeology

Intense glaciation occurred during the Pleistocene epoch over much of the Alaska Peninsula, which produced the outwash sediment underlying much of KSD. At least three aquifer units are known to be present in the King Salmon area. These aquifers consist of unconsolidated, well-sorted to poorly sorted silty and gravelly sands separated by aquitard units consisting of silty sands, silts, and clays. The aquitards separating these aquifers may be discontinuous (Science Applications International Corporation [SAIC], 1992).

The shallowest aquifer, the A-Aquifer, is unconfined and composed of moderately well-sorted sands and silty sands with discontinuous lenses of medium- to coarse-grained gravel at the base. The A-Aquifer outcrops in many areas within KSD, and the total depth to the A-Aquifer ranges from ground surface at water bodies and wetlands, to 45 feet below ground surface (bgs) along the northern margin of KSD. The saturated thickness ranges from 0 to 15 feet. Groundwater movement is generally toward local topographic lows and surface drainages such as wetlands, rivers, creeks, and ditches, and is most likely recharged by precipitation and surface water. **Figures 2-1 and 2-2** present the groundwater flow directions based on water levels collected during this SI. Major drainages such as the Eskimo and Red Fox Creeks have eroded through the A-Aquifer. At the base of the A-Aquifer is a zone of lower hydraulic conductivity, consisting of a gravelly clayey silt and sandy silt, referred to as the A-Aquitard. The A-Aquitard is from 7 to 22 feet thick (USAF, 2017b). The A-Aquitard has previously been reported to locally disrupt and modify the regional unconfined groundwater flow pattern (A-Aquifer) in some areas when encountered at its thickest points (SAIC, 1992). Some drinking water wells downgradient of the KSD may be screened in the A-Aquifer.

The top of the B-Aquifer has been encountered at depths ranging from 50 to 80 feet bgs. The known thickness of this aquifer ranges from 15 to 40 feet. The B-Aquifer is situated in interbedded sequences of silty sands, sandy gravels, and silty sandy gravels. A second aquitard (the B-Aquitard) is present at the base of the B-Aquifer. The thickness of this second aquitard is estimated at between 10 and 120 feet. This unit is composed of predominantly sandy clay (SAIC, 1992). Groundwater in the B-Aquifer is probably in equilibrium with the A-Aquifer; similar piezometric surface has been measured in adjacent A-Aquifer and B-Aquifer monitoring wells. Groundwater flow direction in the B-Aquifer is south towards the Naknek River. Numerous residential drinking water-supply wells are screened in this aquifer. The underlying B-Aquitard varies between 10 and 120 feet thick (USAF, 2017b).

The C-Aquifer underlies the B-Aquitard at a depth of approximately 205 feet bgs. KSD water-supply wells are reported to terminate in the C-Aquifer, which is thought to be a confined aquifer. The aquifer thickness and flow direction are unknown for the C-Aquifer (Paug-Vik Services [PVS], 2009). Limited data from water-supply well No. 5 suggest that the thickness of C-Aquifer is at least 20 feet (SAIC, 1992). Available cross sections are provided in Appendix A and include a general cross section for the King Salmon area (SAIC, 1992) and a series of more detailed cross sections near Building 617 (Wastewater Treatment Plant) (EA, 2016).

2.2.1 Groundwater Zones

The Environmental Restoration Program (ERP) sites at the KSD have been grouped into seven environmental management zones, called groundwater zones. Groundwater Zones 1 through 5 are located at KSD, with the remaining two groundwater zones located nearby at Naknek Recreation Camp I [Rapids Camp – Zone 6], and Naknek Recreation Camp II [Lake Camp – Zone 7]). Each zone is a geographically and hydrogeologically contiguous area that is amenable to investigative and remedial management as a single unit. Three of the seven groundwater zones are located within the boundaries of the SI. Descriptions of each of the three groundwater zones are as follows (USAF, 2018b):

- Groundwater Zone 1, Base Living Area - Coincides with the KSD Base Living Area. Trichloroethene (TCE) and petroleum are contaminants of concern in groundwater at sites in Groundwater Zone 1 (USAF, 2018b). AFFF areas within Groundwater Zone 1 include Building 617 (Wastewater Treatment Plant).

- Groundwater Zone 2, Base Industrial Area – Coincides with the KSD Base Industrial Area. TCE and petroleum are contaminants of concern in groundwater, surface water, and soil at sites in Groundwater Zone 2 (USAF, 2018b). AFFF areas within Groundwater Zone 2 include Building 160 (Combat Alert Cell), Spray Test Area, Former Building 152 (Former Fire Station), Building 300 (Current fire Station), and Former Landfarm and Holding Ponds.

- Groundwater Zone 5, Radar Approach Control (RAPCON)/Red Fox Creek – Contains the KSD FTAs and landfills. Eight source areas may have potentially contributed to the contamination in this zone, including FT001 and the RAPCON; FT002, FT003, and FT004; Lower Landfill No. 2; Upper Landfill No. 2; Landfill No. 3; and Circle Landfill (USAF, 2018b). AFFF areas within Groundwater Zone 5 include FT001, FT002, and FT004.

2.3 Site Descriptions

2.3.1 Building 160 (Combat Alert Cell)

Building 160 (Combat Alert Cell) was constructed in 1957 (USAF, 2013) and is located southeast of Jensen Road and north of the northern end of the main runway. The Combat Alert Cell is composed of eight hangar cells, situated in a row and numbered sequentially from northwest to southeast, connected by man doors. Each has two hangar doors, opening to the asphalt pad to the northeast and southwest. Cell 5 has been subdivided into office space, a mechanical room, and storage.

The building is surrounded by pavement, with a dirt and grass area to the west and southeast. There is a drainage ditch extending along the northern and western sides of the paved area surrounding the Combat Alert Cell that exits to the west, where it becomes a steep-sided ravine after crossing beneath Jensen Road. The geographical coordinates for the Combat Alert Cell are 58°41'9.35"N and 156°39'45.05"W. The location is presented on **Figures 1-1 and 2-3**.

An AFFF fire suppression system was installed at an unknown date. During periodic system testing, only water has been used to check the spray pattern (McMichael, 2016a). The AFFF system is currently not in use; however, two known activations of the AFFF system have occurred within the Combat Alert Cell (Rose, 2016). The system consists of one 300-gallon plastic tank containing AFFF (located in the mechanical room) connected to four cannons in each of the individual cells (two on the northwestern and two on the southeastern side of each cell.) When the main storage tank needed to be refilled, a hand pump was used to transfer the AFFF from 55-gallon drums into the tank.

There are no floor drains in the individual hangar bays (cells) at the Combat Alert Cell. The mechanical room, which is used for AFFF storage and is where the pumps are housed, has a floor drain that connects to the wastewater system. There are no known leaks or spills associated with the mechanical room. Two known releases of AFFF have been reported in the hangar cells, but the dates and amount of AFFF released are unknown. During one incident, the system was accidentally tripped when sunlight reflecting off fuel tripped a sensor designed to detect light indicative of a fire. In both releases, AFFF was pushed out the hangar doors on both sides of the hangar (northeastern and southwestern sides) (Rose, 2016). Drainage at the Combat Alert Cell flows to the west and northwest into dirt and grass areas and eventually into a ravine that connects to Eskimo Creek.

2.3.2 Former Building 152 (Former Fire Station)

The Former Building 152 (Former Fire Station) was located south of Wolf Road between Raven Lane and Boris Boulevard. The Former Fire Station was surrounded by paved roads on the north, east, and west and by Taxiway N on the south. The Former Fire Station served as the main airfield fire station from approximately 1957 until construction of Building 300 (the Current Fire Station) and was demolished sometime between 1989 and 1994; the location is currently a grassy field. There are drainage ditches west of the area that lead to Eskimo Creek. The geographical coordinates for the Former Fire Station are 58°41'13.29"N and 156°39'24.02"W. The location is presented on **Figures 1-1 and 2-4**.

The Former Fire Station housed at least one fire engine that contained AFFF. AFFF was also stored within the building, but the amount of AFFF kept on each fire engine and stored in the building is unknown. It is also unknown whether any AFFF spills or leaks occurred or how the fire engines were refilled with AFFF. Nozzle spray tests were periodically conducted in the grassy areas east and west of the Former Fire Station (Rose, 2016). The amount and frequency of AFFF released during each test is unknown.

2.3.3 Spray Test Area

The Spray Test Area is located southwest of the Former Fire Station, on the parking apron of Taxiway N. The parking apron is surrounded by grass, except for the paved access roads into the apron. The nozzle spray tests were conducted on the parking apron of Taxiway N while the Former Fire Station was in operation to check equipment and evaluate the chemical balance of the AFFF (McMichael, 2016a). The general surface water drainage path is to the north and south toward the drainage ditches, which connect to Eskimo Creek (AECOM, 2014). The geographical coordinates for the Spray Test Area are 58°41'9.89"N and 156°39'25.98"W. The location of the area is presented on **Figures 1-1 and 2-5**.

The KSD Fire Department performed nozzle spray tests on the parking apron of Taxiway N. The Spray Test Area was used for many years, from about 1957 when the Former Fire Station was constructed until it was demolished sometime between 1989 and 1994, but the volume of AFFF applied to the area cannot be estimated.

2.3.4 Building 300 (Current Fire Station)

The Current Fire Station is located north of the northern end of Jensen Road. The station is surrounded by pavement and some small, grassy areas. The building serves as the main airfield fire station. The primary surface drainage in the area is to the northwest to Eskimo Creek. The geographical coordinates for the building are 58°41'27.66"N and 156°39'37.97"W. The location of the Current Fire Station is presented on **Figures 1-1 and 2-6**.

The Current Fire Station was constructed in 1988 and currently houses three fire engines that carry between 75 and 130 gallons each of AFFF (for a total volume of approximately 335 gallons). During a 2016 site visit to the building for the PA, 123 5-gallon buckets (615 gallons) of AFFF were observed stored in the northwestern portion of the building. An overhead fill system is used to refill the fire engines with AFFF. The supply for the overhead fill system is a 325-gallon AFFF tank located on the northern portion of the building; the tank was half full at the time of the PA visit.

There have been no reported leaks or spills associated with the trucks, storage containers, or the fill system. However, the fire engines are occasionally washed outdoors; based on personal communication with John Rose, a local electrician, if any residual AFFF were on the truck, it would be released to the environment (USAF, 2018a). When the engines are washed indoors, the wash water is collected in the floor drains, processed through an oil-water separator, and pumped out to the wastewater drains (McMichael, 2016b), which ultimately run to the Wastewater Treatment Plant. From the time the Current Fire Station was completed in 1988 until wastewater was routed to the new Wastewater Treatment Plant in the town of King Salmon (operated by the Bristol Bay Borough) in 1994 or 1995, wastewater would have been routed to the Building 617 Wastewater Treatment Plant. Only indoor releases of AFFF would have been routed to Building 617. In addition, AFFF was released during the nozzle spray tests in the grassy area northeast of the building (Rose, 2016). Currently, nozzle spray testing is restricted to water only, but AFFF dilutions may have previously been used. The amount and frequency of AFFF released during each test is unknown.

2.3.5 Building 617 (Wastewater Treatment Plant)

Building 617 (Wastewater Treatment Plant) was constructed in 1969 and is located southeast of Caribou Road in the Main Cantonment portion of KSD. Wastewater was treated at the Wastewater Treatment Plant in the aeration lagoons and tested for effluent 5-day biochemical oxygen demand. Industrial cooling water flows were sent directly to Eskimo Creek without treatment at the lagoons (SAIC, 1992); therefore,

it is likely that the treated wastewater from the Wastewater Treatment Plant was also discharged to Eskimo Creek.

The only industrial wastewater (from areas identified as possibly having AFFF releases) received by the Wastewater Treatment Plant was from the Current Fire Station and the Combat Alert Cell. The Wastewater Treatment Plant received wastewater from the Current Fire Station from 1988 through 1994 or 1995 and received wastewater from the Combat Alert Cell from as early as 1969 through 1994 or 1995. The current Bristol Bay Borough's King Salmon Wastewater Treatment Plant was completed in 1992, and by 1994 or 1995, all wastewater from KSD was routed to King Salmon Wastewater Treatment Plant. The Building 617 Wastewater Treatment Plant was abandoned between 1994 and 1995, after all KSD wastewater systems were connected to the current Wastewater Treatment Plant (Gottschalk, 2016). The geographical coordinates for the building are 58°41'26.50"N and 156°40'3.42"W. The location of the Wastewater Treatment Plant is presented on **Figures 1-1** and **2-7**.

2.3.6 Eskimo Creek

Eskimo Creek traverses the Main Cantonment portion of KSD. Water generally flows from the northeast to the southwest and empties into the Naknek River. Eskimo Creek has received surface water runoff from several locations known to have had releases of AFFF, including the Combat Alert Cell and the Former and Current fire stations, as well as the various associated spray test areas. Drainage ditches to the west of the Combat Alert Cell converge and extend under Jensen Road, where the ditch then deepens into a ravine. An additional drainage extends northwest from Building 300 to Eskimo Creek in that area. In addition, wastewater from the Wastewater Treatment Plant likely discharged to Eskimo Creek. The geographical coordinates of the creek (near where the Alaska Peninsula Highway curves near the creek, downgradient of all known potential KSD AFFF source areas) are 58°41'9.40"N and 156°40'11.46"W. The location is presented on **Figures 1-1** and **2-8**.

Two known releases from the AFFF fire suppression system at the Combat Alert Cell have been reported, where AFFF and water were pushed out the hangar doors and onto the pavement. The AFFF likely flowed west toward the Ravine Drainage and then into Eskimo Creek. From the former and current fire stations, spray tests from the fire engines were performed near the stations, and the AFFF and water likely flowed with surface runoff to the west toward Eskimo Creek. Spray testing at the parking area of Taxiway N (the Spray Test Area) likewise probably reached drainage pathways in the surrounding grassy areas that also ultimately lead to Eskimo Creek. The amount of AFFF received by Eskimo Creek is unknown.

In the main portion of the airfield, one surface water sample was collected in 2013 from Eskimo Creek. This location, approximately 1 mile east of the FTAs, was intended to serve as a background sample. PFAS were detected in the surface water sample; however, the concentrations were all flagged as estimated concentrations (J)[1] and were less than the reporting limits (AECOM, 2014). PFOS was detected at a concentration of 14.0 J nanograms per liter (ng/L), and PFOA was not detected (with a detection limit of 20.0 ng/L) (AECOM, 2014). These concentrations were less than the 2016 LHA levels for drinking water (USEPA, 2016a and 2016b).

2.3.7 Red Fox Creek

Red Fox Creek traverses the airfield portion of KSD. Water generally flows from the north-northeast to the south and empties into the Naknek River. Red Fox Creek has received surface water runoff from FT001,

[1] A J qualifier indicates an estimated concentration, where the analyte is positively identified and the result is less than the limit of quantitation but greater than the detection limit.

where AFFF is known to have been released. In addition, there is potential for Red Fox Creek to receive surface water runoff from FT002 and FT004. The geographical coordinates of the creek (near the FT001 RAPCON site) are 58°40'42.69"N and 156°38'35.53"W. The location of Red Fox Creek is presented on **Figures 1-1 and 2-9**.

In 2013, six surface water samples were collected from Red Fox Creek. PFOS was detected in surface water at concentrations up to 18,000 ng/L, and PFOA at concentrations up to 16,000 ng/L (AECOM, 2014). These concentrations are above the current USEPA RSLs (SLs) for surface water, which are 70 ng/L (combined total of PFOS and PFOA) (USEPA, 2016a and 2016b).

In addition, sediment samples were collected from five locations along a channel that discharges into Red Fox Creek. PFOS was detected at concentrations ranging up to 460 micrograms per kilogram (µg/kg), and PFOA at concentrations ranging up to 120 µg/kg (AECOM, 2014). The PFOS concentrations in sediment were above the ADEC Cleanup Level of 3.0 µg/kg, for all five sediment sample locations. Two of the five locations had PFOA detected above the Project SL of 1.7 µg/kg (AECOM, 2014).

2.3.8 Fire Training Area 1 (FT001)

FTA 1 (FT001), a former FTA, consists of two areas: a former fire training pit and the RAPCON. The RAPCON area does not have a history of known AFFF use; however, the RAPCON facility was said to have been built on a former fire training facility in the early 1980s (AECOM, 2014). Sampling in 2013 and 2016 has already confirmed the presence of PFOA and PFOS above Project SLs in the RAPCON area. Three soil sample locations in 2013 had concentrations ranging up to 770 µg/kg PFOA (above the Project SL of 1.7 µg/kg) and up to 160 µg/kg PFOS (above the Project SL of 3.0 µg/kg). Groundwater samples collected downgradient of FT001 RAPCON in 2013 and 2016 (with only the most recent results considered if multiple samples were collected at a single location) ranged up to 81,000 ng/L PFOA and up to 39,000 ng/L PFOS, above the Project SL of 70 ng/L (combined total of PFOS and PFOA) (AECOM, 2014; PVS, 2018). The focus of this SI is the FT001 former fire training pit area. There are groundwater monitoring wells located near both FT001 and RAPCON areas. The FT001 former fire training pit is currently a dirt field with patches of vegetation located north of Road S and east of the northern half of the north-south runway. The FT001 fire training pit was approximately 50 feet in diameter. From approximately 1980 to 1992 (AECOM, 2014), FT001 was used monthly for training exercises during which both contaminated fuel sources (including waste hydraulic fluid, waste oil, and spent solvents) and non-contaminated jet propellant fuel No. 4 were burned. Less than 10 percent by volume of the contaminated fuel sources were burned during each training exercise. Fires were started by applying 400 to 500 gallons of fuel to pre-wet ground and were extinguished with a mixture of AFFF and water (Engineering Science, 1985). Although the training activities were performed in a pit, the pit was not lined. The geographical coordinates of FT001 are 58°40'50.34"N and 156°38'23.47"W. The location of FT001 is presented on **Figures 1-1** and **2-10**.

In 1995, approximately 2,000 cubic yards of petroleum, oil, and lubricants (POL)-contaminated soil were excavated from within the former fire training pit. The excavation was approximately 70 feet in diameter and was excavated to 12 feet, where groundwater was encountered. The excavated soil was first stockpiled on 10-mil (i.e., one thousandth of an inch) -thick polyethylene liner material on the eastern side of the pit and then transported to the biocells. Clean fill materials were imported to backfill the excavation. The excavation area was overfilled to form a mound, to account for future settling of the fill material (EMCON Alaska, 1996).

In 2013, groundwater samples were collected from three A-Aquifer monitoring wells associated with the FT001 fire training pit. The total depths of the monitoring wells range from 20 to 38 feet bgs. PFOS was

detected in groundwater at up to 150,000 ng/L and PFOA was detected at up to 16,000 ng/L (both for the sample from monitoring well ESMW-2A) (AECOM, 2014). These concentrations are greater than the Project SL of 70 ng/L (combined total of PFOS and PFOA).

2.3.9 Fire Training Area 2 (FT002)

FTA 2 (FT002) is currently a partially paved access road located approximately 3,400 feet southwest of the intersection of Lake Camp Road and Paradise Point Road. From approximately 1979 to the 1980s, FT002 was used monthly for training exercises during which contaminated fuel sources were applied to scrap lumber and wooden boats. The training area was off the abandoned airfield pavement until 1984, when it was moved onto the pavement and diked with sand. Fires were extinguished with AFFF, halon, or potassium bicarbonate (Engineering Science, 1985; SAIC, 1992). It is unknown how much fuel and extinguishing agent were used during each training event. The geographic coordinates of this location are 58°40'24.34"N and 156°38'10.54"W. The location of FT002 is presented on **Figures 1-1** and **2-11**.

From 1979 to the 1980s, waste fuels were used to burn scrap lumber and wooden boats during fire training exercises. AFFF was one of the extinguishing agents used to extinguish the fires. The training activities were performed on and off the airfield pavement. Although the area was occasionally diked with sand, a permanent containment system did not exist. It is unknown whether the sand contained all the water and AFFF during training activities. In addition, the current location of the sand is unknown because the sand is no longer in this area. Based on the operational history and release of AFFF during these years, the potential for PFAS released to the environment is high.

In 2013, three surface soil samples were collected at FT002. PFOS was detected at concentrations up to 1,500 µg/kg, (above the Project SL of 3.0 µg/kg) and PFOA was detected at up to 4.3 µg/kg (above the Project SL of 1.7 µg/kg) (AECOM, 2014).

2.3.10 Fire Training Area 4 (FT004)

FTA 4 (FT004) is currently a gravel and dirt field located approximately 2,500 feet southwest of the intersection of Lake Camp Road and Paradise Point Road. FT004 consisted of a circular burn pit approximately 50 feet in diameter in which waste oil, spent solvents, and contaminated fuels were burned up until 1980 (the date the area was first used for fire training is unknown). Old automobiles were used during training exercises to simulate aircraft fires (Engineering Science, 1985; SAIC, 1992). The geographic coordinates of this location are 58°40'29.20"N and 156°37'54.42"W. The location of FT004 is presented on **Figures 1-1** and **2-12**.

Between September and November 2009, approximately 1,200 cubic yards of POL-contaminated soil were excavated and transported to the former landfarm (see Section 2.3.11). The area of the oval excavation (54 feet in diameter by 67 feet in diameter) was approximately 2,840 square feet, with a depth of approximately 11 to 12 feet bgs. Following excavation, six confirmation samples were collected from the sidewall; gasoline-range organics (GRO), volatile organic compounds (VOCs), and polycyclic aromatic hydrocarbons (PAHs) were detected at concentrations above the ADEC 2008 Method Two soil cleanup levels. Additional excavation to remove soil with concentrations above cleanup levels was not performed because the contractual excavation of 1,200 cubic yards had been reached. Therefore, the excavation was lined with reinforced plastic sheeting and backfilled with clean soil (PVS, 2011). In 2014, soil was excavated from the remaining areas of contamination at the perimeter of the 2009 excavation. An additional 228 cubic yards of POL-contaminated soil was transported to the landfarm. Confirmation samples were below ADEC soil cleanup levels (2008) for VOCs, GRO, diesel-range- (DRO) and residual-range organics (RRO), and PAHs (USAF, 2017b).

In 2013 (AECOM, 2014) and 2015 and 2016 (PVS, 2018), groundwater samples were collected for PFAS from a total of six A-Aquifer monitoring wells at FT004. Three monitoring wells were sampled in 2013, three different monitoring wells were sampled in 2015, and all six monitoring wells were sampled in 2016. The total depths of the monitoring wells were approximately 25 feet bgs. In 2013, PFOS was detected in groundwater at concentrations ranging up to 36,000 ng/L and PFOA was detected at concentrations ranging up to 8,700 ng/L (both results from monitoring well FT004-MW-2) (AECOM, 2014). In 2015, PFOS was detected in groundwater ranging up to 68,000 ng/L and PFOA was detected at concentrations ranging up to 19,000 ng/L (both results from FT04-MW8 (PVS, 2018). In 2016, all six monitoring wells were sampled for PFAS; PFOS was detected in groundwater at concentrations ranging up to 30,000 ng/L (result from monitoring well FT04-MW7) and PFOA was detected at concentrations ranging up to 68,000 ng/L (result from FT04-MW08) (PVS, 2018). These concentrations are above the SL of 70.0 ng/L (combined total of PFOS and PFOA). There are no monitoring wells completed deeper than the A-Aquifer at FT004 (PVS, 2018).

In addition, in 2013 three surface soil samples were collected at FT004. PFOS was detected at concentrations up to 190 µg/kg (above the Project SL of 3.0 µg/kg) and PFOA was detected at up to 160 µg/kg (above the Project SL of 1.7 µg/kg) (AECOM, 2014). PFOS and PFOA were also detected in the excavation stockpile samples from the 2014 removal action (concentrations not provided) (PVS, 2018).

2.3.11 Former Landfarm and Holding Ponds

The Former Landfarm and Holding Ponds are located north of Bear Loop. The area is relatively flat, although overland flow is likely toward the forested wetland area to the north. Based on the 2012 wetland inventory map information, much of the area that was occupied by the former landfarm and leachate holding ponds was previously identified as a continuation of the forested wetland (USFWS, 2012). The landfarm was constructed in 2014 with lined cells for ex situ bioremediation of a total of 1,550 cubic yards of POL-contaminated soils from DA031, FT004, SA036-DR13, SA039-DR3, SA039-DR14, SA039-DR16, and SA039-DR18. Approximately 37 cubic yards of additional POL-contaminated soils were contributed from other locations. The landfarm cells were approximately 12 inches deep and were tilled periodically during the summer to assist bioremediation (USAF, 2018b). The following year, in 2015, excess leachate from rain collecting in the lined cells was pumped through a granular activated carbon (GAC) filter and stored in temporary holding ponds until the water met ADEC water quality standards and could be discharged onsite (USAF, 2018b). The geographical coordinates are 58°41'25.45"N and 156°39'10.78"W. The location of the Former Landfarm and Holding Ponds is presented on **Figures 1-1 and 2-13**.

The former landfarm received contaminated soil, stored in engineered biocells, from FT004 and other KSD locations. FT004 has confirmed PFOS and PFOA concentrations above ADEC's cleanup levels for migration to groundwater. In 2015, the soils at the landfarm that had come from FT004 were sampled for PFOS and PFOA. Results indicated that the soil had concentrations of 77 to 100 µg/kg PFOA and 180 to 240 µg/kg PFOS in 2015 (based on three multi-increment samples). In 2016, soils from the FT004 area of the landfarm as well as the other locations in the landfarm were sampled for PFOS and PFOA. Incremental sampling methodology samples from decision units with soil from the FT004 area had concentrations of 8.0 to 29 µg/kg PFOA and 110 to 170 µg/kg PFOS. Incremental sampling methodology samples of soil from the other landfarm locations had detectable concentrations of PFOS and PFOA in all but one of the four other samples. At one of these locations, concentrations of PFOA and PFOS exceeded their respective migration-to-groundwater cleanup levels (USAF, 2018b).

Starting in 2015, excess leachate resulting from rain collecting in the landfarm was pumped through a GAC filter and stored in temporary, lined holding ponds until analytical results indicated that ADEC cleanup

levels for water quality were being met. PFOS and PFOA were added to the analysis while the cleanup levels were being considered in October 2015, and both contaminants were found to be above the proposed cleanup levels (concentrations were not provided; cleanup levels [proposed at the time] were 400 ng/L for PFOS and PFOA). Additional sampling in 2016 for PFOA and PFOS from leachate holding ponds indicated that one of the eight holding ponds had PFOA concentrations above the cleanup level. Though the specific results were not provided, the 2015 and 2016 results would also be above the current SL of 70 ng/L (combined total of PFOS and PFOA). Approximately 150,000 gallons of leachate were discharged onsite prior to the addition of PFOS and PFOA to the discharge requirements (USAF, 2018b). Because some pond results have indicated that PFOS and PFOA have been above cleanup levels in some of the leachate ponds, the discharged leachate could have had concentrations above cleanup levels for those contaminants. The treated water discharge point location is shown on **Figure 2-13.**

The former landfarm was deconstructed in 2018. A total of 4,674 tons of POL and PFOA/PFOS contaminated soil were removed, transported and disposed of at an approved facility from the North and South Biocells and the Landfarm Area. Approximately 4,700-CY/7,000 tons of PFOA/PFOS contaminated soil remains stored in three long-term stockpiles within the former landfarm footprint at the King Salmon Biocell and Landfarm project area. Based upon confirmation soil sample results, PFOA/PFOS contaminated soil remains above the regulatory cleanup levels in the sub-base below two of the remaining stockpiles (the Sub-Base Stockpile and Naknek Backhaul Stockpile), as well as the western berm of the Naknek Backhaul stockpile, and in the northeast quadrant of the former landfarm footprint.

In addition, the sub-base of the Sacrificial Sand Stockpile is assumed to be contaminated as no samples have been collected sub-liner. The vertical and horizontal extents of PFOA/PFOS detected at concentrations above the regulatory cleanup level are not defined. There is insufficient data at this time to accurately estimate the quantity or extent of impacted media at the Site (Air Force Civil Engineer Center [AFCEC], 2019).

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3.0 FIELD ACTIVITIES AND FINDINGS

Site Inspection field activities were conducted at the KSD between 14 August 2019 and 09 September 2019. Field activities included advancing soil borings; surface and subsurface soil sampling; soil boring abandonment; monitoring well installation, well development; groundwater sampling; surface water and sediment sampling; soil boring and monitoring well surveying; and IDW management. IDW transport was completed 22 November 2019.

A field preparatory/quality control meeting was conducted by Ayuda project management, safety, field, and chemistry personnel prior to mobilizing to the KSD. The meeting covered anticipated hazards, types and proper use of equipment needed for the field activities, sampling procedures, and review of relevant SOPs to be used, including preventative measures to avoid cross-contamination of samples with PFAS-containing compounds. These preventative measures included the following:

- Prohibiting equipment or material containing suspect PFAS content in the vicinity of field activities.
- Prohibiting sampling personnel from donning Gore-Tex® clothing, Tyvek® suits, or clothes treated with stain- or weather-resistant coatings.
- Requiring field personnel to wash their hands thoroughly before coming onsite and after coming in contact with food wrappers, Post-It® notes, or other suspect materials that potentially contain PFAS.

Field activities were recorded in field logbooks and summarized in the daily quality control reports presented in **Appendix A**. Daily safety briefings were performed prior to performing work tasks to review the anticipated tasks and associated hazards. Tailgate safety forms are presented in **Appendix B**.

A potable water source sample (KS-PotableEB-001) was collected and submitted to the DoD-accredited environmental laboratory, Eurofins Lancaster Laboratories Environmental, LLC, (Eurofins) of Lancaster, Pennsylvania, and analyzed by Eurofins for 18 PFAS compounds by Method 537 Version 1.1 Modified using LCMS-MS, in compliance with DoD QSM 5.1, Table B-15. There were no PFAS compounds detected above the laboratory detection limits in the potable water source tested and used during investigation activities. The analytical results are presented in **Appendix F**.

A gel ice pack equipment blank (EB) sample (KS-IceEB-001) was submitted for laboratory analysis to Eurofins for 18 PFAS compounds by Method 537 Version 1.1 Modified using LCMS-MS, in compliance with DoD QSM 5.1, Table B-15. All 18 PFAS compounds were below laboratory detection limits. The gel ice pack EB results are included in **Appendix F**.

Laboratory-certified PFAS-free water was supplied by Alaska Pure Water Products and was used for decontamination of groundwater sampling equipment during the project, as described in **Section 3.2.5**. The laboratory-certified PFAS-free water was also used as the source water for the groundwater sampling EBs. These results are also presented in **Appendix F**.

Analytical samples were shipped in gel ice-packed filled sample coolers under proper chain-of-custody (CoC) procedures via cargo plane from King Salmon, Alaska, to Anchorage, Alaska, and then via overnight courier to Eurofins. Analytical procedures were performed in accordance with DoD QSM version 5.1, Programmatic UFP-QAPP (Ayuda, 2018), and UFP-QAPP Addendum (Ayuda et al., 2019).

The investigative and quality control samples were analyzed for PFAS compounds by Method 537 Version 1.1 Modified using LCMS-MS, in compliance with DoD QSM 5.1, Table B-15. Eighteen PFAS compounds were analyzed for these SIs and all results are included in **Appendix F**; however, only PFOA, PFOS, and PFBS are the focus of these SIs.

3.1 Soil Boring Advancement and Sampling of Surface and Subsurface Soils

3.1.1 Boring Advancement

Soil boring locations were defined in the UFP-QAPP Addendum (Ayuda et al., 2019) and selected based upon findings in the PA (USAF, 2018a) and site reconnaissance. They were biased toward potential source areas and downgradient migration pathways. Slight modifications to the proposed locations were made in the field based on utility conflicts and with approval from Chugach and KSD personnel. The borings were advanced and installed in accordance with Ayuda SOPs and the USACE Geology Supplement to the Scope of Services (USACE, 2018). Soil borings were advanced at all areas with the exception of Eskimo Creek and Red Fox Creek (nine of the 11 areas identified in the PA).

In total, 26 soil borings were advanced using a Geoprobe 6620DT DPT drill rig to depths ranging from 10.0 feet bgs to 28.8 feet bgs. Subsurface soil samples were collected continuously using a Geoprobe Macro-Core MC5 5-foot by 1.75-inch core barrel sampler. Prior to logging, a photoionization detector (PID) was calibrated with isobutylene calibration gas on a daily basis. Each soil core was field screened for the presence of VOCs using a PID. After field screening, the geologist recorded the core recovery, lithology and sample collection information on the drilling log.

All soil descriptions were recorded in accordance with the Geology Supplement to the Scope of Services (USACE, 2018), using the following general format:

- Unified Soil Classification System (USCS) symbol (e.g., GW, SP, ML, or CH) and soil type (e.g., fat clay, lean clay, sand, or silty gravel).
- Consistency of cohesive materials or apparent density of non-cohesive materials.
- Moisture content.
- Color (using Munsell soil color charts).
- Other descriptive features, such as grading, staining, organics, fossils, odors, and similar.

The soil drilling logs for all soil borings are presented in **Appendix D-1**. All soil cuttings that were not used for samples were containerized in either 5-gallon buckets or 55-gallon drums in accordance with the IDW management plan included in the UFP-QAPP Addendum (Ayuda et al., 2019). All soil cuttings were staged within secondary containment at the landfarm and holding ponds pending the results of waste characterization analysis.

3.1.2 Soil Sampling

One surface soil and at least one subsurface soil sample were collected from each soil boring and submitted for laboratory analysis as specified in the modified PWS (USACE, 2017a) and in accordance with the UFP-QAPP Addendum (Ayuda et al., 2019). All soil samples were collected using the Geoprobe Macrocore MC5 core barrel sampler using new, dedicated polyvinyl chloride (PVC) liners. Surface soil samples were collected from the top 6 inches of soil below the vegetation in the sample cores.

Subsurface soil samples were collected from the 1-foot interval immediately above the water table observed during drilling activities or 1-foot interval immediately above the A-Aquitard encountered at the Combat Alert Cell. Soil samples were collected in accordance with the UFP-QAPP Addendum and Ayuda SOP No. 3 (Ayuda et al., 2019). Soil sampling logs are included in **Appendix D-6**. A photographic log of activities performed at KSD is presented in **Appendix E.**

Soil samples were collected into laboratory-supplied 125-milliliter (mL) or 4-ounce polyethylene containers and immediately placed in gel ice-pack filled sample coolers. A laboratory CoC was maintained for each sample collected. Copies of the CoCs are included in the individual analytical data packages

provided in **Appendix F, Attachment F-1**. Sample locations, site-specific lithology, analytical results, and conclusions for each SI area are discussed in **Sections 3.5** through **3.15**. The media sampling locations and results are presented on **Figures 2-3** through **2-13**.

3.1.3 Soil Boring Abandonment

At the conclusion of soil sampling activities, soil borings that were collocated with existing monitoring wells and not completed as new monitoring wells (FFS-SB1902, WTP-SB1901, WTP-SB1902, FT1-SB1901, FT1-SB1902, and FT2-SB1902) were properly abandoned in accordance with the 2013 ADEC Monitoring Well Guidance, Ayuda SOP No. 16, and the UFP-QAPP Addendum (Ayuda et al., 2019). Soil borings were backfilled using 3/8-inch bentonite chips and hydrated with KSD potable water. The boreholes were capped using material from the surrounding area.

3.1.4 Decontamination Procedures

DPT drilling equipment decontamination occurred before the start of drilling activities and between each boring to prevent cross-contamination, in accordance with Ayuda SOP No. 10. The drill rods, core barrel sampler, and augers followed a three-step decontamination process. All drill rods, augers and tooling were placed on elevated racks within a dedicated decontamination pad lined with 6-mil plastic sheeting. A pressure washer equipped with a soap reservoir was used initially with onsite potable water to remove gross soil cuttings adhered to the rods, tooling, and augers. All rods, tooling, and augers were rotated to ensure complete removal of any cuttings. The equipment was then sprayed with a Liquinox/PFAS-free water mixture before a final rinse with Alaska Pure Water PFAS-free water. All decontamination water generated during pressure washing was collected into 55-gallon drums designated by investigation area.

Geoprobe Macrocore MC5 cutting shoes were decontaminated after every soil core was advanced using a similar decontamination process. Each MC5 cutting shoe was first scrubbed in a bucket of PFAS-free water for gross decontamination, subsequently scrubbed in a bucket with a Liquinox and PFAS-free water mixture, and given a final rinse with PFAS-free water. All decontamination water generated during hand washing of the MC5 sample shoes was collected into 5-gallon buckets and transferred into the designated drums by investigation area.

To assess the effectiveness of decontamination procedures, EBs were collected and submitted to Eurofins for analysis 18 PFAS compounds by Method 537 Version 1.1 Modified using LCMS-MS, in compliance with DoD QSM 5.1, Table B-15. EBs were collected from decontaminated reusable stainless-steel core barrel sampling shoes. The EBs were generally collected once per day of field activities, including soil sampling, groundwater sampling, and drilling. Eight EB samples (LHP-SO-EB01, CFS-SO-EB02, WTP-SO-EB03, FT1-SO-EB04, CAC-SO-EB05, FT4-SO-EB06, FT2-SO-EB07, and FT4-SO-EB08) were obtained for the 8.5 days of drilling and sampling activities.

Each EB was collected by pouring Alaska Pure Water laboratory-certified PFAS-free deionized water over or through the decontaminated piece of equipment directly into laboratory-supplied, unpreserved, 250-mL associated high-density polyethylene (HDPE) sampling bottles. Following sample collection, EBs were submitted to Eurofins for laboratory analysis.

3.2 Monitoring Well Installation and Development

3.2.1 Installation

A permanent monitoring well was installed in 20 of 26 soil boring locations. The monitoring wells were installed and developed in accordance with the 2013 ADEC Monitoring Well Guidance (ADEC, 2013), and UFP-QAPP Addendum (Ayuda et al., 2019). A Geoprobe 6620DT DPT drill rig was used to advance

Geoprobe dual-tube 4.5-inch (DT45) tooling to depth and install Geoprobe pre-packed monitoring wells inside the DT45 casing annulus. The total depth of each monitoring well was determined by the onsite geologist. The DT45 tooling was typically advanced further into the formation than DPT soil borings to install monitoring well screens across the water table.

Geoprobe pre-packed monitoring wells were constructed of 2-inch-diameter, schedule 40 PVC continuous slot (0.010 inch) screen with 20/40 silica sand wrapped in 65-mesh stainless-steel screen, and solid risers with flush threads. Each 10-foot well screen was installed to bracket the top of the water table. Additional 10/20 silica sand filter was poured in the annulus of the DT45 casing and pre-packed screen from 0.5 to 3 feet above the top of the well screen. A minimum 1-foot bentonite seal composed of 3/8-inch bentonite chips was installed above the filter pack and hydrated with KSD potable water. A 3/8-inch pea gravel was placed on top of the bentonite seal to the ground surface. All monitoring wells were completed with a 6-5/8-inch-diameter by 5.25-foot-long square steel protective casing installed to approximately 3 feet above the ground surface. Pea gravel was placed in the protective steel stickups to approximately 0.5 foot below the top of the monitoring wells.

Two or three concrete-filled, steel, protective bollards were placed around each monitoring well. A 2-foot by 2-foot by 4-inch-thick concrete pad was also installed at each monitoring well with the protective casing in the approximate center. Monitoring wells were installed in general accordance with the UFP-QAPP Addendum, however deviations to the length of filter pack, bentonite seal, and backfill materials were necessary due to the shallow nature of the monitoring wells.

Soil boring and monitoring well completion details including survey data are presented in **Table 3-1**. Monitoring well construction diagrams are presented in **Appendix D-2.**

There were several deviations to the UFP-QAPP during monitoring well installation activities, which included using Geoprobe prepacked monitoring wells in place of standard well construction methods. Geoprobe prepacked wells are constructed with 0.010-inch machine slotted screen, which deviated from the 0.020-inch continuous slotted screen in the UFP-QAPP. Filter pack sand inside the prepacked consisted of 20/40 silica sand with a 10/20 silica sand emplaced around the prepacked screen. Well screen construction consisted of machine-slotted instead of continuous-slotted screen due to the prepacked well construction. The UFP-QAPP required well screens to be placed so that the top of the well screen was 5 feet above and below the water table; however, due to the shallow water table encountered during drilling, the top of the well screen was not always able to be placed 5 feet above the water table as it would affect well construction. The modified well construction due to the shallow water table also affected the ability to achieve a bentonite seal a complete 3 to 5 feet above the filter pack at every monitoring well. The following monitoring wells had a bentonite seal less than 3 feet:

- Building 160 – CAC-MW1901 through CAC-MW1903, bentonite seal varied between 2.1 and 2.5 feet
- Former Fire Station – MW1901, approximately 2.8 feet of bentonite seal
- FT001 – MW1901, 1.0 foot of bentonite seal
- FT002 – FT2-MW1903, 2.5 feet of bentonite seal
- FT004 – FT4-MW1901 through FT4-MW1903, 2.5 feet of bentonite seal
- Former Landfarm and Holding Ponds – LHP-MW1901, 2.0 feet of bentonite seal; LHP-MW1902, 2.1 feet of bentonite seal
- Spray Test Area – STA-MW1901, 2.3 feet of bentonite seal; STA-MW1902, approximately 2.3 feet of bentonite seal

The well construction diagrams (Appendix D-2) provide more detail. In addition, pea gravel, which prevents frostjacking issues, was placed above the bentonite seal to complete the annular seal in lieu of

using bentonite grout to the ground surface. All monitoring wells were completed as aboveground completions as stipulated, but concrete-filled bollards were not installed at locations where wells were not in proximity to active roads or high traffic areas. Prepacked monitoring wells are consistent with ADEC well installation protocol (ADEC, 2013). These deviations were approved by Ayuda and USACE via email on 27 August 2019.

3.2.2 Well Development

Per Ayuda SOP No. 6 (Ayuda, 2018), development of the newly installed monitoring wells was initiated after a 48-hour waiting period following each installation. The monitoring wells were considered fully developed when the purged groundwater was free of visible sediment and one of the following conditions was met:

- At least three well volumes has been removed.
- All potable water introduced during drilling activities had been removed.
- A minimum of 2 hours of continuous manual surging and bailing had elapsed.
- Continuous pumping achieved water quality parameter stabilization criteria.

In addition, the following water quality parameters were required to be stabilized according to the criteria presented in the UFP-QAPP Addendum and Ayuda SOP No. 6 (Ayuda et al., 2019):

- Drawdown
- Temperature
- Specific conductivity
- Dissolved oxygen (DO)
- Oxygen reduction potential (ORP)
- Potential of hydrogen (pH)
- Turbidity

Monitoring well development was successfully completed in accordance with required criteria for all wells except FFS-MW1902, FT2-MW1901, FT2-MW1902, FT4-MW1901, FT4-MW1902, and FT4-MW1903, where development was achieved after less than 2 hours of surging and pumping. However, each well was surged, bailed, and pumped until four consecutive water quality parameter readings were achieved. Stabilization criteria included temperature and specific conductivity readings consecutively within 10 percent and pH within 0.2 standard unit (SU). Turbidity readings of purged water were also less than 25 nephelometric turbidity units (NTUs) for four consecutive readings.

Monitoring well development deviations included purging less than the required three well volumes and purging less than the minimum of 2 hours. These deviations occurred as visual water clarity and water quality parameters stabilized sooner than required in Ayuda SOP No. 6. Also, photographs of the final purge volume were not collected at all well locations at the conclusion of well development.

Well development activities at FFS-MW1902 were conducted on 01 September 2019. After approximately 30 minutes of manual surging and bailing, pumping proceeded for 1 hour. After that time had elapsed, sedimentation and turbidity cleared during surging and field parameters stabilized. Water quality field parameters stabilized within an hour of pumping; therefore, well development was completed in less than the 2-hour minimum time required in Ayuda SOP No. 6. The final four readings were less than 25 NTU and all water quality parameters stabilized.

Monitoring well FT2-MW1901 was developed on 05 September 2019. Following 45 minutes of manual surging and bailing, pumping proceeded for approximately 40 minutes before water quality parameters stabilized. Approximately five well volumes were removed by surging and pumping methods. Water quality parameters stabilized for four consecutive readings, although turbidity was greater than 25 NTUs. This well was not purged for 2 hours as stipulated in Ayuda SOP No. 6.

Monitoring well FT2-MW1902 was developed on 05 September 2019. Following approximately 45 minutes of manual surging and bailing, pumping proceeded for approximately 40 minutes before water quality parameters stabilized. Approximately five well volumes were removed by surging and pumping methods. Water quality parameters stabilized for four consecutive readings, although turbidity was greater than 25 NTUs. This well was not purged for 2 hours as stipulated in Ayuda SOP No. 6.

Well development activities of FT4-MW1901 were completed on 06 September 2019. Manual surging and bailing were performed for approximately 45 minutes, followed by approximately 40 minutes of pumping. A total of 23 gallons were removed, exceeding the five well volumes (i.e., 14 gallons). Water quality parameters stabilized for four consecutive readings and turbidity was less than 25 NTUs.

Monitoring well FT4-MW1902 was developed on 01 September 2019. Following 1 hour of manual surging and bailing and approximately 30 minutes of pumping, 16 gallons of purge water were removed. This was equivalent to more than three well volumes. All water quality parameters stabilized over four consecutive readings and turbidity was less than 25 NTUs.

Well development activities at FT4-MW1903 were completed on 05 September 2019. Manual surging and bailing were performed for approximately 45 minutes, followed by approximately 1 hour of pumping. In total, 18 gallons were removed during development, which was equivalent to more than five well volumes. Water quality parameters stabilized within four consecutive readings and turbidity was less than 25 NTUs.

The well development data sheets are presented in **Appendix D-3** and photographs of the final purge water are presented in the photographic log of **Appendix E**.

3.2.3 Well Gauging

Prior to sampling, groundwater levels were measured and recorded for each of the 20 newly installed monitoring wells and 6 existing monitoring wells (SS021445, MW37, MW23, MW-14-26A, ESMW-01A, and ESMW4A) as part of the SI activities conducted at KSD. Groundwater level forms are included in **Appendix D-4**. On 13 September 2019, a comprehensive groundwater gauging event was performed; groundwater elevation data are summarized in **Table 3-2**. Groundwater elevation data collected from three monitoring wells located at each area were used to determine groundwater flow directions. Specific groundwater elevation data and flow direction information is discussed further in **Sections 3.5 to 3.15**.

3.2.4 Groundwater Sampling

Groundwater sampling was conducted at least 24 hours following the completion of well development, as outlined in the ADEC guidance (ADEC, 2017). Groundwater samples were collected using a peristaltic pump with new, dedicated, HDPE tubing following low-flow sampling methodology in accordance with Ayuda SOP No. 07. Water level measurement forms and groundwater sampling logs are included in **Appendix D-4** and **D-5.**

In accordance with Ayuda SOP No. 7 for groundwater sampling, water quality parameters were monitored and recorded during well purging. Groundwater samples were collected following water quality stabilization parameters outlined in Ayuda SOP No. 7. All monitoring wells were sampled within water quality stabilization criteria except CFS-MW1903, FT1-ESMW04A, FT2-MW1902, WTP-MW-14-26A, and WTP-MW37, where turbidity was slightly outside the stabilization criteria. Groundwater samples were collected directly into laboratory supplied 250-mL polyethylene bottleware. Field duplicate and matrix sample/matrix sample duplicates (MS/MSD) samples were collected into separate 250-mL polyethylene bottleware.

Sample purging flow rates of 100 mL per minute or less (even at the lowest pumping speed on the peristaltic pump) were unable to be achieved at monitoring wells CAC-MW1901, CAC-MW1902, ESMW-01A, FT1-MW1901, FT2-MW1902, FT4-MW1902, LHP-MW1901, and STA-MW1902, which deviated from Ayuda SOP No. 06, Monitoring Well Installation and Development (Ayuda et al., 2019). For the pump to remain operational at these wells, the flow rate could not be adjusted to less than 100 mL per minute. In addition, monitoring wells CAC-MW1901, CFS-MW1902, and LHP-MW1902 exceeded the drawdown requirement of no greater than 0.33 foot while pumping at the lowest possible flowrate due to insufficient recharge in the wells and, in some cases, the necessary higher flow rates to sustain pump operation.

The final stabilized parameters, total drawdown, purge rate, and purge volume for all groundwater wells sampled are summarized in **Table 3-3**.

3.2.5 Decontamination Procedures

All non-disposable groundwater sampling equipment (i.e., water level meters) was decontaminated before and between use at each monitoring well to reduce the potential for cross-contamination in accordance with Ayuda SOP No. 10. The equipment was decontaminated by spraying a Liquinox and PFAS-free water mixture on the equipment followed by spraying with PFAS-free water. The water was containerized in 5-gallon buckets and transferred into 55-gallon drums designated for each area.

3.3 Surface Water and Sediment Sampling

In total, 9 surface water and 12 sediment samples were collected in accordance with Ayuda SOPs No. 8 and No. 13 (Ayuda et al., 2019). One additional sediment sample (STA-SD1901-0) and surface water sample (STA-SW1901) were collected from the drainage channel observed at the Spray Test Area because field observations indicated surface water flow from the Spray Test Area was in the direction of the drainage channel (south). This location was not specified in the UFP-QAPP Addendum (Ayuda et al., 2019), but the UFP-QAPP did state that if field observations indicate the source area is an impervious surface and if surface water runoff occurs in more than one direction, additional samples should be collected. Samples collected from within the same drainage channel or creek were collected from downgradient to upgradient locations to prevent cross-contamination and disturbance to sediment samples. At each of the collocated sample locations, surface water samples were collected initially followed by sediment samples to prevent sediment disturbance.

Sediment samples were collected with stainless-steel spoons into 1-gallon zippered plastic bags for homogenization and then transferred into laboratory-supplied 4-ounce HDPE sample containers in accordance with Ayuda SOP No. 13. A new, dedicated stainless-steel spoon was used at each location.

Surface water samples were collected by direct immersion method into 250-mL polyethylene containers in accordance with Ayuda SOP No. 08. Water quality parameters (i.e., temperature, specific conductance, pH, DO, ORP, and turbidity) were collected from each surface water location using a YSI water quality meter and a Hach turbidity meter. Water quality readings were recorded on the soil/sediment collection field sheets included in **Appendix D-6**.

The surface water and sediment sample locations are presented on the figures for each AFFF area.

3.4 Survey Coordinates

On 12 and 13 September 2019, Boutet Company, Inc., a State of Alaska-registered professional land surveyor, was subcontracted to establish the coordinates, surface elevation, and top-of-casing elevation

of each groundwater monitoring well using real time kinetic (RTK) global positioning system (GPS) survey methods. Northing and easting coordinates were recorded in U.S. survey feet using the Alaska State Plane 1983 coordinate system, Alaska Zone 4. Elevations were recorded in feet and referenced to the North American Vertical Datum 1988. Soil boring, surface water, and sediment sample locations were recorded using a hand-held GPS with sub-meter accuracy. The surveyor's report is included in **Appendix C**.

3.5 Building 160 (Combat Alert Cell)

3.5.1 Sample Locations

Three soil borings (CAC-MW1901, CAC-MW1902, and CAC-MW1903) were advanced at the Combat Alert Cell, as presented on **Figure 2-3**. Soil borings CAC-MW1901 and CAC-MW1902 were positioned downgradient from the Combat Alert Cell building to evaluate if AFFF releases associated with two system activations may have been transported by sheet flow from the building to grass areas. CAC-MW1903 was installed as an upgradient location. Although the quantities released during the system activations are unknown, AFFF was reportedly pushed out the hangar doors on the northeastern and southwestern sides during each occurrence. Surface flow from the hangar is to the west and northwest towards a drainage ditch beyond the pavement edge. A surface soil sample was collected from the first 6 inches of ground surface at all three locations. A subsurface soil sample was collected at depth in all three borings from 1 foot above the observed water table during drilling. Each soil boring was completed as a monitoring well following soil sampling activities using the Geoprobe DT45 system. Groundwater samples were collected from each monitoring well following well development. Static water levels were measured in each monitoring well and the groundwater flow direction across the area is southwest towards Eskimo Creek. One sediment sample, CAC-SD1901, was collected from the drainage ditch located downgradient of the Combat Alert Cell building. Surface water was not present in the ephemeral drainage ditch; therefore, a surface water sample was not collected.

3.5.2 Lithology and Soil Description

Soil borings CAC-MW1901, CAC-MW1902, and CAC-MW1903 were advanced to depths of 15.0 feet bgs, 16.5 feet bgs, and 10.0 feet bgs, respectively. The overlying unconsolidated sediments generally consisted of silty sand to poorly graded sands with trace silt and gravels and varying degrees of moisture and density. Groundwater was encountered between 5.0 to 9.0 feet bgs during drilling. A stiff silt with sand and gravel confining unit was observed in CAC-MW1902 at approximately 15.0 feet bgs during monitoring well installation using Geoprobe DT45 methods. The confining unit was consistent with past descriptions of the A-Aquitard (SAIC, 1992).

Borehole CAC-MW1901 consisted of silty fine-grained sand with trace fine gravels grading to poorly graded sand with trace silt and medium-grained sand with varying degrees of moisture and density to a depth of 15.0 feet. The water table was encountered at 8.7 feet bgs during drilling activities.

Borehole CAC-MW1902 consisted of silty sand to silt with varying amounts of fine-grained sand and gravels to 2.9 feet bgs. From 2.9 to 15 feet bgs, a poorly graded sand to silty sand consisting of fine-grained sand with trace to few fine gravels was encountered at depth. The A-Aquitard (consisting of a stiff silt with fine to coarse sand and gravel) was encountered from 15.0 to 16.5 feet bgs while attempting to install the monitoring well using Geoprobe DT45 tooling. After the A-Aquitard was encountered, bentonite chips were used to backfill the hole from 15.0 to 16.5 feet bgs. The water table was encountered at 7.0 feet bgs during drilling activities.

Borehole CAC-MW1903 was advanced to a depth of 10.0 feet bgs. The lithology consisted of a silty sand from 0.0 to 2.0 feet bgs grading to poorly graded sand from 2.0 to 10 feet bgs, with varying degrees of moisture and density. The water table was encountered at 5.0 feet bgs during drilling activities.

Detailed drilling logs for the Combat Alert Cell are included in **Appendix D-1**.

3.5.3 Analytical Results

3.5.3.1 Surface Soil

One surface soil sample was collected from each of the three soil borings completed at the Combat Alert Cell. Concentrations of PFBS were less than the limit of detection (LOD). PFOA was detected at a concentration of 0.22 J and 0.39 J µg/kg in the surface soil samples at boreholes CAC-MW1902 and CAC-MW1903, respectively. Each concentration was less than the Project SL for PFOA, which is 1.7 µg/kg. PFOS was detected at concentrations of 2.4, 2.7, and 13 µg/kg in the surface soil samples. One surface sample, from CAC-MW1903 (13 µg/kg), exceeded the Project SL for PFOS, which is 3.0 µg/kg. The surface soil analytical results are presented in **Table 3-4** and on **Figure 2-3**.

3.5.3.2 Subsurface Soil

Subsurface soil samples were collected from each of the three soil borings completed at the Combat Alert Cell from varying depths dependent on the depth to water observed during drilling. PFBS concentrations were below the LOD in all soil samples collected. PFOA was detected in one subsurface soil sample (CAC-MW1903, from 4.0 to 5.0 feet bgs) at a concentration of 0.33 J µg/kg, which is less than the Project SL of 1.7 µg/kg for PFOA. Concentrations of PFOA were below the LOD in the other two subsurface samples collected. PFOS was detected in CAC-MW1901 (8.0 to 9.0 feet bgs) and CAC-MW1903 (4.0 to 5.0 feet bgs) at concentrations of 2.0 and 23 µg/kg, respectively. PFOS was below the LOD in CAC-MW1902 (6.0 to 7.0 feet bgs). The CAC-MW1901 soil sample concentration (2.0 µg/kg) is less than the Project SL of 3.0 µg/kg for PFOS. One sample, CAC-MW1903 (23 µg/kg), exceeded the 3.0 µg/kg Project SL for PFOS. The analytical results and depths of subsurface soil samples are presented in **Table 3-4** and on **Figure 2-3**.

3.5.3.3 Groundwater

Groundwater samples were collected from each new monitoring well installed at the Combat Alert Cell. All PFBS concentrations were less than the Project SL of 40,000 ng/L, detected at concentrations ranged from 46 J to 92 ng/L. PFOA was detected at concentrations of 680 ng/L in CAC-MW1901, 430 ng/L in CAC-MW1902, and 1,600 ng/L in CAC-MW1903, all exceeding the Project SL for PFOA of 40 ng/L. PFOS was detected at 5,300 ng/L in CAC-MW1901, 4,200 ng/L in CAC-MW1902, and 5,500 ng/L in CAC-MW1903, all exceeding the Project SL of 40 ng/L for PFOS. The analytical results are presented in **Table 3-5** and on **Figure 2-3**.

3.5.3.4 Sediment

One sediment sample was collected from the drainage channel located at the Combat Alert Cell. The PFBS concentration was less than the LOD. PFOA was detected at a concentration of 0.54 J µg/kg, which is less than the Project SL of 1.7 µg/kg for PFOA. PFOS was detected at a concentration of 7.1 µg/kg, exceeding the Project SL of 3.0 µg/kg. The sediment analytical results are presented in **Table 3-6** and on **Figure 2-3**.

3.5.4 Conclusions

Based on the laboratory analysis of soil samples collected at the Combat Alert Cell, historical fire training exercises have resulted in a release of PFAS to the environment. Soil analytical results indicated that

concentrations of PFOS in the upgradient monitoring well, CAC-MW1903 surface and subsurface soil exceeded the Project SL of 3.0 µg/kg. Groundwater analytical results indicated PFOA and PFOS concentrations exceeded the Project SL of 40 ng/L at each monitoring well location. Groundwater analytical results also indicated the upgradient monitoring well, CAC-MW1903, had high levels of PFOA and PFOS. Higher concentrations of PFOA and/or PFOS in soil and groundwater upgradient of the Combat Alert Cell indicate likely contamination from the upgradient Spray Test Area and Former Fire Station. PFOS concentrations in sediment exceeded the Project SL of 3.0 µg/kg.

3.6 Former Building 152 (Former Fire Station)

3.6.1 Sample Locations

Four soil borings (FFS-MW1901, FFS-MW1902, FFS-SB1901, and FFS-SB1902) were advanced at the Former Fire Station as presented on **Figure 2-4**. Soil borings FFS-SB1901 and FFS-SB1902 were positioned to the east and west side of the Former Fire Station in potential spray testing areas. FFS-MW1901 was located east of the Former Fire Station as an upgradient location to the Former Fire Station, and FFS-MW1902 was positioned to distinguish potential AFFF contamination between the Former Fire Station and the Spray Test Area to the south. Surface soil samples were collected from the top 6 inches of ground surface at each boring location. Subsurface soil samples were collected at each location from 1 foot above the observed water table during drilling activities. Soil borings FFS-SB1901 and FFS-SB1902 were properly abandoned following soil sampling activities. Soil borings FFS-MW1901 and FFS-MW1902 were completed as monitoring wells following soil sampling activities using the Geoprobe DT45 system. Groundwater samples were collected from monitoring wells FFS-MW1901 and FFS-MW1902 following well development. A groundwater sample was also collected from existing well FFS-SS021445, located downgradient of the Former Fire Station. Static water levels were measured in each monitoring well and the groundwater flow direction was estimated using the 3-point method. The groundwater flow direction across the area is southwest towards Eskimo Creek and Naknek River.

One sediment sample, FFS-SD1901, was collected from the main drainage channel to the south and downslope of the Former Fire Station (**Figure 2-4**). Surface water was not present within the ephemeral drainage ditch; therefore, a surface water sample was not collected.

3.6.2 Lithology and Soil Description

Soil borings FFS-SB1901, FFS-SB1902, FFS-MW1901, and FFS-MW1902 were each advanced to a total depth of 15.0 feet bgs. The overlying unconsolidated sediments primarily consisted of silt and silty sand with trace gravel and varying degrees of moisture and density. The A-Aquitard confining unit was not observed during drilling activities. Groundwater was encountered between 9.5 to 12 feet bgs during drilling activities.

FFS-SB1901 consisted of silt to silty sand with trace fine gravels to 5.0 feet bgs grading to poorly graded sand with trace fine gravels to 15 feet bgs. The water table was encountered at 12.0 feet bgs during drilling activities.

FFS-SB1902 consisted of silty sand with trace fine gravels to 1.0 foot bgs grading to interbedded silt and poorly graded sand with trace fine gravel lenses to 15 feet bgs. The water table was encountered at 9.5 feet bgs during drilling activities.

FFS-MW1901 consisted of silt and silty sand to 4.0 feet bgs grading to poorly graded sand with trace silt from 4.0 feet bgs to 15 feet bgs. The water table was encountered at 10.0 feet bgs during drilling activities.

FFS-MW1902 consisted of silt and silty sand to 2.5 feet bgs followed by a thin poorly graded sand lens to 3.0 feet bgs, followed by a thin lens of silt to 3.3 feet bgs, and grading to a dense, poorly graded sand with trace silt to 15 feet bgs. The water table was encountered at 9.5 feet bgs during drilling activities.

Detailed drilling logs for the Former Fire Station are included in **Appendix D-1**.

3.6.3 Analytical Results

3.6.3.1 Surface Soil

One surface soil sample was collected from each of the four soil borings completed at the Former Fire Station. Concentrations of PFBS at each location were less than the LOD. PFOA was detected in FFS-MW1902 and FFS-SB1902 at concentrations of 0.28 J and 8.5 µg/kg, respectively. The FFS-SB1902 PFOA concentration was greater than the Project SL of 1.7 µg/kg. PFOS concentrations in FFS-MW1901 (17 µg/kg), FFS-MW1902 (12 J µg/kg), FFS-SB1901 (8.1 µg/kg), and FFS-SB1902 (810 µg/kg), all exceeded the Project SL of 3.0 µg/kg. The analytical surface soil results are presented in **Table 3-4** and on **Figure 2-4**.

3.6.3.2 Subsurface Soil

Subsurface soil samples were collected from each of the four soil borings completed at the Former Fire Station from varying depths dependent on the depth to water observed during drilling. PFBS was not detected in any subsurface soil samples. PFOA was detected at concentrations ranging from 0.28 J to 2.3 µg/kg. The value of 2.3 µg/kg in FFS-SB1902 exceeded the Project SL of 1.7 µg/kg. PFOA was below the detection limit in FFS-MW1901. PFOS was detected at concentrations ranging from 1.2 to 140 µg/kg. The value of 140 µg/kg in FFS-SB1902 exceeded the Project SL of 3.0 µg/kg. PFOS was below the detection limit in FFS-MW1902. The analytical results and depths of subsurface soil samples are presented in **Table 3-4** and on **Figure 2-4**.

3.6.3.3 Groundwater

Groundwater samples were collected from existing monitoring well FFS-SS021445 and new monitoring wells FFS-MW1901 and FFS-MW1902. PFBS was detected at concentrations below the Project SL ranging from 8.5 to 290 ng/L. PFOA was detected at a concentration of 17 ng/L in FFS-MW1901 and exceeded the Project SL of 40 ng/L in samples collected from FFS-MW1902 and FFS-SS021445 at concentrations of 270 and 2,900 ng/L, respectively. PFOS was detected at 430 ng/L in FFS-MW1901, 540 ng/L in FFS-MW1902, and 45,000 ng/L in FFS-SS021445. Each PFOS concentration exceeded the Project SL of 40 ng/L for PFOS. The analytical results are presented in **Table 3-5** and on **Figure 2-4**.

3.6.3.4 Sediment

One sediment sample, FFS-SD1901, was collected along the drainage ditch at the Former Fire Station. The PFBS concentration was 1.2 J µg/kg, which is less than the Project SL of 130,000 µg/kg. PFOA was detected at a concentration of 70 µg/kg, which exceeded the Project SL of 1.7 µg/kg. PFOS was detected at a concentration of 300 µg/kg, exceeding the Project SL of 3.0 µg/kg. The sediment analytical results are presented in **Table 3-6** and on **Figure 2-4**.

3.6.4 Conclusions

Based on the laboratory analysis of soil, sediment, and groundwater samples collected at the Former Fire Station, historical fire training exercises at the Former Fire Station have resulted in a release of PFAS to the environment. Soil analytical results indicated concentrations of PFOA and PFOS in surface and subsurface soil exceeded one or both of their respective Project SLs. Groundwater analytical results indicated concentrations of PFBS were detected in each monitoring well but were below the Project SL of

40,000 ng/L for PFBS. Concentrations of PFOA and PFOS in each groundwater sample exceeded the combined PFOA+PFOS SL of 70 ng/L. PFOA and PFOS in sediment exceeded Project SLs for PFOA and PFOS.

3.7 Spray Test Area

3.7.1 Sample Locations

Two soil borings (STA-MW1901 and STA-MW1902) were advanced at the Spray Test Area as presented on **Figure 2-5**. STA-MW1901 was positioned in the grass area south and downgradient of Taxiway N apron in an area identified by Chugach personnel where AFFF was sprayed, released to the ground, or both. STA-MW1902 was positioned along the northern grass area of Taxiway N and south of the drainage ditch to evaluate impacts of AFFF runoff from the apron in soil and groundwater. A surface soil sample was collected from the top 6 inches of ground surface at each location. A subsurface soil sample was collected from 1 foot above the observed water table in each soil boring. Each soil boring was completed as a monitoring well using the Geoprobe DT45 system. Groundwater samples were collected following well development activities. Static water levels were measured in each monitoring well and the groundwater flow direction across the area is southwest towards Eskimo Creek and Naknek River.

One collocated sediment and surface water sample, STA-SD1901/STA-SW1901, was collected from the drainage ditch located south of Taxiway N to evaluate the potential impacts of AFFF surface runoff from Taxiway N into sediment and surface water (**Figure 2-5**).

3.7.2 Lithology and Soil Description

Soil borings STA-MW1901 and STA-MW1902 were advanced to a total depth of 10.0 feet bgs for soil sample collection and lithological characterization. The overlying unconsolidated sediments consisted of silt and sand with varying degrees of moisture and density. The A-Aquitard confining unit was not observed during drilling activities.

STA-MW1901 consisted of a loose, silty sand with trace organics grading to a stiff, silt with sand to 1.9 feet bgs. A poorly graded sand, dense fine-grained sand with trace amounts of silt was encountered from 1.9 to 10 feet bgs. The water table was encountered at 4.0 feet bgs during drilling activities.

STA-MW1902 consisted of a loose, silty sand with trace organics and fine gravels to 0.8 feet bgs grading to a poorly graded sand, fine- to medium-grained, with trace amounts of silt from 0.8 to 10 feet bgs. The water table was encountered at 5.0 feet bgs during drilling activities.

Detailed drilling logs for the Spray Test Area are included in **Appendix D-1**.

3.7.3 Analytical Results

3.7.3.1 Surface Soil

One surface soil sample was collected from each of the two soil borings completed at the Spray Test Area. PFBS was less than the LOD in STA-MW1901 and had a concentration of 0.43 J µg/kg in STA-MW1902, less than the Project SL of 130,000 µg/kg for PFBS. PFOA was detected in STA-MW1901 and STA-MW1902 at concentrations of 0.25 J and 3.1 µg/kg, respectively. The STA-MW1902 concentration exceeded the 1.7 µg/kg Project SL for PFOA. PFOS was detected at concentrations of 5.5 µg/kg in STA-MW1901 and 89 µg/kg in STA-MW1902 which both exceed the Project SL of 3.0 µg/kg for PFOS. The analytical surface soil results are presented in **Table 3-4** and on **Figure 2-5**.

3.7.3.2 Subsurface Soil

Subsurface soil samples were collected from the two soil borings completed at the Spray Test Area from varying depths depending on the depth to water observed during drilling activities. PFBS concentrations were less than the laboratory LOD. PFOA was detected in STA-MW1901 (3.0 to 4.0 feet bgs) at a concentration of 2.0 µg/kg, which is above the Project SL of 1.7 µg/kg for PFOA. PFOA was below LOD in the STA-MW1902 (4.0 to 5.0 feet bgs) sample. PFOS was detected at a concentration of 77 µg/kg in STA-MW1901 and at 5.5 µg/kg in STA-MW1902, both exceeding the Project SL of 3.0 µg/kg. The subsurface soil analytical results are presented in **Table 3-4** and on **Figure 2-5**.

3.7.3.3 Groundwater

Groundwater samples were collected from monitoring wells STA-MW1901 and STA-MW1902. PFBS was detected at concentrations ranging from 20 to 26 ng/L, less than the Project SL of 40,000 ng/L. PFOA was detected at concentrations of 330 ng/L in STA-MW1901 and 300 ng/L in STA-MW1902, which both exceeded the Project SL of 40 ng/L. PFOS was detected at 3,400 ng/L in STA-MW1901 and 4,500 ng/L in STA-MW1902. Both PFOS concentrations exceeded the Project SL of 40 ng/L. The analytical results are presented in **Table 3-5** and on **Figure 2-5**.

3.7.3.4 Sediment

One sediment sample, STA-SD1901, was collected along the drainage ditch at the Spray Test Area. The PFBS concentration was less than the laboratory LOD. PFOA was detected at a concentration of 15 µg/kg, which exceeded the Project SL of 1.7 µg/kg for PFOA. PFOS was detected at a concentration of 1,000 µg/kg, exceeding the Project SL of 3.0 µg/kg for PFOS. The sediment analytical results are presented in **Table 3-6** and on **Figure 2-5**.

3.7.3.5 Surface Water

One surface water sample, STA-SW1901, was collected along the drainage ditch at the Spray Test Area. PFBS was detected at a concentration of 35 ng/L, which is below the Project SL of 40,000 ng/L for PFBS. The PFOA concentration of 440 ng/L and PFOS concentration of 4,300 ng/L exceeded the Project SL of 40 ng/L. The surface water analytical results are presented in **Table 3-7** and on **Figure 2-5**.

3.7.4 Conclusions

Based on the various media analytical results for the Spray Test Area, historical fire training exercises at the Spray Test Area have resulted in a release of PFAS to the environment. Soil, groundwater, sediment, and surface water analytical results indicated concentrations of PFOA and PFOS exceeded one or both of the PFOA and PFOS Project SLs.

3.8 Building 300 (Current Fire Station)

3.8.1 Sample Locations

Three soil borings (CFS-MW1901, CFS-MW1902, and CFS-MW1903) were advanced at the Current Fire Station as presented on **Figure 2-6**. Each soil boring was completed as a monitoring well following soil sampling activities. CFS-MW1901 is upgradient of the Current Fire Station. CFS-MW1902 is cross-gradient and north of the building to evaluate potential runoff from the Spray Test Area adjacent to the Current Fire Station. CFS-MW1903 was placed in the grassy area west of the Current Fire Station to evaluate potential AFFF runoff related to truck washing and incidental spills of AFFF from the Current Fire Station. A surface soil sample from the first 6 inches of ground surface and a subsurface soil sample from 1 foot above the observed water table during drilling was collected from each soil boring. Groundwater samples

were collected from each monitoring well following well development. Static water levels were measured in each monitoring well and the groundwater flow direction across the area is west-northwest towards Eskimo Creek.

One sediment sample, CFS-SD1901, was collected from the ephemeral drainage ditch located north of the Current Fire Station and immediately west of CFS-MW1902 to evaluate potential AFFF impacts from the Current Fire Station that may have traveled by surface flow into the drainage ditch. The ephemeral drainage ditch was dry during the investigation; therefore, a surface water sample was not collected.

3.8.2 Lithology and Soil Description

Soil borings CFS-MW1901, CFS-MW1902, and CFS-MW1903 were advanced to a total depth of 22.5 feet bgs, 22.5 feet bgs, and 26.5 feet bgs, respectively, for the purpose of soil sampling and lithological characterization. The overlying unconsolidated sediments primarily consisted of poorly graded to well graded sand with trace silt and varying degrees of moisture and density. The A-Aquitard confining unit was not observed during drilling activities. Groundwater was ultimately encountered between 15 to 20 feet bgs during drilling activities.

CFS-MW1901 consisted of dry, fine-grained, silty sand, with trace fines and gravels to 1.0 foot bgs, where a thin, 1.6-foot-thick silt with sand lens was encountered, followed by loose, fine-grained, poorly graded sand with trace fines to 20 feet bgs. Groundwater was encountered at approximately 15 feet bgs.

CFS-MW1902 consisted of a dry, stiff, silt, with trace fine-grained sand and organics to 3.5 feet bgs followed by a dry, loose, very-fine-grained, silty sand, to a depth of 7.0 feet bgs, grading to a very fine to fine-grained, poorly graded sand with trace silt and gravels with varying degrees of moisture. Groundwater was observed at approximately 17 feet bgs.

CFS-MW1903 consisted of a dry, loose, fine-grained, poorly graded sand with silt and gravels to 0.5 feet bgs followed by a well-graded sand with gravel, medium dense to 5.5 feet bgs. A silty sand to sandy silt lens was observed from 5.5 to 6.5 feet bgs, followed by a thin, poorly graded sand lens from 6.5 to 7.1 feet bgs and silt lens from 7.1 to 7.3 feet bgs. A medium dense to dense, fine-grained, poorly graded sand with trace amounts of medium to coarse grained sand was observed from 7.3 to 25 feet bgs. Groundwater was encountered at approximately 20 feet bgs.

Detailed drilling logs for the Current Fire Station are included in **Appendix D-1**.

3.8.3 Analytical Results

3.8.3.1 Surface Soil

One surface soil sample was collected from each of the three soil borings completed at the Current Fire Station. Concentrations of PFBS were less than the laboratory LOD. PFOA was detected at concentrations ranging from 0.72 to 3.0 µg/kg. The concentration of 3.0 J µg/kg in CFS-MW1901 was an estimated value and exceeded the Project SL of 1.7 µg/kg. PFOS was detected at concentrations of 41 µg/kg in CFS-MW1901, 35 µg/kg in CFS-MW1902, and 180 µg/kg in CFS-MW1903, with each concentration greater than the Project SL of 3.0 µg/kg for PFOS. The analytical results are presented in **Table 3-4** and on **Figure 2-6**.

3.8.3.2 Subsurface Soil

Subsurface soil samples were collected from each of the three soil borings completed at the Current Fire Station from varying depths dependent upon on the depth to water observed during drilling. PFBS was not detected in any of the subsurface soil samples greater than laboratory LOD. PFOA was detected at

concentrations ranging from 0.36 J to 1.4 µg/kg, which were all below the Project SL of 1.7 µg/kg. PFOS concentrations of 380 µg/kg in CFS-MW1901, 5.0 µg/kg in CFS-MW1902, and 15 µg/kg in CFS-MW1903 all exceeded the Project SL of 3.0 µg/kg for PFOS. The analytical results and depths of subsurface soil samples are presented in **Table 3-4** and on **Figure 2-6**.

3.8.3.3 Groundwater

Groundwater samples were collected from monitoring wells CFS-MW1901, CFS-MW1902, and CFS-MW1903. PFBS was detected at concentrations ranging from 19 to 28 ng/L, all less than the Project SL of 40,000 ng/L for PFBS. PFOA was detected at concentrations of 160 ng/L in CFS-MW1901, 150 ng/L in CFS-MW1902, and 160 ng/L in CFS-MW1903, which all exceeded the Project SL of 40 ng/L. PFOS was detected at concentrations of 500 ng/L in CFS-MW1901, 790 ng/L in CFS-MW1902, and 970 ng/L in CFS-MW1903, which all exceeded the Project SL of 40 ng/L. The analytical results are presented in **Table 3-5** and on **Figure 2-6.**

3.8.3.4 Sediment

One sediment sample was collected from the drainage channel located adjacent to the Current Fire Station. The PFBS concentration was below the LOD. PFOA was detected at a concentration of 1.3 J µg/kg, which is below the Project SL of 1.7 µg/kg. PFOS was detected at a concentration of 37 µg/kg, which exceeded the Project SL of 3.0 µg/kg. The analytical results of sediment samples are presented in **Table 3-6** and on **Figure 2-6.**

3.8.4 Conclusions

Based on the laboratory analytical results of soil, sediment, and groundwater samples, historical fire training exercises at the Current Fire Station have resulted in a release of PFAS to the environment. One soil sample contained a laboratory estimated concentration of PFOA that exceeded the Project SL, while all other soil and sediment results were below the Project SL for PFOA. All PFOS concentrations in soil and sediment exceeded the Project SL. Groundwater analytical results indicated that concentrations of PFOA and PFOS exceeded Project SLs.

3.9 Building 617 (Wastewater Treatment Plant)

3.9.1 Sample Locations

Three soil borings (WTP-SB1901, WTP-SB1902, and WTP-MW1901) were advanced at the Wastewater Treatment Plant as presented on **Figure 2-7**. Soil boring WTP-SB1901 was positioned immediately adjacent (less than 5 feet) to existing monitoring well WTP-MW14-26A to collect soil samples. Soil boring WTP-SB1902 was positioned approximately 25 feet west of existing well WTP-MW-37 due to an abundance of buried utilities located near WTP-MW37. Only soil samples were collected from WTP-SB1902. Proposed monitoring well WTP-MW1901 was unable to be installed due to significantly hummocky terrain and wetland conditions preventing the drill rig access. Instead, WTP-MW1901 was advanced as a hand-auger soil boring to a refusal depth of 3.8 feet bgs after seven hand-auger attempts. A surface soil sample from the top 6 inches of ground surface and a groundwater grab sample were collected from the WTP-MW1901 boring. The ground surface at WTP-MW1901 was covered by approximately 1 foot of tundra matting, which was removed to expose the soil and groundwater for sampling.

Following groundwater grab sampling at WTP-MW1901, the borehole was backfilled with native material. Native material was used instead of bentonite chips to backfill WTP-MW1901 due to the potential health and safety hazard while carrying bentonite chip bags across uneven terrain to the sample location.

Groundwater samples were collected from existing monitoring wells WTP-MW1426A and WTP-MW37. Static water levels were measured in existing monitoring wells WTP-MW37, WTP-MW14-26A, and WTP-MW23, and the groundwater flow direction across the area was estimated using water levels collected during the SI using the 3-point method. Groundwater flows southeast towards Eskimo Creek. One collocated sediment and surface water sample, WTP-SD1901/WTP-SW1901, was collected from the Wastewater Treatment Plant drainage area prior to entering Eskimo Creek.

3.9.2 Lithology and Soil Description

Soil borings WTP-MW1901, WTP-SB1901, and WTP-SB1902 were advanced to a total depth of 3.50 feet bgs, 25.0 feet bgs, and 28.8 feet bgs, respectively. The overlying unconsolidated sediments primarily consisted of silt, silty sand, and poorly graded sand with trace fines and varying degrees of moisture and density. Groundwater was encountered in WTP-SB1901 and WTP-SB1902 at 22.3 feet bgs and 26.7 feet bgs, respectively. A stiff, silt with sand and gravel confining unit was observed in WTP-SB1901 at approximately 23.5 feet bgs during soil sampling activities. The confining unit was consistent with the A-Aquitard described in past investigations (SAIC, 1992). At WTP-MW1901, groundwater was encountered at approximately 0.5 feet bgs, as this boring was installed near Eskimo Creek (**Figure 2-7**).

WTP-MW1901 consisted of silt with sand, gravel, cobbles and boulders encountered during hand augering. Groundwater was observed at approximately 0.5 feet bgs and refusal was at 3.75 feet bgs.

WTP-SB1901 consisted of a dry, very-fine-grained, silty sand, with organics to 1.60 feet bgs followed by a thin silt lens to 2.00 feet bgs, followed by poorly graded sand, fine- to medium-grained, with trace gravels with varying degrees of moisture to 23.5 feet bgs. A confining unit consisting of a very stiff, silt with fine-grained sand, and fine to coarse gravels was encountered from 23.5 to 25.0 feet bgs. This lithology was consistent with the A-Aquitard described in past investigations (SAIC, 1992). Groundwater was encountered at 22.3 feet bgs.

WTP-SB1902 consisted of a loose, poorly graded sand with gravel to 0.700 feet bgs followed by a silty sand to 11.0 feet bgs, grading to a medium dense, poorly graded sand, fine- to medium-grained sand with trace silt to 26.7 feet bgs. A confining unit consisting of a stiff, silt with fine-grained sand, and fine to coarse gravels was encountered from 26.7 to 28.8 feet bgs. This lithology was consistent with the A-Aquitard described in past investigations (SAIC, 1992). Groundwater was encountered at 26.7 feet bgs.

Detailed drilling logs for the Wastewater Treatment Plant are included in **Appendix D-1**.

3.9.3 Analytical Results

3.9.3.1 Surface Soil

One surface soil sample was collected from each of the three soil borings completed at the Wastewater Treatment Plant. Concentrations of PFBS were less than the laboratory LOD. PFOA was detected in sample WTP-MW1901 at a concentration of 0.50 J µg/kg, which is below the Project SL of 1.7 µg/kg. All other PFOA concentrations were below laboratory LOD. PFOS was detected at concentrations ranging from 0.66 to 70 µg/kg. The concentration of 70 µg/kg in WTP-MW1901 exceeded the Project SL of 3.0 µg/kg. The surface soil analytical results are presented in **Table 3-4** and on Figure **2-7**.

3.9.3.2 Subsurface Soil

Subsurface soil samples were collected from two DPT soil borings completed at the Wastewater Treatment Plant from varying depths dependent on the depth to water observed during drilling. PFBS and PFOA were not detected above laboratory LODs. PFOS was detected at a concentration of 0.46 J µg/kg in WTP-SB1901 (21 to 22 feet bgs) and 5.4 µg/kg in WTP-SB1902 (25 to 26 feet bgs). The PFOS concentration

in WTP-SB1902 exceeded the Project SL of 3.0 µg/kg. The analytical results and depths of subsurface soil samples are presented in **Table 3-4** and on **Figure 2-7**.

3.9.3.3 Groundwater

Groundwater samples were collected from existing monitoring wells WTP-MW14-26A and WTP-MW37 and from boring WTP-MW1901 at the Wastewater Treatment Plant. PFBS was detected at concentrations ranging from of 7.7 to 19 J ng/L, which were all below the Project SL of 40,000 ng/L. Concentrations of PFOA were detected at concentrations of 23 ng/L in WTP-MW37, 25 ng/L in WTP-MW14-26A, and 71 ng/L, in WTP-MW1901. The value of 71 ng/L in WTP-MW1901 exceeded the Project SL of 40 ng/L. PFOS was detected at a concentration of 180 ng/L in WTP-MW14-26A, 420 ng/L in WTP-MW1901, and 45 ng/L in WTP-MW37. Concentrations of PFOS at all three locations exceeded the Project SL of 40 ng/L. The combined concentration of PFOA+PFOS in WTP-MW37 was below the SL of 70 ng/L. The analytical results and depths of groundwater samples are presented in **Table 3-5** and on **Figure 2-7**.

3.9.3.4 Sediment

One sediment sample was collected downslope of the Wastewater Treatment Plant outfall in a drainage area leading from the Wastewater Treatment Plant outfall to Eskimo Creek. The only detected analyte was PFOS at a concentration of 0.55 J µg/kg in WTP-SD1901, which was below the Project SL. Concentrations of PFBS and PFOA were not detected above the LOD. The analytical results of sediment samples are presented in **Table 3-6** and on **Figure 2-7**.

3.9.3.5 Surface Water

One surface water sample was collected downslope of the Wastewater Treatment Plant outfall into the drainage channel flowing into Eskimo Creek. PFBS was detected at a concentration of 0.94 J ng/L, which was below the Project SL of 40,000 ng/L. PFOA was detected at a concentration of 9.6 ng/L, which is below the Project SL of 40 ng/L. The detected PFOS concentration of 21 ng/L was below the Project SL of 40 ng/L. The combined PFOA+PFOS concentration was below the SL of 70 ng/L. The analytical results for surface water are presented in **Table 3-7** and on **Figure 2-7**.

3.9.4 Conclusions

Based on the laboratory analytical results at the Wastewater Treatment Plant, historical activities have resulted in a release of PFAS to the environment. PFOS concentrations in surface soil at WTP-MW1901 and subsurface soil at WTP-SB1902 exceeded the Project SL. Groundwater analytical results indicated that the combined concentrations of PFOA+PFOS, and PFOS alone, exceeded the Project SLs in WTP-MW1901 and WTP-MW14-26A. PFAS were detected in sediment and surface water samples but were below the Project SLs.

3.10 Eskimo Creek

3.10.1 Sample Locations

Four collocated sediment and surface water samples were collected along Eskimo Creek as indicated on **Figure 2-8**. ESC-SD1901/SW1901, ESC-SD1902/SW1902, ESC-SD1903/SW1903, and ESC-SD1904/SW1904 were selected to evaluate upstream and downstream impacts from former AFFF activities conducted at KSD. ESC-SD1901/SW1901 was selected as an upstream and background location. ESC-SD1902/SW1902 was selected to identify potential impacts immediately downstream of historical activities at the Current Fire Station that may have impacted Eskimo Creek. ESC-SD1903/SW1903 was selected to identify potential impacts immediately downstream of the Wastewater Treatment Plant outfall prior to discharge

into Eskimo Creek. ESC-SD1904/SW1904 was selected to identify potential impacts to Eskimo Creek as it passes through the KSD boundary.

3.10.2 Analytical Results

3.10.2.1 Sediment

In total, four sediment samples were collected from Eskimo Creek. Concentrations of PFBS were less than the LOD. Concentrations of PFOA were less than the LOD at all locations except for the downstream sample (ESC-SD1904), where the concentration was 1.5 µg/kg, which is below the Project SL of 1.7 µg/kg. PFOS was detected at concentrations of 4.4 µg/kg, 0.6 J µg/kg, and 150 µg/kg in the sediment samples collected at ESC-SD1902, ESC-SD1903, and ESC-SD1904, respectively. The concentrations of PFOS at ESC-SD1901 was below the LOD. Concentrations of PFOS at the location downstream of the Current Fire Station (ESC-SD1902) and the location at the installation boundary (ESC-SD1904) were above the Project SL for PFOS of 3.0 µg/kg. The analytical results are presented in **Table 3-6** and on **Figure 2-8**.

3.10.2.2 Surface Water

Surface water samples were collected from four locations along Eskimo Creek. PFBS was detected at concentrations ranging from 0.51 J to 1.2 J ng/L. PFOA was detected at concentrations ranging from 1.0 J to 11 J ng/L. PFOS was detected at concentrations ranging from 1.4 J to 46 ng/L. Concentrations did not exceed the Project SLs for PFBS (40,000 ng/L), or PFOA (40 ng/L). The concentration of PFOS at one downstream location, ESC-SW1904, was above the Project SL (40 ng/L). The analytical results are presented in **Table 3-7** and on **Figure 2-8**.

3.10.3 Conclusions

Based on the laboratory analysis of sediment and surface water samples collected at Eskimo Creek, historical fire training exercises at the KSD have resulted in a release of PFAS to the environment. Analytical results indicate that concentrations of PFOS exceed the Project SL in sediment and surface water.

3.11 Red Fox Creek

3.11.1 Sample Locations

Three collocated sediment and surface water samples were collected along Red Fox Creek as indicated on **Figure 2-9**. RFC-SD1901/SW1901, RFC-SD1902/SW1902, and RFC-SD1903/SW1903 were selected to evaluate upstream and downstream impacts from former AFFF activities conducted on Base. RFC-SD1901/SW1901 was selected as an upstream and background location. RFC-SD1902/SW1902 was selected to identify potential impacts immediately downstream of historical activities at FT001 that may have impacted Red Fox Creek. RFC-SD1903/SW1903 was selected to identify potential impacts at the Base boundary.

3.11.2 Analytical Results

3.11.2.1 Sediment

In total, three sediment samples were collected from Red Fox Creek. Concentrations of PFBS and PFOA were less than the LOD at all three locations. PFOS was detected at concentrations of 11 and 3.7 µg/kg in sediment samples RFC-SD1902 and RFC-SD1903, respectively. The concentrations of PFOS at RFC-SD1901 was below the LOD. Concentrations of PFOS at RFC-SD1902, located downgradient of FT001, and the

location at the installation boundary (RFC-SD1903) were above the Project SL for PFOS of 3.0 µg/kg. The analytical results are presented in **Table 3-6** and on **Figure 2-9**.

3.11.2.2 Surface Water

Surface water samples were collected from three locations along Red Fox Creek. PFBS was detected at concentrations from 8.5 to 11 ng/L. PFOA was detected at concentrations from 40 to 61 ng/L. PFOS was detected at RFC-SW1902 and RFC-SW1903 at concentrations of 860 and 1,300 ng/L, respectively. Concentrations did not exceed the Project SLs for PFBS (40,000 ng/L). The concentration of PFOA at the installation boundary (RFC-SW1903) was above the Project SL (40 ng/L). Concentrations of PFOS at the location downgradient of FT001, RFC-SD1902, and the location at the installation boundary (RFC-SD1903) were above the Project SL for PFOS of 40 ng/L. In addition, the combined concentration of PFOA+PFOS at both locations exceeded the Project SL of 70 ng/L. The surface water sample for RFC-SW1901 was very turbid; as a result, the lab used a much smaller sample amount for the extraction to avoid drawing sediment, and the LOD at RFC-SW1901 was greater than the Project SL of 40 ng/L for PFOS and PFOA. The analytical results are presented in **Table 3-7** and on **Figure 2-9**.

3.11.3 Conclusions

Based on the laboratory analysis of sediment and surface water samples collected at Red Fox Creek, historical fire training exercises at the KSD have resulted in a release of PFAS to the environment. Analytical results indicated that concentrations of PFOS exceeded the Project SLs in sediment and water and concentrations of PFOA exceeded the Project SL for surface water.

3.12 Fire Training Area 1 (FT001)

3.12.1 Sample Locations

Three soil borings (FT1-MW1901, FT1-SB1901, and FT1-SB1902) were advanced at FT001 as presented on **Figure 2-10**. Soil borings FT1-SB1901, and FT1-SB1902 were located immediately adjacent to existing monitoring wells FT1-ESMW-01A and FT1-ESMW-4A/4B, respectively, to collect soil samples only. A surface soil sample was collected from the top 6 inches of ground surface and a subsurface soil sample was collected 1 foot above the observed water table during drilling at all three soil boring locations. Hydrated bentonite chips were used to properly abandon soil borings FT1-SB1901 and FT1-SB1902. FT1-MW1901 was installed upgradient of the former burn pit and excavation area in the northern portion of FT001. Soil boring FT1-MW1901 was completed as a monitoring well following soil sampling activities using the Geoprobe DT45 system. Groundwater samples were collected from existing wells FT1-ESMW-01A and FT1-ESMW-4A and newly installed FT1-MW1901 following well development activities. Static water levels were measured in each monitoring well and groundwater flow direction was estimated using the 3-point method. The groundwater flow direction across the area is southwest.

3.12.2 Lithology and Soil Description

Soil borings FT1-MW1901, FT1-SB1901, and FT1-SB1902 were advanced to a total depth of 12.0 feet bgs, 15.0 feet bgs, and 15.0 feet bgs, respectively. The overlying unconsolidated sediments primarily consisted of silt, silty sand, and poorly graded sands with trace amounts of gravel, and varying degrees of moisture and density. The A-Aquitard confining unit was not observed during FT001 drilling activities. Groundwater ranged from 4.00 feet bgs to 12.7 feet bgs in FT1-MW1901 and FT1-MW1903, respectively.

Borehole FT1-MW1901 consisted of a dry to moist, fine-grained, poorly graded sand with trace silt, to a depth of 3.3 feet bgs followed by a thin 0.2-foot-thick, silt with sand lens, followed by a dense, poorly

graded, fine-grained sand with trace silt and medium-grained sand. Groundwater was observed at 4.0 feet bgs.

Borehole FT1-SB1901 consisted of a dry, loose, silty sand with trace organics to a depth of 0.5-foot bgs grading to a loose to medium dense, poorly graded, fine-grained sand with trace silt and gravels. A petroleum odor was observed in sands collected from 13 to 15 feet bgs. Groundwater was observed at 11 feet bgs.

Borehole FT1-SB1902 consisted of a dry to moist, loose, poorly graded sand with trace organics and gravels to a depth of 3.5 feet bgs followed by a stiff, moist, silt thin lens followed by moist to wet, dense, poorly graded, fine- to medium-grained sand. Groundwater was observed at 12.7 feet bgs.

Detailed drilling logs for the FT001 are included in **Appendix D-1**.

3.12.3 Analytical Results

3.12.3.1 Surface Soil

One surface soil sample was collected from each of the three soil borings completed at FT001. PFBS concentrations were below the LOD for all surface soil samples except for one detection at FT1-SB1901. PFBS was detected at a concentration of 3.0 µg/kg, which was less than the SL of 130,000 µg/kg. Results for PFOA exceeded the Project SL of 1.7 µg/kg at a concentration of 11 µg/kg at FT1-SB1901. PFOA was detected below the Project SL in FT1-SB1902 at a concentration of 0.56 J µg/kg. PFOS concentrations in samples collected from FT1-SB1901 and FT1-SB1902 exceeded the Project SL of 3.0 µg/kg at concentrations of 2,700 and 83 µg/kg, respectively. The analytical surface soil results are presented in **Table 3-4** and on **Figure 2-10**.

3.12.3.2 Subsurface Soil

Subsurface soil samples were collected from each of the three soil borings completed at FT001 from varying depths that depended on the assumed depth to water. Concentrations of PFBS were below the LOD in subsurface soil. PFOA was detected at a concentration of 5.0 µg/kg between 10 and 11 feet bgs from FT1-SB1901, which exceeded the Project SL of 1.7 µg/kg; remaining concentrations were below the LOD. PFOS exceeded the Project SL of 3.0 µg/kg in subsurface soil collected from FT1-SB1901 and FT1-SB1902 (11 to 12 feet bgs) at concentrations of 490 and 6.8 µg/kg, respectively. The detection of PFOS at a concentration of 0.43 J µg/kg at FT1-MW1901 did not exceed the Project SL. The analytical results and depths of subsurface soil samples are presented in **Table 3-4** and on **Figure 2-10**.

3.12.3.3 Groundwater

Three groundwater samples were collected at FT001: two from existing monitoring wells and one from a newly installed well. PFBS was detected below the Project SL (40,000 ng/L) in each sample, ranging in concentration from 4.9 to 170 ng/L. Groundwater results from existing wells FT1-ESMW-01A and FT1-ESMW-4A exceeded the Project SL for PFOA (40 ng/L) at concentrations of 340 and 710 ng/L, respectively, while PFOA was detected below the Project SL in newly installed monitoring well FT1-MW1901 at a concentration of 23 ng/L. PFOS concentrations exceeded the Project SL of 40 ng/L in all samples at concentrations of 96,000 ng/L in FT1-ESMW-01A, 17,000 ng/L in FT1-ESMW-4A, and 170 ng/L in FT1-MW1901, respectively. Combined PFOA+PFOS results for each of the three wells (FT1-ESMW-01A, FT1-ESMW-4A, and FT1-MW1901) exceeded the Project SL of 70 ng/L with concentrations of 96,340, 17,710, and 193 ng/L, respectively. The analytical results for groundwater samples are presented in **Table 3-5** and on **Figure 2-10**.

3.12.4 Conclusions

Based on the laboratory analysis of soil and groundwater samples collected at FT001, historical fire training exercises at the FT001 have resulted in a release of PFAS to the environment. PFOA and PFOS were identified in surface and subsurface soil above the Project SLs directly downgradient of the burn pit location (FT1-SB1901). Results of PFOS at this location also exceeded the Project SL in both surface and subsurface soil. PFOS was identified in surface and subsurface soil above the Project SL at the downgradient location in relation to the burn pit (FT1-SB1902). In groundwater, PFOS and combined PFOA+PFOS concentrations exceeded the Project SL at all three locations, while PFOA results exceeded in downgradient locations.

3.13 Fire Training Area 2 (FT002)

3.13.1 Sample Locations

Three soil borings (FT2-MW1901, FT2-MW1902, and FT2-MW1903) were advanced at FT002 as presented on **Figure 2-11**. FT2-MW1901 was advanced as a potential upgradient location to FT002, and FT2-MW1903 was advanced to assess contamination downgradient of the source area. FT2-MW1902 was placed near the suspected source area. At each location, one surface soil sample was collected from the first 6 inches of the ground surface. A subsurface soil sample was collected 1 foot above the observed water table during drilling activities. Each soil boring was completed as a monitoring well using the Geoprobe DT45 system. Groundwater samples were collected from monitoring wells FT2-MW1901, FT2-MW1902, and FT2-MW1903 after well development. Static water levels were measured in each monitoring well and groundwater flow direction was estimated using the 3-point method. The groundwater flow direction across the area is south. Surface water was not present; therefore, sediment and surface water samples were not collected.

3.13.2 Lithology and Soil Description

Soil borings FT2-MW1901, FT2-MW1902, and FT2-MW1903 were each advanced to a total depth of 15.0 feet bgs. The overlying unconsolidated sediments primarily consisted of silt, silty sand, and well to poorly graded sands with trace amounts of gravel, and varying degrees of moisture and density. The A-Aquitard confining unit was not observed during FT001 drilling activities. Groundwater ranged from 7.5 feet bgs in FT2-MW1903 to 12 feet bgs in FT2-MW1902.

Borehole FT2-MW1901 consisted of a moist, loose, silty sand with trace organics to 0.8 feet bgs, grading to a poorly graded sand consisting of very fine to fine-grained sand, with trace silt and medium-grained sand with varying degrees of moisture and density, to the depth of 15 feet bgs. Groundwater was observed at 7.5 feet bgs.

Borehole FT2-MW1902 consisted of a loose to medium-dense, dry to moist, well graded sands with trace to few gravels and silt to 3.0 feet bgs grading to a poorly graded sand, loose to medium-dense, dry to wet, with trace gravels. A petroleum odor was observed in sands collected from 0.0 to 3.0 feet bgs. Groundwater was observed at 12 feet bgs.

Borehole FT2-MW1903 consisted of interbedded lenses of silty sand, silt with sand, and poorly graded sand with varying degrees of moisture and density to 13 feet bgs followed by a medium-dense, wet, well graded sand with trace silt and gravel to 15 feet bgs. Groundwater was observed at 7.5 feet bgs.

Detailed drilling logs for the FT002 are included in **Appendix D-1**.

3.13.3 Analytical Results

3.13.3.1 Surface Soil

One surface soil sample was collected from each of the three soil borings completed at FT002. Concentrations of PFBS were less than LOD at each location except for the sample collected at FT2-MW1902, which had a detection below the Project SL at 5.4 µg/kg. PFOA was detected at concentrations from 0.24 J to 32 µg/kg in surface soil samples. Only the result of 32 µg/kg from FT2-MW1902 exceeded the Project SL of 1.7 µg/kg. PFOS exceeded the Project SL of 3.0 µg/kg in each surface sample collected at FT002. PFOS concentrations in boreholes FT2-MW1901, FT2-MW1902, and FT2-MW1903 were 17 µg/kg, 2,000 µg/kg, and 58 µg/kg, respectively. The surface soil analytical results are presented in **Table 3-4** and on **Figure 2-11**.

3.13.3.2 Subsurface Soil

Subsurface soil samples were collected from each of the three soil borings completed at the FT002 from varying depths that depended on the assumed depth to water. PFBS was not detected at concentrations above the LOD and concentrations of PFOA were either below the LOD or corresponding Project SLs, with detections ranging from 0.35 J to 0.41 J µg/kg. PFOS was detected at concentrations of 6.4 and 19 µg/kg in subsurface soil collected from FT2-MW1901 and FT2-MW1902, which exceeded the Project SL of 3.0 µg/kg. The concentration of 1.0 µg/kg collected from FT2-MW1903 did not exceed the Project SL. The analytical results and depths of subsurface soil samples are presented in **Table 3-4** and on **Figure 2-11**.

3.13.3.3 Groundwater

Three groundwater samples were collected at monitoring wells installed at FT002 during the 2019 field season. PFBS concentrations were below the Project SL in all groundwater samples collected, ranging in concentrations from 3.5 to 340 ng/L. PFOA was detected at concentrations below the Project SL at 3.4 to 5.3 ng/L in FT2-MW1902 and FT2-MW1901, respectively. PFOA exceeded the Project SL of 40 ng/L in FT2-MW1903 at a concentration of 750 ng/L. PFOS was detected in groundwater at concentrations of 82 and 2,900 ng/L, which exceeded the Project SL at monitoring wells FT2-MW1902 and FT2-MW1903, respectively. Both wells contained concentrations of combined PFOA+PFOS that exceeded the Project SL, ranging from 85.4 to 3,650 ng/L. PFOS was detected below the Project SL at FT2-MW1901, at a concentration of 29 ng/L. The analytical results of groundwater samples are presented in **Table 3-5** and on **Figure 2-11**.

3.13.4 Conclusions

Based on the laboratory analysis of soil and groundwater samples collected at FT002, historical fire training exercises at FT002 have resulted in a release of PFAS to the environment. Analytical results indicate that concentrations of PFOA were present above the Project SL in surface soil in the central portion of the area (FT2-MW1902). PFOS was present at concentrations above the Project SL in surface soil at all three locations. Additionally, PFOS was present at concentrations above the Project SL in subsurface soil at FT2-MW1901 and FT2-MW1902. Groundwater within the fire training area and on the downgradient edge contained concentrations of PFOS greater than the Project SL. PFOA was present in groundwater at concentrations that exceeded the Project SL on the downgradient edge. Groundwater has not been significantly affected upgradient of the FT002 source area boundary.

3.14 Fire Training Area 4 (FT004)

3.14.1 Sample Locations

Three soil borings (FT4-MW1901, FT4-MW1902, and FT4-MW1903) were advanced at FT004 as presented on **Figure 2-12**. FT4-MW1901 was advanced cross-gradient of the source area, FT4-MW1902 was advanced within the source area to assess contamination identified during 2015 and 2016 sampling efforts, and FT4-MW1903 was advanced downgradient and cross-gradient of the former source area. At each location, a surface soil sample was collected from the first 6 inches of the ground surface and a subsurface sample was collected from 1 foot above the observed water table during drilling activities. Each boring was completed as a monitoring well following soil sampling activities using the Geoprobe DT45 system. Groundwater samples were collected from monitoring wells FT4-MW1901, FT4-MW1902, and FT4-MW1903 after well development. Static water levels were measured in each monitoring well and groundwater flow direction was estimated using the 3-point method. The groundwater flow direction across the area is northwest. Surface water was not present; therefore, sediment and surface water samples were not collected.

3.14.2 Lithology and Soil Description

Soil borings FT4-MW1901, FT4-MW1902, and FT4-MW1903 were each advanced to a total depth of 15.0 feet bgs. The overlying unconsolidated sediments primarily consisted of silt, silty sand, and well to poorly graded sands with trace fines and gravels, and varying degrees of moisture and density. The A-Aquitard confining unit was not observed during FT001 drilling activities. Groundwater was observed from 8.2 to 9.0 feet bgs in FT4-MW1901 and FT4-MW1903, respectively.

Borehole FT4-MW1901 consisted of a thin organic silt with trace fine-grained sand to 0.2 feet bgs followed by a silt lens to 2.1 feet bgs, followed by a poorly graded sand consisting of fine- to medium-grained sand to 8.2 feet bgs. From 8.2 to 11 feet bgs, the lithology consisted of a dense, silty sand grading to a dense, poorly graded sand with trace gravel to 15 feet bgs. Groundwater was observed at 8.2 feet bgs.

Borehole FT4-MW1902 consisted of silty sand with gravel to 0.5 feet bgs followed by a soft, silt lens to 2.0 feet bgs, followed by a poorly graded sand with trace silt to 15 feet bgs with varying degrees of moisture and density. Groundwater was observed at 9.0 feet bgs.

Borehole FT4-MW1903 consisted of silty sand with gravel to 0.5 feet bgs grading to a poorly graded sand, exhibiting varying degrees of grain size, moisture, and density to 8.50 feet bgs followed by a thin, loose, well graded sand to approximately 8.80 feet bgs. A moist to wet silty sand followed to 10.5 feet bgs grading to a medium-dense to dense, fine- to medium-grained, poorly graded sand with trace gravel to 15.0 feet bgs. Groundwater was observed at 9.0 feet bgs.

Detailed drilling logs for FT004 are included in **Appendix D-1**.

3.14.3 Analytical Results

3.14.3.1 Surface Soil

One surface soil sample was collected from each of the three soil borings completed at the FT004. PFBS was detected below the Project SL (130,000 µg/kg) at FT4-MW1902 at a concentration of 0.72 J µg/kg; the remaining results were below the LOD. Concentrations of PFOA and PFOS exceeded their respective Project SLs in surface soil in all three locations. Concentrations of PFOA were 18 µg/kg, 11 µg/kg, and 2.7 µg/kg in surface soil at FT4-MW1901, FT4-MW1902, and FT4-MW1903, respectively and exceeded the Project SL of 1.7 µg/kg. PFOS concentrations of 120 µg/kg, 220 µg/kg, and 44 µg/kg exceeded the Project SL of 3.0 µg/kg

at locations FT4-MW1901, FT4-MW1902, and FT4-MW1903, respectively. The analytical surface soil results are presented in **Table 3-4** and on **Figure 2-12**.

3.14.3.2 Subsurface Soil

Subsurface soil samples were collected from each of the three soil borings completed at FT004 from varying depths that depended on the assumed depth to water. PFBS concentrations were not detected above the LOD in subsurface soil at FT004. PFOA was detected at concentrations of 0.28 J and 0.66 µg/kg at FT4-MW1901 and FT4-MW1903, respectively, below the Project SL. The subsurface soil sample from FT4-MW1902 exceeded the PFOA Project SL of 1.7 µg/kg at a concentration of 5.6 µg/kg. Similarly, PFOS exceeded the Project SL in all soil samples collected at FT004 except for the upgradient and cross-gradient subsurface soil sample (detected at 0.56 J µg/kg). PFOS is most concentrated (260 µg/kg) within the central portion of FT004; however, concentrations (14 µg/kg) exceeded the Project SL downgradient and cross-gradient to the west in subsurface soil. The analytical results and depths of subsurface soil samples are presented in **Table 3-4** and on **Figure 2-12**.

3.14.3.3 Groundwater

Three groundwater samples were collected from newly installed monitoring wells at FT004. Each sample contained PFAS concentrations greater than the Project SLs for PFOA and PFOS. PFOA concentrations ranged from 160 to 5,500 ng/L while concentrations of PFOS ranged from 400 to 5,100 ng/L, with results most concentrated in the central portion of the source area. PFBS concentrations ranged from 11 to 75 ng/L and were all below the Project SL. The analytical results of groundwater samples are presented in **Table 3-5** and on **Figure 2-12**.

3.14.4 Conclusions

PFOA exceeded the Project SL in surface soil at all three locations but only exceeded in subsurface soil in the central portion of the area. Similarly, PFOS exceeded the Project SL in all surface samples collected and in subsurface soil except for the upgradient and cross-gradient location (subsurface soil at FT4-MW1901). Concentrations that also exceeded the Project SL are the highest within the central part of the area. Groundwater throughout FT004 contains concentrations of PFOA and PFOS above the Project SLs. Concentrations are generally highest in the central part of the area. Based on the laboratory analysis of soil samples collected at the FT004, historical fire training exercises have resulted in a release of PFAS to the environment.

3.15 Former Landfarm and Holding Ponds

3.15.1 Sample Locations

Three soil borings (LHP-MW1901, LHP-MW1902, and LHP-MW1903) were advanced at the Former Landfarm and Holding Ponds as presented on **Figure 2-13**. Because landfarm deconstruction activities were underway at the time of this SI, the focus of this investigation was to assess the potential source of PFAS associated with the holding ponds. LHP-MW1901 was advanced at the upgradient edge, east of Holding Pond 1; LHP-MW1902 was advanced west and downgradient of Holding Pond 8; and LHP-MW1903 was advanced downgradient of the area, immediately west of the South Biocell. At each location, one surface soil sample was collected from the first 6 inches of the ground surface. A subsurface soil sample was collected 1 foot above the observed water table during drilling activities. Each boring was completed as a monitoring well following soil sampling activities using the Geoprobe DT45 system. Groundwater samples were collected from monitoring wells LHP-MW1901, LHP-MW1902, and LHP-MW1903. Static water levels were measured in each monitoring well and the groundwater flow direction

was estimated using the 3-point method. The groundwater flow direction across the area is southwest towards Eskimo Creek. Surface water was not present; therefore, sediment and surface water samples were not collected.

3.15.2 Lithology and Soil Description

Soil borings LHP-MW1901, LHP-MW1902, and LHP-MW1903 were advanced to a total depth of 16.0 feet bgs, 16.0 feet bgs, and 19.0 feet bgs, respectively. The overlying unconsolidated sediments primarily consisted of silt, silty sand, and poorly graded sands with varying degrees of moisture and density. The A-Aquitard confining unit was not observed during drilling activities. Groundwater was observed between 10 to 13 feet bgs in LHP-MW1901, LHP-MW1902, and LHP-MW1903.

Borehole LHP-MW1901 consisted of a poorly graded sand, with trace silt and gravel with varying amounts of moisture and density from ground surface to 15 feet bgs. A thin lens of sandy silt was present from 2.3 to 3.1 feet bgs. Groundwater was observed at 10 feet bgs.

Borehole LHP-MW1902 consisted of poorly graded sand with silt to 1.2 followed by a thin lens of silty sand from 1.2 to 1.6 feet bgs, grading back to a poorly graded sand with silt from 1.6 to 3.2 feet bgs. A 1.4-foot-thick layer of medium-stiff silt with fine-grained sand was observed to 4.6 feet bgs, followed by poorly graded sand with trace gravel and varying amounts of moisture, density and grain size to 15 feet bgs. Groundwater was observed at 10 feet bgs.

Borehole LHP-MW1903 consisted of silty sand with organics to 0.50 feet bgs followed by silt with fine-grained sand and trace organics to 3.0 feet bgs, followed by silty sand to 4.4 feet grading to a poorly graded sand with varying degrees of moisture and density to 15 feet bgs. Groundwater was observed at 13 feet bgs.

Detailed drilling logs for the Former Landfarm and Holding Ponds are included in **Appendix D-1**.

3.15.3 Analytical Results

3.15.3.1 Surface Soil

One surface soil sample was collected from each of the three soil borings completed at the Former Landfarm and Holding Ponds. All concentrations of PFBS were less than the LOD. Concentrations of PFOA at LHP-MW1903 slightly exceeded the Project SL of 1.7 µg/kg, at a concentration of 1.9 µg/kg. PFOA was detected at a concentration of 0.34 J µg/kg, below the Project SL, at LHP-MW1902, while the remaining result at LHP-MW1901 was below the LOD. PFOS concentrations at LHP-MW1902 and LHP-MW1903 exceeded the Project SL of 3.0 µg/kg, at concentrations of 3.6 and 73 µg/kg, respectively. The PFOS detection of 0.38 J µg/kg at LHP-MW1901 was less than the Project SL. The surface soil analytical results are presented in **Table 3-4** and on **Figure 2-13**.

3.15.3.2 Subsurface Soil

Subsurface soil samples were collected from each of the three soil borings completed at the Former Landfarm and Holding Ponds from varying depths that depended on the assumed depth to water. Concentrations of PFOA and PFBS were not detected above the LOD in subsurface soils collected at the Former Landfarm and Holding Ponds. PFOS concentrations exceeded the Project SL of 3.0 µg/kg in LHP-MW1903 between 12 and 13 feet bgs with a result of 4.6 µg/kg. The only other detection of PFOS in subsurface soil (1.9 µg/kg at LHP-MW1902) was below the Project SL. The analytical results and depths of subsurface soil samples are presented in **Table 3-4** and on **Figure 2-13**.

3.15.3.3 Groundwater

Three groundwater samples were collected from newly installed monitoring wells at the Former Landfarm and Holding Ponds. PFBS was detected under the Project SL at concentrations of 1.9 and 66 ng/L at LHP-MW1902 and LHP-MW1903, respectively. PFOA and PFOS concentrations exceeded the Project SLs of 40 ng/L at downgradient location LHP-MW1903, at concentrations of 9,800 and 3,300 ng/L respectively. Although individual concentrations of PFOA (30 ng/L) in groundwater at LHP-MW1902 did not exceed the Project SL, the individual concentration of PFOS (63 ng/L) and the combined concentration of PFOA+PFOS (93 ng/L) exceeded the Project SLs of 40 and 70 ng/L, respectively. The analytical results of groundwater samples are presented in **Table 3-5** and on **Figure 2-13**.

3.15.4 Conclusions

Based on the laboratory analysis of soil and groundwater samples collected at the Former Landfarm and Holding Ponds, historical fire training exercises at this area have resulted in a release of PFAS to the environment. Analytical results indicate PFOA in surface soil and groundwater exceeded the Project SL downgradient of the Former Landfarm and Holding Ponds(LHP-MW1903). In addition, PFOS is present at concentrations above the Project SL in surface soil within the central portion of the Former Landfarm and Holding Ponds (LHP-MW1902), and in surface soil, subsurface soil, and groundwater downgradient.

3.16 Data Validation and Usability

Third-party data validation was conducted by Laboratory Data Consultants, Inc. (LDC) for 100 percent of the analytical data for the 18 PFAS compounds. The analytical data quality review summary prepared by Ayuda for the soil, groundwater, surface water, and sediment samples collected for the USAF SI is presented in the quality control summary report (QCSR) included in **Appendix F**. The Eurofins analytical data are presented in **Attachment F-1** and the data validation report prepared by LDC is presented in **Attachment F-2**. A summary of analytical results for all PFAS target analytes can be found in **Attachment F-3**.

Several tables are also included in Appendix F. Table F4-1 is the sample index. Table F4-2 shows a summary of validation qualifiers. A comparison of the investigative and field duplicate sample detections is presented in F4-3. Table F4-4 contains the equipment and field blank detections and F4-5 summarizes the extracted internal standard outliers.

The investigative samples were collected and analyzed in accordance with the QSM 5.1 Table B-15, USEPA Methods, and laboratory-specific quality assurance/quality control procedures. Based on the data review, the analytical data generated for the KSD SI are acceptable and adequate to fulfill program objectives. The data quality indicators, in terms of precision, accuracy, representativeness, completeness, comparability, and sensitivity (PARCCS), can be found in Section 2.3, Data Quality Objectives, of the Appendix F QCSR.

3.17 Investigation-derived Waste

3.17.1 Soil

Soil cuttings generated during the advancement of soil borings were placed in site-specific containers and staged in secondary containment at the LHP. Soil samples were collected from site-specific soil drums for waste profiling purposes. Samples were analyzed for VOCs by Method 8260C, semivolatile organic compounds (SVOCs) by Method 8270D, total petroleum hydrocarbons (TPH) GRO by Method AK101, TPH DRO/RRO by Methods AK102/AK103, and toxicity characteristic leaching procedure (TCLP) Resource Conservation and Recovery Act (RCRA) 8 Metals. All IDW sample results and PFAS sample results, were

compared to Project SLs to determine if soil would be disposed of onsite or transported offsite for treatment and disposal.

Waste soil generated during the advancement of soil borings WTP-SB1901, CAC-MW1901, and CAC-MW1902 was below ADEC waste disposal criteria and was dispersed on the ground around the former soil boring locations. All other soil was transported offsite by NRC Alaska/U.S. Ecology (NRC). One soil drum containing all soil except the dispersed soil from WTP-SB1901, CAC-MW1901, and CAC-MW1902 was transported offsite.

Final disposition of soil IDW with concentrations above ADEC waste disposal criteria was treated by thermal desorption at the Organic Incineration Technology (OIT) facility operated by NRC in Moose Creek, Alaska. The facility was in compliance with the USEPA Off-Site Rule. The signed non-hazardous waste manifest, Bill of Lading, Certificate of Disposal, and ADEC Transport, Treatment, & Disposal Approval Form for Contaminated Media are contained in **Appendix G**.

3.17.2 Aqueous

Aqueous IDW generated during well development, groundwater sampling, and decontamination of reusable equipment used at KSD were containerized in site-specific 55-gallon steel drums and staged in secondary containment at the Former Landfarm and Holding Ponds. Aqueous samples were collected from site-specific drums for waste profiling purposes. Samples were analyzed for VOCs by Method 8260C, SVOCs by Method 8270D, TPH GRO by Method AK101, TPH DRO/RRO by Methods AK102/AK103, and RCRA 8 Metals by Method 6010/7470A. Analytical results that exceeded ADEC waste disposal criteria were observed in all site-specific drums, except for water generated at LHP-MW1902. Individual PFOA and PFOS results for groundwater samples collected at LHP-MW1902 were below the individual Project SL of 70 ng/L and the ADEC Table B1 Human Health Groundwater Cleanup Level of 400 ng/L, identified in the UFP-QAPP Addendum (Ayuda et al., 2019). The LHP-MW1902 water drum was dispersed around the ground surface at monitoring well LHP-MW1902. All other aqueous drums were transported by NRC to their facility in Anchorage, Alaska, on 23 November 2019. Water was treated through GAC at their facility and then discharged to the Anchorage Wastewater Utility Publicly Owned Treatment Works under NRC's PFOA/PFOS discharge permit. As part of NRC's operation, the spent GAC is subsequently treated by thermal desorption at the OIT facility operated by NRC in Moose Creek, Alaska. The signed ADEC Transport, Treatment, & Disposal Approval Form for Contaminated Media, nonhazardous waste manifest, bill of lading, and certificate of disposal are included in **Appendix G**.

3.17.3 General Refuse

General refuse including paper, plastic, trash, and personal protective equipment was placed in opaque contractor trash bags and disposed as municipal waste.

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4.0 BUILDING 160 (COMBAT ALERT CELL) – EXPOSURE PATHWAYS AND UPDATED CSM

4.1 Soil Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-3**, PFBS was not detected in surface or subsurface soil. PFOA was detected in surface and subsurface soil samples with a maximum concentration of 0.39 J and 0.33 J µg/kg, respectively, but all concentrations were below the Project SL. The greatest concentrations of PFOS were 13 µg/kg in surface soil and 23 µg/kg in subsurface soil, which exceeded the Project SL of 3.0 µg/kg. Based on PFOS concentrations above the Project SL, soil is a medium of potential concern and the exposure pathway for human and biota is complete at the Combat Alert Cell.

4.2 Groundwater Exposure Pathway

PFBS was detected in all groundwater samples with a maximum concentration of 92 ng/L; however, all concentrations were less than the SL (**Table 3-5** and **Figure 2-3**). PFOA and PFOS were detected in each groundwater sample at concentrations greater than the Project SL of 40 ng/L. The maximum PFOA and PFOS concentrations were 1,600 and 5,500 ng/L, respectively. Groundwater is a medium of potential concern and the exposure pathway for human and biota is potentially complete at the Combat Alert Cell.

4.3 Sediment and Surface Water Exposure Pathway

As presented in **Table 3-6** and on **Figure 2-3**, PFBS was not detected in sediment at a concentration above the LOD. PFOA was detected in sediment at a concentration less than the Project SL. The PFOS concentration of 7.1 µg/kg exceeded the Project SL. Although surface water was not observed during the 2019 field activities, field personnel indicated having observed surface water flowing in the ephemeral drainage ditch during heavy rains. Overland flow from the Combat Alert Cell building flows across the parking lot directly into the grass area into the ephemeral drainage ditch (**Figure 2-3**). PFAS-impacted sediment would likely be transported via surface water from the ephemeral drainage ditch into Eskimo Creek, approximately 1,000 feet away. Therefore, surface sediment is a medium of potential concern and the exposure pathway for human and biota is potentially complete at the Combat Alert Cell. It is unknown if seasonal surface water is a medium of potential concern.

4.4 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified soil, groundwater, surface water, and sediment as media potentially impacted by previous releases of AFFF at the Combat Alert Cell. Potential human receptors include Base personnel exposed to impacted soil, sediment, and ingestion of groundwater and off-Base residents exposed through ingestion of impacted groundwater. Ecological receptors would be exposed to all media of potential concern.

Based on the findings discussed in Section 3, surface and subsurface soil, groundwater, and sediment at the Combat Alert Cell have been impacted by concentrations of PFAS that exceeded their respective Project SLs; therefore, these media have been retained as media of potential concern. Surface water was not observed, and further investigation is needed to determine if surface water is a medium of potential concern, as it has the potential to transport PFAS in suspended sediment from the drainage ditch to Eskimo Creek. Therefore, all media have been retained as a medium of potential concern.

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5.0 FORMER BUILDING 152 (FORMER FIRE STATION) – EXPOSURE PATHWAYS AND UPDATED CSM

5.1 Soil Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-4**, PFBS was not detected in surface or subsurface soil. PFOA was detected in surface and subsurface soil with a maximum concentration of 8.5 and 2.3 µg/kg, respectively. The maximum concentration of PFOS in surface soil was 810 and 140 µg/kg in subsurface soil, which were both greater than the Project SL of 3.0 µg/kg. Based on the soil analytical results, PFOA and PFOS concentrations exceeded the Project SLs. Therefore, soil is a medium of potential concern and the exposure pathway for humans and biota in soil is potentially complete at the Former Fire Station.

5.2 Groundwater Exposure Pathway

Groundwater has been impacted by PFAS based on the analytical results presented in **Table 3-5** and on **Figure 2-4.** PFBS was detected in groundwater but was below the Project SL of 40,000 ng/L. The maximum concentrations of PFOA and PFOS were 2,900 and 45,000 ng/L, respectively. The combined PFOA and PFOS concentrations for all groundwater samples ranged from 447 to 47,900 ng/L, which exceeded the combined PFOA+PFOS SL of 70 ng/L. Therefore, groundwater is a medium of potential concern and the exposure pathway for human and biota in groundwater is potentially complete at the Former Fire Station.

5.3 Sediment and Surface Water Exposure Pathway

As presented in **Table 3-6** and on **Figure 2-4**, PFBS was detected in sediment below the Project SL. PFOA was present at a concentration of 70 µg/kg, which was greater than the Project SL of 1.7 µg/kg. The PFOS concentration of 300 µg/kg exceeded the Project SL of 3.0 µg/kg. Although surface water was not observed during the 2019 field activities, field personnel confirmed that the onsite ephemeral drainage ditch is intermittently full of water during heavy rainfall events. Overland flow at the Former Fire Station flows south across the grass area into the ephemeral drainage ditch (**Figure 2-4**). Sediment impacted with PFOA and PFOS has the potential to be suspended in surface water and transported from the ephemeral drainage ditch to Eskimo Creek. Therefore, surface water and sediment are media of potential concern at the Former Fire Station. The human and biota exposure pathway for sediment and surface water is potentially complete at the Former Fire Station.

5.4 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified soil, groundwater, surface water, and sediment as media potentially impacted by previous releases of AFFF at the Former Fire Station. Potential human receptors include Base personnel exposed to impacted soil, sediment, and groundwater and off-Base residents exposed through ingestion of impacted groundwater and surface water. Ecological receptors would be exposed to all media of potential concern.

Based on the findings discussed in Section 3, surface and subsurface soil, groundwater, and sediment at the Former Fire Station have been impacted by concentrations of PFAS that exceeded their respective Project SLs; therefore, these media remain media of potential concern. Surface water was not observed but is retained as a medium of potential concern as it is likely to transport PFAS in sediment from the drainage ditch to Eskimo Creek.

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6.0 SPRAY TEST AREA– EXPOSURE PATHWAYS AND UPDATED CSM

6.1 Soil Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-5**, PFBS was detected in one surface soil sample that was below the Project SL. PFOA was detected in surface and subsurface soil with the greatest concentration of 3.1 µg/kg in surface soil and 2.0 µg/kg in subsurface soil. Both PFOA concentrations exceeded the Project SL of 1.7 µg/kg. PFOS maximum concentrations were 89 µg/kg in surface soil and 77 µg/kg in subsurface soil, both of which exceeded the Project SL of 3.0 µg/kg. Based on the soil analytical results, PFOA and PFOS concentrations were greater than the respective Project SLs. Therefore, soil is a medium of concern and the human and biota exposure pathway for soil is complete at the Spray Test Area.

6.2 Groundwater Exposure Pathway

Groundwater analytical results are presented in **Table 3-5** and on **Figure 2-5.** PFBS was detected at a concentration below the Project SL. The maximum PFOA concentration was 330 ng/L, which was greater than the Project SL of 40 ng/L. PFOS was detected at a maximum concentration of 4,500 ng/L, which exceeded the Project SL of 40 ng/L. Therefore, groundwater is a medium of concern and the exposure pathway is complete at the Spray Test Area.

6.3 Sediment and Surface Water Exposure Pathway

Sediment analytical results are presented in **Table 3-6** and on **Figure 2-5**. PFBS concentrations in sediment were not detected above the LOD. PFOA was present at a concentration of 15 µg/kg in sediment, which was greater than the Project SL of 1.7 µg/kg. The PFOS concentration of 1,000 µg/kg in sediment exceeded the Project SL of 3.0 µg/kg. Surface water results are presented in **Table 3-7** and on **Figure 2-5**. PFBS was detected in surface water; however, concentrations were below the Project SL of 40,000 ng/L. PFOA and PFOS were detected at concentrations of 440 and 4,300 ng/L, respectively, which exceeded the Project SL of 40 ng/L for each analyte. Sediment and surface water are media of potential concern and the human and biota exposure pathway for sediment and surface water are complete at the Spray Test Area.

6.4 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified soil, surface water, sediment, and groundwater as media potentially impacted by previous releases of AFFF at the Spray Test Area. Potential human receptors include Base personnel exposed to impacted soil, sediment, and groundwater via ingestion and off-Base residents exposed through ingestion of impacted groundwater and surface water. Ecological receptors would be exposed to all media of potential concern.

Based on the findings discussed in Section 3, surface and subsurface soil, surface water, sediment, and groundwater at the Spray Test Area have been impacted by PFAS concentrations greater than their respective Project SLs; therefore, all media remain a potential concern.

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7.0 BUILDING 300 (CURRENT FIRE STATION) – EXPOSURE PATHWAYS AND UPDATED CSM

7.1 Soil Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-6**, PFBS was not detected in surface or subsurface soil above the LOD. The maximum PFOA concentration was 3.0 J µg/kg in surface soil, which exceeded the Project SL of 1.7 µg/kg. Concentrations of PFOA in subsurface soil were below the Project SL. The greatest concentrations of PFOS were 180 µg/kg in surface soil and 380 µg/kg in subsurface soil, which were greater than the Project SL of 3.0 µg/kg and the SL. Based on the soil sample analytical results, PFOA and PFOS concentrations exceeded their respective Project SLs, indicating that soil is a medium of potential concern and the human and biota exposure pathway for soil is complete at the Current Fire Station.

7.2 Groundwater Exposure Pathway

Groundwater analytical results are presented in **Table 3-5** and on **Figure 2-6.** PFBS was detected in all groundwater samples but was below the Project SL. PFOA was detected in all samples with a range of concentrations from 150 to 160 ng/L, and all concentrations exceeded the Project SL of 40 ng/L. PFOS concentrations ranged from 500 to 970 ng/L, which exceeded the Project SL of 40 ng/L. Therefore, groundwater is a medium of potential concern and the exposure pathway for humans and biota is complete at the Current Fire Station.

7.3 Sediment and Surface Water Exposure Pathway

Sediment analytical results are presented in **Table 3-6** and on **Figure 2-6**. PFBS concentrations in sediment were not detected above the LOD. PFOA was detected in sediment but was below the Project SL. The PFOS concentration of 37 µg/kg in sediment exceeded the Project SL of 3.0 µg/kg. Although surface water was identified as a medium of potential concern at the Current Fire Station in the UFP-QAPP Addendum (Ayuda et al., 2019), surface water was not present in the ephemeral drainage at the Current Fire Station during 2019 field activities. Site personnel confirmed that the sheet flow across the paved areas migrates towards the ephemeral drainage ditch. Sediment impacted with PFOS has the potential to be suspended and transported in surface water from the ephemeral drainage ditch to Eskimo Creek. Sediment is a medium of potential concern; therefore, the human and biota exposure pathway is complete at the Current Fire Station. It is unknown if surface water is a medium of potential concern.

7.4 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified soil, groundwater, sediment, and surface water as media potentially impacted by previous releases of AFFF at the Current Fire Station. Potential human receptors include Base personnel exposed to impacted soil and sediment and off-Base residents exposed through ingestion of impacted groundwater.

Based on the findings discussed in Section 3, surface and subsurface soil at the Current Fire Station have concentrations of PFOA, PFOS, or both greater than one or both of their respective Project SLs; therefore, surface and subsurface soil remain media of potential concern.

Groundwater was impacted by concentrations of PFAS greater than their respective Project SLs; therefore, groundwater remains a medium of potential concern.

Sediment has been impacted by PFOS concentrations exceeded the Project SL; therefore, sediment has been retained as a medium of potential concern. Surface water was not observed. Further investigation is needed to determine if surface water is a medium of potential concern, as it has the potential to transport PFAS in suspended sediment from the drainage ditch to Eskimo Creek.

8.0 BUILDING 617 (WASTEWATER TREATMENT PLANT) – EXPOSURE PATHWAYS AND UPDATED CSM

8.1 Soil Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-7**, PFBS was not detected in soil samples above the LOD. PFOA was detected in only one surface soil sample at less than the Project SL. PFOA was not detected above the LOD in subsurface samples. The greatest concentration of PFOS in surface soil was 70 and 5.4 µg/kg in subsurface soil, both of which exceeded the Project SL of 3.0 µg/kg. Based on the analytical results, soil has been impacted by PFOS concentrations and is a medium of potential concern and the exposure pathway for human and biota soil is complete at the Wastewater Treatment Plant.

8.2 Groundwater Exposure Pathway

Groundwater analytical results are presented in **Table 3-5** and on **Figure 2-7.** PFBS was detected in all groundwater samples collected, but concentrations were below the SL. PFOA was detected in all groundwater samples with a maximum concentration of 71 ng/L, slightly above the Project SL of 40 ng/L in one sample. PFOS exceeded the Project SL of 40 ng/L in two samples at concentrations of 180 and 420 ng/L. The combined PFOA+ PFOS concentrations exceeded the Project SL of 70 ng/L in two of three groundwater samples. Therefore, groundwater is a medium of concern and the exposure pathway for humans and biota is complete at the Wastewater Treatment Plant.

8.3 Sediment and Surface Water Exposure Pathway

Sediment analytical results are presented in **Table 3-6** and on **Figure 2-7**. PFBS and PFOA concentrations in sediment were not detected above the LOD, and the PFOS concentration was less than the Project SL. Surface water results are presented in **Table 3-7** and on **Figure 2-7**. PFBS, PFOA, and PFOS were all detected in surface water; however, concentrations were below their respective Project SLs. Although PFAS analytes were detected in sediment and surface water samples, all concentrations were less than their respective Project SLs. Therefore, sediment and surface water are not media of potential concern and the human and biota exposure pathway for soil is incomplete at the Wastewater Treatment Plant. Although sediment is not a medium of concern for this area based on the sample collected in the Wastewater Treatment Plant area, sediment is retained as a medium of concern for Eskimo Creek based on other samples collected in the creek during this SI (see Section 9.0).

8.4 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified surface water, sediment, and groundwater as media potentially impacted by previous releases of AFFF at the Wastewater Treatment Plant. Although soil was not included as a potential media of concern, the laboratory analytical results indicated that soil has been impacted, with PFOS concentrations exceeded Project SLs. Potential human receptors include Base personnel exposed to impacted soil and groundwater and off-Base residents exposed through ingestion of impacted groundwater.

Based on the findings discussed in Section 3, surface and subsurface soil at the Wastewater Treatment Plant have been impacted by concentrations of PFOS above their respective Project SLs; therefore, surface and subsurface soil have been added as media of potential concern.

Groundwater was impacted by concentrations of PFOA and PFOS greater than their respective Project SLs; therefore, groundwater remains a medium of potential concern.

Sediment and surface water results indicated the presence of PFAS analytes, but sample concentrations were below their respective Project SLs. Therefore, sediment and surface water were removed as media of potential concern.

9.0 ESKIMO CREEK– EXPOSURE PATHWAYS AND UPDATED CSM

9.1 Sediment and Surface Water Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-8**, PFOS concentrations exceeded the Project SLs in two of the four sediment samples collected, with 4.4 µg/kg detected in ESC-SD1902 and 150 µg/kg detected in ESC-SD1904. In surface water, PFOS was detected above the Project SL (40 ng/L) at location ESC-SW1904 at a concentration of 46 ng/L. All other PFAS detections in surface water samples were below the Project SLs. Based on the analytical results, PFOS was present in sediment and surface water at concentrations above the Project SLs; therefore, sediment and surface water are media of concern. Human and ecological exposure pathways for sediment and surface water are complete at Eskimo Creek.

9.2 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified surface water and sediment as media potentially impacted by previous releases of AFFF at Eskimo Creek. Potential human receptors include Base personnel exposed to impacted sediment and off-Base residents exposed through ingestion of impacted groundwater and surface water.

Based on the findings discussed in Section 3, sediment at Eskimo Creek has been impacted by concentrations of PFOS that exceeded Project SLs; therefore, sediment has been retained as media of concern.

Although surface water analytical results were below Project SLs, sediment impacted by PFOS may have the potential to be suspended in surface water; therefore, surface water should remain as a medium of concern at this time.

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10.0 RED FOX CREEK– EXPOSURE PATHWAYS AND UPDATED CSM

10.1 Sediment and Surface Water Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-9**, PFOS exceeded the Project SL in two of the three sediment samples collected at Red Fox Creek. At the same locations, PFOA, PFOS, and combined PFOA+PFOS concentrations exceeded the SLs in one or both collocated surface water samples. The collocated sediment and surface water sample collected upstream of the source area contained results below the LOD for both media. Based on the sediment and surface water analytical results, PFOA and PFOS were present at concentrations above Project SLs. Sediment and surface water are media of concern and the human and ecological exposure pathway for sediment and surface water are complete at Red Fox Creek.

10.2 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified surface water and sediment as media potentially impacted by previous releases of AFFF at Eskimo Creek. Potential human receptors include Base personnel exposed to impacted sediment and off-Base residents exposed through ingestion of impacted groundwater and surface water.

Based on the findings discussed in Section 3, sediment and surface water at Eskimo Creek contain concentrations of PFAS that are above one or both of their respective Project SLs; therefore, sediment and surface water have been retained as media of concern.

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11.0 FIRE TRAINING AREA 1 (FT001) – EXPOSURE PATHWAYS AND UPDATED CSM

11.1 Soil Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-10,** PFBS was below the Project SL in surface and subsurface soil. The greatest concentrations of PFOA were 11 µg/kg in surface soil and 5 µg/kg in subsurface soil, which exceeded the Project SL of 1.7 µg/kg. PFOS concentrations in soil were detected above the Project SL in surface and subsurface soil in two borings, ranging from 6.8 to 2,700 µg/kg. Based on the soil sample analytical results, PFAS concentrations are greater than the Project SLs and soil is a medium of concern and the human exposure pathway for soil is complete at FT001.

11.2 Groundwater Exposure Pathway

Groundwater at FT001 was listed as a medium of concern in the UFP-QAPP Addendum (Ayuda et al., 2019). PFBS concentrations in groundwater are all below the Project SL. Existing monitoring wells (FT1-ESMW-01A, and FT1-ESMW-4A) contained concentrations of PFOA ranging from 340 to 710 ng/L, which exceeded the Project SL of 40 ng/L. All three wells sampled contained results that exceeded both PFOS and combined PFOA+PFOS SLs, ranging from 170 to 96,000 ng/L and 193 to 96,340 ng/L, respectively. Due to exceedances of the Project SLs, groundwater is considered a complete pathway for exposure at the FT001. The analytical results of groundwater samples are presented in **Table 3-5** and on **Figure 2-10**.

11.3 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified soil and groundwater as media potentially impacted by previous releases of AFFF at FT001. Potential human receptors include Base personnel exposed to impacted surface soil and groundwater and off-Base residents exposed through ingestion of impacted groundwater. Ecological receptors would be exposed to all media of concern.

Based on the findings discussed in Section 3, surface and subsurface soil in the central portion of FT001 have been impacted by concentrations of PFAS that exceeded Project SLs; therefore, surface and subsurface soil have been retained as media of concern.

Groundwater results indicate there are concentrations of PFAS greater than Project SLs and this media has been impacted by AFFF; therefore, the groundwater pathway is complete at FT001 and it will be retained as a medium of concern.

Based on field observations discussed in Section 3.12, surface water and sediment are not present at FT001.

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12.0 FIRE TRAINING AREA 2 (FT002) – EXPOSURE PATHWAYS AND UPDATED CSM

12.1 Soil Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-11**, PFBS concentrations are below the SL in surface and subsurface soil. The greatest concentrations of PFOA and PFOS are 32 and 2,000 µg/kg, respectively, in surface soil. Both analytes exceeded the Project SLs, while only PFOS is present at a concentration that exceeded the Project SL in subsurface soil. Based on soil analytical results, PFOA and PFOS concentrations are greater than the Project SLs, so soil will be retained as a medium of concern and the human exposure pathway for soil is complete at the FT002.

12.2 Groundwater Exposure Pathway

Groundwater at FT002 was listed as a medium of concern in the UFP-QAPP Addendum (Ayuda et al., 2019). Monitoring well FT2-MW1902, located in the central portion of the source area, contained concentrations of PFOS and combined PFOA+PFOS above the Project SLs. Similarly, downgradient monitoring well FT2-MW1903 contained concentrations of PFOA, PFOS, and combined PFOA+PFOS of 750 ng/L, 2,900 ng/L, 3,650 ng/L, respectively, greater than the Project SLs of 40 and 70 ng/L. Due to exceedances of the Project SLs, groundwater is considered a complete pathway for exposure at FT002. The analytical results of groundwater samples are presented in **Table 3-5** and on **Figure 2-11**.

12.3 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified soil and groundwater as media potentially impacted by previous releases of AFFF at FT002. Potential human receptors include Base personnel exposed to impacted soil and groundwater and off-Base residents exposed through ingestion of impacted groundwater. Ecological receptors would be exposed to all media of concern.

Based on the findings discussed in Section 3, surface and subsurface soil at FT002 have been impacted by concentrations of PFAS that exceeded Project SLs; therefore, soil has been retained as a medium of concern.

Groundwater results at FT002 indicate concentrations of PFAS greater than the respective Project SLs and this media has been impacted by AFFF; therefore, the groundwater pathway is complete at FT002 and should be considered a medium of concern.

Based on field findings discussed in Section 4.3, surface water and sediment are not present at the FT002.

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13.0 FIRE TRAINING AREA 4 (FT004) – EXPOSURE PATHWAYS AND UPDATED CSM

13.1 Soil Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-12**, PFBS concentrations were below the Project SLs in surface and subsurface soil. The greatest concentrations of PFOA and PFOS in surface and subsurface soil samples were 18 and 260 µg/kg, respectively, which are greater than their Project SLs. Based on soil analytical results, PFAS concentrations are greater than the Project SLs and soil is a medium of concern and the human exposure pathway for soil is complete at FT004.

13.2 Groundwater Exposure Pathway

Groundwater at FT004 was listed as a medium of concern in the UFP-QAPP Addendum (Ayuda et al., 2019). PFBS concentrations were below the Project SL in groundwater at all three locations. Each groundwater sample collected during the 2019 field season at FT004 contained concentrations above the Project SLs for PFOA, PFOS, and combined PFOA+PFOS. Based on these exceedances, the exposure pathway for groundwater is complete and will be retained as a medium of concern. The analytical results of groundwater samples are presented in **Table 3-5** and on **Figure 2-12**.

13.3 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified soil and groundwater as media potentially impacted by previous releases of AFFF at FT004. Potential human receptors include Base personnel exposed to impacted surface soil and groundwater and off-Base residents exposed through ingestion of impacted groundwater. Ecological receptors would be exposed to all media of concern.

Based on the findings discussed in Section 3, surface and subsurface soil at FT004 has been impacted by concentrations of PFAS that exceeded Project SLs; therefore, surface and subsurface soil have been retained as media of concern.

Concentrations of groundwater samples collected at FT004 were all above respective SLs for PFAS. Based on these results, this source area has been impacted by AFFF and groundwater will be retained as a medium of concern.

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14.0 FORMER LANDFARM AND HOLDING PONDS – EXPOSURE PATHWAYS AND UPDATED CSM

14.1 Soil Exposure Pathway

As presented in **Table 3-4** and on **Figure 2-13**, PFBS was not detected in surface or subsurface soil. PFOA and PFOS were detected in surface soil, while PFOS was detected in subsurface soil. The greatest detected concentration of PFOA was 1.9 µg/kg, which exceeded the Project SL of 1.7 µg/kg. PFOS concentrations above the Project SL ranged from 3.6 to 73 µg/kg. Based on the soil sample analytical results, PFOA and PFOS concentrations are greater than the Project SLs, soil will be retained as a medium of concern, and the human exposure pathway for soil is complete at the Former Landfarm and Holding Ponds.

14.2 Groundwater Exposure Pathway

Monitoring well LHP-MW1903 is located approximately 50 feet downgradient to the west of the Former Landfarm and Holding Ponds. PFOA, PFOS, and combined PFOA+PFOS concentrations in groundwater from LHP-MW1903 are 9,800, 3,300, and 13,100 ng/L, respectively. These results exceeded the Project SL of 40 and 70 ng/L. In addition, monitoring well LHP-MW1902, located in the central portion of the source area, directly downgradient from the Former Holding Ponds, contained concentrations of PFOA and PFOS at 30 and 63 ng/L, respectively, with PFOS exceeding the Project SL of 40 ng/L. The combined PFOA+PFOS concentration at LHP-MW1902 of 93 ng/L also exceeded the Project SL of 70 ng/L. Due to exceedances of the Project SLs at this source area, groundwater is considered a complete pathway for exposure at the Former Landfarm and Holding Ponds. The analytical results of groundwater samples are presented in **Table 3-5** and on **Figure 2-13**.

14.3 Updated Conceptual Site Model

The UFP-QAPP Addendum (Ayuda et al., 2019) CSM identified soil and groundwater as media potentially impacted by previous releases of AFFF at the Former Landfarm and Holding Ponds. Potential human receptors include Base personnel exposed to impacted surface soil and off-Base residents exposed through ingestion of impacted groundwater. Ecological receptors would be exposed to all media of concern.

Based on the findings discussed in Section 3, surface and subsurface soil at the Former Landfarm and Holding Ponds have been impacted by concentrations of PFAS that exceeded Project SLs; therefore, surface and subsurface soil have been retained as media of concern.

Groundwater results indicate there are concentrations of PFAS greater than Project SLs and this medium has been impacted by AFFF; therefore, the groundwater pathway is complete at the Former Landfarm and Holding Ponds and should be considered a medium of concern.

Based on field observations discussed in Section 3.15, surface water and sediment are not present at the Former Landfarm and Holding Ponds.

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15.0 SUMMARY AND CONCLUSIONS

An SI was completed at 11 locations where suspected AFFF releases may have occurred as documented in the PA (USAF, 2018) and as detailed in the subsequent UFP-QAPP Addendum (CH2M, 2019). The following areas were inspected:

- Building 160 (Combat Alert Cell)
- Former Building 152 (Former Fire Station)
- Spray Test Area
- Building 300 (Current Fire Station)
- Building 617 (Wastewater Treatment Plant)
- Eskimo Creek
- Red Fox Creek
- Fire Training Area 1 (FT001)
- Fire Training Area 2 (FT002)
- Fire Training Area 4 (FT004)
- Former Landfarm and Holding Ponds

The objectives of the SIs were the following:

- Determine whether a confirmed release of PFBS, PFOS, or PFOA has occurred at the areas selected for inspection.
- Determine if PFOS or PFOA are present in groundwater or surface water at the inspection areas at concentrations greater than the USEPA LHA for drinking water.
- Determine if PFBS is present in groundwater or surface water at concentrations greater than USEPA RSLs.
- Determine if PFOS, PFOA, and PFBS are present in soil or sediment at concentrations greater than the calculated RSLs for PFOS and PFOA or RSLs for PFBS.
- Identify potential receptor pathways with suspected immediate impacts to human health, if present.

Selected sample media for each AFFF area varied, but included surface soil, subsurface soil, groundwater, sediment, and surface water. Sampling was primarily focused on immediate possible release areas, upgradient locations, and downgradient locations most likely to have been impacted by potential releases or potential migration of AFFF.

Soil analytical results for PFBS, PFOA, and PFOS in SI locations at KSD are presented in **Table 3-4** and on **Figures 2-3** through **2-7** and **Figure 2-10** through **Figure 2-13.** Groundwater analytical results for PFBS, PFOA, and PFOS are presented in **Table 3-5** and on **Figures 2-3** through **2-7** and **Figures 2-10** through **2-13**. Sediment analytical results are presented in **Table 3-6** and on **Figures 2-3** through **2-8.** Surface water analytical results are presented in **Table 3-7** and on **Figure 2-7** and **Figure 2-9** through **2-11.** The following sections include a brief summary of key findings and conclusions for each AFFF area.

15.1 Building 160 (Combat Alert Cell)

Building 160 (Combat Alert Cell) was constructed in 1957 (USAF, 2013) and is located southeast of Jensen Road and north of the northern end of the main runway. Two known releases of AFFF have been reported in the hangar cells; in both releases, AFFF was pushed out the hangar doors on both sides of the hangar

(northeastern and southwestern sides) (Rose, 2016). Drainage at the Combat Alert Cell flows to the west and northwest into dirt and grass areas and eventually into a ravine that connects to Eskimo Creek.

Based on the current analytical data, soil, sediment, and groundwater are potential media of concern and the human and biota exposure pathways appear complete. Surface water was not present during SI activities, but this pathway is considered a complete pathway based on field personnel stating water is present intermittently and analytical results indicating sediment is impacted with PFOS.

15.2 Former Building 152 (Former Fire Station)

The Former Fire Station was located south of Wolf Road between Raven Lane and Boris Boulevard. AFFF was stored inside the Former Fire Station as well as in at least one fire engine housed in the building, but the amount of AFFF stored in each is unknown. It is also unknown whether any AFFF spills or leaks occurred or how the fire engine was refilled with AFFF. Nozzle spray tests were periodically conducted in the grassy areas east and west of the Former Fire Station (Rose, 2016). The amount and frequency of AFFF released during each test is unknown.

Based on the current analytical data, PFOA and PFOS in soil, sediment, and groundwater exceeded one or both of their respective Project SLs and are considered media of potential concern with complete human and biota exposure pathways. Surface water was not present during SI activities; however, this pathway is considered a complete pathway based on field personnel stating water is present intermittently and analytical results indicating sediment is impacted with PFOS.

15.3 Spray Test Area

The Spray Test Area is located southwest of the Former Fire Station, on the parking apron of Taxiway N. The KSD Fire Department performed nozzle spray tests on the parking apron of Taxiway N while the Former Fire Station was in operation to check equipment and evaluate the chemical balance of the AFFF (McMichael, 2016a).

Concentrations of PFOA and PFOS in surface soil, subsurface soil, surface water, sediment, and groundwater exceeded one or both of their respective Project SLs. Based on the current analytical data, all media are a potential concern and the human and biota exposure pathways are complete.

15.4 Building 300 (Current Fire Station)

The Current Fire Station was constructed in 1988 and currently houses three fire engines that carry between 75 and 130 gallons each of AFFF (for a total volume of approximately 335 gallons). During a 2016 field visit to the building for the PA, 123 5-gallon buckets (615 gallons) of AFFF were observed stored in the northwestern portion of the building. An overhead fill system is used to refill the fire engines with AFFF. The supply for the overhead fill system is a 325-gallon AFFF tank located on the northern portion of the building. There have been no reported leaks or spills associated with the trucks, storage containers, or fill system. However, the fire engines are occasionally washed outdoors and any residual AFFF in the lines would be released to the environment (USAF, 2018a). When the engines are washed indoors, the wash water is collected in the floor drains, processed through an oil-water separator, and pumped out to the wastewater drains that feed to the Wastewater Treatment Plant (McMichael, 2016b). In addition, AFFF was released during nozzle spray testing in the grassy area northeast of the building (Rose, 2016).

Based on analytical results, PFOA and PFOS concentrations in surface and subsurface soil and groundwater have exceeded one or both of their respective Project SLs. PFOS in sediment also exceeded the Project SL. Therefore, soil, sediment, and groundwater are media of potential concern with complete exposure pathways for human and biota. Although surface water was not observed, it was retained as a medium of potential concern as it has the potential to transport PFOS in suspended sediment from the drainage ditch to Eskimo Creek. Surface water is a potentially complete pathway for human and biota receptors.

15.5 Building 617 (Wastewater Treatment Plant)

The Wastewater Treatment Plant was constructed in 1969 and is located southeast of Caribou Road in the Main Cantonment portion of KSD. Wastewater was treated at the Wastewater Treatment Plant in aeration lagoons and discharged through an outfall pipe directly to Eskimo Creek. Industrial wastewater potentially impacted by AFFF received by the Wastewater Treatment Plant would have been from the Combat Alert Cell (1969 through 1994-1995) and Current Fire Station (1988 through 1994-1995). The current Bristol Bay Borough's King Salmon Wastewater Treatment Plant was completed in 1992 and by 1994-1995, all wastewater from KSD was routed there. The Wastewater Treatment Plant was abandoned sometime between 1994 and 1995, after all KSD wastewater systems were connected to the current King Salmon Wastewater Treatment Plant (Gottschalk, 2016).

Although soil was not included as a potential medium of concern, the laboratory analytical results indicated that surface and subsurface soil have been impacted with PFOS, with concentrations above the Project SL. The highest concentration of PFOS occurred in the surface soil sample collected downgradient and downslope from the Wastewater Treatment Plant outfall pipe leading to Eskimo Creek. This indicates AFFF-impacted industrial wastewater from the Combat Alert Cell or Current Fire Station may have been pumped through the Wastewater Treatment Plant and discharged into Eskimo Creek. Soil has been added as a medium of potential concern.

Groundwater results indicated PFOA and PFOS exceeded the respective Project SLs. Sediment and surface water samples indicated the presence of PFAS analytes, but sample concentrations were below their respective Project SLs. Therefore, sediment and surface water were removed as media of potential concern.

Based on the current analytical data, soil and groundwater are media of potential concern, with complete exposure pathways for human and biota receptors.

15.6 Eskimo Creek

Eskimo Creek traverses the Main Cantonment portion of KSD. Water generally flows from the northeast to the southwest and empties into the Naknek River. Eskimo Creek has received surface water runoff from several locations known to have had releases of AFFF, including the Combat Alert Cell, former and current fire stations, various spray test areas, and likely the Wastewater Treatment Plant.

Concentrations of PFOS exceeded the Project SL in two of the four sediment samples. Although surface water analytical results were below the Project SLs for all except one PFOS exceedance, sediment impacted by PFOS may have the potential to be suspended in surface water. Based on current data, sediment and surface water are considered medium of concern and the exposure pathway for sediment and surface water is complete.

15.7 Red Fox Creek

Red Fox Creek traverses the airfield portion of KSD. Water generally flows from the north-northeast to the south and empties into the Naknek River. Red Fox Creek has received surface water runoff from sources where AFFF has been released, including FT001.

Concentrations of PFOS and PFOA individually exceeded the Project SL in sediment samples collected on the downgradient edge of FT001 and the Base boundary. Similarly, at the same locations, the combined concentrations of PFOA+PFOS detected in surface water were above the Project SLs. Based on current data, sediment and surface water are media of concern and the exposure pathways for both sediment and surface water are complete.

15.8 Fire Training Area 1 (FT001)

FT001 is located north of the southern portion of the main runway. From 1980 through 1992, FT001 was used for monthly fire training exercises that occurred in an unlined fire training pit approximately 50 feet in diameter. The training exercises used approximately 400 to 500 gallons of fuel source and were extinguished using a mixture of AFFF and water. Groundwater samples were collected at FT001 in 2013 and 2016. Results confirmed concentrations of PFOA and PFOS exceeded Project SLs in groundwater.

Concentrations of PFOA and PFOS in surface and subsurface soil exceeded the Project SLs of 1.7 and 3.0 µg/kg, respectively. Based on current data, surface and subsurface soil are considered media of concern at FT001 and the exposure pathway for soil is complete.

Surface water and sediment are not present at FT001; therefore, they were not sampled and are not considered complete exposure pathways at this time.

Concentrations of PFOS and PFOA+PFOS exceeded the Project SLs for groundwater from each groundwater sample collected at FT001 during the 2019 field season. In addition, PFOA exceeded the Project SL at FT1-ESMW-01A and FT1-ESMW-4A at concentrations of 340 and 710 ng/L, respectively. Groundwater flows toward the southwest and impacted groundwater has the potential to migrate offsite. The PFAS were detected at concentrations exceeding the SLs and there is the potential for a complete groundwater pathway for human receptors at FT001.

15.9 Fire Training Area 2 (FT002)

FT002 is located approximately 3,400 feet southwest of the intersection of Lake Camp Road and Paradise Point Road. From 1979 to the 1980s, FT002 was used monthly as a fire training area. During the fire training exercises, contaminated fuel sources were used for an ignition source and AFFF, halogen, or potassium bicarbonate were used as extinguishing agents. In 2013, surface soil and groundwater samples indicated PFOS was present at concentrations greater than Project SLs.

PFOA concentrations exceeded the Project SL in one surface soil sample, while PFOS concentrations exceeded the Project SL in each surface soil sample collected. In addition, PFOS exceeded the Project SL in subsurface soil at two locations. Based on current data, soil is considered a medium of concern at FT002 and the exposure pathway is complete.

Surface water and sediment are not present at FT002; therefore, they were not sampled and are not considered complete exposure pathways at this time.

Concentrations of PFOS and PFOA+PFOS exceeded the Project SLs for groundwater at FT2-MW1902 and FT2-MW1903. PFOA also exceeded the Project SL at FT2-MW1903 at a concentration of 750 ng/L. Groundwater flows toward the south and impacted groundwater has the potential to migrate offsite. The PFAS were detected at concentrations exceeded the Project SLs and there is the potential for a complete groundwater pathway for human receptors at FT002.

15.10 Fire Training Area 4 (FT004)

FT004 is located approximately 2,500 feet southwest of the intersection of Lake Camp Road and Paradise Point Road. This site was used for fire training exercises where old vehicles were ignited and extinguished to simulate aircraft fires. A circular burn pit approximately 50 feet in diameter was used to burn waste oil, spent solvents, and contaminated fuels up until 1980. In 2013, surface soil and groundwater samples were collected. In addition, groundwater samples were collected in 2015 and 2016. PFOA and PFOS were detected in each medium and each year sampled.

PFOA and PFOS exceeded the Project SL in each surface sample collected. In subsurface soil, both compounds exceeded their respective Project SLs in the central portion of the fire training area (FT4-MW1902) while PFOS exceeded the Project SL cross-gradient (FT4-MW1903). Based on current data, surface and subsurface soil are considered media of concern at FT004 and the exposure pathway for soil is complete.

Concentrations of PFOA, PFOS, and PFOA+PFOS exceeded the Project SLs for groundwater from each groundwater sample collected at FT004 during the 2019 field season. Concentrations were highest in the central portion of the area at FT4-MW1902, with concentrations of PFOA, PFOS, and PFOA+PFOS at concentrations of 5,500, 5,100, and 10,600 ng/L, respectively. Groundwater flow direction at FT004 is to the northeast and contaminated groundwater may migrate downgradient and offsite. Based on the current data, PFOA, PFOS, and PFOA+PFOS exceeded the respective Project SLs and groundwater is potentially a complete pathway at FT004.

15.11 Former Landfarm and Holding Ponds

The Former Landfarm and Holding Ponds are located east and adjacent to the biocells and north of Bear Loop. The landfarm was constructed in 2014 and deconstructed in 2018. During operation, the landfarm received PFOA and PFOS contaminated soil from FT004 and other KSD sites.

Concentrations of PFOA and PFOS exceeded the Project SLs in surface soil, while PFOS exceeded the Project SL in subsurface soil at the Former Landfarm and Holding Ponds. Based on current data, surface and subsurface soil are media of concern and the soil human exposure pathway appears to be complete.

Surface water and sediment are not present at the Former Landfarm and Holding Ponds; therefore, they were not sampled and are not considered complete exposure pathways at this time.

Groundwater samples contained concentrations of PFOA, PFOS, and PFOA+PFOS above their respective Project SLs. Although individual groundwater results from LHP-MW1902 did not exceed either of the Project SLs for PFOA, the PFOS (63 ng/L) and combined concentrations of PFOA+PFOS (93 ng/L) exceeded the Project SLs. Concentrations at LHP-MW1903, on the downgradient edge of the Former Landfarm and Holding Ponds, exceeded the Project SLs for PFOA, PFOS, and PFOA+PFOS at 9,800, 3,300, and 13,100 ng/L, respectively. Groundwater flows towards the southwest, and impacted groundwater has the potential to migrate offsite. The PFAS were detected at concentrations above the Project SLs and there is

the potential for a complete groundwater pathway for human receptors at the Former Landfarm and Holding Ponds.

15.12 Summary

Selected sample media for each AFFF source area varied, but included surface soil, subsurface soil, sediment, surface water, and groundwater. **Table 15-1** presents the results and recommendations for each AFFF area.

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FIGURES

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Legend

- Stream/River
- Road
- AFFF Area and Creeks
- Base Boundary
- King Salmon Airport Boundary
- Aerial View

N

0 1,000 2,000

Scale in Feet

FIGURE 1-1
Overview Map
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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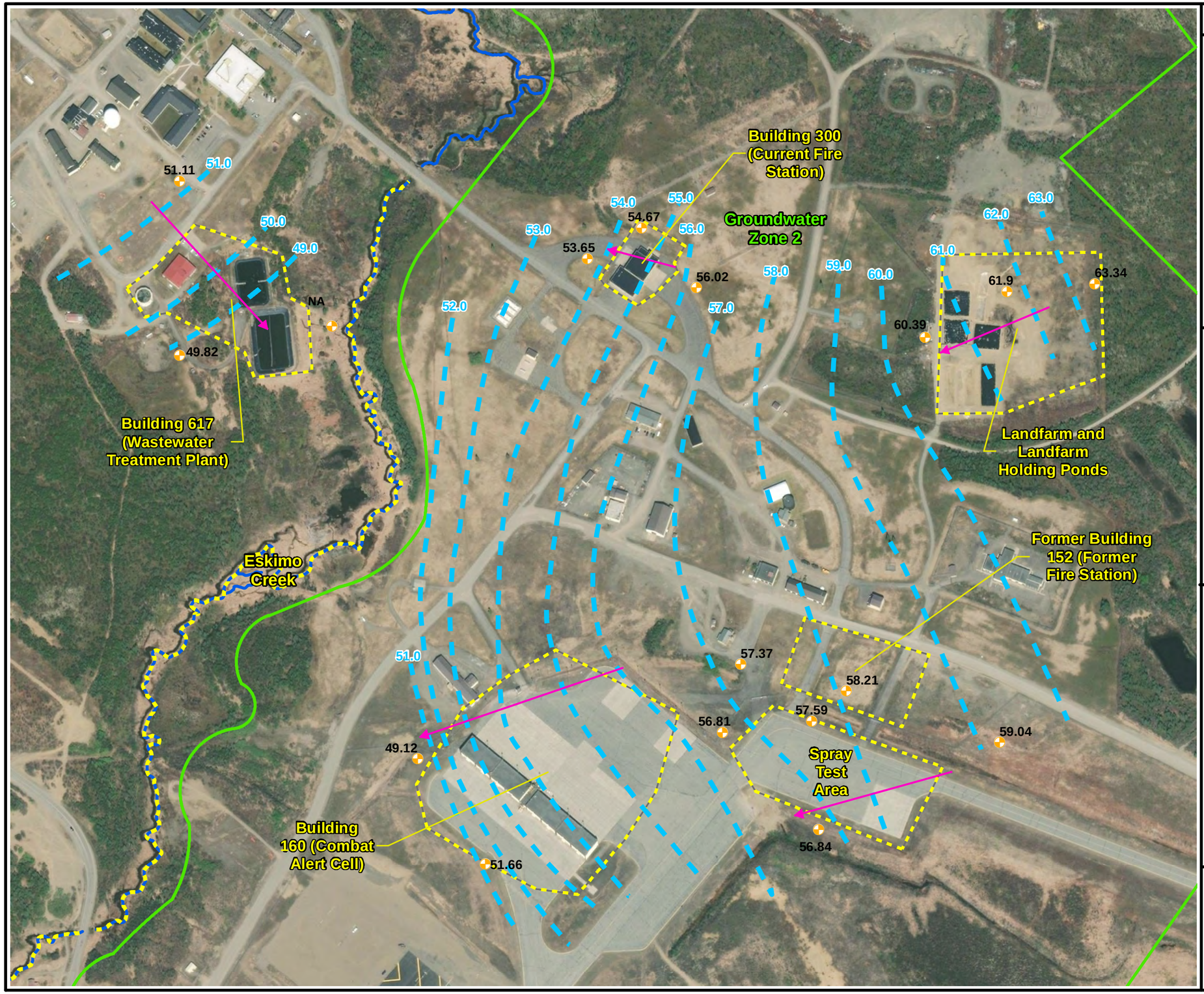

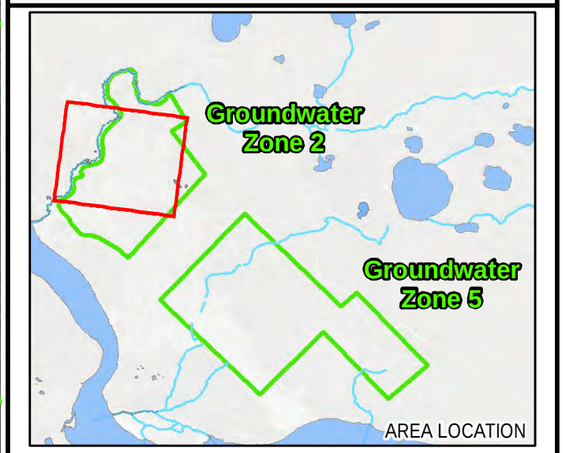

Legend

- Stream/River
- Groundwater Equipotential Line
- Approximate Groundwater Flow Direction
- AFFF Area and Creeks
- Groundwater Zone
- 2019 Groundwater Sample (Groundwater Elevation [ft amsl] shown in black text adjacent to well)

Notes:
ft amsl = feet above mean sea level

N

0 350 700
Scale in Feet

FIGURE 2-1
Groundwater Zone 2 Flow Direction
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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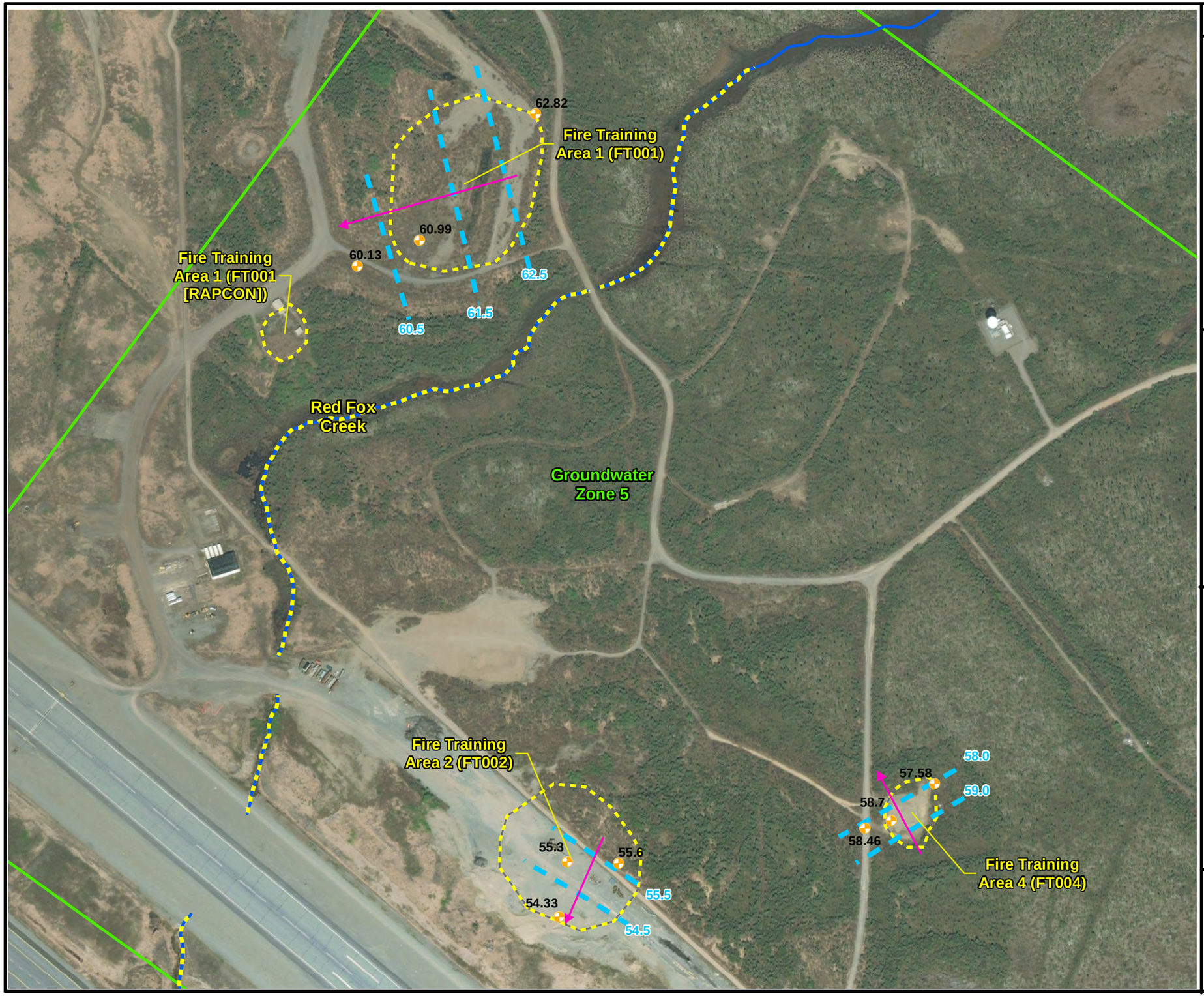

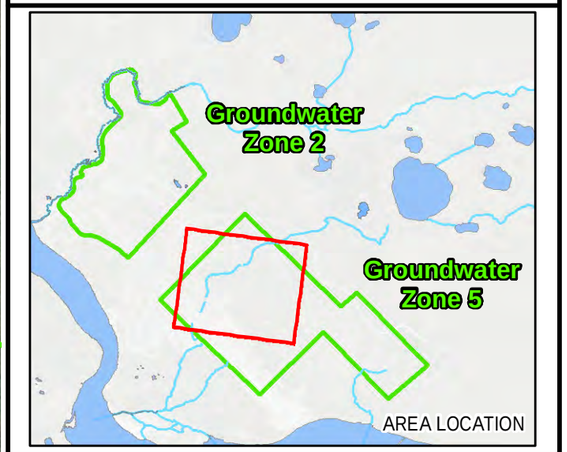

Legend

- Stream/River
- Groundwater Equipotential Line
- Approximate Groundwater Flow Direction
- AFFF Area and Creeks
- Groundwater Zone
- 2019 Groundwater Sample (Groundwater Elevation [ft amsl] shown in black text adjacent to well)

Notes:
ft amsl = feet above mean sea level

N

0 350 700
Scale in Feet

FIGURE 2-2
Groundwater Zone 5 Flow Directions
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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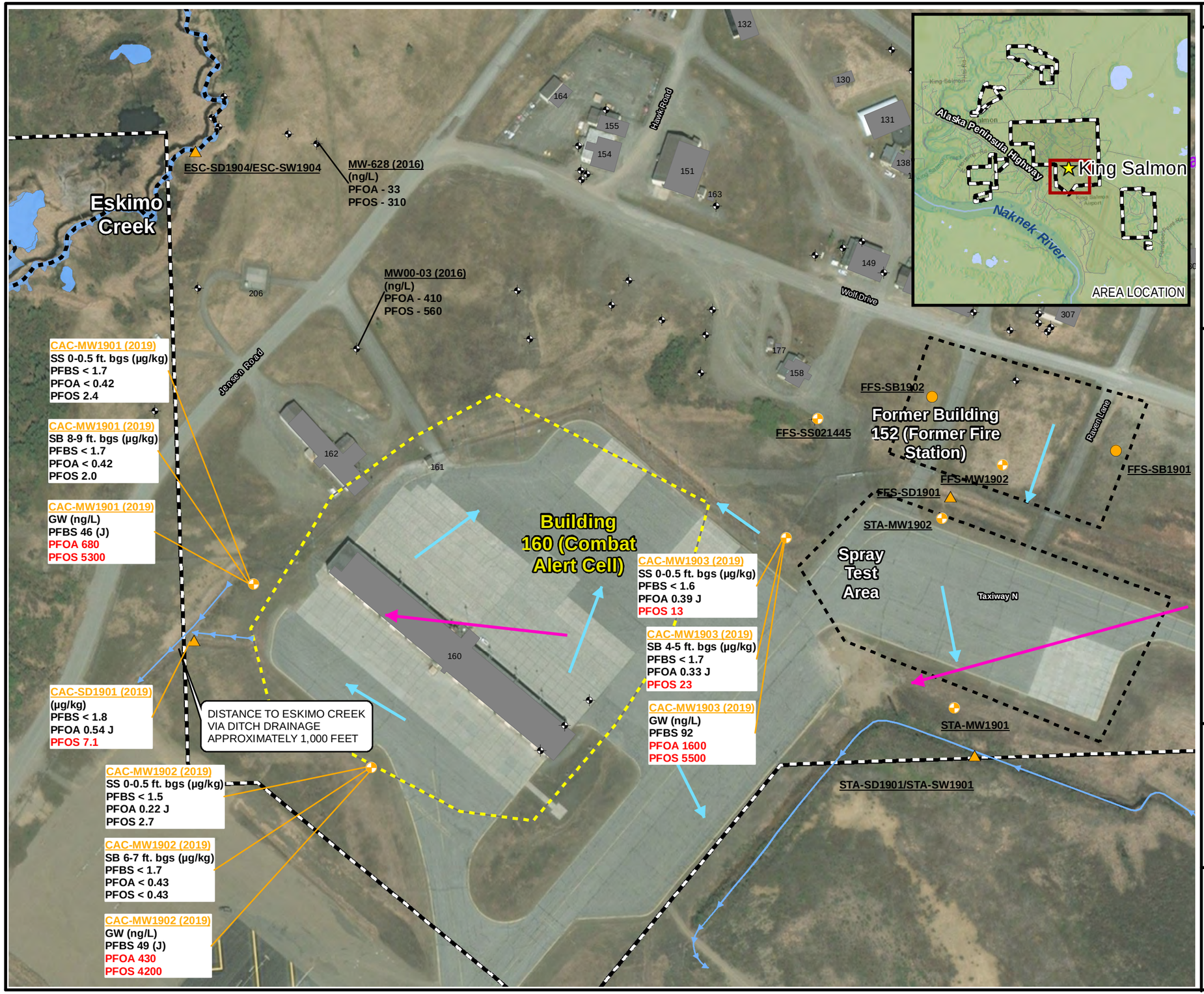

Legend

- 2019 Groundwater Sample
- 2019 Surface Water/Sediment Sample
- 2019 Soil Sample
- Monitoring Well
- Approximate Surface Flow Direction
- Approximate Groundwater Flow Direction
- Stream/River
- Flow Direction
- Base Boundary
- Site Inspection Area
- Building 160 (Combat Alert Cell)
- Aerial View
- 177 Building

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.
- 2016 data from Paug-Vik Services, 2018.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

N

0 200 400
Scale in Feet

FIGURE 2-3
Building 160 (Combat Alert Cell)
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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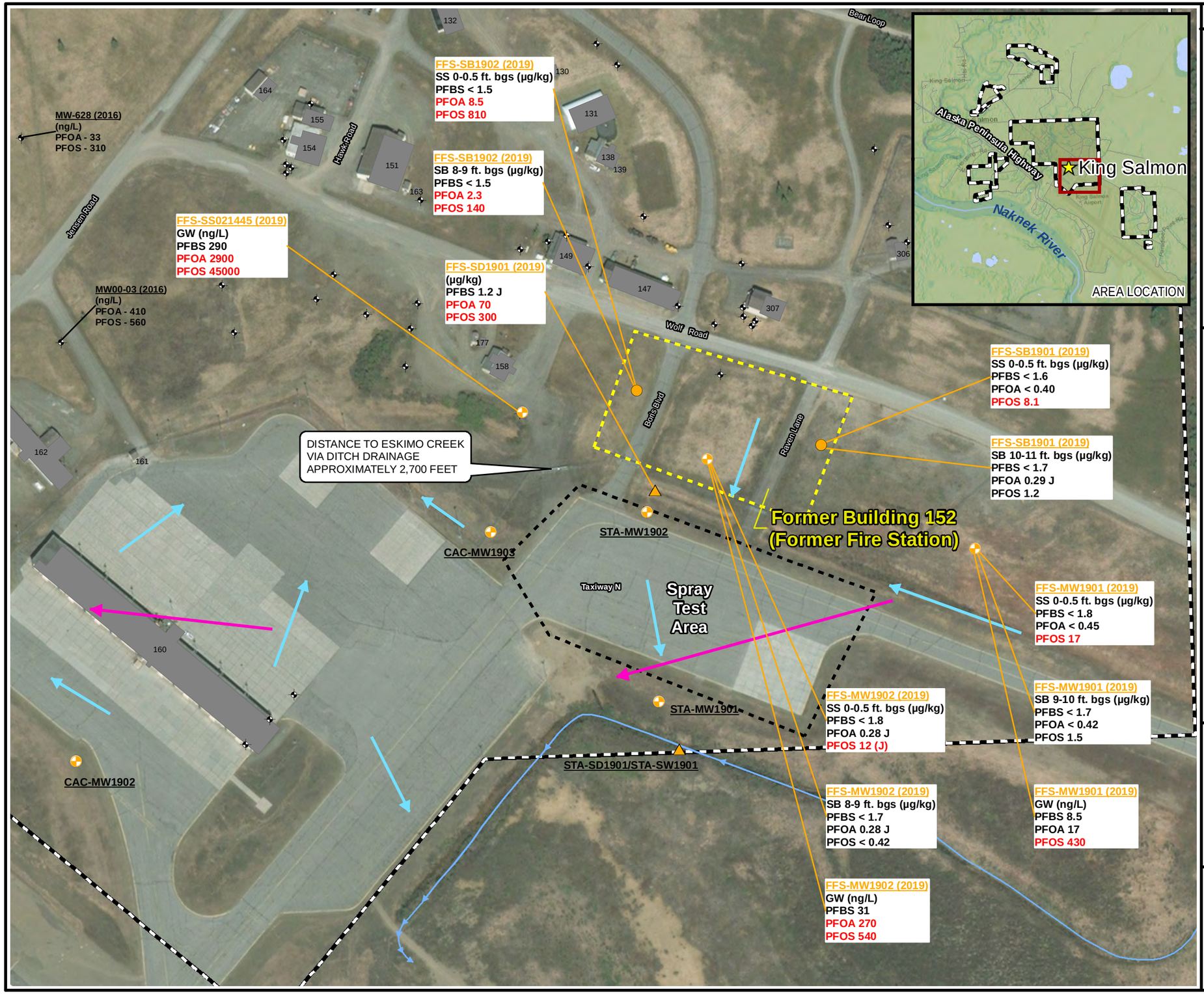

Legend

- 2019 Groundwater Sample
- 2019 Surface Water/Sediment Sample
- 2019 Soil Sample
- Monitoring Well
- Approximate Surface Flow Direction
- Approximate Groundwater Flow Direction
- Stream/River
- Flow Direction
- Site Inspection Area
- Former Building 152 (Former Fire Station)
- Base Boundary
- Aerial View
- 177 Building

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.
- 2016 data from Paug-Vik Services, 2018.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

N

0 200 400

Scale in Feet

FIGURE 2-4
Former Building 152 (Former Fire Station)
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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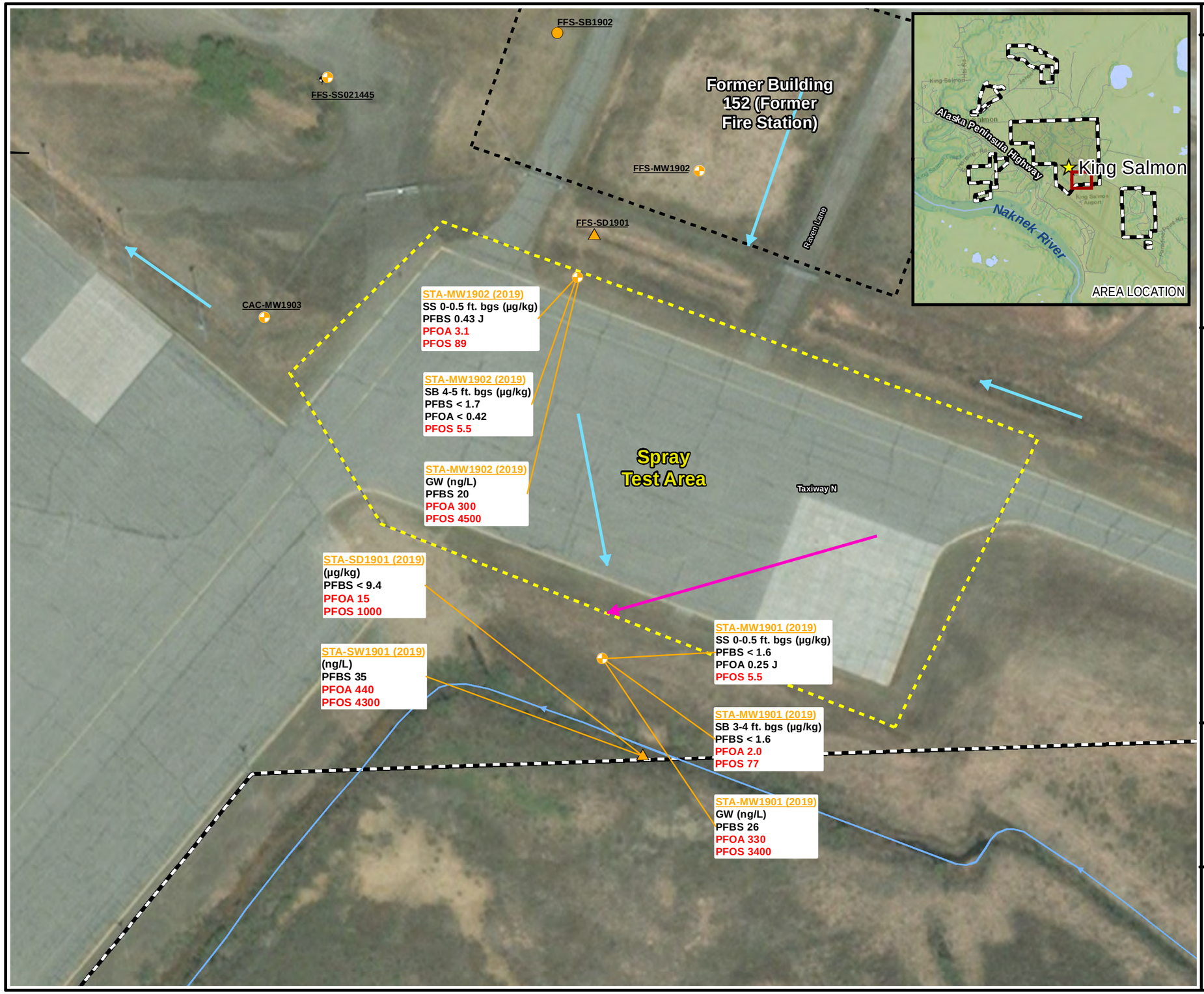

Legend

- 2019 Groundwater Sample
- 2019 Surface Water/ Sediment Sample
- 2019 Soil Sample
- Monitoring Well
- Flow Direction
- Approximate Surface Flow Direction
- Approximate Groundwater Flow Direction
- Aerial View
- Site Inspection Area
- Spray Test Area
- Stream/River
- Base Boundary

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

N

0 100 200

Scale in Feet

FIGURE 2-5
Spray Test Area
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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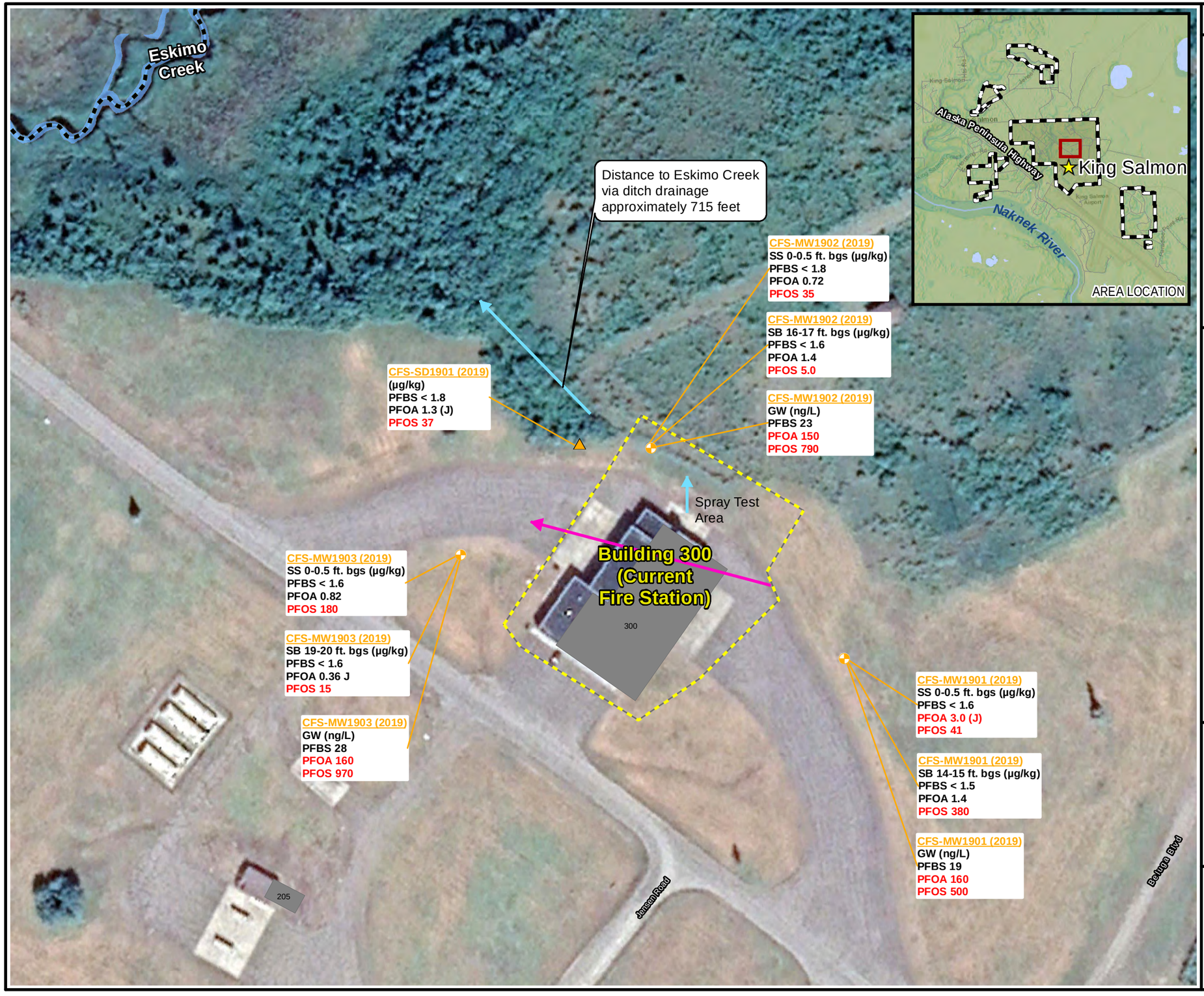

Legend

- 2019 Groundwater Sample
- 2019 Surface Water/ Sediment Sample
- Approximate Surface Flow Direction
- Approximate Groundwater Flow Direction
- Stream/River
- Site Inspection Area
- Building 300 (Current Fire Station)
- Base Boundary
- Aerial View
- 177 Building

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

N

0 100 200
Scale in Feet

FIGURE 2-6
Building 300 (Current Fire Station)
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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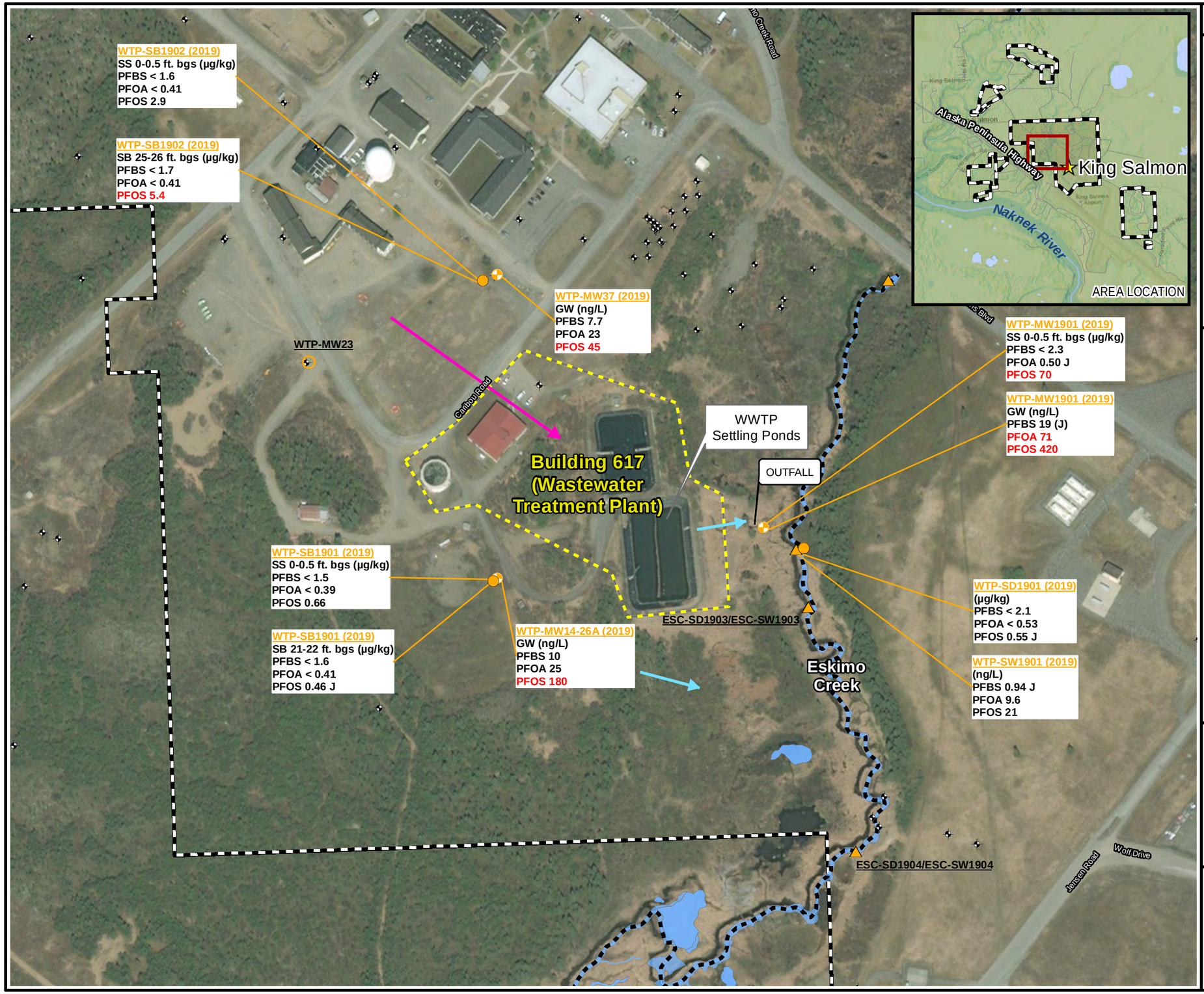

Legend

- 2019 Groundwater Sample
- 2019 Surface Water/ Sediment Sample
- 2019 Soil Sample
- 2019 Water Level Data
- Monitoring Well
- Approximate Surface Flow Direction
- Approximate Groundwater Flow Direction
- Stream/River
- Site Inspection Area
- Building 617 (Wastewater Treatment Plant)
- Base Boundary
- Aerial View

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

N

0 200 400
Scale in Feet

FIGURE 2-7
Building 617 (Wastewater Treatment Plant)
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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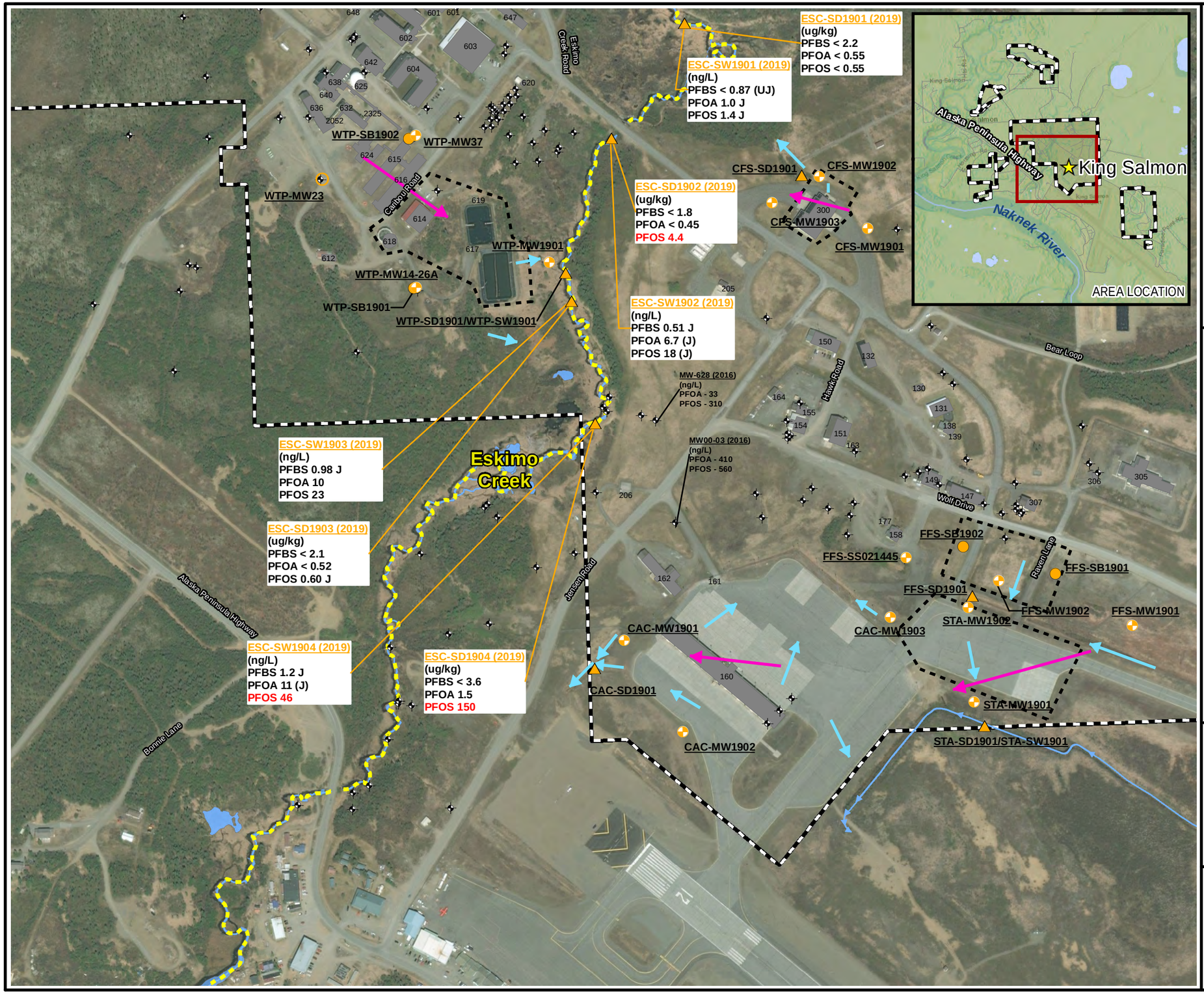

Legend

- 2019 Groundwater Sample
- 2019 Surface Water/ Sediment Sample
- 2019 Soil Sample
- 2019 Water Level Data
- Monitoring Well
- Approximate Surface Flow Direction
- Approximate Groundwater Flow Direction
- Stream/River
- Flow Direction
- Eskimo Creek
- Site Inspection Area
- Base Boundary
- Aerial View
- 177 Building

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.
- 2016 data from Paug-Vik Services, 2018.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

N

0 400 800

Scale in Feet

FIGURE 2-8
Eskimo Creek
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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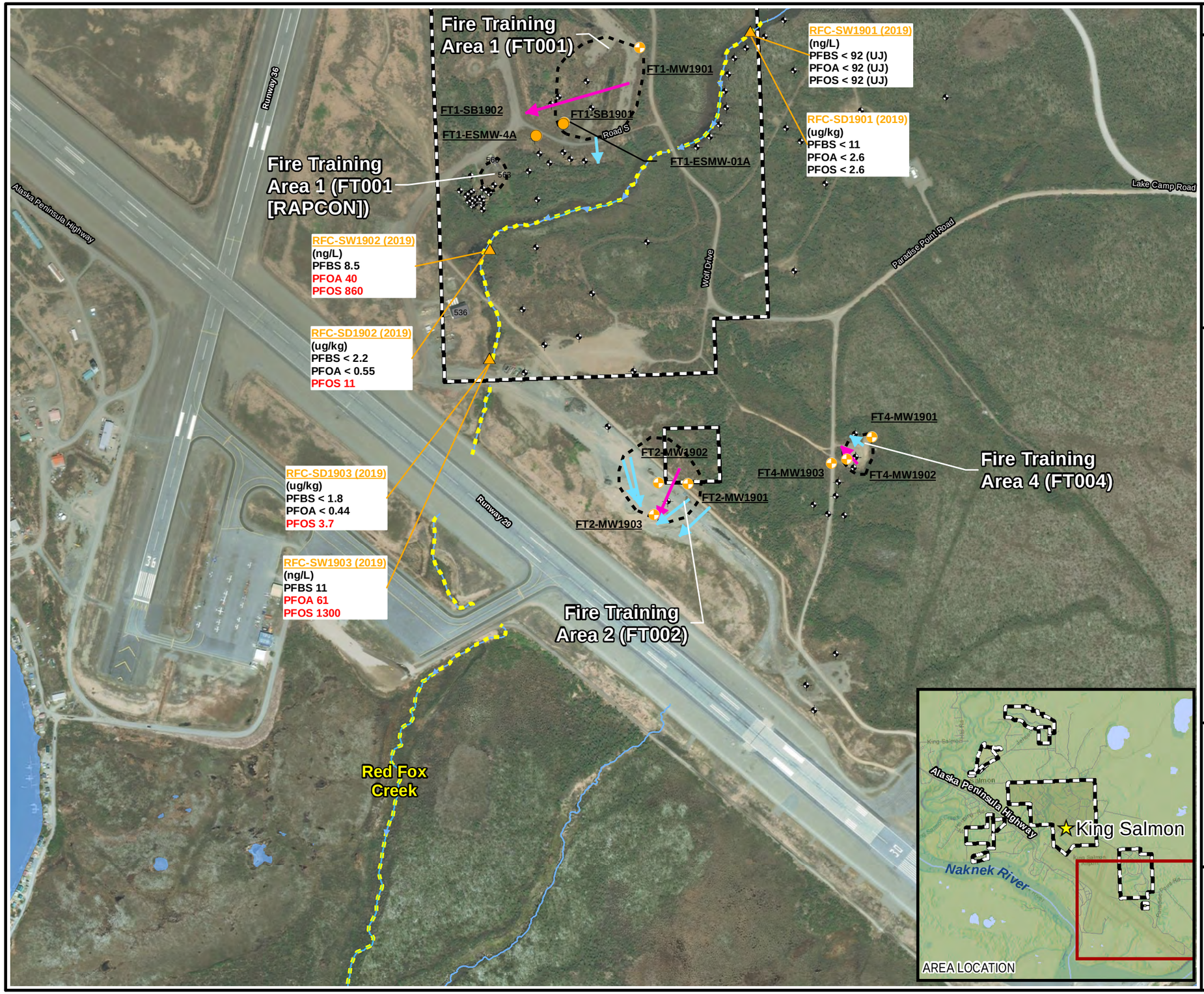

Legend

- 2019 Groundwater Sample
- 2019 Surface Water/ Sediment Sample
- 2019 Soil Sample
- Monitoring Well
- Approximate Surface Flow Direction
- Approximate Groundwater Flow Direction
- Stream/River
- Flow Direction
- Red Fox Creek
- Site Inspection Area
- Base Boundary
- Aerial View
- 177 Building

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

N

0 500 1,000
Scale in Feet

FIGURE 2-9
Red Fox Creek
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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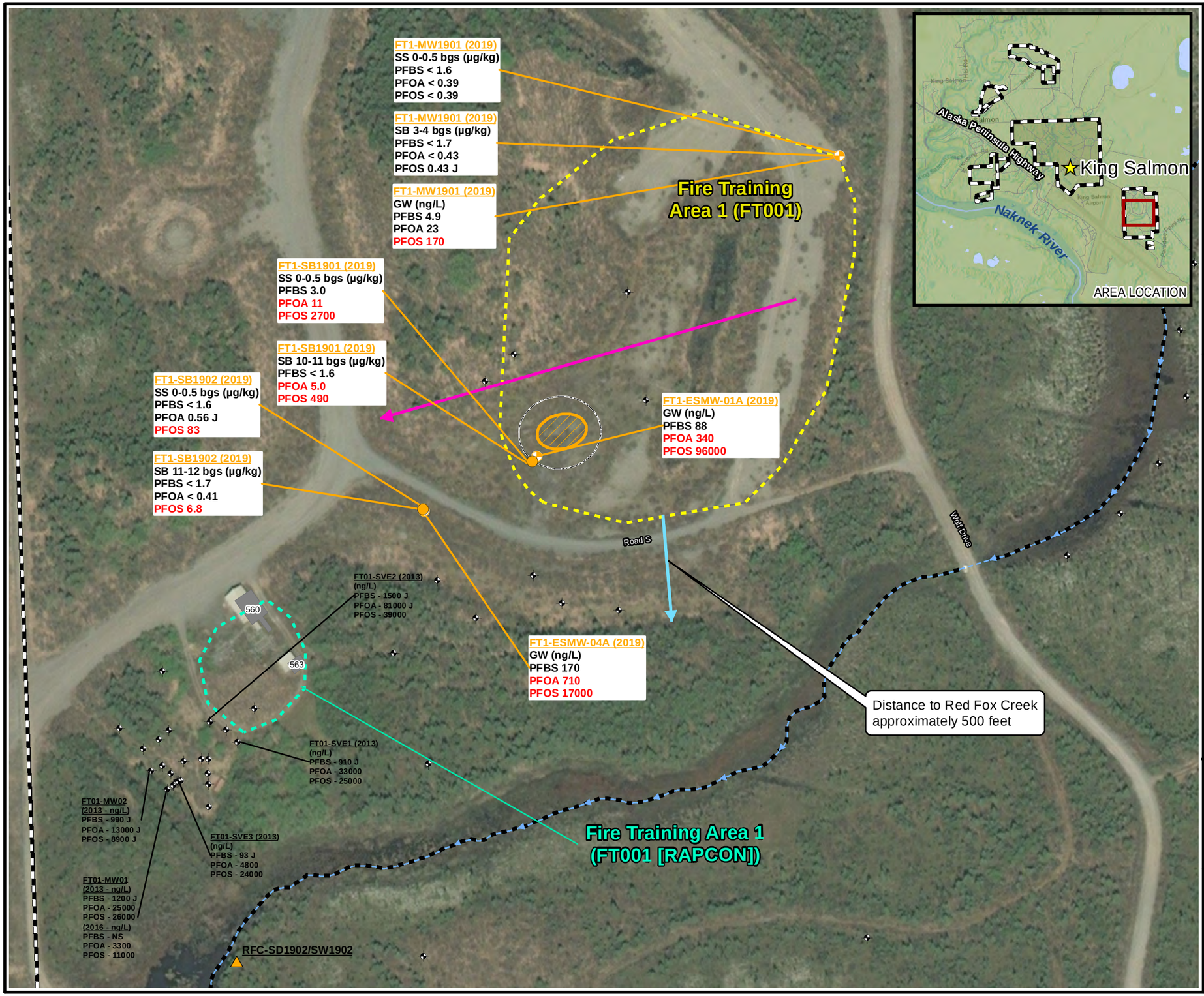

Legend

- 2019 Groundwater Sample
- 2019 Surface Water/ Sediment Sample
- 2019 Soil Sample
- Monitoring Well
- Approximate Groundwater Flow Direction
- Approximate Surface Flow Direction
- Stream/River
- Flow Direction
- Base Boundary
- Site Inspection Area
- Fire Training Area 1 (FT001)
- Fire Training Area 1 (FT001 [RAPCON])
- Approximate Burn Pit Location
- Approximate Excavation Limits
- Aerial View
- 177 Building

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.
- 2013 data from AECOM, 2014.
- 2016 data from Paug-Vik Services, 2018.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

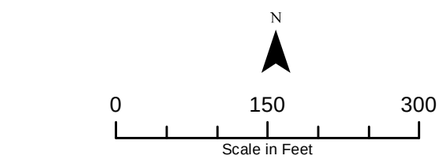

FIGURE 2-10
Fire Training Area 1 (FT001)
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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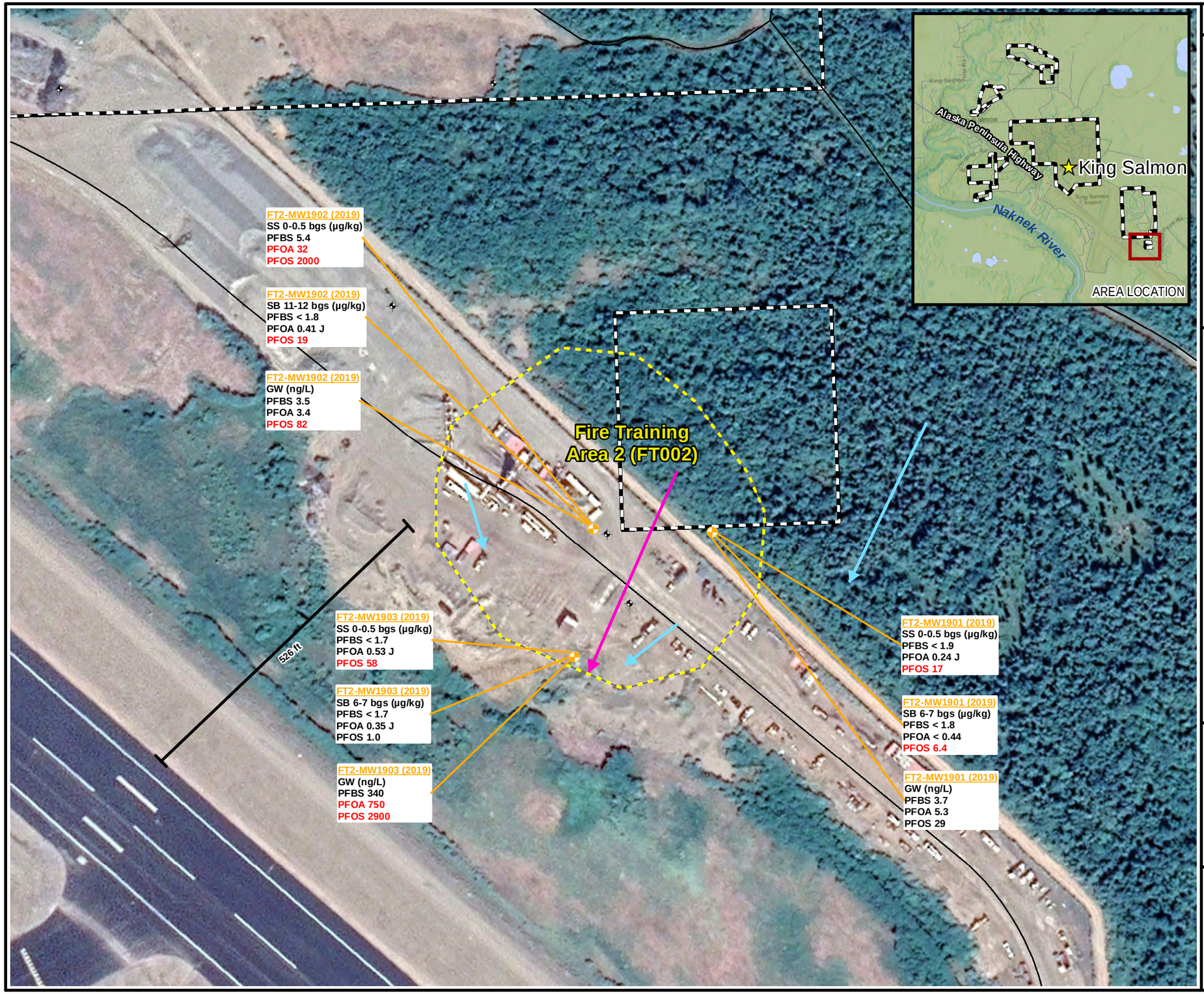

Legend

- 2019 Groundwater Sample
- Monitoring Well
- Approximate Surface Flow Direction
- Approximate Groundwater Flow Direction
- Fire Training Area 2 (FT002)
- Road
- Base Boundary

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

N

0 150 300

Scale in Feet

FIGURE 2-11
Fire Training Area 2 (FT002)
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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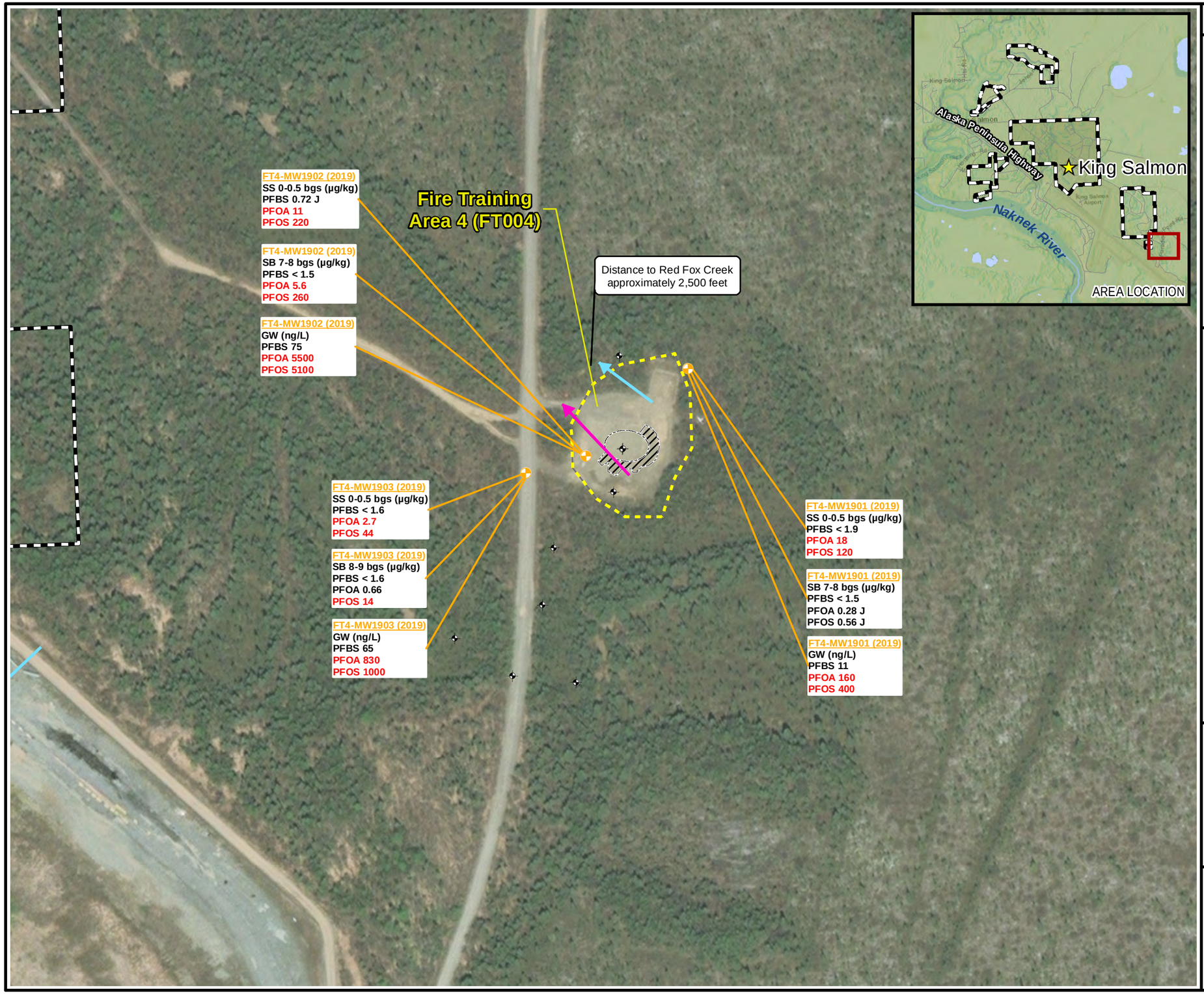

Legend

- 2019 Groundwater Sample
- Monitoring Well
- Approximate Surface Flow Direction
- Approximate Groundwater Flow Direction
- Fire Training Area 4 (FT004)
- Base Boundary
- 2009 Excavation Limits
- 2011 Excavation Limits
- Aerial View

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

Values in **red** indicate that screening level is exceeded.

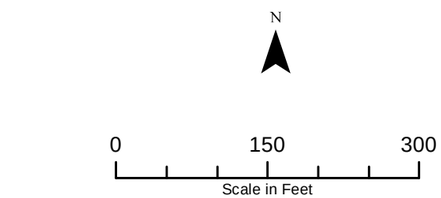

FIGURE 2-12
Fire Training Area 4 (FT004)
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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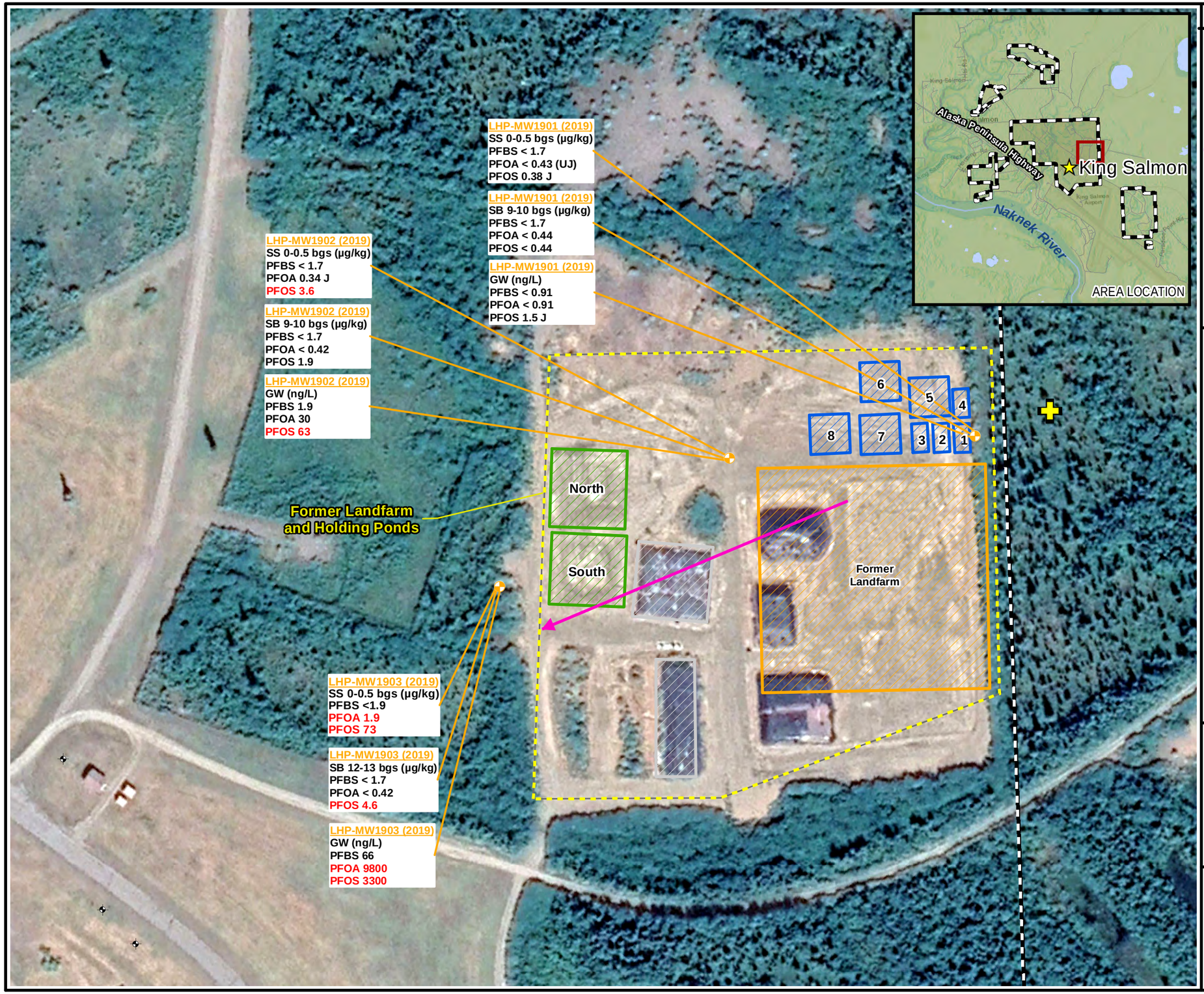

Legend

- 2019 Groundwater Sample
- Monitoring Well
- Approximate Groundwater Flow Direction
- Treated Water Discharge Point
- Former Landfarm and Holding Ponds
- Former Holding Ponds*
- Former Landfarm
- Former North & South Biocells
- Remaining Biocells
- Base Boundary

*Numbered areas 1 through 8 are holding ponds for landfarm cell leachate.

Orange symbols represent data collected in 2019. This figure presents AFFF Area results in data boxes.

Project Screening Levels		
Analyte	**Soil/Sediment (µg/kg)**	**Water (ng/L)**
PFBS	130,000 [a]	400 [c]
PFOA	1.7 [b]	40 [c]
PFOS	3 [b]	40 [c]

a = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019)
b = ADEC 18 AAC 75 Table B1 Soil Cleanup Level Migration to Groundwater (ADEC, 2018a)
c = Residential Scenario Screening Levels Calculated Using USEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019)

Notes:
- Groundwater flow direction estimated from water level elevations collected during SI, using the 3-point method. Groundwater elevation shown adjacent to well in feet above mean sea level.

ng/L = nanogram(s) per liter
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
bgs = Below Ground Surface
CAC = Combat Alert Cell
FFS = Former Fire Station
HQ = hazard quotient
µg/kg = microgram(s) per kilogram
PFBS = perfluorobutane sulfonate
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
RSL = Regional Screening Level
STA = Spray Test Area
USEPA = U.S. Environmental Protection Agency
MEDIA = SS for surface soil, SB for subsurface soil, GW for groundwater.

*After treatment, leachate was discharged to the local area around the holding ponds, the exact location of discharge is unknown.

Values in **red** indicate that screening level is exceeded.

N

0 125 250

Scale in Feet

FIGURE 2-13
Former Landfarm and Holding Ponds
Site Inspection for Aqueous Film-Forming Foam Areas
King Salmon Divert, King Salmon, Alaska

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TABLES

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Table 1-1. Project Screening Levels
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Parameter	Chemical Abstracts Service Number	Soil (µg/kg)				Groundwater (ng/L)		
		USEPA Regional Screening Level for Residential Soil[1]	Calculated USEPA RSL for Soil and Sediment[1]	1/10 ADEC Table B1 [2] Human Health Soil Cleanup Level	ADEC Table B1 [2] Migration to Groundwater Soil Cleanup Level	Calculated USEPA RSL for Tap Water[1, 3]		ADEC Table B1[2] Human Health Groundwater Cleanup Level
Perfluorobutane sulfonate (PFBS)	375-73-5	**130,000**	NL	NL	NL	**40,000**	NL	NL
Perfluorooctanoic acid (PFOA)	335-67-1	NL	130	160	**1.7**	NL	**40**	400
Perfluorooctane sulfonate (PFOS)	1763-23-1	NL	130		**3.0**	NL		

Notes:

µg/kg = micrograms per kilogram
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
HQ = hazard quotient
ng/L = nanograms per liter
NL = No Level
RSL = Regional Screening Level
TR = target cancer risk
USEPA = U.S. Environmental Protection Agency

Shaded and **bold** = Project Screening Level

(1) Residential Scenario Screening Levels Calculated using USEPA RSL Calculator for Soil and Tap Water using a HQ of 0.1 (DoD, 2019).

(2) ADEC 18 AAC 75 Table B1 Soil Cleanup Level (ADEC, October 2018a) using values for the under 40 inches of rainfall annually zone. One-tenth of the Table B1 values is presented to adjust the Table B1 values to an HQ of 0.1 and TR of 1E-06 (ADEC, 2018a).

(3) When both PFOA and PFOS are both present, the combined concentrations of PFOA and PFOS are compared with the 70 ng/L health advisory level.

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Table 1-2. AFFF Areas and Selection Rationale for Site Inspections
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Location	Rationale
Building 160 (Combat Alert Cell)	• AFFF fire suppression system present since unknown date (currently inactive). • Two known activations of system (dates and volumes unknown). • Response to activations included sweeping foam out of hangar doors. • Mechanical room floor drain connects to wastewater system; no known releases associated with mechanical room.
Former Building 152 (Former Fire Station)	• At least one AFFF-equipped fire truck staged onsite. • AFFF backstock also staged onsite. • Spray testing of nozzles using diluted AFFF conducted in grassy areas to the east and west (unknown amounts and frequencies) (see Spray Test Area).
Spray Test Area	• Unknown volume of diluted AFFF sprayed on parking apron of Taxiway N. • Dates of use unknown.
Building 300 (Current Fire Station)	• Current AFFF overhead fill system. • Three emergency vehicles equipped with 75 to 130 gallons AFFF. • Spray testing of nozzles using diluted AFFF may have been conducted to the northeast in a grassy area (current testing is water only). • Current backstock present includes 123 5-gallon buckets of AFFF and a 325-gallon tank that supplies overhead fill system (half full at time of site visit). • Fire trucks sometimes washed outside of station; residual AFFF on trucks may have reached nearby grassy areas. • Potentially AFFF-contaminated water from washing trucks indoors could have reached the wastewater system through floor drains.
Building 617 (Wastewater Treatment Plant)	• Active until 1994 or 1995 when wastewater was diverted to treatment plant in the town of King Salmon. • Received wastewater from Building 160 (CAC), which had a floor drain in the mechanical room (no known releases associated with mechanical room). • Received wastewater from Building 300 (current fire station) that may have been contaminated by residual AFFF during indoor fire truck washes. • Discharges treated wastewater to Eskimo Creek. • Fate of biosolids unknown.
Eskimo Creek	• Likely receives surface water runoff from areas of known AFFF releases including spray test areas around fire stations and taxiway, and from Building 160 (CAC). • Received treated wastewater from Building 617 (WWTP) until 1994 or 1995. • PFAS detected below USEPA HAs in one location in surface water (intended to be background sample for FT001).
Red Fox Creek	• Receives surface water runoff from FT001, where AFFF contamination has been confirmed. May also receive surface water runoff from FT004 via unnamed creeks. • Presence of PFOS and PFOA confirmed in surface water (above HA levels) and sediment (above RSLs).
Fire Training Area 1 (FT001)	• Two areas, RAPCON (no AFFF use) and the fire training pit (where AFFF was used). Remaining bullets refer to the fire training pit. • Active from 1980 to 1992. • Fuels, waste oils, and solvents used in monthly training exercises. • Extinguished with mixture of water and AFFF. • Some remediation (excavation) performed in 1995. • Presence of PFOS and PFOA confirmed in soil (below USEPA RSLs and ADEC human health exposure, but above ADEC migration to groundwater cleanup levels) • Presence of PFOS and PFOA confirmed in groundwater (above USEPA HA levels and ADEC groundwater cleanup levels) during 2013 sampling.
Fire Training Area 2 (FT002)	• Active 1979 to the 1980s. • Waste fuels used to burn wood during monthly training exercises. • AFFF among agents used to extinguish fires. • Presence of PFOS and PFOA confirmed in surface soil during 2013 sampling below EPA RSLs but above ADEC migration to groundwater cleanup levels. • No known excavation.

Table 1-2. AFFF Areas and Selection Rationale for Site Inspections
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Location	Rationale
Fire Training Area 4 (FT004)	• Active for several years up to 1980. • Waste oil, spent solvents, and contaminated fuels and old automobiles used during training to simulate aircraft fires. • AFFF used as extinguishing agent. • Some remediation (excavation) performed in 2009. • Presence of PFOS and PFOA confirmed in groundwater (above USEPA HA and ADEC groundwater cleanup levels) during 2013 sampling. • Presence of PFOS and PFOA confirmed in soil (below USEPA RSLs and ADEC human health exposure cleanup levels and above ADEC migration to groundwater cleanup levels).
Former Landfarm and Holding Ponds	• Constructed in 2014, the landfarm received POL-contaminated soil from a variety of areas, including FT004. • PFOS/PFOA detected above ADEC cleanup levels in landfarm soil. • Landfarm leachate stored in holding ponds until analysis indicates that ADEC cleanup levels are met. • PFOS/PFOA added to leachate analysis in 2015, when ADEC cleanup levels were proposed, and were detected above cleanup levels. • 150,000 gallons discharged onsite without (before) PFOS/PFOA analysis.

Adapted from U.S. Air Force (USAF). 2018a. *Preliminary Assessment Report for Perfluorinated Compounds King Salmon Divert, Alaska.* Final. March.

ADEC = Alaska Department of Environmental Conservation
AFFF = aqueous film-forming foam
CAC = Combat Alert Cell
HA = health advisory
PFAS = per- and poly-fluoroalkyl substances
PFOA = perfluorooctanoic acid
POL = petroleum, oil, and lubricants
RAPCON = radar approach control
RSL = Regional Screening Levels
USEPA = U.S. Environmental Protection Agency
WWTP = wastewater treatment plant

Table 3-1. Soil Boring and Monitoring Well Completion Details
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Sample ID	Date Installed	Date Sampled	Northing (feet)	Easting (feet)	Top-of-Casing Elevation (feet amsl)	Ground Surface Elevation (feet amsl)	Boring Depth (feet bgs)	Screen Interval (feet bgs)	Screen Length (feet)
Building 160 (Combat Alert Cell)									
CAC-MW1901	8/26/2019	9/3/2019	21350017.142	2084503.140	60.53	57.00	15.0	5.0 - 15	10
CAC-MW1902	8/26/2019	9/3/2019	21349645.387	2084742.388	62.13	58.57	16.5	4.0 -14	10
CAC-MW1903	8/27/2019	8/30/2019	21350110.525	2085583.409	65.09	61.54	10.0	4.0 - 14	10
Former Building 152 (Former Fire Station)									
FFS-MW1901	9/4/2019	9/7/2019	21350077.119	2086565.105	73.62	70.13	15.0	6.0 - 16	10
FFS-MW1902	8/28/2019	9/4/2019	21350258.389	2086022.438	71.70	68.23	15.0	5.0 - 15	10
FFS-SB1901*	8/27/2019	8/27/2019	21350245.111	2086248.718	NA	NA	15.0	NA	NA
FFS-SB1902*	8/28/2019	8/28/2019	21350355.026	2085875.059	NA	74.00	15.0	NA	NA
FFS-SS021445	NA	8/26/2019	21350352.628	2085647.306	72.30	68.22	NA	NA	NA
Spray Test Area									
STA-MW1901	8/27/2019	9/3/2019	21349766.398	2085924.140	64.80	61.18	10.0	3.0 - 13	10
STA-MW1902	8/27/2019	9/3/2019	21350150.942	2085899.596	66.01	62.50	10.0	3.0 - 13	10
Building 300 (Current Fire Station)									
CFS-MW1901	8/22/2019	8/29/2019	21351686.030	2085490.883	76.33	72.71	22.5	12 - 22	10
CFS-MW1902	8/23/2019	8/29/2019	21351899.173	2085295.869	76.26	72.86	22.5	12 - 22	10
CFS-MW1903	8/23/2019	8/29/2019	21351790.745	2085104.022	77.46	73.97	26.5	15 - 25	10
Building 617 (Wastewater Treatment Plant)									
WTP-MW37	NA	8/24/2019	21352064.738	2083658.258	81.77	79.49	NA	NA	NA
WTP-MW-14-26A	NA	8/26/2019	21351448.173	2083658.606	75.27	71.87	NA	NA	NA
WTP-MW23	NA	NA	21351886.699	2083276.608	82.48	79.68	NA	NA	NA
WTP-MW1901*	8/24/2019	8/24/2019	21351508.278	2084194.390	NA	46.00	3.75	NA	NA
WTP-SB1901*	8/24/2019	8/24/2019	21351401.120	2083645.748	NA	58.00	25.0	NA	NA
WTP-SB1902*	8/24/2019	8/24/2019	21352009.532	2083625.567	NA	61.00	30.0	NA	NA

Table 3-1. Soil Boring and Monitoring Well Completion Details
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Sample ID	Date Installed	Date Sampled	Northing (feet)	Easting (feet)	Top-of-Casing Elevation (feet amsl)	Ground Surface Elevation (feet amsl)	Boring Depth (feet bgs)	Screen Interval (feet bgs)	Screen Length (feet)
Fire Training Area 1 (FT001)									
FT1-MW1901	8/25/2019	8/29/2019	21348482.936	2089640.269	70.31	66.87	12.0	2.0 - 12	10
FT1-SB1901*	8/25/2019	8/25/2019	21347984.887	2089219.284	NA	76.00	15.0	NA	NA
FT1-SB1902*	8/25/2019	8/25/2019	21347904.463	2089004.504	NA	76.00	15.0	NA	NA
FT1-ESMW-01A	NA	8/22/2019	21348035.545	2089230.164	76.19	73.08	NA	NA	NA
FT1-ESMW-4A	NA	8/26/2019	21347944.186	2089010.377	77.01	73.23	NA	NA	NA
Fire Training Area 2 (FT002)									
FT2-MW1901	9/4/2019	9/7/2019	21345831.027	2089934.222	66.29	62.90	15.0	5.0 - 15	10
FT2-MW1902	9/3/2019	9/7/2019	21345791.956	2089744.176	69.84	66.42	18.0	7.0 - 17	10
FT2-MW1903	9/3/2019	9/7/2019	21345641.247	2089724.472	64.90	61.48	15.0	5.0 - 15	10
Fire Training Area 4 (FT004)									
FT4-MW1901	9/4/2019	9/7/2019	21346113.258	2091053.136	72.47	69.03	15.0	4.0 - 14	10
FT4-MW1902	8/28/2019	9/4/2019	21345980.023	2090898.448	72.16	68.70	15.0	4.0 - 14	10
FT4-MW1903	9/3/2019	9/7/2019	21345953.871	2090806.302	72.85	69.42	15.0	5.0 - 15	10
Former Landfarm and Holding Ponds									
LHP-MW1901	8/21/2019	8/26/2019	21351701.289	2086903.274	74.92	71.20	16.0	5.0 - 15	10
LHP-MW1902	8/22/2019	8/27/2019	21351673.264	2086592.543	76.08	72.48	16.0	5.0 - 15	10
LHP-MW1903	8/24/2019	8/30/2019	21351509.862	2086301.089	77.56	74.06	19.0	8.0 - 18	10

Construction Details:

Well completions consisted of 3 feet protective steel stickups for all groundwater monitoring wells

Riser - Geoprobe Pre-Packed monitoring wells (Part No. 220282) 2-inch nominal diameter, Schedule 40, flush-joint, thread PVC

Screens - Geoprobe Pre-Packed monitoring well (Part No. 220282) with 0.010-inch, flush-joint threaded, continuous slot, Schedule 40 PVC screens

Filter Pack - Geoprobe Pre-Packed monitoring well (Part No. 220282) 20/40 silica sand wrapped with 65-mesh stainless steel screen; 10/20 silica sand

Bentonite Seal - 3/8-inch uncoated bentonite chips, hydrated

Annular Seal - 3/8-inch pea gravel

6.625-inch-diameter x 5.25-foot-long steel stickup installed with 3-foot stick up

2-foot-wide X 2-foot-long X 4-inch-deep concrete pad; 2- or 3-, 4-inch-diameter X 5-foot-long concrete filled protective bollards placed at wells located in public areas

Table 3-1. Soil Boring and Monitoring Well Completion Details
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Notes:
1) Depth to top of screen and boring depth were measured from ground surface during well installation activities.
2) Survey location data was provided by the surveyor in State Plane coordinates that were converted to latitude and longitude.
3) Northings and eastings based on North American Datum of 2011 (NAD 83)
4) Elevation data based on National Geodetic Vertical Datum of 1988 (NAVD 88).

* = field GPS measurement
-- historical information not available
AMSL = Above Mean Sea Level
bgs = below ground surface
ID = Identification
NA = Not Available/Applicable
PVC = Polyvinyl Chloride

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Table 3-2. Groundwater Elevations
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Station Name	Date	Top of Casing Elevation (feet amsl)	Screened Interval (feet bgs)	Depth to Water (feet btoc)	Elevation of Groundwater (feet amsl)
Building 160 (Combat Alert Cell)					
CAC-MW1901	9/13/2019	60.53	5.0 -15	11.41	49.12
CAC-MW1902	9/13/2019	62.13	4.0 -14	10.47	51.66
CAC-MW1903	9/13/2019	65.09	4.0 -14	8.28	56.81
Former Building 152 (Former Fire Station)					
FFS-MW1901	9/13/2019	73.62	6.0 -16	14.58	59.04
FFS-MW1902	9/13/2019	71.70	5.0 -15	13.49	58.21
FFS-SS021445	9/13/2019	72.30	--	14.93	57.37
Spray Test Area					
STA-MW1901	9/13/2019	64.80	3.0 -13	7.96	56.84
STA-MW1902	9/13/2019	66.01	3.0 -13	8.42	57.59
Building 300 (Current Fire Station)					
CFS-MW1901	9/13/2019	76.33	12 - 22	20.31	56.02
CFS-MW1902	9/13/2019	76.26	12 - 22	21.59	54.67
CFS-MW1903	9/13/2019	77.46	15 - 25	23.81	53.65
Building 617 (Wastewater Treatment Plant)					
WTP-MW37	9/13/2019	81.77	--	30.66	51.11
WTP-MW-14-26A	9/13/2019	75.27	NA	25.45	49.82
WTP-MW1901*	9/4/2019	NA	NA	0.50	NA
WTP-MW23	9/13/2019	82.48	NA	30.68	51.80
Fire Training Area 1 (FT001)					
FT1-MW1901	9/13/2019	70.31	2.0 - 12	7.49	62.82
FT1-ESMW-01A	9/13/2019	76.19	--	15.20	60.99
FT1-ESMW-4A	9/13/2019	77.01	--	16.88	60.13
Fire Training Area 2 (FT002)					
FT2-MW1901	9/13/2019	66.29	5.0 - 15	10.69	55.60
FT2-MW1902	9/13/2019	69.84	7.0 - 17	14.54	55.30
FT2-MW1903	9/13/2019	64.90	5.0 - 15	10.57	54.33

Table 3-2. Groundwater Elevations
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Station Name	Date	Top of Casing Elevation (feet amsl)	Screened Interval (feet bgs)	Depth to Water (feet btoc)	Elevation of Groundwater (feet amsl)
Fire Training Area 4 (FT004)					
FT4-MW1901	9/13/2019	72.47	4.0 - 14	14.89	57.58
FT4-MW1902	9/13/2019	72.16	4.0 - 14	13.46	58.70
FT4-MW1903	9/13/2019	72.85	5.0 - 15	14.39	58.46
Former Landfarm and Holding Ponds					
LHP-MW1901	9/13/2019	74.92	5.0 - 15	11.58	63.34
LHP-MW1902	9/13/2019	76.08	5.0 - 15	14.18	61.90
LHP-MW1903	9/13/2019	77.56	8.0 - 18	17.17	60.39

Notes:
* = Groundwater grab sample collected from hand augered boring to 3.75 feet bgs; water encountered at 0.5 foot bgs.
amsl = above mean sea level
bgs = below ground surface
btoc = below top of casing

Table 3-3. Field Groundwater Quality Parameters
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Sample ID	Sample Date	pH (SU)	Temperature (°C)	Specific Conductivity (µS/cm)	DO Concentration (mg/L)	Turbidity (NTU)	ORP (mV)	Flow Rate (mL/min)	Volume Purged (gal)	Draw Down (feet)
Building 160 (Combat Alert Cell)										
CAC-MW1901	9/3/2019	6.40	9.60	0.548	2.74	9.27	9.6	135	1.65	1.1
CAC-MW1902	9/3/2019	6.99	9.80	0.810	1.15	6.33	-25.4	140	2.13	0.29
CAC-MW1903	8/30/2019	6.85	9.10	0.221	0.88	9.53	31	100	1.45	0.15
Former Building 152 (Former Fire Station)										
FFS-MW1901	9/7/2019	6.55	9.90	0.114	6.10	4.96	67.7	100	2.00	0.09
FFS-MW1902	9/4/2019	6.72	8.50	0.152	5.60	3.8	47.5	100	1.25	0.01
FFS-SS021445	8/26/2019	5.80	9.90	0.155	5.86	2.97	107.3	100	1.40	0.02
Spray Test Area										
STA-MW1901	9/3/2019	6.33	8.80	0.192	0.74	10.9	45	100	1.80	0.02
STA-MW1902	9/3/2019	6.75	10.50	0.197	1.94	29.4	17.7	120	2.80	0.16
Building 300 (Current Fire Station)										
CFS-MW1901	8/29/2019	6.53	9.20	0.131	5.45	17.5	47.7	100	2.90	0.15
CFS-MW1902	8/29/2019	6.28	9.20	0.181	5.68	11.1	63.3	100	1.45	0.83
CFS-MW1903	8/29/2019	6.46	13.80	0.120	5.00	9.47	51.3	80	1.50	0.02
Building 617 (Wastewater Treatment Plant)										
WTP-MW37	8/24/2019	6.19	9.20	0.154	8.19	3.31	134.3	100	1.00	0.30
WTP-MW-14-26A	8/26/2019	6.50	10.60	0.147	8.80	5.94	83.1	100	1.00	0.07
WTP-MW1901*	9/4/2019	6.04	12.0	0.312	6.24	39.7	74.6	NA	NA	NA
WTP-MW23	NA	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 3-3. Field Groundwater Quality Parameters
Site Inspection Report
King Salmon Divert, King Salmon, Alaska

Sample ID	Sample Date	pH (SU)	Temperature (°C)	Specific Conductivity (µS/cm)	DO Concentration (mg/L)	Turbidity (NTU)	ORP (mV)	Flow Rate (mL/min)	Volume Purged (gal)	Draw Down (feet)
Fire Training Area 1 (FT001)										
FT1-MW1901	8/29/2019	6.42	11.2	0.086	3.92	12.7	37.6	120	4.00	0.01
FT1-ESMW-01A	8/22/2019	6.57	6.90	0.082	1.08	1.47	11.4	150	2.00	0.01
FT1-ESMW-4A	8/26/2019	5.91	7.90	0.171	5.20	5.7	95	100	0.80	0.02
Fire Training Area 2 (FT002)										
FT2-MW1901	9/7/2019	6.33	8.10	0.105	6.30	4.96	92.7	100	1.00	0.00
FT2-MW1902	9/7/2019	6.15	9.70	0.111	6.07	3.77	103.4	110	1.45	0.01
FT2-MW1903	9/7/2019	6.13	9.80	0.136	4.62	14.4	94.7	100	1.53	0.00
Fire Training Area 4 (FT004)										
FT4-MW1901	9/7/2019	6.42	9.60	0.073	7.65	8.04	80.9	100	1.40	0.02
FT4-MW1902	9/4/2019	6.74	9.40	0.109	2.58	5.62	29.3	130	1.70	0.10
FT4-MW1903	9/7/2019	6.43	11.80	0.091	9.85	3.25	87.5	100	1.25	0.01
Former Landfarm and Holding Ponds										
LHP-MW1901	8/26/2019	6.82	10.0	0.060	10.71	12.6	80.3	150	2.35	0.03
LHP-MW1902	8/27/2019	7.14	8.70	0.182	6.16	21.9	75	100	0.95	1.5
LHP-MW1903	8/30/2019	6.12	7.60	0.160	7.30	2.62	121.6	100	1.85	0.07

Notes:

* = groundwater grab sample collected from hand augered boring to 3.75 feet bgs
°C = degrees Celsius
µS/cm = microSiemens per centimeter
DO = dissolved oxygen
gal = gallon
ID = identification
mg/L = milligrams per liter
mL/min = milliliters per minute
mV = millivolts
NA = not applicable
NS = not sampled
NTU = nephelometric turbidity units
ORP = oxidation reduction potential
pH = potential of hydrogen
SU = standard units

Table 3-4. Summary of Analytical Results in Soil
Site Inspection Report
King Salmon Divert, Alaska

Sample ID	Sample Depth			Sample Date	PFBS µg/kg	PFOA µg/kg	PFOS µg/kg
USEPA SL [(1)]:					**130,000**	**130**	**130**
1/10 ADEC HH CL [(2)]:					**NL**	**160**	**160**
ADEC Migration to GW CL [(3)]:					**NL**	**1.7**	**3.0**
Selected Project Screening Level [(4)]:					**130,000**	**1.7**	**3.0**
Building 160 (Combat Alert Cell)							
CAC-MW1901	0.0	-	0.5	8/26/19	< 1.7	< 0.42	2.4
CAC-MW1901	8.0	-	9.0	8/26/19	< 1.7	< 0.42	2.0
CAC-MW1902	0.0	-	0.5	8/26/19	< 1.5	0.22 J	2.7
CAC-MW1902	6.0	-	7.0	8/26/19	< 1.7	< 0.43	< 0.43
CAC-MW1903	0.0	-	0.5	8/26/19	< 1.6	0.39 J	13
CAC-MW1903	4.0	-	5.0	8/26/19	< 1.7	0.33 J	23
Former Building 152 (Former Fire Station)							
FFS-MW1901	0.0	-	0.5	9/4/19	< 1.8	< 0.45	17
FFS-MW1901	9.0	-	10	9/4/19	< 1.7	< 0.42	1.5
FFS-MW1902	0.0	-	0.5	8/28/19	< 1.8	0.28 J	12 (J)
FFS-MW1902	8.0	-	9.0	8/28/19	< 1.7	0.28 J	< 0.42
FFS-SB1901	0.0	-	0.5	8/27/19	< 1.6	< 0.40	8.1
FFS-SB1901	10	-	11	8/27/19	< 1.7	0.29 J	1.2
FFS-SB1902	0.0	-	0.5	8/28/19	< 1.5	8.5	**810**
FFS-SB1902	8.0	-	9.0	8/28/19	< 1.5	2.3	**140**
Spray Test Area							
STA-MW1901	0.0	-	0.5	8/27/19	< 1.6	0.25 J	5.5
STA-MW1901	3.0	-	4.0	8/27/19	< 1.6	2.0	77
STA-MW1902	0.0	-	0.5	8/27/19	0.43 J	3.1	89
STA-MW1902	4.0	-	5.0	8/27/19	< 1.7	< 0.42	5.5
Building 300 (Current Fire Station)							
CFS-MW1901	0.0	-	0.5	8/22/19	< 1.6	3.0 (J)	41
CFS-MW1901	14	-	15	8/22/19	< 1.5	1.4	**380**
CFS-MW1902	0.0	-	0.5	8/23/19	< 1.8	0.72	35
CFS-MW1902	16	-	17	8/23/19	< 1.6	1.4	5.0
CFS-MW1903	0.0	-	0.5	8/23/19	< 1.6	0.82	**180**
CFS-MW1903	19.0	-	20.0	8/23/19	< 1.6	0.36 J	15
Building 617 (Wastewater Treatment Plant)							
WTP-MW1901	0.0	-	0.5	8/24/19	< 2.3	0.50 J	70
WTP-SB1901	0.0	-	0.5	8/24/19	< 1.5	< 0.39	0.66
WTP-SB1901	21	-	22	8/24/19	< 1.6	< 0.41	0.46 J
WTP-SB1902	0.0	-	0.5	8/24/19	< 1.6	< 0.41	2.9
WTP-SB1902	25	-	26	8/24/19	< 1.7	< 0.41	5.4

Table 3-4. Summary of Analytical Results in Soil
Site Inspection Report
King Salmon Divert, Alaska

Sample ID	Sample Depth			Sample Date	PFBS	PFOA	PFOS
					µg/kg	µg/kg	µg/kg
USEPA SL [(1)]:					**130,000**	**130**	**130**
1/10 ADEC HH CL [(2)]:					**NL**	**160**	**160**
ADEC Migration to GW CL [(3)]:					**NL**	**1.7**	**3.0**
Selected Project Screening Level [(4)]:					**130,000**	**1.7**	**3.0**
Fire Training Area 1							
FT1-MW1901	0.0	-	0.5	8/25/19	< 1.6	< 0.39	< 0.39
FT1-MW1901	3.0	-	4.0	8/25/19	< 1.7	< 0.43	0.43 J
FT1-SB1901	0.0	-	0.5	8/25/19	3.0	11	**2,700**
FT1-SB1901	10	-	11	8/25/19	< 1.6	5.0	**490**
FT1-SB1902	0.0	-	0.5	8/25/19	< 1.6	0.56 J	83
FT1-SB1902	11	-	12	8/25/19	< 1.7	< 0.41	6.8
Fire Training Area 2							
FT2-MW1901	0.0	-	0.5	9/4/19	< 1.9	0.24 J	17
FT2-MW1901	6.0	-	7.0	9/4/19	< 1.8	< 0.44	6.4
FT2-MW1902	0.0	-	0.5	9/3/19	5.4	32	**2,000**
FT2-MW1902	11	-	12	9/3/19	< 1.8	0.41 J	19
FT2-MW1903	0.0	-	0.5	9/3/19	< 1.7	0.53 J	58
FT2-MW1903	6.0	-	7.0	9/3/19	< 1.7	0.35 J	1.0
Fire Training Area 4							
FT4-MW1901	0.0	-	0.5	9/4/19	< 1.9	18	120
FT4-MW1901	7.0	-	8.0	9/4/19	< 1.5	0.28 J	0.56 J
FT4-MW1902	0.0	-	0.5	8/28/19	0.72 J	11	**220**
FT4-MW1902	7.0	-	8.0	8/28/19	< 1.5	5.6	**260**
FT4-MW1903	0.0	-	0.5	9/3/19	< 1.6	2.7	44
FT4-MW1903	8.0	-	9.0	9/3/19	< 1.6	0.66	14
Former Landfarm and Holding Ponds							
LHP-MW1901	0.0	-	0.5	8/21/19	< 1.7	< 0.43 (UJ)	0.38 J
LHP-MW1901	9.0	-	10	8/21/19	< 1.7	< 0.44	< 0.44
LHP-MW1902	0.0	-	0.5	8/22/19	< 1.7	0.34 J	3.6
LHP-MW1902	9.0	-	10.0	8/22/19	< 1.7	< 0.42	1.9
LHP-MW1903	12	-	13	8/24/19	< 1.7	< 0.42	4.6
LHP-MW1903	0.0	-	0.5	8/24/19	< 1.9	1.9	73

Table 3-4. Summary of Analytical Results in Soil
Site Inspection Report
King Salmon Divert, Alaska

Notes:

< = Less than the Limit of Detection (LOD)
µg/kg = micrograms per kilogram
ADEC = Alaska Department of Environmental Conservation
bgs = below ground surface
GW = Groundwater
HH = Human Health
HQ = hazard quotient
ID = identification
NL = No level
PFBS = Perfluorobutanesulfonic acid
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid
RSL = Regional Screening Level
SCL = Soil cleanup level
SL = Screening Level
TR = target cancer risk
USEPA = United States Environmental Protection Agency

Result > Selected Project Screening Level
Result > USEPA SL

(1) Residential Scenario Screening Levels Calculated using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019).
(2) ADEC 18 AAC 75 Table B1 HH CL using values for the under 40 inches of annual rainfall zone. 1/10th of value shown to adjust the Table B1 values to a HQ of 0.1 and TR=1E-06.
(3) ADEC 18AAC 75 Table B1 Migration to Groundwater CL.
(4) Project Screening Levels were selected from applicable regulatory levels from USEPA and ADEC.

Soil sample results are reported in dry weight.

Lab Flags:

J = Estimated concentration, analyte is positively identified and the result is less than the Limit of Quantitation (LOQ), but greater than the Detection Limit (DL).

Validation Flags:

(J) = Estimated detect; the analyte was positively identified by the laboratory, however, the reported concentration is estimated due to non-conformances discovered during data validation.
(UJ) = Non-detect estimated; the analyte was reported as not detected by the laboratory, however, the reported quantitation limit is estimated due to non-conformances discovered during data validation.

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Table 3-5. Summary of Analytical Results in Groundwater
Site Inspection Report
King Salmon Divert, Alaska

Well ID	Sample Date	PFBS ng/L	PFOA ng/L	PFOS ng/L	PFOA+PFOS ng/L
USEPA SL [1]:		**40,000**	**40**	**40**	**70**
ADEC HH GW CL [2]:		**NL**	**400**	**400**	**NL**
Selected Project Screening Level [3]:		**40,000**	**40**	**40**	**70**
Building 160 (Combat Alert Cell)					
CAC-MW1901	9/3/19	46 (J)	680	5,300	5,980
CAC-MW1902	9/3/19	49 (J)	430	4,200	4,630
CAC-MW1903	8/30/19	92	1,600	5,500	7,100
Former Building 152 (Former Fire Station)					
FFS-MW1901	9/7/19	8.5	17	430	447
FFS-MW1902	9/4/19	31	270	540	810
FFS-SS021445	8/26/19	290	2,900	45,000	47,900
Spray Test Area					
STA-MW1901	9/3/19	26	330	3,400	3,730
STA-MW1902	9/3/19	20	300	4,500	4,800
Building 300 (Current Fire Station)					
CFS-MW1901	8/29/19	19	160	500	660
CFS-MW1902	8/29/19	23	150	790	940
CFS-MW1903	8/29/19	28	160	970	1,130
Building 617 (Wastewater Treatment Plant)					
WTP-MW14-26A	8/26/19	10	25	180	205
WTP-MW1901	9/4/19	19 (J)	71	420	491
WTP-MW37	8/24/19	7.7	23	45	68
Fire Training Area 1					
FT1-ESMW-01A	8/22/19	88	340	96,000	96,340
FT1-ESMW-4A	8/26/19	170	710	17,000	17,710
FT1-MW1901	8/29/19	4.9	23	170	193
Fire Training Area 2					
FT2-MW1901	9/7/19	3.7	5.3	29	34.3
FT2-MW1902	9/7/19	3.5	3.4	82	85.4
FT2-MW1903	9/7/19	340	750	2,900	3,650
Fire Training Area 4					
FT4-MW1901	9/7/19	11	160	400	560
FT4-MW1902	9/4/19	75	5,500	5,100	10,600
FT4-MW1903	9/7/19	65	830	1,000	1,830
Former Landfarm and Holding Ponds					
LHP-MW1901	8/26/19	< 0.91	< 0.91	1.5 J	1.5 J
LHP-MW1902	8/27/19	1.9	30	63	93
LHP-MW1903	8/30/19	66	9,800	3,300	13,100

Table 3-5. Summary of Analytical Results in Groundwater
Site Inspection Report
King Salmon Divert, Alaska

Notes:

< = Less than the Limit of Detection (LOD)
µg/kg = micrograms per kilogram
ADEC = Alaska Department of Environmental Conservation
bgs = below ground surface
GW = Groundwater
HH = Human Health
HQ = hazard quotient
ID = identification
NL = No level
PFBS = Perfluorobutanesulfonic acid
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid
RSL = Regional Screening Level
SCL = Soil cleanup level
SL = Screening Level
TR = target cancer risk
USEPA = United States Environmental Protection Agency

Result > Project Screening Level

(1) Residential Scenario Screening Levels Calculated Using ESEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019). The combined concentrations of PFOA and PFOS are compared to the 70 ng/L HA Levels.
(2) ADEC Table B1 HH GWCL.
(3) Project Screening Levels were selected from applicable regulatory levels from USEPA and ADEC.

Lab Flag:

J = Estimated concentration, analyte is positively identified and the result is less than the Limit of Quantitation (LOQ), but greater than the Detection Limit (DL).

Table 3-6. Summary of Analytical Results in Sediment
Site Inspection Report
King Salmon Divert, Alaska

Sample ID	Sample Date	PFBS µg/kg	PFOA µg/kg	PFOS µg/kg
USEPA SL [1]:		**130,000**	**130**	**130**
1/10 ADEC HH SCL [2]:		**NL**	**160**	**160**
ADEC Migration to GW SCL [3]:		**NL**	**1.7**	**3.0**
Selected Project Screening Level [4]:		**130,000**	**1.7**	**3.0**
Building 160 (Combat Alert Cell)				
CAC-SD1901	8/20/19	< 1.8	0.54 J	7.1
Building 300 (Current Fire Station)				
CFS-SD1901	8/17/19	< 1.8	1.3 (J)	37
Eskimo Creek				
ESC-SD1901	8/19/19	< 2.2	< 0.55	< 0.55
ESC-SD1902	8/17/19	< 1.8	< 0.45	4.4
ESC-SD1903	8/20/19	< 2.1	< 0.52	0.60 J
ESC-SD1904	8/17/19	< 3.6	1.5	**150**
Former Building 152 (Former Fire Station)				
FFS-SD1901	8/20/19	1.2 J	70	**300**
Red Fox Creek				
RFC-SD1901	8/19/19	< 11	< 2.6	< 2.6
RFC-SD1902	8/20/19	< 2.2	< 0.55	11
RFC-SD1903	8/20/19	< 1.8	< 0.44	3.7
Spray Test Area				
STA-SD1901	8/20/19	< 9.4	15	**1,000**
Building 617 (Wastewater Treatment Plant)				
WTP-SD1901	8/20/19	< 2.1	< 0.53	0.55 J

Notes:

< = Less than the Limit of Detection (LOD)
µg/kg = micrograms per kilogram
AAC = Alaska Administrative Code
ADEC = Alaska Department of Environmental Conservation
GW = Groundwater
HH = Human Health
HQ = hazard quotient
ID = identification
NL = No level
PFBS = Perfluorobutanesulfonic acid
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid
RSL = Regional Screening Level
SCL = Soil cleanup level
SL = Screening Level
TR = target cancer risk
USEPA = United States Environmental Protection Agency

Result > Selected Project Screening Level
Result > USEPA SL

Table 3-6. Summary of Analytical Results in Sediment
Site Inspection Report
King Salmon Divert, Alaska

Sediment samples were collected from the top 6 inches, and are reported in dry weight.

(1) Residential Scenario Screening Levels Calculated using USEPA RSL Calculator for Soil using a HQ of 0.1 (DoD, 2019).
(2) ADEC 18 AAC 75 Table B1 HH SCL using values for the under 40 inches of annual rainfall zone. 1/10th of value shown to adjust the Table B1 values to a HQ of 0.1 and TR=1E-06.
(3) ADEC 18 AAC 75 Table B1 Migration to Groundwater SCL.
(4) Project Screening Levels were selected from applicable regulatory levels from USEPA and ADEC.

Lab Flag:
J = Estimated concentration, analyte is positively identified and the result is less than the Limit of Quantitation (LOQ), but greater than the Detection Limit (DL).

Validation Flag:
(J) = Estimated detect; the analyte was positively identified by the laboratory, however, the reported concentration is estimated due to non-conformances discovered during data validation.

Table 3-7. Summary of Analytical Results in Surface Water
Site Inspection Report
King Salmon Divert, Alaska

Sample ID	Sample Date	PFBS	PFOA	PFOS	PFOA+PFOS
		ng/L	ng/L	ng/L	ng/L
USEPA SL [(1)]:		**40,000**	**40**	**40**	**70**
ADEC HH GWCL [(2)]:		**NL**	**400**	**400**	**NL**
Selected Project Screening Level [(3)]:		**40,000**	**40**	**40**	**70**
Eskimo Creek					
ESC-SW1901	8/19/19	< 0.87 (UJ)	1.0 J	1.4 J	2.4 J
ESC-SW1902	8/17/19	0.51 J	6.7 (J)	18 (J)	24.7
ESC-SW1903	8/20/19	0.98 J	10	23	33
ESC-SW1904	8/17/19	1.2 J	11 (J)	46	57
Red Fox Creek					
RFC-SW1901	8/19/19	< 92 (UJ)	< 92 (UJ)	< 92 (UJ)	< 92 (UJ)
RFC-SW1902	8/20/19	8.5	40	860	900
RFC-SW1903	8/20/19	11	61	1,300	1,361
Spray Test Area					
STA-SW1901	8/20/19	35	440	4,300	4,740
Building 617 (Wastewater Treatment Plant)					
WTP-SW1901	8/20/19	0.94 J	9.6	21	30.6

Notes:

< = Less than the Limit of Detection (LOD)
µg/kg = micrograms per kilogram
ADEC = Alaska Department of Environmental Conservation
bgs = below ground surface
GW = Groundwater
HH = Human Health
HQ = hazard quotient
ID = identification
NL = No level
PFBS = Perfluorobutanesulfonic acid
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid
RSL = Regional Screening Level
SCL = Soil cleanup level
SL = Screening Level
TR = target cancer risk
USEPA = United States Environmental Protection Agency

Result > Selected Project Screening Level
Result > USEPA SL

(1) Residential Scenario Screening Levels Calculated Using ESEPA RSL Calculator for Tap Water using a HQ of 0.1 (DoD, 2019). The combined concentrations of PFOA and PFOS are compared to the 70 ng/L HA Levels.
(2) ADEC Table B1 HH GWCL.
(3) Project Screening Levels were selected from applicable regulatory levels from USEPA and ADEC.

Table 3-7. Summary of Analytical Results in Surface Water
Site Inspection Report
King Salmon Divert, Alaska

Lab Flag:

J = Estimated concentration, analyte is positively identified and the result is less than the Limit of Quantitation (LOQ), but greater than the Detection Limit (DL).

Validation Flag:

(J) = Estimated detect; the analyte was positively identified by the laboratory, however, the reported concentration is estimated due to non-conformances discovered during data validation.

(UJ) = Non-detect estimated; the analyte was reported as not detected by the laboratory, however, the reported quantitation limit is estimated due to non-conformances discovered during data validation.

Table 15-1. Summary of Results and Recommendations
Site Inspection Report
King Salmon Divert, Alaska

AFFF Area	Soil						Groundwater				Sediment			Surface Water				Recommendation
	Surface			Subsurface														
	PFBS	PFOA	PFOS	PFBS	PFOA	PFOS	PFBS	PFOA	PFOS	PFOA +PFOS	PFBS	PFOA	PFOS	PFBS	PFOA	PFOS	PFOA +PFOS	
Building 160 (Combat Alert Cell)	-	-	X	-	-	X	-	X	X	X	-	-	X	N/A				Remedial Investigation recommended.
Former Building 152 (Former Fire Station)	-	X	X	-	X	X	-	X	X	X	-	X	X	N/A				Remedial Investigation recommended.
Spray Test Area	-	X	X	-	X	X	-	X	X	X	-	X	X	-	X	X	X	Remedial Investigation recommended.
Building 300 (Current Fire Station)	-	X	X	-	-	X	-	X	X	X	-	-	X	N/A				Remedial Investigation recommended.
Building 617 (Wastewater Treatment Plant)	-	-	X	-	-	X	-	X	X	X	-	-	-	-	-	-	-	Remedial Investigation recommended.
Eskimo Creek	N/A			N/A			N/A				-	-	X	-	-	X	-	Off-Base Site Inspection recommended.
Red Fox Creek	N/A			N/A			N/A				-	-	X	-	X	X	X	Off-Base Site Inspection recommended.
Fire Training Area 1 (FT001)	-	X	X	-	X	X	-	X	X	X	N/A			N/A				Remedial Investigation recommended.
Fire Training Area 2 (FT002)	-	X	X	-	-	X	-	X	X	X	N/A			N/A				Remedial Investigation recommended.
Fire Training Area 4 (FT004)	-	X	X	-	X	X	-	X	X	X	N/A			N/A				Remedial Investigation recommended.
Former Landfarm and Holding Ponds	-	X	X	-	-	X	-	X	X	X	N/A			N/A				Remedial Investigation recommended.

Notes:
- = analytical results were below cleanup level or screening level
X = analyte exceeded Project Screening Level
N/A = media was not sampled
PFBS = Perfluorobutanesulfonic acid
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctanesulfonic acid

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Definitions for Data Dump tables:

Notes:

< = Less than the Limit of Detection (LOD)
µg/kg = micrograms per kilogram
ng/L = nanograms per liter
EB = Equipment blank
FB = Field blank
FD = Field duplicate
NS = Normal sample
O = Other type of matrix (sample from gel ice pack)
PFAS = Poly and Perfluoroalkyl Substances
SE = Sediment
SO = Soil
SW = Surface Water
WG = Groundwater
W = Water
DL = Detection Limit
LOD = Limit of Detection
LOQ = Limit of Quantitation

Lab Flags:

J = Estimated concentration, analyte is positively identified and the result is less than the Limit of Quantitation (LOQ), but greater than the Detection Limit (DL).
U = Analyte was not detected at the value indicated.

Validation Qualifiers (DV Qual):

J = Estimated detect; the analyte was positively identified by the laboratory, however, the reported concentration is estimated due to non-conformances discovered during data validation.
UJ = Non-detect estimated; the analyte was reported as not detected by the laboratory, however, the reported quantitation limit is estimated due to non-conformances discovered during data validation.
X = Result was affected by serious deficiencies in the ability to analyze the sample and to meet method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Exclusion of the data is recommended.

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