FINAL PRELIMINARY ASSESSMENT AND SITE INSPECTION OF PER- AND POLYFLUOROALKYL SUBSTANCES

Fort Polk, Louisiana

Prepared For:
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Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

Fort Polk, Louisiana

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EXECUTIVE SUMMARY

The United States Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The PA identifies areas of potential interest (AOPIs) where PFAS-containing materials were used, stored, and/or disposed, or areas where known or suspected releases to the environment occurred. The SI includes multi-media sampling at AOPIs to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required. This Fort Polk PA/SI was completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, National Oil and Hazardous Substances Pollution Contingency Plan, and Army/Department of Defense (DoD) policy and guidance.

Fort Polk is located in Vernon Parish, Louisiana 6 miles southeast of Leesville, Louisiana. The installation occupies approximately 100,430 acres which is divided into two cantonment areas and several large training ranges. The larger and more extensively developed cantonment area is known as South Fort Polk. North Fort Polk is contiguous to South Fort Polk. A sub-installation to Fort Polk, identified as Peason Ridge, is located approximately 20 miles north of the main post.

The Fort Polk PA identified nine AOPIs for investigation during the SI phase. SI sampling results from the nine AOPIs were compared to risk-based screening levels calculated by the Office of the Secretary of Defense (OSD) for PFOS, PFOA, and PFBS. PFOS, PFOA, and/or PFBS were detected in soil and/or groundwater at eight AOPIs, and eight of the nine AOPIs had PFOS, PFOA, and/or PFBS present at concentrations greater than the risk-based screening levels. The Fort Polk PA/SI identified the need for further study in a Comprehensive Environmental Response, Compensation, and Liability Act of 1980 remedial investigation. **Table ES-1** below summarizes the PA/SI sampling results and provides recommendations for further study in a remedial investigation or no action at this time at each AOPI.

Table ES-1. Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at Fort Polk, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)		Recommendation
	GW	SO	
Bradley Tank Fire Location	NS	No	No action at this time
Building 4172 – Current Firefighter Training Area	Yes	No	Further study in a remedial investigation
Former Firefighter Training Area	Yes	No	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)		Recommendation
	GW	SO	
Original Firefighter Training Area	Yes	No	Further study in a remedial investigation
Building 4239 – Aircraft maintenance Hangar and Adjacent Nozzle Test Location	Yes	No	Further study in a remedial investigation
Building 4256 – Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station)	Yes	No	Further study in a remedial investigation
Building 1736 – Former Fire Station #1	Yes	No	Further study in a remedial investigation
Building 7156 – North Fort Fire Station and Aqueous Film-Forming Foam Storage Building	Yes	No	Further study in a remedial investigation
Building 7525 – Former North Fort Fire Station	Yes	No	Further study in a remedial investigation

Notes:
Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
NS – not sampled
SO – soil

1 INTRODUCTION

The United States (U.S.) Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The Army is the lead agency under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Executive Order 12580 and is conducting the PA/SI consistent with its authority under CERCLA, 42 United States Code §§ 9600, et seq. (as amended), and the Defense Environmental Restoration Program, 10 United States Code §§ 2701, et seq. The PFAS PA/SI included two distinct efforts. The PA identified locations that are areas of potential interest (AOPIs) at Fort Polk based on the use, storage and/or disposal of PFAS-containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018). The SI included multi-media sampling at AOPIs to determine whether or not a release has occurred, and the PFOS, PFOA, and PFBS results were compared to the Office of the Secretary of Defense (OSD) PFOS, PFOA, and PFBS risk screening levels to determine whether further investigation is warranted. This report provides the PA/SI for Fort Polk and was completed in accordance with CERCLA and The National Oil and Hazardous Substances Pollution Contingency Plan.

1.1 Project Background

PFAS are a class of compounds that have been used in a wide range of industrial applications and commercial products due to their unique surface tension/leveling properties. Due to industry and regulatory concerns about the potential health effects and adverse environmental impacts, there has been a reduction in the manufacture and use of PFAS worldwide. In the U.S., significant reductions in the production, importation, and use of PFOS and PFOA (two individual compounds in the PFAS class) occurred between 2001 and 2015 (Interstate Technology Regulatory Council 2017). PFBS replaced PFOS in some applications and is currently used and manufactured in the U.S.

In 2016, the United States Environmental Protection Agency (USEPA) established a lifetime health advisory of 70 nanograms per liter (ng/L) in drinking water for PFOS or PFOA and for the sum of PFOS and PFOA when both are present (USEPA 2016). On 15 October 2019, the OSD provided guidance on the investigation of PFOS, PFOA, and PFBS at Department of Defense (DoD) restoration sites (OSD 2019). The DoD guidance provides risk screening levels for PFOS, PFOA, and PFBS in groundwater (tap water) or soil, calculated using the USEPA's Regional Screening Level (RSL) calculator for residential and industrial/commercial worker receptor scenarios. Following the issuance of the 2021 OSD memo, on 08 April 2021, USEPA published an updated toxicity assessment for PFBS (USEPA 2021). Based on the u pdated toxicity assessment for PFBS, the OSD issued a memorandum on 15 September 2021 to include u pdated PFBS risk screening levels. The September 2021 Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program is provided for reference as **Appendix A**. The OSD risk screening levels for tap water (and used to evaluate groundwater) are 40 ng/L for PFOS and PFOA, and 600 ng/L for PFBS. The PFOS and PFOA soil screening levels for the residential and industrial/commercial scenarios are 0.13 milligrams per kilogram (mg/kg) (residential) and

1.6 mg/kg (industrial/commercial). The soil screening levels for PFBS are 1.9 mg/kg (residential) and 25 mg/kg (industrial/commercial). These screening criteria are discussed further in **Section 6.5**.

1.2 PA/SI Objectives

This PA/SI was conducted consecutively because the results of the PA yielded AOPIs that necessitated continuing onto the SI phase in accordance with CERCLA. Consequently, this report provides the combined objectives of both PA and SI reports.

1.2.1 PA Objectives

During the PA, investigators collect readily available information and conduct site reconnaissance. This PA will evaluate and document areas where PFAS-containing materials were used, stored, and/or disposed, so the Army can distinguish between sites that pose little or no threat to human health and the environment and sites that require further investigation.

1.2.2 SI Objectives

An SI is conducted when the PA determines an AOPI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI includes multi-media sampling at AOPIs to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required.

Installation-specific data quality objectives (DQOs) and the sampling design and rationale are summarized in **Sections 6.1** and **6.2**.

1.3 PA/SI Process Description

For Fort Polk, PA/SI development followed a similar process as described in **Sections 1.3.1** through **1.3.5** below. **Section 3** provides a summary of the PA activities completed, and **Section 6** provides a summary of the SI activities completed for Fort Polk. The PA and SI processes are documented in the PA/SI Quality Control Checklist included as **Appendix B**.

1.3.1 Pre-Site Visit

First, an installation kickoff teleconference was held between applicable points of contact (POCs) from United States Army Environmental Command (USAEC), United States Army Corps of Engineers (USACE), Fort Polk, and Arcadis U.S., Inc. (Arcadis). The kickoff call occurred on 16 October 2018, four weeks before the site visit to discuss the goals and scope of the PA, project scheduling, installation access, timeline for the site visit, access to installation-specific databases, and to request available records.

Records review was conducted before the site visit to obtain electronically available documents from the installation and external sources for review. The purpose of the records research was to identify any area

on the installation that may have been a location where PFAS-containing materials were used, stored, and/or disposed, as well as to gather information on the physical setting and site history at Fort Polk.

A read-ahead package was prepared and submitted to the appropriate POCs 2 weeks before the site visit. The read-ahead package contains the following information:

- The Installation Management Command (IMCOM) operation order
- The Army PA Operations Security requirements package, which includes the antiterrorism/operations security review cover sheet (**Appendix C**)
- The PFAS PA kickoff call minutes
- An information paper on the PA portion of the Army's PFAS PA/SI
- Contact information for key POCs
- A list of the data sources requested and reviewed
- A list of preliminary locations identified during the kickoff call and pre-site visit records review, to be evaluated for use, storage, and/or disposal of PFAS-containing materials, where additional information on those areas will be collected through personnel interviews, additional document review, and site reconnaissance.
- A list of roles for the installation POC to consider when recommending potential interviewees.

1.3.2 Preliminary Assessment Site Visit

The site visit was conducted on 13 through 15 November 2018. An in-brief meeting was held to provide installation staff with the objectives of the site visit and team introductions. **Section 3** includes information regarding personnel interviewed.

Personnel interviews were conducted with individuals having significant historical knowledge at Fort Polk. The interviews focused on confirming information discussed in historical documents, collecting information that may have not been in historical documents, corroborating other interviewees' information.

Site reconnaissance included visual surveys that assessed the points of potential use, storage, and/or disposal of PFAS-containing materials, as well as potential secondary impacts, and the migration potential from each AOPI (e.g., stormwater drains, building drains and sumps, cracks in the floor/pavement). Physical attributes of the preliminary locations were documented, including local slope and ground and floor conditions (i.e., paved, unpaved, visual staining), surface water bodies and surface flow, potential receptors, and the distance to the installation boundary. Access to existing groundwater monitoring wells, if present, was also noted during the site reconnaissance in case the monitoring wells could be proposed for SI sampling. Photo documentation of the preliminary locations was collected, and access limitations or advantages related to potential future sampling activities were noted.

An exit briefing was offered to installation personnel at the conclusion of the site visit to raise any items identified during the site visit, discuss any follow-up items, and review the schedule for submitting deliverables. The exit briefing was conducted on 15 November 2018 with the installation, USAEC, and USACE to discuss preliminary findings of the PA site visit.

1.3.3 Post-Site Visit

Information collected before, during, and after the site visit was reviewed and corroborated by cross-referencing records and reviewing interview details and observations noted during site visit reconnaissance. A site visit trip report was completed and provided to the installation POC, applicable USAEC POCs, and USACE regional POCs following the site visit. The information collected during the pre-site visit and site visit activities was compiled to develop the installation-specific PA portion of the PA/SI report (**Section 3**). Site data obtained during the PA were used to develop preliminary conceptual site models (CSMs) for each AOPI, which serve as the basis for developing the SI scope of work presented in an installation-specific Quality Assurance Project Plan (QAPP) Addendum.

1.3.4 Site Inspection Planning and Field Work

The SI process was initiated at the installation to evaluate PFOS, PFOA, and PFBS presence or absence at each AOPI and determine whether further investigation is warranted. First, an SI kickoff teleconference was held between the Army PA team and Fort Polk.

The objectives of the SI kickoff teleconference were to:

- Discuss the AOPIs selected for sampling and the proposed sampling plan for each AOPI
- Gauge regulatory involvement (Louisiana Department of Environmental Quality) requirements or preferences
- Discuss general SI deliverable and field work schedule information and logistics

Following development of the SI sampling technical approach, an SI scoping teleconference was held to obtain concurrence on the SI sampling plan from USAEC, USACE, and the installation. Additional discussion topics included:

- Confirm the plan for investigation derived waste (IDW) handling and disposal
- Identify specific installation access requirements and potential schedule conflicts
- Provide an updated SI deliverable and field work schedule.

A Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP) was developed and finalized in October 2019 for the USAEC PFAS PA/SI (Arcadis 2019). The PQAPP details general planning processes for collecting data and describes the implementation of quality assurance (QA) and quality control (QC) activities for the SI portion for Army installations nationwide. Additionally, an installation-specific QAPP Addendum was developed to define the DQOs, present the sampling design and rationale, and provide qualifications for project personnel. The SI field work was completed in accordance with the PQAPP (Arcadis 2019) and the approved installation-specific QAPP Addendum. A Site Safety and Health Plan (SSHP) was also developed as an attachment to the QAPP Addendum to identify specific health and safety hazards that may be encountered at the installation during sampling. The SSHP was designed to supplement the Accident Prevention Plan (Arcadis 2018), which was developed for Army installations nationwide. The QAPP Addendum and SSHP were submitted to the installation and finalized before commencement of field work.

The DQOs, sampling design and rationale, and field methods employed for the SI are summarized from the QAPP Addendum developed for Fort Polk (Arcadis 2020) in **Sections 6.1** through **6.3**.

After finalization of the QAPP Addendum and SSHP, field planning and coordination with the installation and subcontractors was completed. Once the schedule was determined, field teams mobilized to the installation to complete the scope of work defined in the QAPP Addendum.

1.3.5 Data Analysis, Validation, and Reporting

Environmental samples collected during the SI were submitted to a laboratory which is DoD Environmental Laboratory Accreditation Program (ELAP)-accredited for PFOS, PFOA, and PFBS analysis by liquid chromatography with tandem mass spectrometry and compliant with the DoD Quality Systems Manual (QSM) 5.3 (DoD and Department of Energy 2019). Laboratory analytical results were then validated and verified by a project chemist to assess the usability of the data collected. Validated analytical results were summarized in the context of OSD risk screening levels (defined in **Section 6.5**).

2 INSTALLATION OVERVIEW

The following subsections provide general information about Fort Polk, including the location and layout, the installation mission(s) over time, a brief site history, current and projected land use, climate, topography, geology, hydrogeology, surface water hydrology, potable wells within a 5-mile radius of the installation, and applicable ecological receptors.

2.1 Site Location

Fort Polk is located in Vernon Parish, Louisiana, 6 miles southeast of Leesville, Louisiana as shown on **Figure 2-1**. The installation occupies approximately 100,430 acres and contains two cantonment areas, identified as South Fort Polk and North Fort Polk, on the east and northeast portion of the installation with the remainder of the installation being used for training areas and several large training ranges (impact areas) as shown on **Figure 2-2**. The larger and more extensively developed cantonment area is known as South Fort Polk and includes the Polk Army Airfield (PAAF). North Fort Polk is a relatively smaller cantonment area and is contiguous to South Fort Polk.

A sub-installation to Fort Polk, identified as Peason Ridge, is located approximately 20 miles north of North Fort Polk and is located in Vernon, Sabine, and Natchitoches Parishes as shown on **Figure 2-1**. Peason Ridge is approximately 33,500 acres in size and is used for training. Army personnel and support assets (e.g., fire stations) are not permanently stationed at Peason Ridge.

Additionally, Fort Polk uses 98,125 acres owned by the United States Forest Service (USFS) under the conditions of a special use permit authorization. In combination with the 100,430 acres occupied by Fort Polk, the total current acreage utilized by Fort Polk is 198,555 acres (USAEC 2016; USDA Forest Service 2004).

2.2 Mission and Brief Site History

The primary mission of Fort Polk is to train soldiers to deploy, fight, and win; train Brigade Combat Teams for war; provide a secure, thriving community for soldiers, Army civilians, retirees, and their families; prepare, deploy, sustain, and re-deploy assigned trained and ready forces; and serve as a power projection platform by mobilizing, validating, deploying, and re-deploying active, National Guard, and Army Reserve forces (Directorate of Public Works 2016).

Fort Polk was established in 1941 as an armored division training center that held military training exercises. Since 1941, Fort Polk has been deactivated and activated depending on U.S. Military activity (e.g., World War II, Korean War) with the overall purpose of training and preparing soldiers. According to Fort Polk personnel and review of historical documents, large-scale industrial operations have not existed (nor currently exist) at Fort Polk. Fort Polk can be described as having typical military and industrial activities/practices (USAEC 2016).

2.3 Current and Projected Land Use

Fort Polk is an active military installation, specifically used for training purposes, and is classified under North American Industrial Classification System number 92811 – National Security. It is expected to

remain active for the foreseeable future and, as a result, is classified as an industrial facility. The installation obtained permission from the U.S. Fish and Wildlife Service (and USFS) for limited use of 98,125 acres within in the Kisatchie National Forest. The areas are lightly populated but could be used for residential and agricultural activities in the future (URS 2004; USAEC 2016). Currently, there are no plans to transfer military property at Fort Polk to the public or terminate land-lease agreements with the USFS.

2.4 Climate

The climate in the area is generally mild, with the January mean minimum temperature of 37 degrees Fahrenheit and July mean maximum temperature of 93 degrees Fahrenheit. The average precipitation is about 54 inches a year. The greatest precipitation generally occurs in May, and the least occurs in October. Prevailing wind directions are generally from the south and southeast during summer months and from the north during winter months (URS 2004).

2.5 Topography

Fort Polk is situated in the Central Gulf Coastal Plain section of the Coastal Plain physiographic province. The land surface is characterized by rolling hills and consist of a series of ridges generally oriented northwest to southeast. The local topographic relief of North and South Fort Polk is generally less than 100 feet with overall installation elevations ranging from 250 to 400 feet above mean sea level (Roy F. Weston, Inc. 1989; URS 2004). **Figure 2-3** shows the topographic relief on the Fort Polk installation.

2.6 Geology

Fort Polk is located on the western flank of the Mississippi embayment of the Gulf Coastal Plain physiographic province. The Gulf Coastal Plain is developed upon a sequence of sedimentary lithologic units, which dip greatly southward, resulting in successively younger formations cropping out towards the Gulf of Mexico (Radian International 1995).

Middle and Late Tertiary age deposition under deltaic and brackish water conditions resulted in the thick accumulation of sediment within the Mississippi embayment. The surface and near-surface bedrock formation at Fort Polk is the Pliocene to Miocene-age Fleming Formation, which is subdivided into six alternating sand (sandstone) and clay (claystone) members: the Blounts Creek, Castor Creek, Williamson Creek, Dough Hill, Carnahan Bayou, and Lena Member. The Castor Creek (claystone) and Blounts Creek (sandstone) formations comprise the members that crop out at Fort Polk. In addition to the Tertiary age strata, alluvial deposits of Quaternary age occur at the surface in local stream valleys (Radian International 1995).

Geologic strata in the area generally dip toward the southeast at a slope of approximately 50 to 70 feet per mile near the updip limit, increasing to greater than 100 feet per mile near the southern boundary of Vernon Parish County. No faulting has been interpreted or mapped in the Fort Polk area. However, based on regional geologic studies, growth faults typical of the Gulf Coastal Plain could occur in the area. The closest known fault in the area is approximately 15 to 25 miles north of Fort Polk (Radian International 1995).

2.7 Hydrogeology

Underlying the installation are Quaternary age water-bearing, unconsolidated alluvial and terrace sediments. These uppermost water-bearing units are shallow and thin and yield limited amounts of water for public supply; however, the water-bearing terrace sediment units have some water-supply potential in the southern part of the parish.

Below the Quaternary age units are six Tertiary age hydrogeologic units (three aquifers and three confining units) of the Fleming Formation. These groundwater aquifers are the principal drinking water sources for Fort Polk and Vernon Parish. The following hydrogeologic units (and the geologic unit name in which they are found) comprise the Fleming Formation (in order of increasing depth):

- Evangeline sandstone aquifer (Blounts Creek Member)
- Castor Creek claystone confining unit (Castor Creek Member, 200 to 400 feet thick)
- Williamson Creek sandstone aquifer (Williamson Creek Member)
- Dough Hills claystone confining unit (Dough Hills Member, 300 to 400 feet thick)
- Carnahan Bayou sandstone aquifer (Carnahan Bayou Member)
- Lena confining claystone unit (Lena Member, 300 to 400 feet thick)

The aquifer units are of Miocene age and younger and are exposed at the land surface in Vernon Parish.

The permeable units which outcrop at Fort Polk (i.e., the alluvial and terrace deposits, the Blounts Creek Member deposits, and the Castor Creek Member deposits) serve as recharge areas for the regional and local aquifers. Groundwater at Fort Polk is encountered at depths ranging from the surface to approximately 60 feet below ground surface (bgs). Groundwater recharge to the Williamson Creek and Carnahan Bayou confined aquifers occurs by infiltration and percolation of rainfall in the recharge zones as well as vertical leakage from adjacent units in areas where these units crop out north of Fort Polk. Groundwater flow from the recharge areas is generally to the southeast, perpendicular to the strike and parallel to the dip of the strata. Natural groundwater flow directions and gradients are altered by groundwater pumping which creates cones of depression in the area of Fort Polk and Leesville and near DeRidder, southwest of Fort Polk (Radian International 2000; URS 2004).

2.8 Surface Water Hydrology

Fort Polk is situated on a local topographic high, and surface drainage generally radiates outward from Fort Polk. The principal streams in Vernon Parish include the Calcasieu River, Bayou Anacoco, and Bayou Castor. Two reservoirs, Lake Vernon and Anacoco Lake, are in the Bayou Anacoco drainage basin approximately 8 miles to the west and northwest of Fort Polk. The Sabine River forms the western boundary of the parish as part of the Louisiana-Texas state line.

Surface water drainage for most of the installation occurs to the south from tributaries located throughout the installation which flow to the Calcasieu River. These tributaries include Bundick, Drake's, Whiskey Chitto, Bird's, Six Mile, and Big Brushy Creeks. Bayou Zourie drains the westernmost portion of the installation and is a tributary to the Sabine River.

Some of the low-lying areas in the floodplains are usually inundated to form swampy areas. Seasonal springs and seeps are also relatively common near the base of hills at contacts between underlying clay strata and overlying sand.

No developed potable surface water supplies exist on the installation; however, during field exercises, some military units will take water from local streams and treat it for drinking purposes (Radian International LLC 1995).

2.9 Relevant Utility Infrastructure

The following subsections provide general information regarding the installation's stormwater and wastewater management systems, as well as information on how the utility infrastructures may influence the fate and transport of PFAS at Fort Polk.

2.9.1 Stormwater Management System Description

The stormwater at Fort Polk is managed through a series of swales and culverts or a curb-and-gutter system with other stormwater best management practices. The installation does not have a combined sewer system, so stormwater is reportedly discharged directly into streams and other conveyances (no pre-treatment prior to discharge).

2.9.2 Sewer System Description

The sanitary sewer system at Fort Polk is a standard municipal system. Sanitary wastewater generated at Fort Polk is conveyed via lift stations and gravity mains to on-post privately owned wastewater treatment plants (WWTPs; one at North Fort Polk and the other at South Fort Polk). The wastewater collection system and two WWTPs are operated by American Water Military Services Group (American Water).

2.10 Potable Water Supply and Drinking Water Receptors

In October 1991, 17 active supply wells were on post. Since 1991, six wells have been capped and one additional water supply well has been installed. The installation utilizes four water treatment plants to treat potable water obtained from these 12 active supply wells. Fort Polk purchases the potable water supplied to the installation from American Water. American Water's water (and wastewater) systems at Fort Polk serve a population of approximately 100,000 (American Water 2019).

Presently, seven supply wells at South Fort Polk obtain groundwater from the Williamson Creek aquifer and range in depth from 573 to 912 feet bgs. The five other wells located at North Polk obtain groundwater from the Carnahan Bayou aquifer and range in depth from 635 to 1,415 feet bgs. These aquifers also provide water to local communities and rural residences. The potable well construction details are presented in **Table 2-1**. The recharge area for both aquifers is located 7 to 15 miles northwest of Fort Polk (Directorate of Public Works, Environmental and Natural Resources Management Division 2016; URS 2004).

The town of Pitkin (5 miles south of Fort Polk) and domestic wells in the southern part of Vernon Parish obtain groundwater from the Evangeline aquifer. As shown on **Figure 2-4,** the recharge area for the Evangeline Aquifer runs through Fort Polk. The Williamson Creek aquifer is the source of groundwater for

public supply wells at Fort Polk, for the town of Pickering 2 miles west of Fort Polk, and for domestic wells north and west of Fort Polk. The Carnahan Bayou aquifer is the source of groundwater for public supply wells at Fort Polk, in the towns of Leesville (2 miles northwest of Fort Polk) and Simpson (5 miles north of Fort Polk), and for domestic wells north and west of Fort Polk. **Figure 2-5** shows the potable wells identified on-post at Fort Polk.

An Environmental Data Resources, Inc. (EDR) report includes search results from a variety of environmental, state, city, and other publicly available databases for a referenced property. An EDR report was generated for Fort Polk, which along with state and county GIS provided by the installation identified several off-post public and private wells within 5 miles of the installation boundary (**Figure 2-4**). The EDR report providing well search results provided as **Appendix E**.

2.11 Ecological Receptors

The PA team collected information regarding ecological receptors that was available in the installation documents. The following information is provided for future reference should the Army decide to evaluate exposure pathways relevant to the ecological receptors.

Several state rare and sensitive species are found in the area of Fort Polk, which include the Louisiana Pine Snake (a candidate for the endangered species list), Bog Coneflower, Sprague's Pipit, and Alligator Snapping Turtle. The only endangered species that habitats the installation is the Red-Cockaded Woodpecker. Additionally, the Southern Bald Eagle, which is a de-listed endangered species, has been known to transiently visit Fort Polk, but does not nest within the installation.

Currently, 236 avian, 50 reptile, 21 amphibian, 45 mammal, and 82 butterfly species have been identified on Fort Polk and Peason Ridge. This includes several non-game species, some of which use Fort Polk and Peason Ridge as a key land base. A variety of species are commonly hunted on the installation including white-tailed deer, turkey, bobwhite quail, mourning dove, gray and fox squirrels, rabbits, feral hogs, woodcock, and several types of duck (Radian International 1995; Directorate of Public Works, Environmental and Natural Resources Management Division 2016).

2.12 Previous PFAS Investigations

Previous (i.e., pre-PA) PFAS investigations relative to Fort Polk, including both those conducted and not conducted by the Army, are summarized to provide full context of available PFAS data for Fort Polk. However, only data collected by the Army will be used to make recommendations for further investigation. In 2016, under the IMCOM Operations Order 16-088, five potable water samples were collected from the following Fort Polk locations and analyzed for PFOS and PFOA: Building 2902 (South Fort Polk); Building 7216 (North Fort Polk); Point of Entry/Well 14D; Point of Entry/Well 15D; and Point of Entry/Well 16D. The water wells 14D and 15D are screened within the Carnahan Bayou aquifer and the well 16D is screened in the shallower Williamson Creek aquifer. The source of groundwater for samples from Buildings 2902 and 7216 was not reported. The samples from the potable water sample locations are shown on **Figure 2-5**.

Analytical results indicated that PFOS and PFOA were not detected in the samples; the limit of detection was 40 and 20 ng/L for PFOS and PFOA, respectively (**Table 2-2**).

3 SUMMARY OF PA ACTIVITIES

To document areas where any potential current and/or historical PFAS-containing materials were used, stored and/or disposed at Fort Polk, data was collected from three principal sources of information:

1. Records review
2. Personnel interviews
3. Site reconnaissance.

These sources of data, along with their relative application to this PA, are discussed below. The specific findings of records review, personnel interviews, and site reconnaissance relevant to PFAS-containing materials at Fort Polk are described in **Section 4**.

3.1 Records Review

The records reviewed for this PA included, but were not limited to, various Installation Restoration Program (IRP) administrative record documents, compliance documents, Fort Polk fire department documents, Fort Polk directorate of public works documents, and GIS files. Internet searches were also conducted to identify publicly available and other relevant information. A list of the specific documents reviewed for Fort Polk is provided in **Appendix F**.

3.2 Personnel Interviews

Interviews were conducted during the site visit. If a previously identified interviewee was not available during the site visit, attempts were made to complete the interview via telephone before or following the site visit or by contacting an alternate interviewee identified by the installation POC.

The list of roles for the installation personnel interviewed during the PA process for Fort Polk is presented below (affiliation is with Fort Polk unless otherwise noted).

- Hazardous Waste Manager
- IRP Manager
- Active Airfield Manager
- Environmental IRP/IR Manager
- Senior Supervisor for Wastewater
- Senior Supervisor for Operations
- Cultural Resource Manager
- Main Field Archeologist
- Fire Chief
- Deputy Fire Chief
- AECOM On-Site Manager

- Range Operation Supervisor
- Conservation Branch Chief
- Installation Pesticide Application Manager
- Installation Stormwater Manager
- Real Property Officer
- Master Planning Division Chief

The compiled interview logs are provided in **Appendix G**.

3.3 Site Reconnaissance

Site reconnaissance and visual surveys were conducted at the preliminary locations identified at Fort Polk during the records review process, the installation in-brief meeting, and/or during the installation personnel interviews. A photo log from the site reconnaissance is provided in **Appendix H**; photos were used to assist in verification of qualitative data collected in the field. The site reconnaissance logs are provided in **Appendix I**.

Preliminary locations of potential use, storage, and/or disposal of PFAS-containing materials were then evaluated in the PA (during records review, personnel interviews, and/or site reconnaissance) and were categorized as AOPIs or as areas not retained for further investigation at this time based on a combination of information collected (e.g., records reviewed, personnel interviews, internet searches). A summary of the observations made, and data collected through records reviews (**Appendix F**), installation personnel interviews (**Appendix G**), and site reconnaissance logs (**Appendix I**) during the PA process for Fort Polk is presented in **Section 4**. Further discussion regarding rationale for not retaining areas for further investigation is presented in **Section 5.1**, and further discussion regarding categorizing areas as AOPIs is presented in **Section 5.2**.

4 POTENTIAL PFAS USE, STORAGE, AND/OR DISPOSAL AREAS

Fort Polk was evaluated for all potential current and historical use, storage, and/or disposal of PFAS-containing materials. There are a variety of PFAS-containing materials used in relation to current and historical Army operations. However, the use, storage, and/or disposal of aqueous film-forming foam (AFFF) is the most prevalent potential source of PFAS chemicals at DoD facilities. As such, this section is organized to summarize the AFFF-related uses first, and all remaining potential PFAS-containing materials in the subsequent section.

4.1 AFFF Use, Storage, and Disposal Areas

AFFF was developed in the mid-1960s in response to a need for firefighting foams better suited to extinguish Class B, fuel-based fires. AFFF formulations consist of water, an organic solvent, up to 5 percent (%) hydrocarbon surfactants, and 1 to 3% PFAS (Interstate Technology Regulatory Council 2020). AFFF concentrate is designed to be diluted with water to become a 1, 3, or 6% foam. AFFF releases at DoD facilities may have occurred during firefighter training, emergency response actions, equipment testing, or accidental releases. The military still primarily uses AFFF for Class B fires; however, the current formulations of AFFF contain significantly lower amounts of PFOS, PFOA, and their precursors, and significant operational changes have been implemented to restrict uncontrolled releases and non-essential use of PFAS-containing foams. Army installations may still house AFFF, commonly stored in closed containers (e.g., 55-gallon drums, 5-gallon buckets), within designated storage buildings or at firehouses.

Currently, the Fort Polk Fire Department utilizes two fire stations for fire department operations: Building 1 (Fire Station #1 located in South Fort Polk) and Building 7156 (Fire Station #2 located in North Fort Polk). The current Fire Station #1 (Building 1) was newly constructed at the time of the PA site visit and AFFF had reportedly never been stored or used at that location. Building 7156 is used as the largest storage area for AFFF on-post and reportedly houses approximately 935 gallons of Denko 3% AFFF (seventeen 55-gallon drums). One half-full 5-gallon container of National Foam AFFF was also reported to be stored at this fire station. The current Fire Station #1 (Building 1) was newly constructed at the time of the PA site visit and AFFF was reported and observed to only be stored in the fire trucks at this location.

Building 4239 is a hangar at the PAAF and is equipped with an AFFF fire suppression system. The max capacity of the system is 600 gallons and is currently filled with that amount of Buckeye 3% AFFF.

An AFFF inventory spreadsheet provided by the Army for IMCOM installations indicated that a total of 11 vehicles house approximately 1,320 total gallons of Denko 3% AFFF. Additionally, the inventory indicated that Fort Polk houses a foam trailer which holds 1,000 gallons of Denko 3% AFFF. Other storage of Denko 3% AFFF is noted for Fort Polk; approximately 2,585 gallons of AFFF was stored in 55-gallon barrels. The building locations for storage of the AFFF containers and locations for storage/filling of the AFFF-containing fire fighting vehicles (including the foam trailer) were not provided (USAEC 2016).

AFFF has reportedly been released during fire truck nozzle testing and truck line purging into a wash rack basin southwest of PAAF hangar Building 4239. According to Fort Polk Fire Department personnel, there

has been one instance of a fire response involving AFFF. In 2016, approximately 6 gallons of AFFF were used to extinguish a tank fire caused by broken fuel lines, located at the northwest corner of the 4th Street and Texas Avenue intersection (identified as the Bradley Tank Fire AOPI).

In addition, personnel interviews with the fire department staff indicated that a common practice in the 1980s was to dispose of mixed AFFF down storm drains. If an AFFF batch was improperly mixed in a holding tank, the entire contents of the holding tank would be disposed to a storm drain. Personnel also indicated that old AFFF would be sent to the Defense Reduction Management Office for disposal.

4.2 Other PFAS Use, Storage, and/or Disposal Areas

Following document research, personnel interviews, and site reconnaissance at Fort Polk, other PFAS sources (e.g., metal plating operations, WWTPs, and landfills) were not identified as preliminary locations for use, storage, and/or disposal of PFAS-containing materials. A summary of information gathered in the PA for each of these preliminary locations is described below. Specific discussion regarding areas not retained for further investigation is presented in **Section 5.1** and specific discussion regarding areas retained as AOPIs is presented in **Section 5.2**.

It was noted during a discussion with a USAEC Pest Management Consultant that the larger group of pesticides are generally not of PFAS concern. Specifically, products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS and were phased out in 1996. The USAEC Pest Management Consultant has records of pesticides used and stored at IMCOM installations, including Fort Polk, and did not identify Fort Polk as an installation having used or stored PFAS-containing pesticides/insecticides. Additionally, the PA team reviewed available pesticide use inventory documentation provided by the installation and did not identify PFAS-containing pesticides use, storage, or disposal.

The former Building 2627, a Former Training Audiovisual Support Center, was reviewed for potential PFAS use based on the photo processing operations that reportedly occurred at that location. Records regarding the chemicals used at this location were not available for review and the building was demolished in 2005 to make way for the new building 2675 (Mission Training Complex), which was constructed over the former site.

4.3 Readily Identifiable Off-Post PFAS Sources

An exhaustive search to identify all potential off-post PFAS sources (i.e., not related to operations at Fort Polk) is not part of the PA/SI. However, potential off-post PFAS sources within a 5-mile radius of the installation that were identified during the records search and site visit are described below.

Nearby community fire departments within 5 miles of Fort Polk, such as Leesville Fire Department, New Llano Fire Department, Rosepine Volunteer Fire Department, Pitkin Volunteer Fire Department, Slagle Volunteer Fire Department, Hicks Volunteer Fire Department, and LaCamp Volunteer Fire Department, could potentially be off-post PFAS sources near Fort Polk if the departments use AFFF within 5 miles of the installation.

Nearby airport Leesville City Airport (9 miles northwest of Fort Polk) is upgradient of Fort Polk (in terms of local aquifer dip direction) and could potentially be an off-post PFAS source near Fort Polk if the airport uses AFFF.

Interviews with Fort Polk Fire Department personnel indicated that the department has mutual aid agreements with nine off-post fire departments and identified the following locations where AFFF was used during a fire response off-post:

- At a railroad ties fire caused by a shredding machine, which occurred south of Vernon Lake (approximately 17 miles from South Fort Polk) in approximately 2015. Approximately 30 gallons of either 3% or 6% AFFF was used.
- At an oil well field in Pitkin, Louisiana (originally identified as Pickens, Louisiana in recorded notes) approximately 20 miles from South Fort Polk, a backhoe caught fire. The year of the event and quantity of AFFF used during the response is unknown.

5 SUMMARY AND DISCUSSION OF PA RESULTS

The areas evaluated for potential use, storage, and/or disposal of PFAS-containing materials at Fort Polk were further refined during the PA process and identified either as an area not retained for further investigation or as an AOPI. In accordance with the established process for the PA/SI, nine have been identified as AOPIs. The process used for refining these areas is presented on **Figure 5-1**, below.

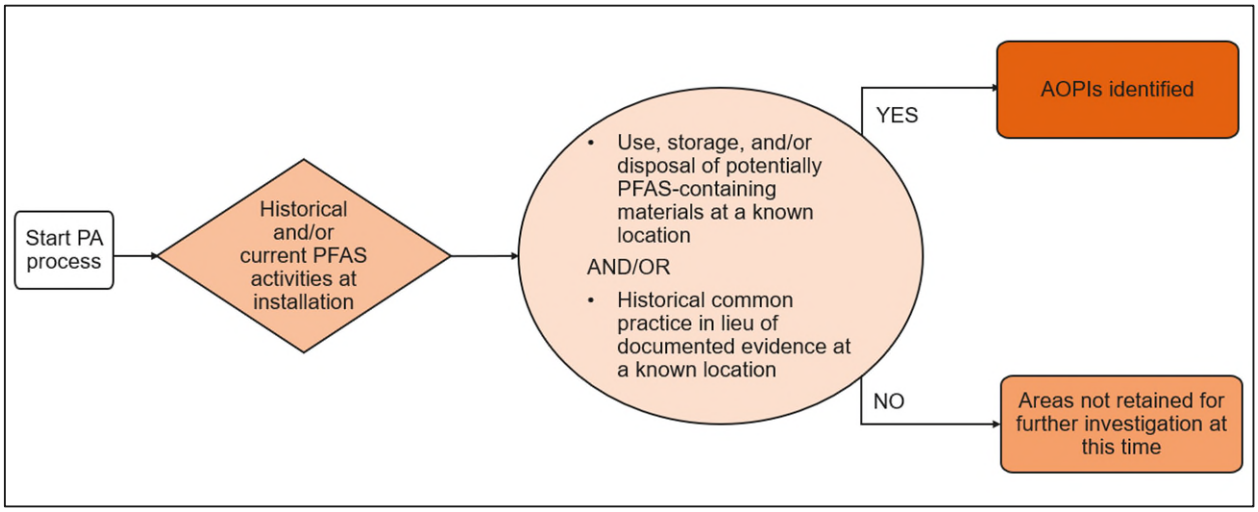

Figure 5-1: AOPI Decision Flowchart

The areas not retained for further investigation are presented in **Section 5.1**. The areas retained as AOPIs are presented in **Section 5.2**.

Data limitations for this PA/SI at Fort Polk are presented in **Section 8**.

5.1 Areas Not Retained for Further Investigation

Through the evaluation of information obtained during records review, personnel interviews, and/or site reconnaissance, the areas described below were categorized as areas not retained for further investigation at this time.

A brief site history and rationale for areas not retained for further investigation is presented in **Table 5-1**, below.

Table 5-1. Installation Areas Not Retained for Further Investigation

Area Description	Dates of Operation	Relevant Site History	Rationale
Building 3120 Vehicle Maintenance Area	Unknown	Fire trucks were reportedly historically maintained in Building 3120.	Maintenance was completed on vehicle components (e.g., oil changes and tire servicing) and not related to AFFF systems. No evidence that PFOS, PFOA, or PFBS containing products used, stored, and/or disposed at this location.
Building 4386 Vehicle Maintenance Area	Unknown to present	Fire trucks are currently maintained in in Building 4386.	Maintenance was completed on vehicle components (e.g., oil changes and tire servicing) and not related to AFFF systems. No evidence that PFOS, PFOA, or PFBS containing products used, stored, and/or disposed at this location.
Building 2627 – Former Training Audiovisual Support Center	Unknown to approximately 2005	Photo processing operations took place in Building 2627. No records available for review and building demolished. New building 2675 (Mission Training Complex) constructed over the former site.	No evidence that PFOS, PFOA, or PFBS containing products used, stored, and/or disposed at this location.

5.2 AOPIs

Overviews for each AOPI identified during the PA process are presented in this section. Two of the AOPIs overlap with Fort Polk IRP sites and/or Headquarters Army Environmental System sites (**Figure 5-2**). The AOPI, overlapping IRP site identifier, Headquarters Army Environmental System number, and current site status are discussed within each AOPI subsection presented below. At the time of this PA, none of the Fort Polk IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS-containing materials.

The AOPI locations are shown on **Figure 5-2**. Aerial photographs of each AOPI are presented on **Figures 5-3** through **5-11**.

5.2.1 Bradley Tank Fire Location

The Bradley Tank Fire Location is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the use of AFFF foam at the location to extinguish an armored vehicle that caught fire.

The armored vehicle fire (Incident # 2016-1046) occurred on Texas Avenue at a location north of the intersection of Texas Avenue and 4th Street in October 2016. The Fort Polk Fire Department estimates that a maximum of 6 gallons of AFFF concentrate was used to extinguish the flames. There is potential for AFFF to have entered the drainage ways to the east of the fire location (**Figure 5-3**).

5.2.2 Building 4172 – Current Firefighter Training Area

The AOPI Building 4172 – Current Firefighter Training Area is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to current use and operation of the AOPI for firefighter training exercises including the past use of AFFF foam.

The Fort Polk Fire Chief reported that nozzle testing with AFFF was practiced at this location beginning in the 2000s. However, the testing frequency and volume of AFFF used during each occasion is unknown. AFFF would potentially have discharged towards the west-southwest end of the AOPI (**Figure 5-4**).

5.2.3 Former Firefighter Training Area

The Former Firefighter Training Area (Polk-18, 22725.1016) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the former use and operation of the AOPI for firefighter training exercises including the past possible use of AFFF foam. The site is also listed as SWMU 38 on Fort Polk's Resource Conservation and Recovery Act (RCRA) Permit.

The Former Firefighter Training Area was active between 1969 and sometime in the 1990s. The AOPI is located on South Fort Polk approximately 900 feet east of the West Virginia Avenue and Texas Avenue intersection (west of the northern end of the PAAF runway). The site consisted of an unlined earthen pad which was covered with waste oil and other fuels and then likely extinguished with AFFF (**Figure 5-5**).

5.2.4 Original Firefighter Training Area

The Original Firefighter Training Area (Polk-17, 22725.1015) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the former use and operation of the AOPI for firefighter training exercises including the past possible use of AFFF foam. The site is also listed as SWMU 42 on Fort Polk's Resource Conservation and Recovery Act permit.

The AOPI contained two approximately 40 to 60-foot diameter unlined earthen pits located at the southwest corner and along the central eastern boundary of the AOPI in which fuel was placed, ignited, and extinguished (potentially with AFFF) for firefighter training. Firefighter training activities at this location were discontinued in the 1970s (**Figure 5-6**).

5.2.5 Building 4239 – Aircraft Maintenance Hangar and Adjacent Nozzle Test Location

The AOPI Building 4239 – Aircraft Maintenance Hangar and Adjacent Nozzle Test Location is identified as an AOPI following records research, personnel interviews, and site reconnaissance because of nozzle testing for fire extinguishing operations and the presence of an AFFF charged fire suppression system mounted in the hangar. Past nozzle testing operations included past possible spraying of AFFF foam into the retention basin to the south/southwest of Building 4239.

Building 4239 is an aircraft maintenance hangar at the south end of the PAAF runway and is equipped with the only known AFFF-containing fire suppression system currently or historically at Fort Polk. Adjacent to and southwest of the hangar is a drainage easement/catchment basin where Fort Polk Fire Department personnel reported that nozzle testing with AFFF and line bleeding from crash vehicles took place (**Figure 5-7**).

5.2.6 Building 4256 – Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station)

The AOPI Building 4256 – Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the former use and operation of the AOPI for storage of AFFF foam.

The former Building 4256 location was the original airfield fire station (Crash Station) for the PAAF. The construction date of the building is unknown and aerial photography records indicate that the building was demolished between 1994 and 1998 when the new airfield fire station was constructed. Document research, personnel interviews, and site reconnaissance indicate that the building housed vehicles likely containing AFFF and potentially stored AFFF. Additionally, nozzle testing may have occurred at this location (**Figure 5-8**). During the SI activities, the current Building 4256 location was added as an investigation area within this AOPI due to the storage of AFFF on fire trucks.

5.2.7 Building 1736 – Former Fire Station #1

The AOPI Building 1736 – Former Fire Station #1 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the former use and operation of the AOPI for storage of AFFF foam.

Building 1736 was the original main fire station (Fire Station #1) on-post and operated for most of Fort Polk's history. The fire station building was located on a now vacant lot located north of the intersection of Louisiana and Alabama Avenues and across Louisiana Avenue from where the new Fire Station #1 is located (**Figure 5-9**). The property was formerly used as a fire station that may have used and/or stored AFFF for use.

5.2.8 Building 7156 – North Fort Fire Station and AFFF Storage Building

AOPI Building 7156 North Fort Fire Station and AFFF Storage Building is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the former use and operation of the AOPI as an active fire station and for current storage of AFFF.

Building 7156 is the active North Fort Polk fire station. Building 7156, also referred to as Fire Station #2, was constructed to replace the demolished North Fort Fire Station (Building 7525). At the time of the PA site visit, this fire station was used to house AFFF in 5-gallon containers. Additionally, nozzle testing may have occurred at this location (**Figure 5-10**).

5.2.9 Building 7525 – Former North Fort Fire Station

The AOPI Building 7525 – Former North Fort Fire Station is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the former use and operation of the AOPI for storage of AFFF foam and potential nozzle testing.

Building 7525 was the location of the former North Fort Polk Fire Station at 3rd Street and I Avenue as shown on **Figure 5-11**. The North Fort Polk Fire Station was demolished in 1996 and replaced by the current North Folk Polk Fire Station, Building 7156. The former fire station may have been used to house AFFF, vehicles that stored and used AFFF, and nozzle testing may have occurred at this location.

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at Fort Polk, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at Fort Polk at all nine of the AOPIs to evaluate presence or absence of PFOS, PFOA, and PFBS in comparison with the OSD risk screening levels. As such, an installation-specific QAPP Addendum (Arcadis 2020) was developed to supplement the general information provided in the PQAPP (Arcadis 2019) and to detail the site-specific proposed scopes of work for the SI. A preliminary CSM was prepared for each of the installation's AOPIs in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 200-1-12 (USACE 2012). The preliminary CSMs identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses. The preliminary CSMs identified soil, groundwater, surface water, and sediment pathways as potentially complete which guided the SI sampling. The QAPP Addendum details the sampling design and rationale based on each AOPI's preliminary CSM. The SI scope of work was completed in two phases through the collection of field data and analytical samples. Phase I occurred in July 2020 and Phase II occurred in December 2020.

The SI field work was completed in accordance with the standard operating procedures (SOPs), technical guidance instructions (TGIs), sampling design, and QA/QC requirements as detailed in the QAPP Addendum (Arcadis 2020) and PQAPP (Arcadis 2019). The subsections below summarize the DQOs, sampling design and rationale, sampling activities and methods, and data analyses procedures for the SI phase at Fort Polk. Non-conformances to the prescribed procedures in the PQAPP and QAPP Addendum are described in **Section 6.3.3**. Analytical results obtained through SI field activities are summarized in **Section 7**.

6.1 Data Quality Objectives

As identified during the DQO process and outlined in the site-specific QAPP Addendum (Arcadis 2020), the objective of the SI is to identify whether there has been a release to the environment at the AOPIs identified in the PA and to determine if further investigation is warranted. This SI evaluated soil and groundwater for PFOS, PFOA, or PFBS presence or absence at each of the sampled AOPIs.

6.2 Sampling Design and Rationale

The rationale for sampling at each AOPI is illustrated on **Figure 6-1** below.

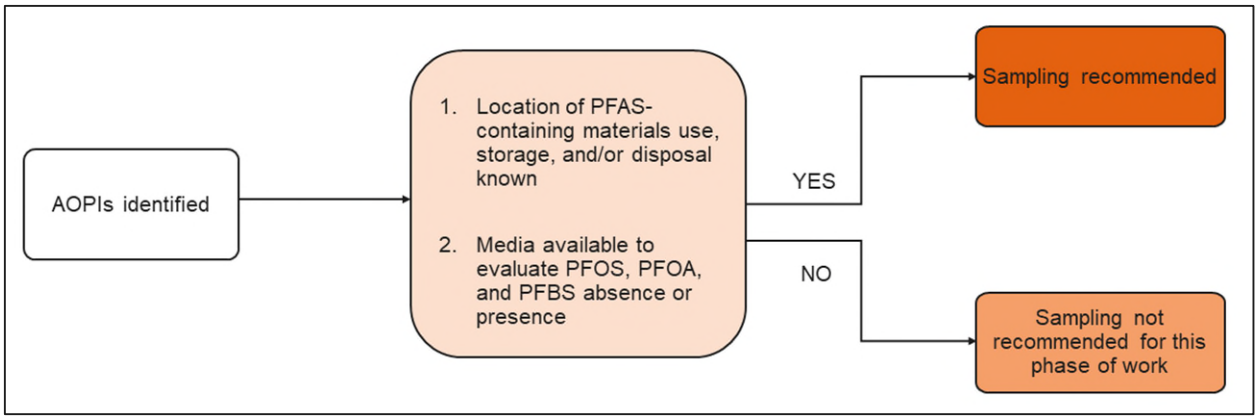

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for Phase I SI sampling activities at Fort Polk is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2020). Groundwater sampling was added during a second investigation phase at four AOPIs (Building 7525 – Former North Fort Fire Station, Building 4172 – Current Firefighter Training Area, Building 1736 – Former Fire Station #1, and Building 7156 – North Fort Fire Station and AFFF Storage Building) based on the Phase I results showing PFOS, PFOA, and PFBS detections in soil samples. Based on limited groundwater data available in the area of these AOPIs from the approved sampling scope, it was determined that groundwater analytical results were needed (see Field Change Report discussion in **Section 6.3.3**). The Phase II groundwater sampling was performed in December 2020.

Groundwater and/or soil samples were collected at or downgradient of all nine AOPIs to evaluate PFOS, PFOA, and PFBS presence or absence. Surface water was not sampled during the SI because surface water is not used as a drinking water source at or near the installation. Additionally, sediment samples were not collected because drainages within or near the AOPIs did not contain water; therefore, the media in the drainages was classified as soil. Groundwater samples were collected at all AOPIs, except for the Bradley Tank Fire AOPI. Groundwater was not sampled at the Bradley Tank Fire AOPI, because AFFF was used during a single event to extinguish a vehicle fire at this location. Based on the non-detect soil sample results which were obtained during the SI at this AOPI, it is inferred that PFOS, PFOA, and PFBS are not present in groundwater or other environmental media due to the one-time, historical nature of AFFF use at this location. Therefore, soil samples only were collected from downgradient drainage pathways adjacent to the fire location, which may have accumulated AFFF runoff.

A total of 14 groundwater samples and 29 soil samples were collected from downgradient areas within each AOPI boundary to evaluate PFOS, PFOA, and PFBS presence, type, and concentrations. Additionally, total organic carbon (TOC), pH, and grain size were analyzed in one soil sample per AOPI, in case future fate and transport analysis was needed. The sampling locations targeted at each AOPI are believed to have the potential for the greatest PFOS, PFOA, and PFBS concentrations based on known or suspected use, storage, or disposal of AFFF.

The sampling depths at temporary monitoring wells were at approximately the center of the saturated screened interval. **Table 6-1** includes the construction details for the temporary wells installed and sampled during the SI. Shallow soil samples were collected from the upper 2 feet of the ground surface.

6.3 Sampling Methods and Procedures

Environmental data were collected and analyzed in accordance with the PQAPP (Arcadis 2019), the SOPs and TGIs included as Appendix A to the PQAPP, the QA/QC requirements identified in Worksheet #20 of the PQAPP, the approved scope and sampling methods outlined in the site-specific QAPP Addendum (Arcadis 2020), and the safety procedures specified in the Accident Prevention Plan (Arcadis 2018) and SSHP (Arcadis 2020). The sampling methods described in the SOPs and TGIs establish equipment requirements, procedures for preparing equipment and containers before sampling, sampling procedures under various conditions, and procedures for storing samples to ensure that sample contamination does not occur during collection, and transport. In general, sampling techniques used in the SI were consistent with conventional sampling techniques used in the environmental industry, but special considerations were made regarding PFAS-containing materials and equipment and cross-contamination potential.

The sampling methods employed during the SI are detailed in the PQAPP (Arcadis 2019) and QAPP Addendum (Arcadis 2020). The subsections below provide a summary of the field methods and procedures utilized to complete the SI scope of work. Field notes and field forms (i.e., soil boring logs, groundwater purging logs, equipment calibration forms, tailgate health and safety forms, and sample collection logs) documenting the SI sampling activities are included in **Appendices J** and **K**, respectively. Photographs of the sampling activities are included in **Appendix L**.

6.3.1 Field Methods

At sampling locations where boreholes were advanced using direct push technology (DPT), temporary monitoring wells were installed. Groundwater samples were collected using either low-flow purging methods from approximately the center of the saturated screened interval or using a disposable bailer. Depending on field conditions, either a peristaltic pump with disposable high-density polyethylene tubing or a PFAS-free disposable bailer was used to collect groundwater samples from the temporary monitoring well or a screen-point sampler, where applicable. When groundwater accumulation was not sufficient for low-flow purge methods, disposable bailers were used to collect groundwater samples from the bottom of the temporary well.

Surface soil samples were collected from the top two feet of native soil. Soil samples were collected in PFAS-free acetate liners at sampling locations where boreholes were advanced using DPT when paired with a groundwater sample. Otherwise, they were collected using a shovel or hand auger.

Decontamination procedures for non-dedicated equipment used during sampling are described in **Section 6.3.4**.

6.3.2 Quality Assurance/Quality Control

Worksheets #20 of the PQAPP and QAPP Addendum provide QA/QC requirements for field duplicates, matrix spike/matrix spike duplicates, equipment blanks (EBs), source blanks for water used in the initial decontamination step for drill tooling, and field blanks for laboratory-supplied water used in the final decontamination step.

QA/QC samples were collected at the frequencies specified in the QAPP Addendum (Arcadis 2020), typically at a rate of 1 per 20 parent samples. Field duplicates and matrix spike/matrix spike duplicate samples were collected for media sampled for PFOS, PFOA, and PFBS, and TOC only. EBs were collected for media sampled for PFOS, PFOA, and PFBS at a frequency of one per piece of relevant equipment for each sampling event, as specified in the QAPP Addendum (Arcadis 2020). The decontaminated reusable equipment and disposable equipment from which EBs were collected include water level indicator, temporary well screening, DPT barrel cutting shoe, hand auger, and shovel as applicable to the sampled media. Source blanks were collected from the water used to wash Geoprobe tooling and sampling equipment. Analytical results for blank samples are discussed in **Section 7.12.**

6.3.3 Field Change Reports

No instances of major scope modifications or non-conformances (i.e., those that may have had a significant impact on the project scope and/or data usability/quality, or required stop-work, and warranted discussion with USACE) were encountered during the SI field work at Fort Polk. In some cases, clarifications to the established scope of work were needed but do not necessarily constitute a non-conformance from the sampling plans described in the QAPP Addendum (Arcadis 2020). Minor modifications from and clarifications for the procedures and scope of work detailed in the QAPP Addendum and PQAPP and that did not affect DQOs are documented in Field Change Reports (FCRs) included as **Appendix M** and are summarized below.

The following modifications from the scope of work detailed in the Fort Polk QAPP occurred during the SI Field work conducted in July 2020 (FCR-FTP-01):

- EB-02: Previously identified as “Groundwater Sampling Device Screen”, the blank was taken from the temporary well screen used for temporary monitoring well installation for collection of groundwater samples.
- EB-03: Previously identified as “Groundwater Tubing”, the blank was taken from the soil cutting shoe used on the end of the sampling barrel for collection of soil samples.
- EB-04: Previously identified as “Tubing Weight”, the blank was taken from the hand auger used for collection of soil samples.
- EB-05: Previously identified as “Hand Auger/Hand tool”, the blank was taken from a shovel used for collection of soil samples.

On 28 September 2020, the USAEC requested additional SI sampling to be conducted at the following Fort Polk AOPIs to collect groundwater samples (FCR-FTP-02):

- Building 7525 – Former North Fort Fire Station,
- Building 4172 – Current Firefighter Training Area,
- Building 1736 – Former Fire Station #1, and
- Building 7156 – North Fort Fire Station and AFFF Storage Building

Collection of groundwater samples at these AOPIs was requested due to the PFOS, PFOA, and PFBS detections observed in soil samples collected during the July 2020 SI sampling activities and the limited

groundwater data available in the area surrounding the AOPIs from the approved sampling scope. It was therefore determined that groundwater analytical results were needed to inform recommendations for future investigations at these AOPIs. Groundwater sampling was performed at these locations in December 2020.

6.3.4 Decontamination

Non-dedicated reusable sampling equipment (e.g., stainless-steel trowels, hand augers, drill cutting shoes and casing, screen-point samplers, water-level meters) that came into direct contact with sampling media was decontaminated before first use, between sampling locations/intervals, and before demobilization in accordance with P-09, TGI - Groundwater and Soil Sampling Equipment Decontamination (Arcadis 2019, Appendix A).

6.3.5 Investigation-Derived Waste

IDW, including soil cuttings, groundwater, and decontamination fluids were collected and placed in four Department of Transportation-approved 55-gallon drums, labeled as non-hazardous, segregated by medium: water and soil, and transported to an on-site staging area prior to disposal off-site. Equipment IDW was collected in bags and disposed in municipal waste receptacles. Equipment IDW includes personal protective equipment and other disposable materials (e.g., gloves, plastic sheeting, Lexan tubes, and high-density polyethylene and silicon tubing) that may come in contact with sampling media. Analytical results for IDW samples collected during the SI and off-site disposal of the IDW are discussed in **Section 7.10.**

6.4 Data Analysis

The subsections below summarize the laboratory analytical methods and the methodology used to evaluate data collected during the SI through data verification and usability assessments (as completed by a project chemist, independent of the project team).

6.4.1 Laboratory Analytical Methods

Analytical samples collected during the SI were submitted to Pace South Carolina (formerly Shealy Environmental Services, Inc.), an ELAP-accredited laboratory for PFAS analysis, including PFOS, PFOA, and PFBS, by liquid chromatography with tandem mass spectrometry. Laboratory analyses associated with the SI were completed in accordance with Worksheets #12.1 through #12.5 in the PQAPP (Arcadis 2019). Eighteen PFAS-related compounds, including PFOS, PFOA, and PFBS, were analyzed were analyzed for in groundwater and soil samples using an analytical method that is ELAP-accredited and compliant with QSM 5.3 (DoD and Department of Energy 2019), Table B-15.

Additionally, the following general chemistry and physical characteristic analyses were completed for select soil samples in accordance with Worksheet #18 of the QAPP Addendum (Arcadis 2020) by the analytical method noted:

- TOC by Solid Waste Test Method 846 9060A
- Grain size analysis by American Society for Testing and Materials D422-63

- pH by Solid Waste Test Method 846 9045D

These data are collected as they may be useful in future fate and transport studies.

The laboratory limit of detection (LOD) is defined as "the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99 percent confidence" (DoD 2017). The lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias is known as the limit of quantitation (LOQ; DoD 2017). Concentrations detected between the LOD and LOQ, therefore, are considered estimates and are qualified as such on laboratory analytical reports. Instrument-specific detection limits (e.g., the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99 percent confidence; DoD 2017), as provided for each analyte by the laboratory, are reported along with the LODs and LOQs in the laboratory analytical reports included in the Data Usability Summary Report (DUSR) (**Appendix N**).

6.4.2 Data Validation

All analytical data generated during the SI, except grain size and data generated from IDW profiling, were verified and validated in accordance with the data verification procedures described in Worksheets #34 through #36 of the PQAPP (Arcadis 2019). Each laboratory data package/sample delivery group underwent Stage 3 data validation in accordance with DoD QSM 5.3 (DoD and Department of Energy 2019). Additionally, 10% of the data underwent Stage 4 data validation. Copies of the data validation reports for each sample delivery group are included as attachments to the DUSR in **Appendix N**.

6.4.3 Data Usability Assessment and Summary

A data usability assessment was completed for all analytical data associated with SI sampling at Fort Polk. Documentation generated during the data usability assessments, which were compiled into a DUSR (**Appendix N**), was prepared in accordance with the USACE Engineer Manual 200-1-10 (USACE 2005), the Final DoD General Data Validation Guidelines (DoD 2019) and the Final DoD Data Validation Guidelines Module 3: Data Validation Procedure for Per-and Polyfluoroalkyl Substances Analysis by QSM Table B-15 (DoD 2020), that reviewed precision, accuracy, completeness, representativeness, comparability, and sensitivity. A statement of overall data usability is included in the DUSR.

Based on the final data usability assessment, the environmental data collected at Fort Polk during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUSR and its associated data validation reports (**Appendix N**), and as indicated in the full analytical tables (**Appendix O**) provided for the SI results. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019) and Fort Polk QAPP Addendum (Arcadis 2020). Data qualifiers applied to laboratory analytical results for samples collected during the SI at Fort Polk are provided in the data tables, data validation reports, and the Data Usability Summary Table located at the end of DUSR. Qualifiers for data shown on figures are defined in the notes of figures.

6.5 Office of the Secretary of Defense Risk Screening Levels

The OSD risk screening levels for PFOS, PFOA, and PFBS in groundwater (tap water) and soil were calculated using the USEPA's RSL calculator for residential and industrial/commercial worker receptor scenarios and current toxicity values. These risk screening levels are shown in **Table 6-2**.

Table 6-2 OSD Risk Screening Levels Calculated for PFOS, PFOA, PFBS in Tap Water and Soil Using USEPA's Regional Screening Level Calculator

Chemical	Residential Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator		Industrial/Commercial Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator
	Tap Water (ng/L or ppt) [1]	Soil (mg/kg or ppm) [1,2]	Soil (mg/kg or ppm) [1,2]
PFOS	40	0.13	1.6
PFOA	40	0.13	1.6
PFBS	600	1.9	25

Notes:
1. Risk screening levels for tap water and soil provided by the OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15 (**Appendix A**).
2. All soil data will be screened against both the Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet bgs), regardless of the current and projected land use of the AOPI.
mg/kg = milligram per kilogram
ng/L = nanograms per liter
ppm = parts per million
ppt = parts per trillion

The OSD residential tap water risk screening levels will be used to compare all groundwater data for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPIs at Fort Polk are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, and PFBS will be used to evaluate detected soil concentrations. The data from the SI sampling event are compared to the OSD risk screening levels in **Section 7**. If concentrations of PFOS, PFOA, or PFBS are detected greater than the applicable OSD risk screening levels, further study in a remedial investigation is recommended in **Section 8**.

7 SUMMARY AND DISCUSSION OF SI RESULTS

This section summarizes the analytical results obtained from samples collected during the SI at Fort Polk (field duplicate results are provided in the associated tables). Sampled media and QA/QC samples were analyzed for the constituents prescribed per Worksheet #18 of the QAPP Addendum (Arcadis 2020). The sample results discussion below focuses on the PFOS, PFOA, and PFBS analytical results because they have OSD risk screening levels. The Army will make subsequent investigation decisions based on these constituents' concentrations relative to the OSD risk screening levels.

Tables 7-1 and **7-2** provide a summary of the soil and groundwater analytical results for PFOS, PFOA, and PFBS. **Table 7-3** summarizes AOPIs and whether their SI results exceed the OSD risk screening levels. **Appendix O** includes the full suite of analytical results for these media, as well as for the QA/QC samples. An overview of AOPIs at Fort Polk with OSD risk screening level exceedances is depicted on **Figure 7-1**. **Figures 7-2** through **7-10** show the PFOS, PFOA, and PFBS analytical results in soil and groundwater for each AOPI. Non-detected results are reported as less than the LOQ. Detections of PFOS, PFOA, and/or PFBS greater than the applicable OSD risk screening levels are highlighted in summary tables and on figures. Final qualifiers applied to the data by the laboratory and the project chemist (as defined in **Section 6.4.3**) are presented on the analytical tables. Groundwater data is reported in ng/L, or parts per trillion, and soil data is reported in mg/kg, or parts per million.

Field parameters measured for groundwater during low-flow purging and sample collection are provided on the field forms in **Appendix K**. Soil descriptions are provided on the field forms in **Appendix K**. The results of the SI are grouped by AOPI and discussed for each medium as applicable. Groundwater was generally first encountered at depths of approximately 10 to 20 feet bgs in temporary monitoring wells installed for groundwater sample collection.

Table 7-3 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
Bradley Tank Fire	No
Building 4172 – Current Firefighter Training Area	Yes
Former Firefighter Training Area	Yes
Original Firefighter Training Area	Yes
Building 4239 – Aircraft Maintenance Hangar and Adjacent Nozzle Test Area	Yes
Building 4256 –Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station)	Yes
Building 1736 – Former Fire Station #1	Yes
Building 7156 – North Fort Fire Station and AFFF Storage Building	Yes
Building 7525 – Former North Fort Fire Station	Yes

7.1 Bradley Tank Fire Location

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with Bradley Tank Fire Location. The analytical results are depicted on **Figure 7-2**.

7.1.1 Soil

Two shallow soil samples (0 to 2 feet) were collected from this AOPI (FTB-BTS-1-SO and FTB-BTS-2-SO). PFBS, PFOA, and PFOS were not detected in either soil sample.

7.1.2 Groundwater

Groundwater was not sampled at this AOPI, because AFFF was used during a single event to extinguish a vehicle fire at this location. Therefore, soil samples only were collected from downgradient drainage pathways adjacent to the fire location, which may have accumulated AFFF runoff.

7.2 Building 4172 – Current Firefighter Training Area

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with Building 4172 – Current Firefighter Training Area. The analytical results are depicted on **Figure 7-3**.

7.2.1 Soil

Four shallow soil samples (0 to 2 feet) were collected from this AOPI (FTP-BD4172-1-SO through FTP-BD4172-4-SO). PFOA was detected at concentrations ranging from 0.0031 to 0.009 mg/kg in two surface soil sample locations (FTP-BD4172-3-SO and FTP-BD4172-4-SO), which is less than the OSD risk screening level. PFBS and PFOS were not detected.

7.2.2 Groundwater

Three groundwater samples were collected from this AOPI (FTP-BD4172-1-GW through FTP-BD4172-3-GW). PFOA and PFOS were detected at concentrations greater than the OSD risk screening level in two sample locations (FTP-BD4172-2-GW and FTP-BD4172-3-GW). At the third location, PFOA and PFOS were detected, but at a concentration less than the OSD risk screening level. The maximum PFOA concentration was detected in sample FTP-BD4172-3-GW (200 ng/L) and the maximum PFOS concentration was detected in sample FTP-BD4172-2-GW (160 ng/L). PFBS was detected in two groundwater samples (FTP-BD4172-2-GW and FTP-BD4172-3-GW) at concentrations of 3.4 and 8.9 ng/L, which are below the OSD risk screening level, and was not detected in the third groundwater sample.

7.3 Former Firefighter Training Area

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with Former Firefighter Training Area. The analytical results are depicted on **Figure 7-4**.

7.3.1 Soil

Three shallow soil samples (0 to 2 feet) were collected from this AOPI (FTP-SWMU38-1-SO through FTP-SWMU38-3-SO). PFOS was detected in two soil samples (FTP-SWMU38-1-SO and FTP-SWMU38-3-SO) at concentrations of 0.00071 and 0.0005 mg/kg, which are less than the OSD risk screening level for both samples. PFBS and PFOA were not detected in the third soil sample FTP-SWMU38-2-SO.

7.3.2 Groundwater

One groundwater sample was collected from this AOPI (FTP-SWMU38-1-GW). PFOS was detected in the groundwater at a concentration of 50 ng/L, which exceeds the OSD risk screening level. PFOA and PFBS were detected at concentrations of 15 and 5.5 ng/L, respectively, which are less than the OSD risk screening levels.

7.4 Original Firefighter Training Area

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with Original Firefighter Training Area. The analytical results are depicted on **Figure 7-5**.

7.4.1 Soil

Two surface soil samples (0 to 2 feet bgs) were collected from this AOPI (FTP-SWMU42-1-SO and FTP-SWMU42-2-SO). PFOS was detected at concentrations of 0.0044 and 0.0045 mg/kg, which are less than the OSD risk screening level for both samples. PFOA and PFBS were not detected.

7.4.2 Groundwater

Two groundwater samples were collected from this AOPI (FTP-SWMU42-1-GW and FTP-SWMU42-2-GW). PFOA and PFOS concentrations were detected at concentrations greater than the OSD risk screening level in both samples. The maximum PFOA and PFOS concentrations were detected in sample FTP-SWMU42-2-GW (1,000 ng/l and 6,800 ng/L, respectively). PFBS was detected at concentrations of 16 and 93 ng/L in the two groundwater samples, which are less than the OSD risk screening level.

7.5 Building 4239 – Aircraft maintenance Hangar and Adjacent Nozzle Test Location

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with Building 4239 – Aircraft maintenance Hangar and Adjacent Nozzle Test Location. The analytical results are depicted on **Figure 7-6**.

7.5.1 Soil

Two surface soil samples (0 to 2 feet bgs) were collected from this AOPI (FTP-BD4239-1-SO and FTP-BD4239-2-SO). PFOS was detected at concentrations of 0.0063 and 0.014 mg/kg in the two

samples, which are less than the OSD risk screening level. PFOA and PFBS were not detected in the soil samples.

7.5.2 Groundwater

One groundwater sample (FTP-BD4239-1-GW) was collected on the far side of the creek that runs adjacent to the nozzle test location. PFOA and PFOS were detected at concentrations of 160 ng/L and 420 ng/L, respectively, which exceed the OSD risk screening levels. PFBS was detected at a concentration of 160 ng/L, which is less than the OSD risk screening level.

7.6 Building 4256 – Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station)

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with Building 4256 – Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station). The analytical results are depicted on **Figure 7-7**.

7.6.1 Soil

Six surface soil samples (0 to 2 feet bgs) were collected from this AOPI: two at the Former Airfield Fire Station location (FTP-BD4256-1-SO and FTP-BD4256-2-SO), one northeast of the current airfield fire station location (FTP-BD4256C-1-SO) in the drainage leading to the nearby creek, and three from the current airfield fire station location (FTP-BD4256C-2-SO through FTP-BD4256C-4-SO). PFOS was detected at concentrations ranging from 0.0035 to 0.021 mg/kg in four sample locations (FTP-BD4256-1-SO, FTP-BD4256-2-SO, FTP-BD4256C-3-SO, and FTP-BD4256C-4-SO), which are less than the OSD risk screening level. PFOA was detected at concentrations ranging from 0.0011 to 0.0039 mg/kg in three sample locations (FTP-BD4256C-3-SO and FTP-BD4256C-4-SO), which are less than the OSD risk screening level. PFBS was not detected in any of the soil samples.

7.6.2 Groundwater

One groundwater sample (FTP-BD4256C-1-GW) was collected northeast of the current airfield fire station location in the drainage leading to the nearby creek. PFOA and PFOS were detected at concentrations of 100 ng/L and 66 ng/L, respectively, which exceed the OSD risk screening levels. PFBS was detected at a concentration of 130 ng/L, which is less than the OSD risk screening level.

7.7 Building 1736 – Former Fire Station #1

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with Building 1736 – Former Fire Station #1. The analytical results are depicted on **Figure 7-8**.

7.7.1 Soil

Three surface soil samples (0 to 2 feet bgs) were collected from this AOPI (BD1736-1-SO through BD1736-3-SO). PFOS was detected in each of the three soil samples at concentrations ranging from 0.0014 to 0.0041 mg/kg, which are less than the OSD screening level. PFOA was detected in the soil sample FTP-BD1736-1-SO at a concentration of 0.0012 mg/kg, which is less than the OSD risk screening level. PFBS was not detected at any of the soil samples.

7.7.2 Groundwater

Two groundwater samples were collected from this AOPI (BD1736-1-GW and FTP-BD1736-2-GW). PFOA and PFOS were detected at concentrations above the OSD screening levels in sample FTP-BD1736-2-GW and PFOS was detected at a concentration above the OSD screening level in sample FTP-BD1736-1-GW. The maximum PFOA and PFOS concentrations were detected in sample FTP-BD1736-2-GW (1,400 ng/l and 4,300 ng/L, respectively). PFBS was detected in both samples at concentrations of 6.0 and 94 ng/L, which is below OSD risk screening level.

7.8 Building 7156 – North Fort Fire Station and AFFF Storage Building

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with Building 7156 – North Fort Fire Station and AFFF Storage Building. The analytical results are depicted on **Figure 7-9**.

7.8.1 Soil

Three surface soil samples (0 to 2 feet bgs) were collected from this AOPI (FTP-BD7156-1-SO through FTP-BD7156-3-SO). PFOA was detected at concentrations ranging from 0.0048 through 0.03 mg/kg in the three samples, which are below the OSD risk screening level. PFOS was detected at concentrations ranging from 0.0023 through 0.0063 mg/kg in the three samples, which are below the OSD risk screening level. PFBS was not detected in any of the soil samples.

7.8.2 Groundwater

One groundwater sample was collected from this AOPI (FTP-BD7156-1-GW). PFOA and PFOS were detected at concentrations of 91 ng/L and 200 ng/L, respectively, which exceed the OSD risk screening levels. PFBS was detected at a concentration of 30 ng/L, which us less than the OSD risk screening level.

7.9 Building 7525 – Former North Fort Fire Station

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with Building 7525 – Former North Fort Fire Station. The analytical results are depicted on **Figure 7-10**.

7.9.1 Soil

Two surface soil samples (0 to 2 feet bgs) were collected from this AOPI (FTP-BD7525-1-SO and FTP-BD7525-2-SO). PFOS was detected in both samples at concentrations of 0.0052 and 0.013mg/kg. which is less than the OSD risk screening level. PFOA and PFBS were not detected in either of the soil samples.

7.9.2 Groundwater

One groundwater sample was collected from this AOPI (FTP-BD7525-1-GW). PFOS was detected at a concentration of 96 ng/L, which exceeds the OSD risk screening level. PFOA (5.2 ng/L) and PFBS (4.6 ng/L) were detected at concentrations less than the OSD risk screening levels in the groundwater sample.

7.10 Investigation Derived Waste

A composite sample of the purge and decontamination wastewater was collected from the two, 55-gallon drums which contained liquids (approximately 80 gallons of liquid). The results indicated the following concentrations in the wastewater: 690 ng/L PFOS, 40 ng/L PFOA, and 26 ng/L PFBS. The PFOS concentration observed exceeded the OSD risk screening levels for tap water. A composite sample of the two, 55-gallon drums which contained soil cuttings was also collected. The results indicated the following concentrations in the IDW soil: 0.52 mg/kg PFOS, 1.0 mg/kg PFOA, and 1.0 mg/kg PFBS. The PFOS and PFOA concentrations observed exceed the residential OSD risk screening levels for soil. The full analytical results (i.e., for all constituents analyzed) for IDW samples collected during the SI are included in **Appendix P**.

The four drums of IDW were removed from Fort Polk on 08 April 2021 by Waste Management Company and disposed off-site at the Waste Management facility, CWM Emelle, located in Emelle, Alabama. The completed waste profiles and waste manifests are also included in **Appendix P**.

7.11 TOC, pH, and Grain Size

In addition to sampling soil for PFOS, PFOA, and PFBS, one soil sample per AOPI was analyzed for TOC, pH, moisture content, and grain size data as they may be useful in future fate and transport studies. The TOC in the soil samples ranged from 567 to 8,730 mg/kg. The TOC at this installation was within range typically observed in topsoil: 5,000 to 30,000 mg/kg. The combined percentage of fines (i.e., silt and clay) in soils at Fort Polk ranged from 8.5 to 82.1% with an average of 45.3%. In general, PFAS constituents tend to be more mobile in soils with less than 20% fines (silt and clay) and lower TOC. The percent moisture of the soil, 6.4%, was typical for clay (0 to 20%). The pH of the soil was neutral (approximately 7 standard units). Based on these geochemical and physical soil characteristics (i.e., high

percentage of fines and TOC) observed underlying the installation during the SI, PFAS constituents are expected to be relatively less mobile at Fort Polk than in soils with lower percentages of fines and TOC.

7.12 Blank Samples

PFOS, PFOA, and/or PFBS were not detected in any of the QA/QC samples collected during the SI work. The full analytical results for blank samples collected during the SI are included in **Appendix O**.

7.13 Conceptual Site Models

The preliminary CSMs presented in the QAPP Addendum (Arcadis 2020) were re-evaluated and updated, if necessary, based on the SI sampling results. The CSMs presented on **Figures 7-11** through **7-12** and in this section therefore represent the current understanding of the potential for human exposure. For some AOPIs, the CSM is the same and thus shown on the same figure.

Many of the PFAS constituents found in AFFF are surfactants (which do not volatilize) and are found in a charged or ionic state at environmentally-relevant pH (i.e., pH 5 to 9 standard units). PFOS, PFOA, and PFBS are each negatively charged at environmentally-relevant pH. The media potentially affected by PFOS, PFOA, PFBS releases at Army installations are soil, groundwater, surface water, and sediment. Once released to the environment, a primary factor that inhibits the movement of PFAS constituents is the presence of organic matter and organic co-constituents in soils and sediments. Generally, PFAS constituents are mobile in the potentially affected media, and they are not known to be fully broken down by natural processes.

Based on the use, storage, and/or disposal of PFAS-containing materials at the AOPIs, affected media are likely to consist of soil and groundwater and could include downgradient surface water and sediment.

Release and transport mechanisms include dissolution/desorption from soil to groundwater, transport via sediment carried in and dissolution to stormwater and surface water, discharge/recharge between groundwater and surface water, and adsorption/desorption between surface water and sediment. Generic categories of potential human receptors and their associated exposure scenarios that are typically evaluated in a CERCLA human health risk assessment were considered and include on-installation site workers (e.g., industrial/commercial workers, utility workers, or future construction workers who could be exposed to chemicals in soil at an AOPI or to chemicals in tap water in an industrial/commercial building), on-installation residents (e.g., adults and children who could be exposed to chemicals in tap water in a residence), and on-installation recreational users (e.g., hikers or hunters who could be exposed to chemicals in waterways at an installation). Off-installation receptor types could include drinking water receptors (i.e., commercial/industrial workers or residents) and recreational users.

Human exposure pathways are shown as “complete, “potentially complete”, or “incomplete” on the CSM figures. A complete exposure pathway consists of a constituent source and release mechanism, a transport or retention medium, an exposure point where human contact with the contaminated medium could occur, and an exposure route at the exposure point. If any of these elements is missing, the exposure pathway is incomplete. Pathways are “potentially complete” where data are insufficient to conclude the pathway is either “complete” or “incomplete”. Additionally, the CSMs do not include ecological receptors and exposure pathways. The potential for ecological exposures to PFOS, PFOA, and PFBS may be evaluated at a future date if those pathways warrant further consideration.

Figure 7-11 shows the CSM for the following eight AOPIs: Building 4239 – Aircraft Maintenance Hangar and Adjacent Nozzle Test Location, Building 4256 – Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station), Original Firefighter Training Area, Former Firefighter Training Area, Building 7525 – Former North Fort Fire Station, Building 4172 – Current Firefighter Training Area, Building 1736 – Former Fire Station #1, and Building 7156 – North Fort Fire Station and AFFF Storage Building. These AOPIs have a potential for PFOS, PFOA and PFBS use, storage and/or disposal.

- PFOS, PFOA, and/or PFBS were detected in soil, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete.
- The AOPIs are not residential or recreational sites and are wholly located within the installation boundaries. Therefore, the soil exposure pathways for on-installation residents and recreational users and for off-installation receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater. The AOPIs are downgradient of and not likely to affect the existing drinking water wells used to supply potable water at Fort Polk, which are screened in separate deeper aquifers not in contact with shallow groundwater. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to account for potential future use of the on-post groundwater downgradient of the AOPIs.
- Recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-installation recreational users is incomplete.
- The general conveyance of groundwater from the AOPIs is to the east and southeast. The groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete due to the potential future use of groundwater as a drinking water source outside Fort Polk.
- PFOS, PFOA, and/or PFBS could migrate via surface runoff or shallow groundwater discharge to nearby surface water. Surface water drainage for most of the installation occurs to the south from tributaries located throughout the installation which eventually flow to the Calcasieu River. Surface water is not used as a drinking water source at Fort Polk or within 5 miles of the installation boundary. However, recreational users on-post and off-post could contact constituents in surface water and sediment through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for on-installation recreational users and off-installation receptors are potentially complete.
- On-installation site workers and residents are not expected to contact surface water and sediment in water bodies at Fort Polk. Therefore, these exposure pathways are incomplete.

Figure 7-12 shows the CSM for the Bradley Tank Fire Location AOPI, where approximately 6 gallons of AFFF concentrate was used to extinguish a tank that had caught on fire.

- PFOS, PFOA, and/or PFBS were not detected in soil. Therefore, the soil exposure pathway for on-installation site workers is incomplete.
- Groundwater samples were not collected at this AOPI. Based on the non-detect soil sample results, it is inferred that PFOS, PFOA, and PFBS are not present in groundwater or other

environmental media because of the one-time historical release at this AOPI. Therefore, the groundwater, surface water, and sediment exposure pathways are also incomplete.

Following the SI sampling, 8 AOPIs with confirmed PFOS, PFOA, and/or PFBS presence were considered to have complete or potentially complete exposure pathways. Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for remedial investigation is based on the comparison of analytical results for PFOS, PFOA, and PFBS to the OSD risk screening levels (**Table 6-2**).

8 CONCLUSIONS AND RECOMMENDATIONS

The PFAS PA/SI included two distinct efforts. The PA identified AOPIs at Fort Polk based on the use, storage, and/or disposal of PFAS-containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018). The SI included multi-media sampling at AOPIs to determine whether or not a release of PFOS, PFOA, and PFBS occurred.

OSD provided residential risk screening levels based on the USEPA oral reference dose for PFOS, PFOA, and PFBS in soil and groundwater (tap water) and industrial/commercial risk screening levels for PFOS, PFOA, and PFBS in soil (**Appendix A**). A combination of document review, internet searches, interviews with installation personnel, and an installation site visit were used to identify specific areas of suspected PFOS, PFOA, and PFBS use, storage, and/or disposal at Fort Polk. Following the evaluation, nine AOPIs were identified.

The installation utilizes four water treatment plants to treat potable water obtained from 12 active supply wells. Presently, seven supply wells at South Fort Polk obtain groundwater from the Williamson Creek aquifer and range in depth from 573 to 912 feet bgs, and five wells located at North Polk obtain groundwater from the Carnahan Bayou aquifer and range in depth from 635 to 1,415 feet bgs. Fort Polk purchases the potable water supplied to the installation from American Water which serves a population of approximately 100,000 (American Water 2019). Previous sampling of the water supply wells did not indicate the presence of PFOA or PFOS above LODs.

All AOPIs were sampled during the SI at Fort Polk to identify presence or absence of PFOS, PFOA, and PFBS at each AOPI. The SI scope of work was completed in accordance with the Final PQAPP (Arcadis 2019) and the Fort Polk QAPP Addendum (Arcadis 2020).

Eight of the nine AOPIs had detections of PFOS, PFOA, and PFBS in soil and groundwater, and all eight of these AOPIs exceeded OSD risk screening levels. The Bradley Tank Fire AOPI was the only AOPI which did not exceed the OSD risk screening levels. Groundwater samples were not collected at the Bradley Tank Fire AOPI (due to the one-time, historical nature of the AFFF release at this location), and PFOS, PFOA, and PFBS were not detected in the soil samples collected at this AOPI. At the remaining eight AOPIs, PFOS, PFOA, and PFBS concentrations detected in soil samples were below the residential OSD risk screening levels (0.13 mg/kg for PFOS and PFOA and 1.9 mg/kg for PFBS). Groundwater samples from each of the eight AOPIs sampled exceeded the OSD tap water risk screening level for PFOS and/or PFOA (40 ng/L). PFBS was not detected in groundwater above the OSD risk screening level for tap water (600 ug/L). The maximum PFOA concentration in groundwater was detected at the Building 1736 – Former Fire Station #1 AOPI (1,400 ng/L) and the maximum PFOS concentration in groundwater was detected at the Original Fire Fighter Training Area AOPI (6,800 ng/L).

Following the SI sampling, the eight AOPIs with confirmed PFOS, PFOA, and/or PFBS presence were considered to have potentially complete exposure pathways.

- The soil exposure pathway for on-installation site workers is complete at seven AOPIs.
- Although the existing drinking water wells at Fort Polk are upgradient of the AOPIs, the groundwater exposure pathways for on-installation drinking water receptors are potentially complete at eight of the AOPIs to account for the potential future potable use of the on-post downgradient groundwater.

- Due to a lack of land use controls off-installation and downgradient of Fort Polk, the groundwater exposure pathways for off-installation receptors are also potentially complete for eight AOPIs.
- Surface water is not used as a drinking water source at Fort Polk or within 5 miles of the installation boundary. However, recreational users could contact constituents in surface water and sediment via incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways are potentially complete for on-post and off-post receptors at eight AOPIs.

Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for future study in a remedial investigation or no action at this time is based on the comparison of the SI analytical results for PFOS, PFOA, and PFBS to the OSD risk screening levels (**Table 6-2**). **Table 8-1** below summarizes the AOPIs identified at Fort Polk, PFOS, PFOA, and PFBS sampling and recommendations for each AOPI; further investigation is warranted at Fort Polk. In accordance with CERCLA, site-specific risk will be assessed during a future phase to evaluate whether remedial actions are required.

Table 8-1 Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at Fort Polk, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)		Recommendation
	GW	SO	
Bradley Tank Fire Location	NS	No	No action at this time
Building 4172 – Current Firefighter Training Area	Yes	No	Further study in a remedial investigation
Former Firefighter Training Area	Yes	No	Further study in a remedial investigation
Original Firefighter Training Area	Yes	No	Further study in a remedial investigation
Building 4239 – Aircraft maintenance Hangar and Adjacent Nozzle Test Location	Yes	No	Further study in a remedial investigation
Building 4256 – Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station)	Yes	No	Further study in a remedial investigation
Building 1736 – Former Fire Station #1	Yes	No	Further study in a remedial investigation
Building 7156 – North Fort Fire Station and AFFF Storage Building	Yes	No	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)		Recommendation
	GW	SO	
Building 7525 – Former North Fort Fire Station	Yes	No	Further study in a remedial investigation

Notes:
Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
NS – not sampled
SO – soil

Data collected during the PA (**Sections 3** through **5**) and SI (**Sections 6** through **8**) were sufficient to draw conclusions and recommendations summarized above. The data limitations relevant to the development of this PA/SI for PFOS, PFOA, and PFBS at Fort Polk are discussed below.

Records gathered for the use, storage and/or disposal of PFAS-containing materials were reviewed during the PA process. Documentation specific to AFFF may have been limited (e.g., each AFFF use; procurement records, documentation of AFFF used during fire responses or fire training activities) due to lack of recordkeeping requirements for the full timeline of common AFFF practices. Anecdotal accounts of AFFF use (and therefore likely PFOS, PFOA, and PFBS use) were limited to available installation personnel, whose knowledge of AFFF use may have been restricted by their time spent at the installation or previous roles held that limited their relevant knowledge of potential AFFF (or other PFAS-containing material) use.

A comprehensive well survey was not completed as part of this PA; therefore, the information reviewed regarding off-post wells is limited to what is contained in the off post well search results (**Appendix E**).

The searches for ecological receptors and off-post PFOS, PFOA, and PFBS sources were not exhaustive and were limited to easily identifiable and readily available information evaluated during the relevant documents research, installation personnel interviews, and site reconnaissance.

Finally, the available PFOS, PFOA, and PFBS analytical data are limited to results from temporary monitoring wells installed and sampled during the SI and shallow soil samples (0 to 2 feet bgs). Available data, including PFOS, PFOA, and PFBS, is listed in **Appendix P**, which were analyzed per the selected analytical method.

Results from this PA/SI indicate further study in a remedial investigation is warranted at Fort Polk in accordance with the guidance provided by the OSD.

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ACRONYMS

%	percent
AFFF	aqueous film-forming foam
AOPI	area of potential interest
Arcadis	Arcadis U.S., Inc.
Army	United States Army
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	conceptual site model
DoD	Department of Defense
DPT	direct-push technology
DQO	data quality objective
DUSR	Data Usability Summary Report
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
GIS	geographic information system
GW	groundwater
IDW	investigation-derived waste
IMCOM	Installation Management Command
installation	United States Army or Reserve installation
IRP	Installation Restoration Program
LOD	limit of detection
LOQ	limit of quantitation
mg/kg	milligrams per kilogram (parts per million)
ng/L	nanograms per liter (parts per trillion)
NS	not sampled
OSD	Office of the Secretary of Defense
PA	preliminary assessment
PAAF	Polk Army Airfield

PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
POC	point of contact
ppm	parts per million
ppt	parts per trillion
PQAPP	Programmatic Uniform Federal Policy-Quality Assurance Project Plan
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RSL	Regional Screening Level
SI	site inspection
SO	soil
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
SWMU	solid waste management unit
TGI	technical guidance instruction
TOC	total organic carbon
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
USFS	Unite States Forest Service
WWTP	wastewater treatment plant

TABLES

Table 2-1 On-Post Potable Water Well Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Polk, Louisiana

American Water Company Well Identification Number	State Water Well Identification Number	Well Status	Total Well Depth (ft btoc)	Measuring Point Elevation (ft amsl)	Measuring Point	Depth to Groundwater from MP (ft)	Groundwater Elevation (ft amsl)	Screened Interval (ft btoc)
Water Well #2	115-644	Active	612	325	TOC	216.00	109.0	539-612
Water Well # 6A	115-504	Active	1288	340	TOC	173.30	166.7	1199-1288
Water Well # 6B	115-663	Active	573	330	TOC	222.00	108.0	507-573
Water Well # 7 (North Fort)	115-513	Active	1275	330	TOC	193.00	137.0	Multiple
Water Well # 7 (South Fort)	115-669	Active	904	340	TOC	217.30	122.7	844-904
Water Well #8	115-659	Active	912	280	TOC	230.00	50.0	859-912
Water Well #9	115-497	Active	885	325	TOC	231.67	93.3	845-885
Water Well #11	115-518	Active	885	330	TOC	244.35	85.7	Multiple
Water Well #12	115-661	Active	860	332	TOC	237.00	95.0	807-860
Water Well #14D	115-496	Active	1415	284	TOC	120.80	163.2	1345-1415
Water Well #15D	115-515	Active	1233	280	TOC	138.00	142.0	1166-1233
Water Well #16D	115-658	Active	635	309	TOC	200.0	109.0	505-635

Notes:
1. All well construction data was retrieved from the Louisiana Department of Natural Resources.

Acronyms/Abreviations:
amsl - above mean sea level
btoc - below top of casing
ft - feet
MP - measuring point
TOC - top of casing

Table 2-2. Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Polk, LA

Location			Building 7216 (North Fort)	POE/Well 16D	POE/Well 15D	Building 2902 (South Fort)	POE/Well 14D
Sample ID			32976701/NF WTP	32976601/NFH Well 16d	32976901/NFH Well 15d	32976501/SF WTP	32976801/SF Well 14d
Sample Date			4/13/2015	5/14/2015	9/12/2016	7/19/2016	12/20/2016
PFAS	**Units**	**LHA**					
Perfluorooctanoic acid (PFOA)	µg/L	0.070	ND	ND	ND	ND	ND
Perfluorooctanesulfonic acid (PFOS)	µg/L	0.070	ND	ND	ND	ND	ND
Sum of PFOS and PFOA Concentrations			N/A	N/A	N/A	N/A	N/A

PFAS = per- and polyfluoroalkyl substances

LHA = 2016 United States Environmental Protection Agency Health Advisory Limit of 0.070 µg/L for PFOS, PFOA, or the sum of PFOS and PFOA

µg/L = micrograms per liter (parts per billion)
ND = Non-detect (Note: Limit of Detection = 0.02 µg/L for PFOA and 0.04 µg/L for PFOS
N/A = Not applicable
POE = Point of Entry
LHA = 2016 United States Environmental Protection Agency Lifetime Health Advisory Limit of 0.070 µg/L for PFOS, PFOA, or the sum of PFOS and PFOA

Notes:
All data and qualifier definitions are as provided to Arcadis by U.S. Army Corps of Engineers (unless otherwise noted [†]), for primary samples only. For qualifiers which laboratory-specific definitions were not provided, a standard definition is provided below (‡). Data were reviewed and conditionally formatted in accordance with the bolding and shading notes below.

† Data and qualifiers are as provided by Installation Management Command PFOA/PFOS Water System Testing data.

Table 6-1 - Monitoring Well Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Polk, LA

Area of Potential Interest	Sampling Location ID	Total Well Depth (ft btoc)	Measuring Point Elevation (ft amsl)	Measuring Point	Depth to Groundwater from MP (ft)	Groundwater Elevation (ft amsl)	Screened Interval (ft btoc)	Casing Diameter (inches)	Dedicated Bladder Pump (Y/N)
Building 4172 – Current Firefighting Training Area	BD4172-1	45.18	NM	TOC	33.82	NC	20-45	1	N
	BD4172-2	45.00	NM	TOC	41.00	NC	41-45	1.5	N
	BD4172-3	42.5	NM	TOC	30.00	NC	22.5-42.5	1	N
Former Firefighter Training Area	SWMU38-1	25.25	NM	TOC	17.55	NC	10-25	1	N
Original Firefighter Training Area	SWMU42-1	20.21	NM	TOC	15.28	NC	10-20	1	N
	SWMU42-2	20.17	NM	TOC	10.52	NC	10-20	1	N
Building 4239 – Aircraft Maintenance Hangar & Adjacent Nozzle Test Location	BD4239-1	15.21	NM	TOC	13.00	NC	5-15	1	N
Building 4259 – Former and Current Airfield Station	BD4256C-1	20.18	NM	TOC	10.46	NC	10-20	1	N
Building 1736 – Former Fire Station #1	BD1736-1	19.9	NM	TOC	10.10	NC	10-20	1	N
	BD1736-2	20.04	NM	TOC	7.88	NC	10-20	1	N
Building 7156 – North Fort Fire Station and AFFF Storage Building	BD7156-1	19.88	NM	TOC	12.11	NC	9-19	1	N
Building 7525 – Former North Fort Fire Station	BD7525-1	35.02	NM	TOC	20.1	NC	15-35	1	N

Table 6-1 - Monitoring Well Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Polk, LA

Notes:

Permanent wells were not installed at the DPT sampling locations. The total depth listed indicates the total depth of the temporary borehole; the screened interval listed for DPT sampling points indicates the interval of temporary well screen

Sampling point BD4172-2 was sampled with a metal hydrosleeve screen so the DPT rig would not have larger drill stems stuck in the stiff soils deep below ground surface (bgs).

Acronyms/Abreviations:

amsl - above mean sea level
bgs - below ground surface
ft - feet
GS - ground surface
ID - identification
MP - measuring point
NA - not available
NC - not calculated
NM - not measured (not surveyed)
TOC - top of casing
btoc - below top of casing

Table 7-1 Site Inspection Laboratory Analytical Results - Groundwater
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Polk, Louisiana

					Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
					OSD Tapwater Risk Screening Level	40		40		600	
Associated AOPI	Location Type	Location Type	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Former Fire Station #1	Groundwater Boring	FTP-BD1736-1	FTP-BD1736-1-GW	12/15/2020	N	**270**		**31**		**6.0**	
Former Fire Station #1	Groundwater Boring	FTP-BD1736-2	FTP-BD1736-2-GW	12/16/2020	N	**4300**	J	**1400**	J	**94**	
Current Firefighter Training Area	Groundwater Boring	FTP-BD4172-1	FTP-FD-1-GW-071520 /	07/15/2020	FD	**3.9**	J	**4.7**		4.0	U
	Groundwater Boring		FTP-BD4172-1-GW	12/16/2020	N	**3.4**	J	**2.9**	J	3.9	U
Current Firefighter Training Area	Groundwater Boring	FTP-BD4172-2	FTP-BD4172-2-GW	12/16/2020	N	**160**		**70**		**3.4**	J
	Groundwater Boring			12/16/2020	FD	**160**		**52**		**2.9**	J
Current Firefighter Training Area	Groundwater Boring	FTP-BD4172-3	FTP-BD4172-3-GW	12/16/2020	N	**49**	J-	**200**	J-	**8.9**	J-
Aircraft Maintenance Hangar & Adjacent Nozzle Test Location	Groundwater Boring	FTP-BD4239-1	FTP-BD4239-1-GW	07/14/2020	N	**420**	J+	**160**	J-	**160**	J-
Former Airfield Fire Station (Crash Station) Location	Groundwater Boring	FTP-BD4239C-1	FTP-BD4239C-1-GW	07/14/2020	N	**66**	J-	**100**	J-	**130**	J-
North Fort Fire Station and AFFF Storage Building	Groundwater Boring	FTP-BD7156-1	FTP-BD7156-1-GW	12/15/2020	N	**200**		**91**		**30**	
Former North Fort Fire Station	Groundwater Boring	FTP-BD7525-1	FTP-BD7525-1-GW	12/15/2020	N	**96**		**5.2**		**4.6**	
Former Firefighter Training Area	Groundwater Boring	FTP-SWMU38-1	FTP-SWMU38-1-GW	07/14/2020	N	**50**		**15**		**5.5**	
Original Firefighter Training Area	Groundwater Boring	FTP-SWMU42-1	FTP-SWMU42-1-GW	07/15/2020	N	**1800**	J	**160**		**16**	
Original Firefighter Training Area	Groundwater Boring	FTP-SWMU42-2	FTP-SWMU42-2-GW	07/15/2020	N	**6800**	J	**1000**	J	**93**	

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September).
3. All groundwater samples collected during the PA/SI scope of work were from the shallow unconsolidated zone overlying bedrock and are not representative of the deeper drinking water aquifers present at Fort Polk.

Acronyms/Abbreviations:
AOPI = Area of Potential Interest
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

Qualifier	Description
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only
J+	The result is an estimated quantity; the result may be biased high.
J-	The result is an estimated quantity; the result may be biased low.
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).

Table 7-2 Site Inspection Laboratory Analytical Results - Soil
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Polk, Louisiana

						Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
						OSD Industrial/Commercial Risk Screening Level	1.6		1.6		25	
						OSD Residential Risk Screening Levels	0.13		0.13		1.9	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type		Result	Qual	Result	Qual	Result	Qual
Former Fire Station #1	Soil	FTP-BD1736-1	FTP-BD1736-1-SO	07/16/2020	N		**0.0033**		**0.0012**		0.001	U
			FTP-FD-2-SO / FTP-BD1736-1-SO	07/16/2020	FD		**0.0024**		**0.00094**		0.00091	U
Former Fire Station #1	Soil	FTP-BD1736-2	FTP-BD1736-2-SO	07/16/2020	N		**0.0014**		0.00094	U	0.00094	U
Former Fire Station #1	Soil	FTP-BD1736-3	FTP-BD1736-3-SO	07/16/2020	N		**0.0041**		0.0012	U	0.0012	U
Current Firefighter Training Area	Soil	FTP-BD4172-1	FTP-BD4172-1-SO	07/15/2020	N		0.0012	U	0.0012	U	0.0012	U
			FTP-FD-1-SO-071520 / FTP-BD4172-1-SO	07/15/2020	FD		0.0012	U	0.0012	U	0.0012	U
Current Firefighter Training Area	Soil	FTP-BD4172-2	FTP-BD4172-2-SO	07/15/2020	N		0.0011	U	0.0011	U	0.0011	U
Current Firefighter Training Area	Soil	FTP-BD4172-3	FTP-BD4172-3-SO	07/15/2020	N		0.0011	U	**0.009**		0.0011	U
Current Firefighter Training Area	Soil	FTP-BD4172-4	FTP-BD4172-4-SO	07/15/2020	N		0.0012	U	**0.0031**		0.0012	U
Aircraft Maintenance Hangar & Adjacent Nozzle Test Location	Soil	FTP-BD4239-1	FTP-BD4239-1-SO	07/13/2020	N		**0.00063**	J	0.0012	U	0.0012	U
Aircraft Maintenance Hangar & Adjacent Nozzle Test Location	Soil	FTP-BD4239-2	FTP-BD4239-2-SO	07/13/2020	N		**0.014**		0.0011	U	0.0011	U
Former Airfield Fire Station (Crash Station) Location	Soil	FTP-BD4239C-1	FTP-BD4239C-1-SO	07/14/2020	N		0.0011	U	0.0011	U	0.0011	U
Former Airfield Fire Station (Crash Station) Location	Soil	FTP-BD4256-1	FTP-BD4256-1-SO	07/13/2020	N		**0.0061**		**0.0011**	J	0.0012	U
Former Airfield Fire Station (Crash Station) Location	Soil	FTP-BD4256-2	FTP-BD4256-2-SO	07/13/2020	N		**0.021**		0.0011	U	0.0011	U
Current Airfield Fire Station (Crash Station) Location	Soil	FTP-BD4256C-2	FTP-BD4256C-2-SO	07/13/2020	N		0.0011	U	0.0011	U	0.0011	U
Current Airfield Fire Station (Crash Station) Location	Soil	FTP-BD4256C-3	FTP-BD4256C-3-SO	07/13/2020	N		**0.0035**		**0.0039**		0.0011	U
Current Airfield Fire Station (Crash Station) Location	Soil	FTP-BD4256C-4	FTP-BD4256C-4-SO	07/13/2020	N		**0.0048**		**0.0018**		0.0012	U
North Fort Fire Station and AFFF Storage Building	Soil	FTP-BD7156-1	FTP-BD7156-1-SO	07/16/2020	N		**0.03**		**0.006**		0.0012	U
North Fort Fire Station and AFFF Storage Building	Soil	FTP-BD7156-2	FTP-BD7156-2-SO	07/16/2020	N		**0.0048**		**0.0023**		0.0011	U
North Fort Fire Station and AFFF Storage Building	Soil	FTP-BD7156-3	FTP-BD7156-3-SO	07/16/2020	N		**0.029**		**0.0063**		0.0013	U
Former North Fort Fire Station	Soil	FTP-BD7525-1	FTP-BD7525-1-SO	07/16/2020	N		**0.0052**		0.00097	U	0.00097	U
Former North Fort Fire Station	Soil	FTP-BD7525-2	FTP-BD7525-2-SO	07/16/2020	N		**0.013**		0.00094	U	0.00094	U
Bradley Tank Fire Location	Soil	FTP-BTF-1	FTP-BTF-1-SO	07/13/2020	N		0.001	U	0.001	U	0.001	U
Bradley Tank Fire Location	Soil	FTP-BTF-2	FTP-BTF-2-SO	07/13/2020	N		0.0011	U	0.0011	U	0.0011	U
Former Firefighter Training Area	Soil	FTP-SWMU38-1	FTP-SWMU38-1-SO	07/14/2020	N		**0.00071**	J	0.001	U	0.001	U
Former Firefighter Training Area	Soil	FTP-SWMU38-2	FTP-SWMU38-2-SO	07/14/2020	N		0.001	U	0.001	U	0.001	U
Former Firefighter Training Area	Soil	FTP-SWMU38-3	FTP-SWMU38-3-SO	07/14/2020	N		**0.0005**	J	0.00099	U	0.00099	U
Original Firefighter Training Area	Soil	FTP-SWMU42-1	FTP-SWMU42-1-SO	07/15/2020	N		**0.0045**		0.0012	U	0.0012	U
Original Firefighter Training Area	Soil	FTP-SWMU42-2	FTP-SWMU42-2-SO	07/15/2020	N		**0.0044**		0.0012	U	0.0012	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the 2021 Office of the Secretary of Defense (OSD) risk screening levels for the residential and commercial/industrial scenario (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.).

Acronyms/Abbreviations:
AOPI = Area of Potential Interest
DPT = Direct-Push Technology
FD = field duplicate sample
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

Qualifier	Description
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).

FIGURES

USAEC PFAS Preliminary Assessment / Site Inspection Fort Polk, LA

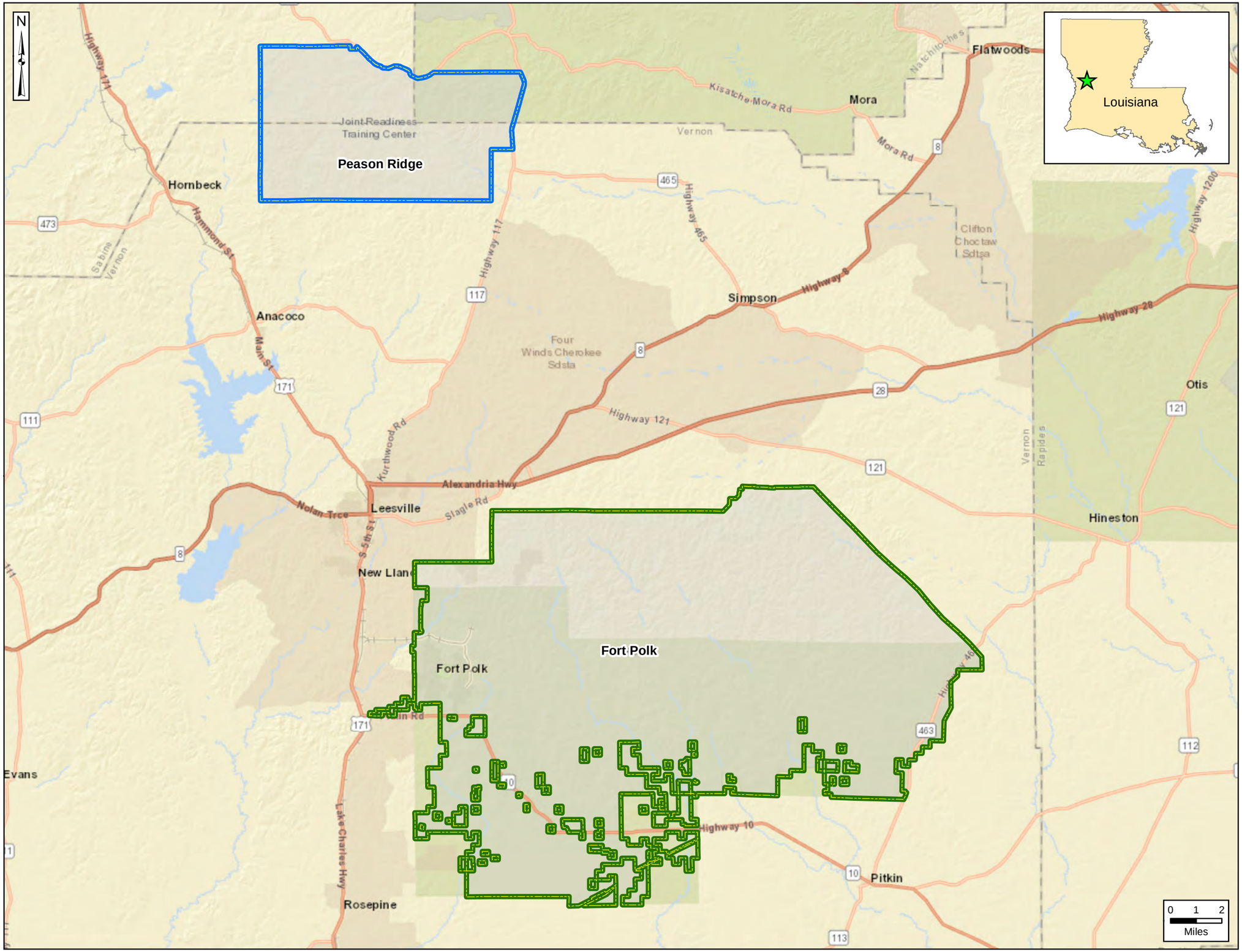

Figure 2-1
Site Location

Legend

- Fort Polk
- Peason Ridge

Note: Small parcels of land depicted within Fort Polk are privately-owned residential properties.

Data Sources:
Fort Polk, GIS Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 15 North

USAEC PFAS Preliminary Assessment / Site Inspection Fort Polk, LA

Figure 2-2 Site Layout

N

North Fort Polk

South Fort Polk

Beason Creek
Cooper Creek
Palmer Creek
Burton Creek
Flagg Lick
Clear Runner
Flocton Creek
Vincent Creek
Clear Runner Branch
North Fork Mill Creek
Billy Creek
Long Branch
Houge Branch
Mill Creek
Little Dry Creek
Dry Creek
Big Creek
Tennile Creek
Templeton Branch
Thompson Branch
Big Brushy Creek
Little Brushy Creek
Boggy Branch
Gum Branch
Sixmile Creek
East Fork Sixmile Creek
West Fork Sixmile Creek
Little Sixmile Creek
Flat Branch
Turkey Creek
Panther Branch
Campbell Branch
Blue Branch
Pollard Branch
Sugar Creek
Soapstone Creek
Brushy Creek
Libety Creek
Pond Branch
Bayou Castor
Bayou Zourie
Zourie Creek
Little Prairie Creek
Bird's Creek
Calhoun Branch
Big Beaver Dam Creek
Obanion Branch
Hogpen Branch
Blackland Branch
Bear Branch
Dry Branch
Rocky Branch
Tigrteye Creek
Coon Branch
Sassafras Branch
Maple Branch
Whisky Chitto Creek
Jackson Branch
Drakes Creek
Glade Branch
Tiger Creek
Black Branch
East Branch Black Creek
West Branch Black Creek
Horse Branch
Flat Creek
Pin Branch
Little Clear Creek
Clear Creek
Hurricane Branch
Bundrick Creek

0 1 2 Miles

Legend

- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Groundwater Flow Direction
- Surface Water Flow Direction
- North Fort Polk (Cantonment Area)
- South Fort Polk (Cantonment Area)
- Training Area
- Impact Area

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
URS, *Corrective Measures Study Report Installation-Wide Solid Waste Management Units*, Groundwater Flow Direction, 2004
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 2-3
Site Topography

Legend

- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Elevation Contour (feet)

0 1 2 Miles

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
USGS, Elevation Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 2-4
Off-Post Potable Supply Wells

Legend

- Installation Boundary
- 5-Mile Radius
- North Fort Polk
- South Fort Polk
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Evangeline Aquifer Recharge Area *
- Regional Groundwater Flow Direction
- Public Water Supply System Well
- Other Public Supply Well
- Domestic Well
- Other Designated Use Water Well

Notes:

* Only Vernon Parish portion of aquifer shown. Extent outside parish boundary unavailable.

Water supply well locations and identifications were provided by Environmental Data Resources, Inc. (EDR); in many cases, well use designation of state wells was not specified. See Appendix E for further information.

Other public supply wells include commercial, institutional, municipal, and rural public supply wells.

Other designated use wells include irrigation, fire protection, and livestock wells, as well as wells with unreported or unknown use.

Data Sources:
Fort Polk, GIS Data, 2019
EDR, Well Data, 2018
USGS, NHD Data, 2019
URS, *Corrective Measures Study Report Installation-Wide Solid Waste Management Units*, Groundwater Flow Direction and Evangeline Aquifer, 2004
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 15 North

0 1 2 Miles

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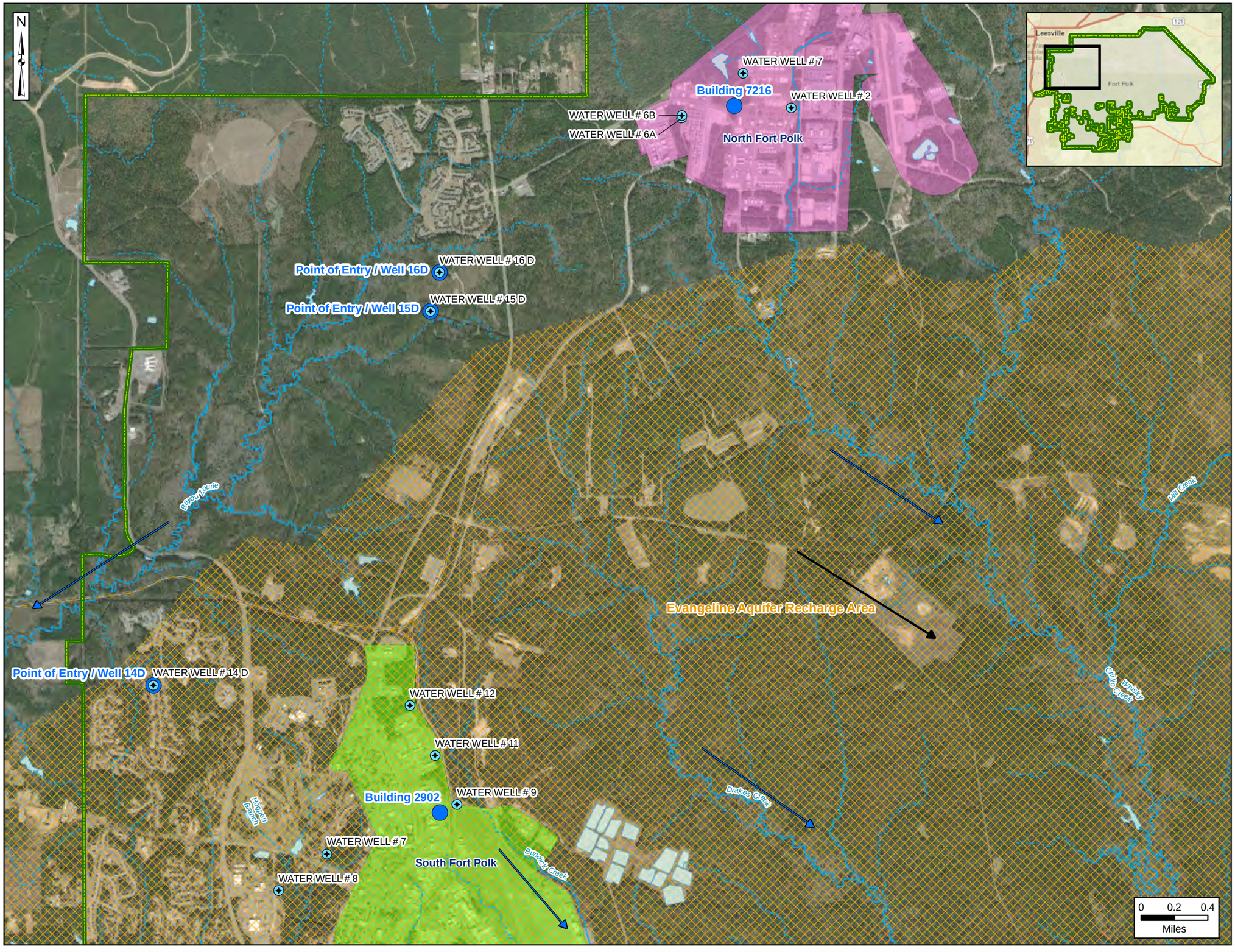
Figure 2-5
Historical PFOS and PFOA Potable Water Sample Locations



Legend

- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Groundwater Flow Direction
- Surface Water Flow Direction
- North Fort Polk
- South Fort Polk
- On-Post Potable Water Well
- Historical PFOS/PFOA Potable Water Sampling Location

PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Polk, GIS Data, 2019
EDR, Well Data, 2019
USGS, NHD Data, 2019
URS, *Corrective Measures Study Report Installation-Wide Solid Waste Management Units*, Groundwater Flow Direction, 2004
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 5-2
AOPI Locations

Building 7156 - North Fort Fire Station
North Fort Polk
Building 7525 - Former North Fort Fire Station
Building 4172 - Current Firefighter Training Area
Bradley Tank Fire
Evangeline Aquifer Recharge Area
Former Firefighter Training Area
Building 4256 - Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station)
Building 1736 - Former Fire Station #1
Building 4239 - Aircraft Hangar and Adjacent Nozzle Test Location
South Fort Polk
Original Firefighter Training Area

Legend

- Installation Boundary
- AOPI Location
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Evangeline Aquifer Recharge Area *
- Groundwater Flow Direction
- Surface Water Flow Direction
- North Fort Polk
- South Fort Polk
- On-Post Potable Water Well
- Public Water Supply System Well
- Other Public Supply Well
- Domestic Well
- Other Designated Use Water Well

AOPI = area of potential interest

* Only Vernon Parish portion of aquifer shown. Extent outside parish boundary unavailable.

Data Sources:
Fort Polk, GIS Data, 2019
EDR, Well Data, 2019
USGS, NHD Data, 2019
URS, *Corrective Measures Study Report Installation-Wide Solid Waste Management Units*, Groundwater Flow Direction, 2004
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

0 1 2 Miles

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Figure 5-3
Aerial Photo of
Bradley Tank Fire Location AOPI

Legend

- Installation Boundary
- AOPI
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction
- Potable Water Well

AOPI = area of potential interest

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
Google Earth, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 5-4
Aerial Photo of
Building 4172 - Current Firefighter Training Area AOPI

Legend

- Installation Boundary
- AOPI
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 5-5 Aerial Photo of Former Firefighter Training Area AOPI

Legend

- Installation Boundary
- AOPI
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 5-6
Aerial Photo of
Original Firefighter Training Area AOPI

Legend

- Installation Boundary
- AOPI
- Stream (Intermittent)
- Surface Water Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 5-7
Aerial Photo of Building 4239 – Aircraft Maintenance Hangar and Adjacent Nozzle Test Location AOPI

Legend

- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

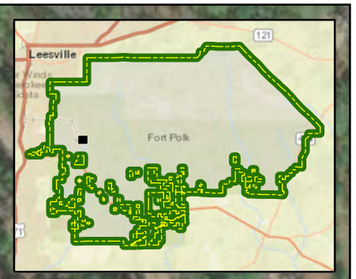
N

Building 4256 -
Former Airfield Fire Station
(Crash Station) Location

Building 4256 -
Current Airfield Fire Station
(Crash Station)

California Ave

Bundick Creek



0 100 200
Feet

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Figure 5-8
Aerial Photo of
Building 4256 - Former Airfield Fire Station (Crash Station) and Current Airfield Fire Station (Crash Station) AOPI

Legend

- Installation Boundary
- AOPI
- Historical Building Footprint
- River/Stream (Perennial)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Site Inspection
Fort Polk, LA

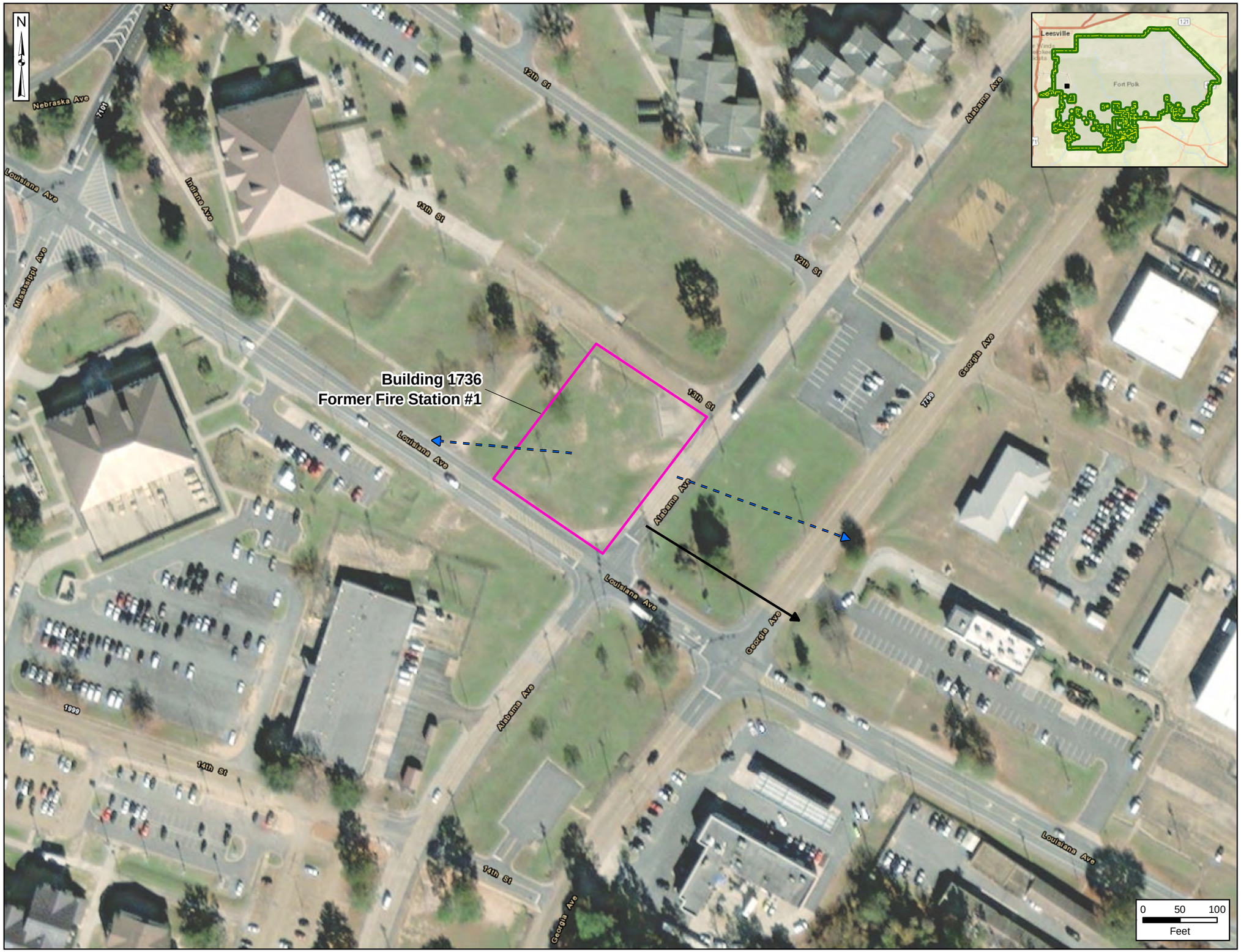

Figure 5-9
Aerial Photo of
Building 1736 -
Former Fire Station #1 AOPI

Legend

- Installation Boundary
- AOPI
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 5-10
Aerial Photo of Building 7156 – North Fort Fire Station and AFFF Storage Building AOPI

Legend

- Installation Boundary
- AOPI
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 5-11 Aerial Photo of Building 7525 - Former North Fort Fire Station AOPI

Legend

- Installation Boundary
- AOPI
- Historical Building Footprint
- River/Stream (Perennial)
- Stream (Intermittent)
- Surface Water Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

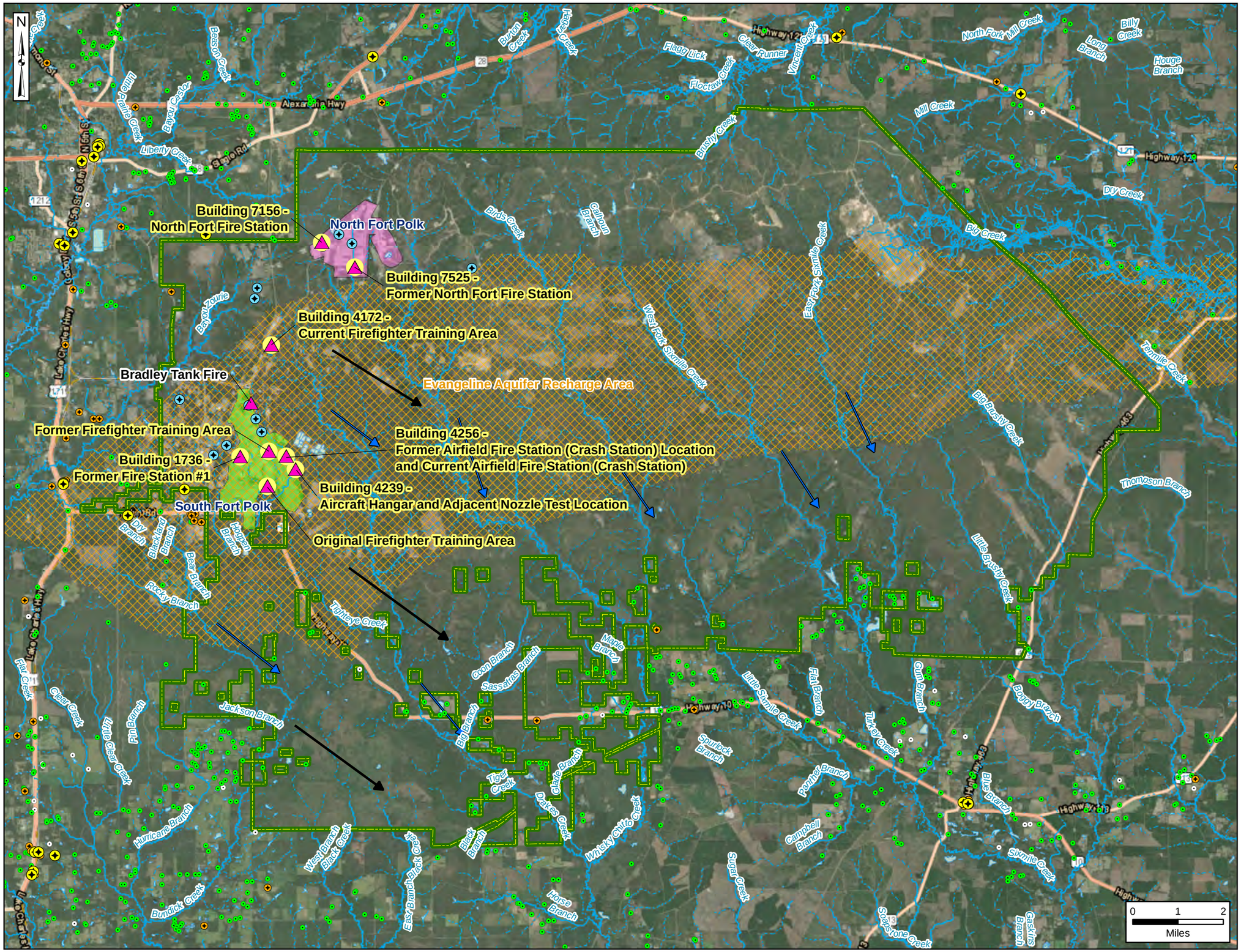

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Figure 7-1
AOPIs with OSD Risk Screening Level Exceedances

Legend

- Installation Boundary
- AOPI Location
- AOP Location with OSD Risk Screening Level Exceedance
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Evangeline Aquifer Recharge Area *
- Groundwater Flow Direction
- Surface Water Flow Direction
- North Fort Polk
- South Fort Polk
- On-Post Potable Water Well
- Public Water Supply System Well
- Other Public Supply Well
- Domestic Well
- Other Designated Use Water Well

AFFF = aqueous film-forming foam
AOPI = area of potential interest
OSD = Office of the Secretary of Defense

* Only Vernon Parish portion of aquifer shown. Extent outside parish boundary unavailable.

Data Sources:
Fort Polk, GIS Data, 2019
EDR, Well Data, 2019
USGS, NHD Data, 2019
URS, *Corrective Measures Study Report Installation-Wide Solid Waste Management Units*, Groundwater Flow Direction, 2004
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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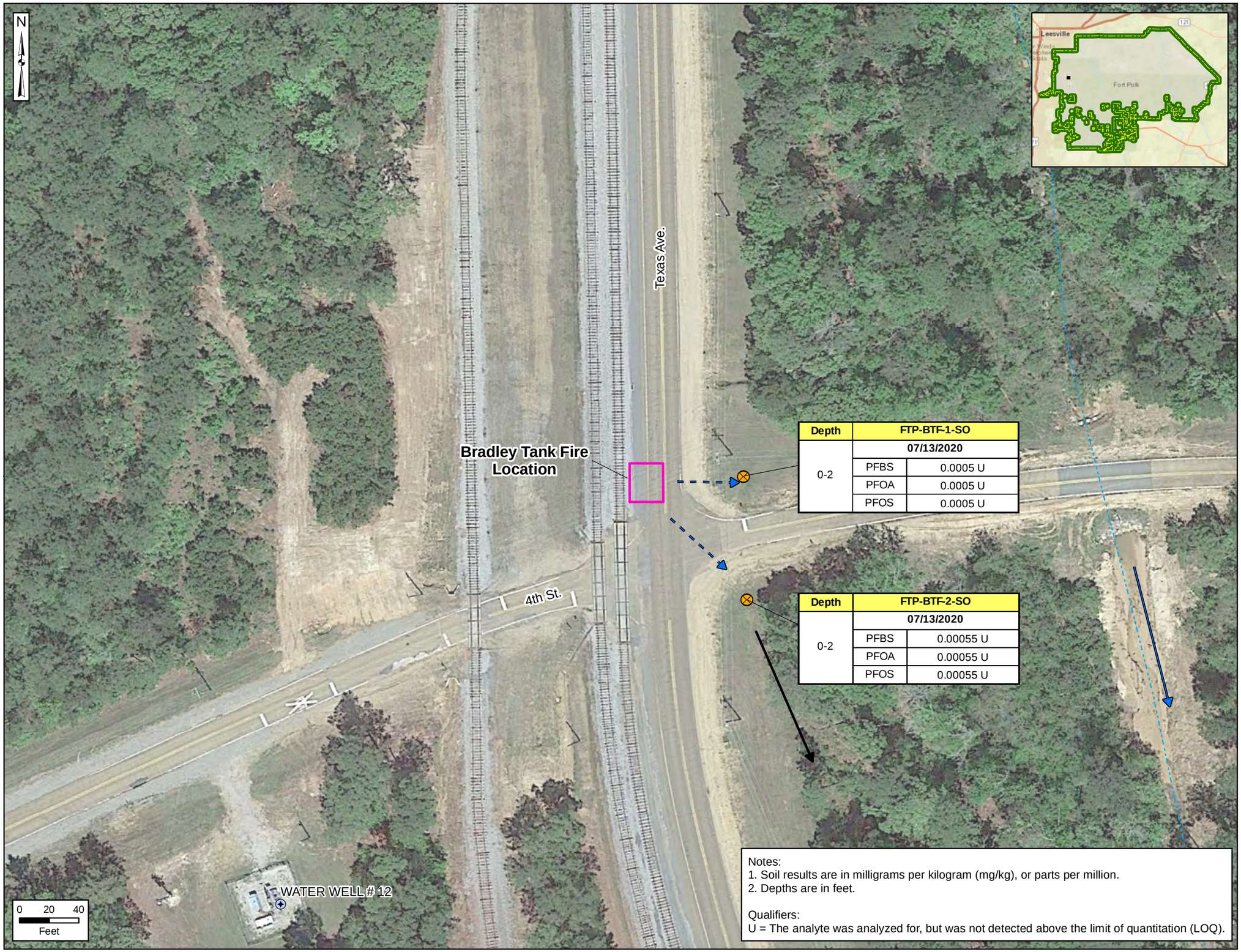
Figure 7-2
Bradley Tank Fire Location AOPI PFOS, PFOA, and PFBS Analytical Results



Depth	FTP-BTF-1-SO	
	07/13/2020	
0-2	PFBS	0.0005 U
	PFOA	0.0005 U
	PFOS	0.0005 U

Depth	FTP-BTF-2-SO	
	07/13/2020	
0-2	PFBS	0.00055 U
	PFOA	0.00055 U
	PFOS	0.00055 U

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Depths are in feet.

Qualifiers:
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

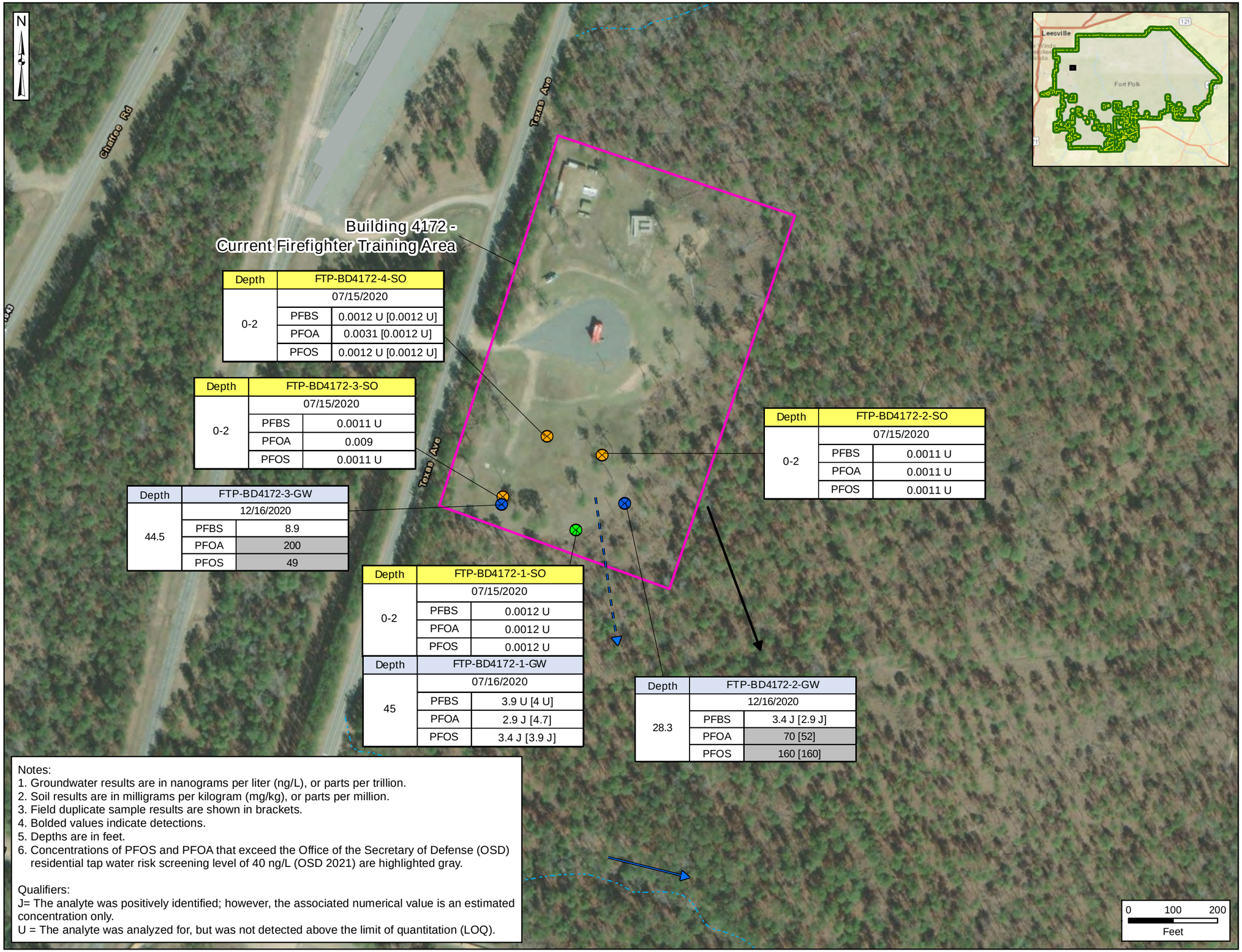
Legend

- Installation Boundary
- AOPI
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction
- Potable Water Well
- Soil Boring

AOPI = area of potential interest
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
Google Earth, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North



Depth	FTP-BD4172-4-SO	
0-2	07/15/2020	
	PFBS	0.0012 U [0.0012 U]
	PFOA	0.0031 [0.0012 U]
	PFOS	0.0012 U [0.0012 U]

Depth	FTP-BD4172-3-SO	
0-2	07/15/2020	
	PFBS	0.0011 U
	PFOA	0.009
	PFOS	0.0011 U

Depth	FTP-BD4172-3-GW	
44.5	12/16/2020	
	PFBS	8.9
	PFOA	200
	PFOS	49

Depth	FTP-BD4172-2-SO	
0-2	07/15/2020	
	PFBS	0.0011 U
	PFOA	0.0011 U
	PFOS	0.0011 U

Depth	FTP-BD4172-1-SO	
0-2	07/15/2020	
	PFBS	0.0012 U
	PFOA	0.0012 U
	PFOS	0.0012 U

Depth	FTP-BD4172-1-GW	
45	07/16/2020	
	PFBS	3.9 U [4 U]
	PFOA	2.9 J [4.7]
	PFOS	3.4 J [3.9 J]

Depth	FTP-BD4172-2-GW	
28.3	12/16/2020	
	PFBS	3.4 J [2.9 J]
	PFOA	70 [52]
	PFOS	160 [160]

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion.
2. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. Field duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
5. Depths are in feet.
6. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
J= The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

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Figure 7-3
Building 4172 - Current Firefighter Training Area AOPI PFOS, PFOA, and PFBS Analytical Results

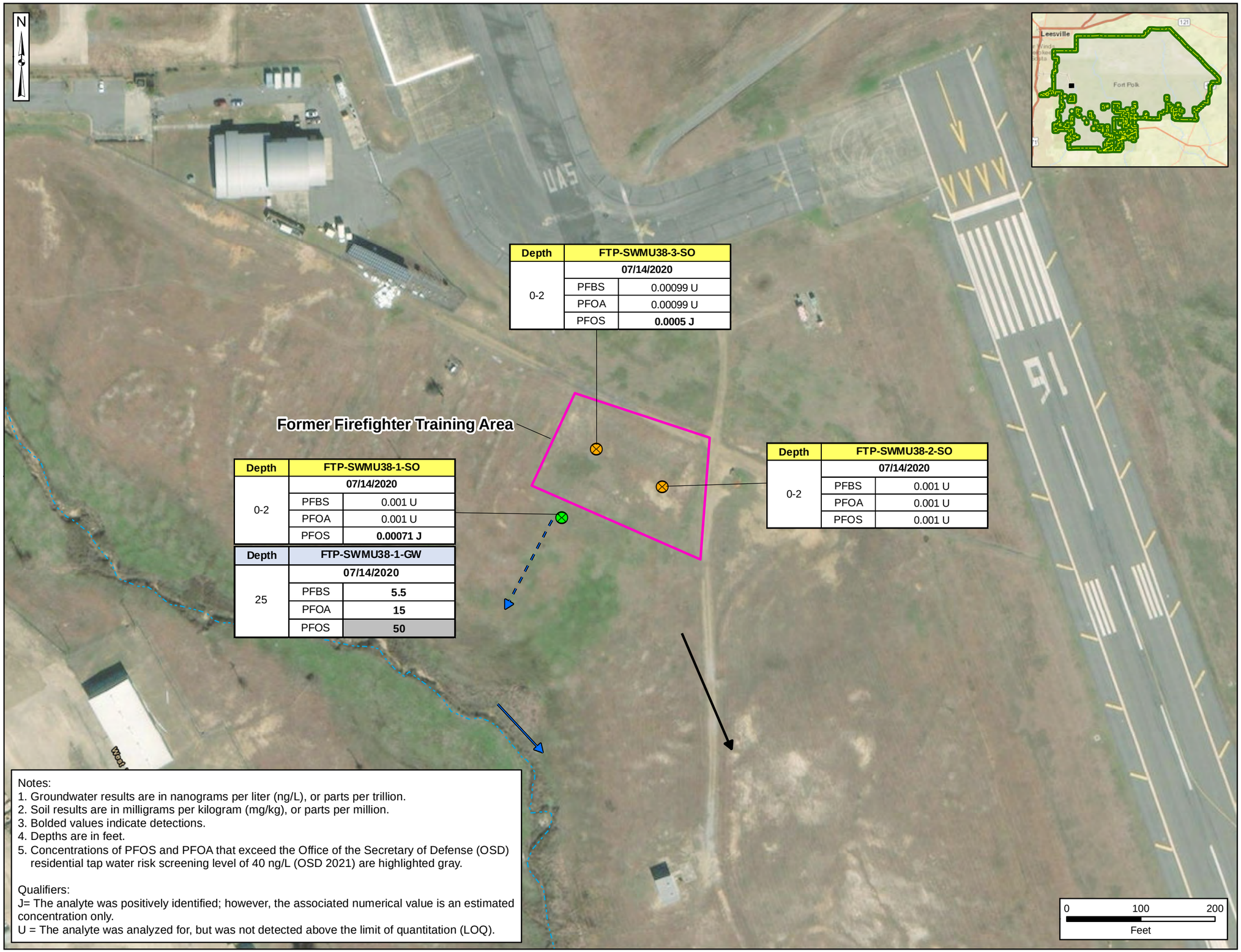
Legend

- Installation Boundary
- AOPI
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction
- Soil Boring
- Soil and Groundwater Sampling Location
- Groundwater Sampling Location

AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North



Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion.
2. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Depths are in feet.
5. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
J= The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

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Figure 7-4 Former Firefighter Training Area AOPI PFOS, PFOA, and PFBS Analytical Results

Legend

- Installation Boundary
- AOPI
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction
- Soil Boring
- Soil and Groundwater Sampling Location

AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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Figure 7-5
Original Firefighter Training Area AOPI
PFOS, PFOA, and PFBS Analytical Results

Depth	FTP-SWMU42-2-SO	
0-2	07/15/2020	
	PFBS	0.0012 U
	PFOA	0.0012 U
	PFOS	**0.0044**
Depth	**FTP-SWMU42-2-GW**	
20	07/15/2020	
	PFBS	**93**
	PFOA	**1,000**
	PFOS	**6,800**

Depth	FTP-SWMU42-1-SO	
0-2	07/15/2020	
	PFBS	0.0012 U
	PFOA	0.0012 U
	PFOS	**0.0045**
Depth	**FTP-SWMU42-1-GW**	
20	07/15/2020	
	PFBS	**16**
	PFOA	**160**
	PFOS	**1,800**

Original Firefighter Training Area

Michigan Ave

Louisiana Ave

Leesville

Fort Polk

0 50 100
Feet

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion.
2. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Depths are in feet.
5. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Legend

- Installation Boundary
- AOPI
- Stream (Intermittent)
- Surface Water Flow Direction
- Groundwater Flow Direction
- Soil and Groundwater Sampling Location

AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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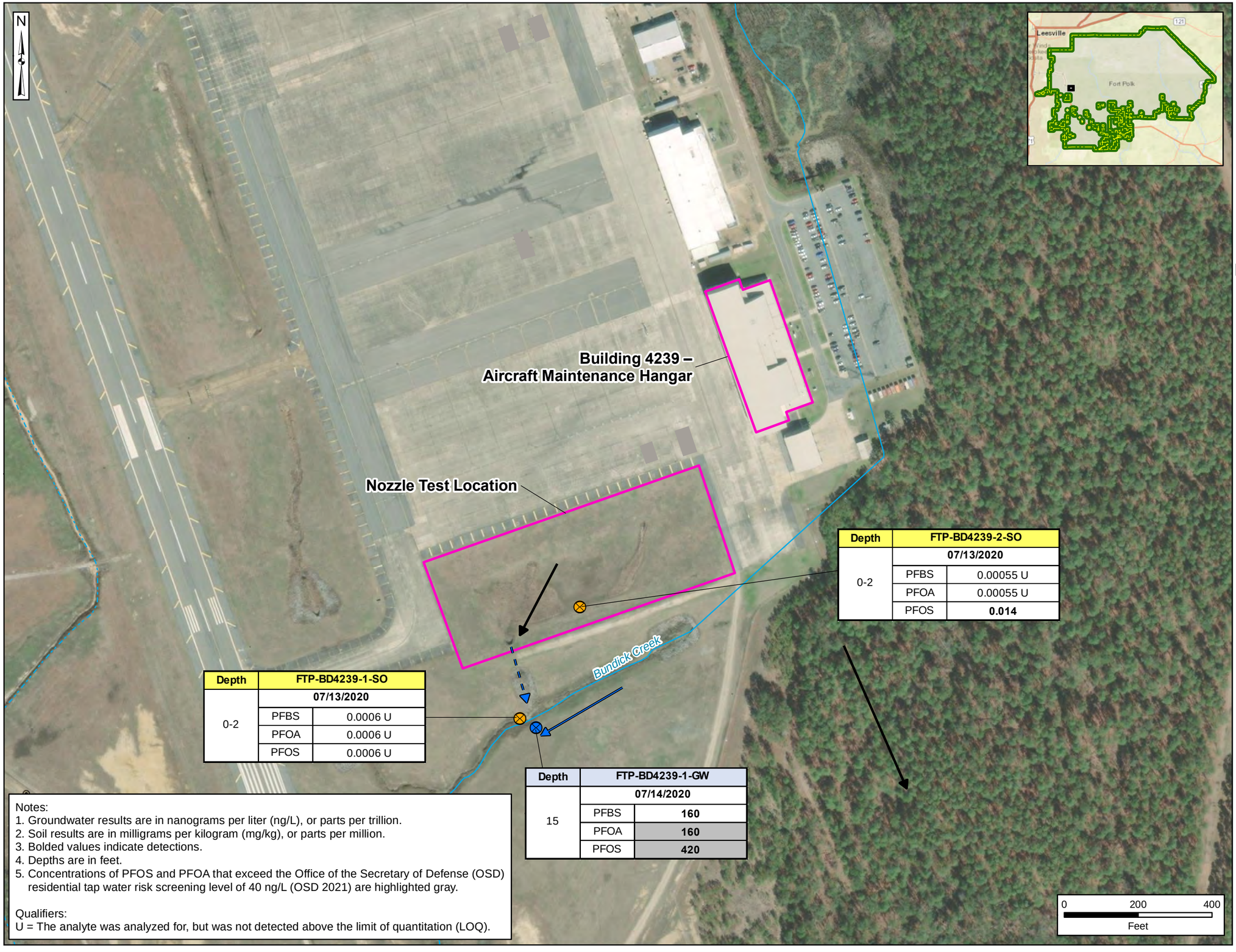
Figure 7-6
Building 4239 – Aircraft Maintenance Hangar and Adjacent Nozzle Test Location AOPI PFOS, PFOA, and PFBS Analytical Results



Depth	FTP-BD4239-1-SO	
	07/13/2020	
0-2	PFBS	0.0006 U
	PFOA	0.0006 U
	PFOS	0.0006 U

Depth	FTP-BD4239-1-GW	
	07/14/2020	
15	PFBS	**160**
	PFOA	**160**
	PFOS	**420**

Depth	FTP-BD4239-2-SO	
	07/13/2020	
0-2	PFBS	0.00055 U
	PFOA	0.00055 U
	PFOS	**0.014**

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion.
2. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Depths are in feet.
5. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

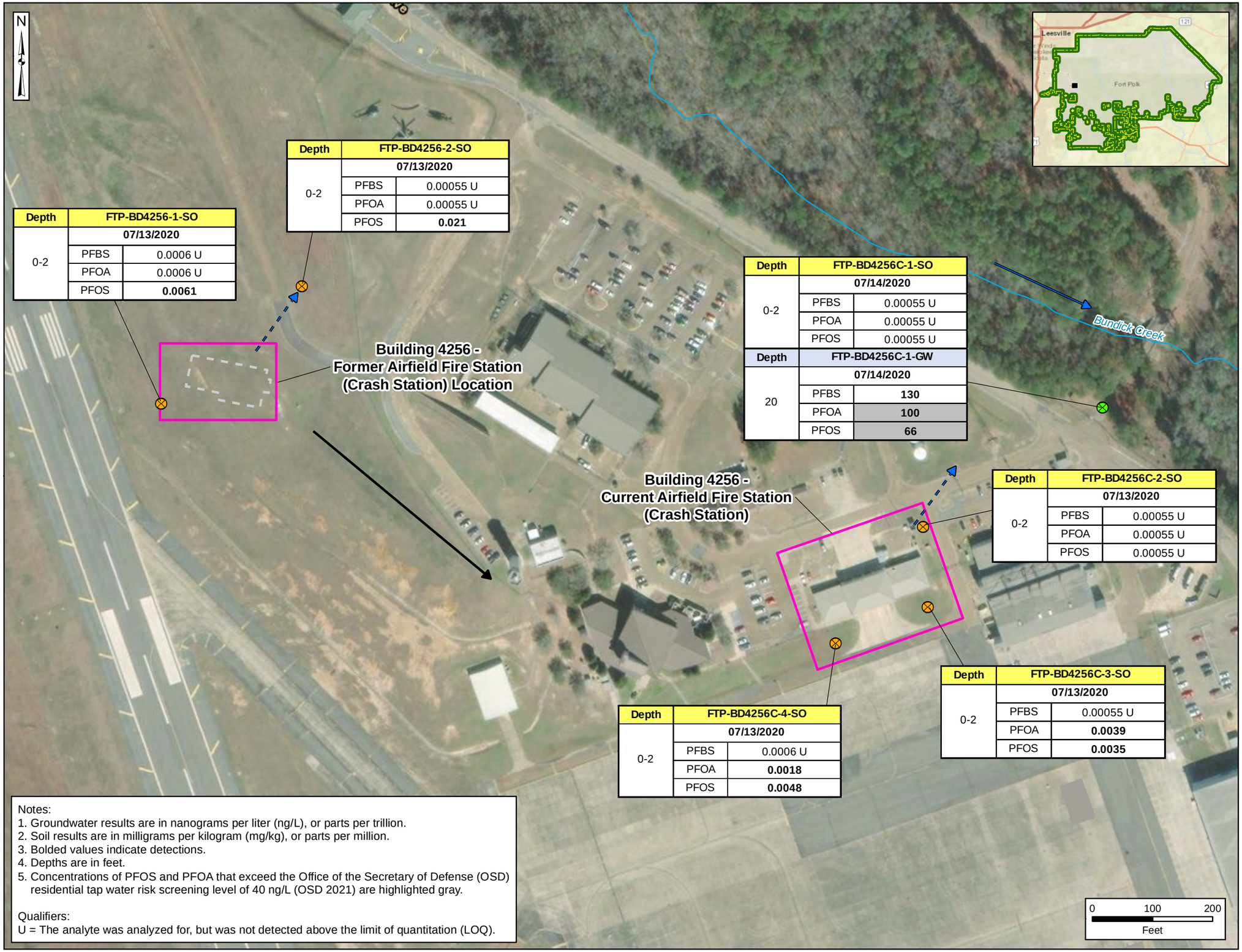
Legend

- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction
- Soil Boring
- Groundwater Sampling Location

AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North



Depth	FTP-BD4256-1-SO	
	07/13/2020	
0-2	PFBS	0.0006 U
	PFOA	0.0006 U
	PFOS	**0.0061**

Depth	FTP-BD4256-2-SO	
	07/13/2020	
0-2	PFBS	0.00055 U
	PFOA	0.00055 U
	PFOS	**0.021**

Depth	FTP-BD4256C-1-SO	
	07/14/2020	
0-2	PFBS	0.00055 U
	PFOA	0.00055 U
	PFOS	0.00055 U

Depth	FTP-BD4256C-1-GW	
	07/14/2020	
20	PFBS	**130**
	PFOA	**100**
	PFOS	**66**

Depth	FTP-BD4256C-2-SO	
	07/13/2020	
0-2	PFBS	0.00055 U
	PFOA	0.00055 U
	PFOS	0.00055 U

Depth	FTP-BD4256C-3-SO	
	07/13/2020	
0-2	PFBS	0.00055 U
	PFOA	**0.0039**
	PFOS	**0.0035**

Depth	FTP-BD4256C-4-SO	
	07/13/2020	
0-2	PFBS	0.0006 U
	PFOA	**0.0018**
	PFOS	**0.0048**

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion.
2. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Depths are in feet.
5. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

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Figure 7-7
Building 4256 - Former Airfield Fire Station (Crash Station) and Current Airfield Fire Station (Crash Station) AOPI
PFOS, PFOA, and PFBS Analytical Results

Legend

- Installation Boundary
- AOPI
- Historical Building Footprint
- River/Stream (Perennial)
- Surface Runoff Flow Direction
- Surface Water Flow Direction
- Groundwater Flow Direction
- Soil Boring
- Soil and Groundwater Sampling Location

AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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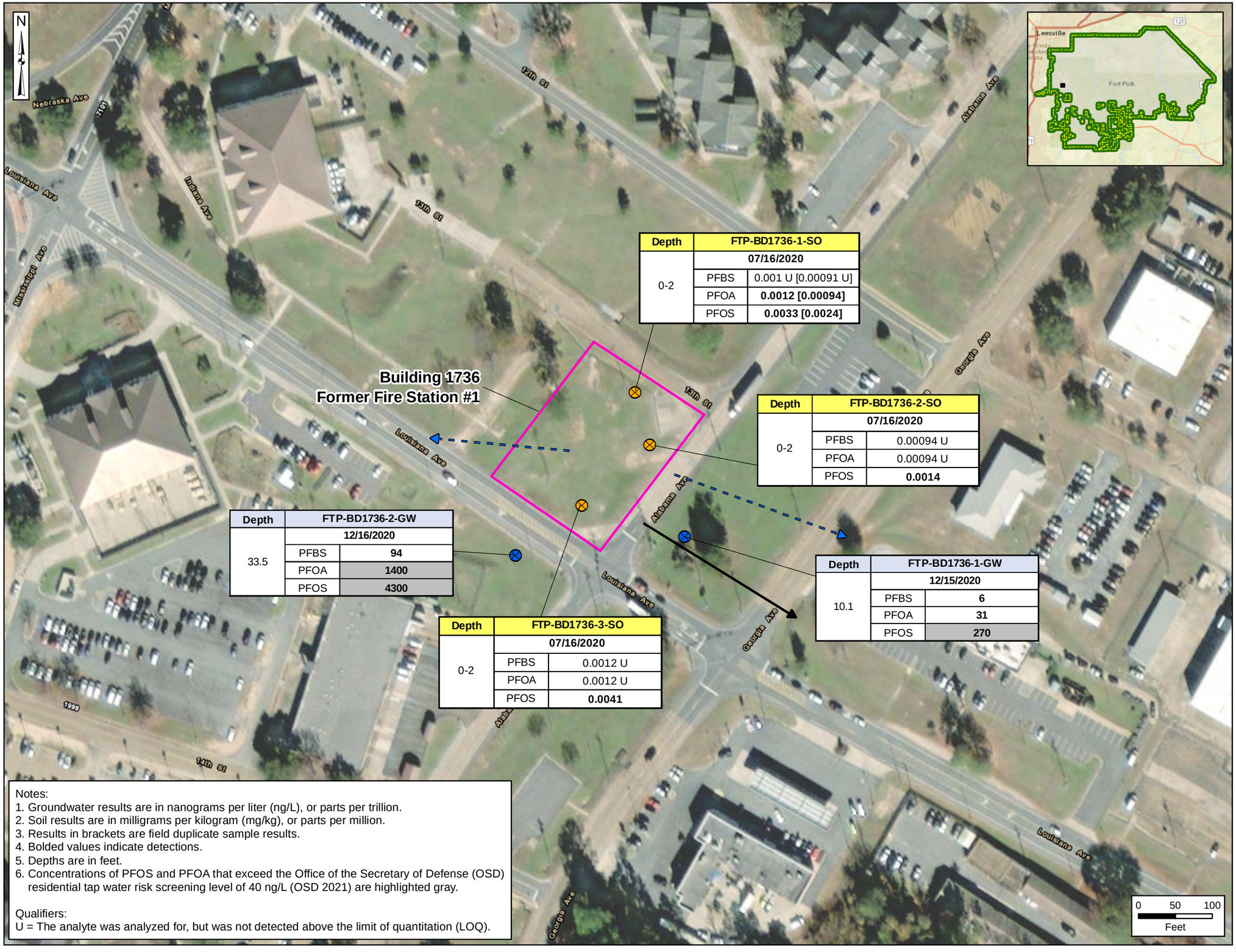
Figure 7-8
Building 1736 - Former Fire Station #1 AOPI PFOS, PFOA, and PFBS Analytical Results



Depth	FTP-BD1736-1-SO	
	07/16/2020	
0-2	PFBS	0.001 U [0.00091 U]
	PFOA	**0.0012 [0.00094]**
	PFOS	**0.0033 [0.0024]**

Depth	FTP-BD1736-2-SO	
	07/16/2020	
0-2	PFBS	0.00094 U
	PFOA	0.00094 U
	PFOS	**0.0014**

Depth	FTP-BD1736-2-GW	
	12/16/2020	
33.5	PFBS	**94**
	PFOA	**1400**
	PFOS	**4300**

Depth	FTP-BD1736-3-SO	
	07/16/2020	
0-2	PFBS	0.0012 U
	PFOA	0.0012 U
	PFOS	**0.0041**

Depth	FTP-BD1736-1-GW	
	12/15/2020	
10.1	PFBS	**6**
	PFOA	**31**
	PFOS	**270**

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion.
2. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.
5. Depths are in feet.
6. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

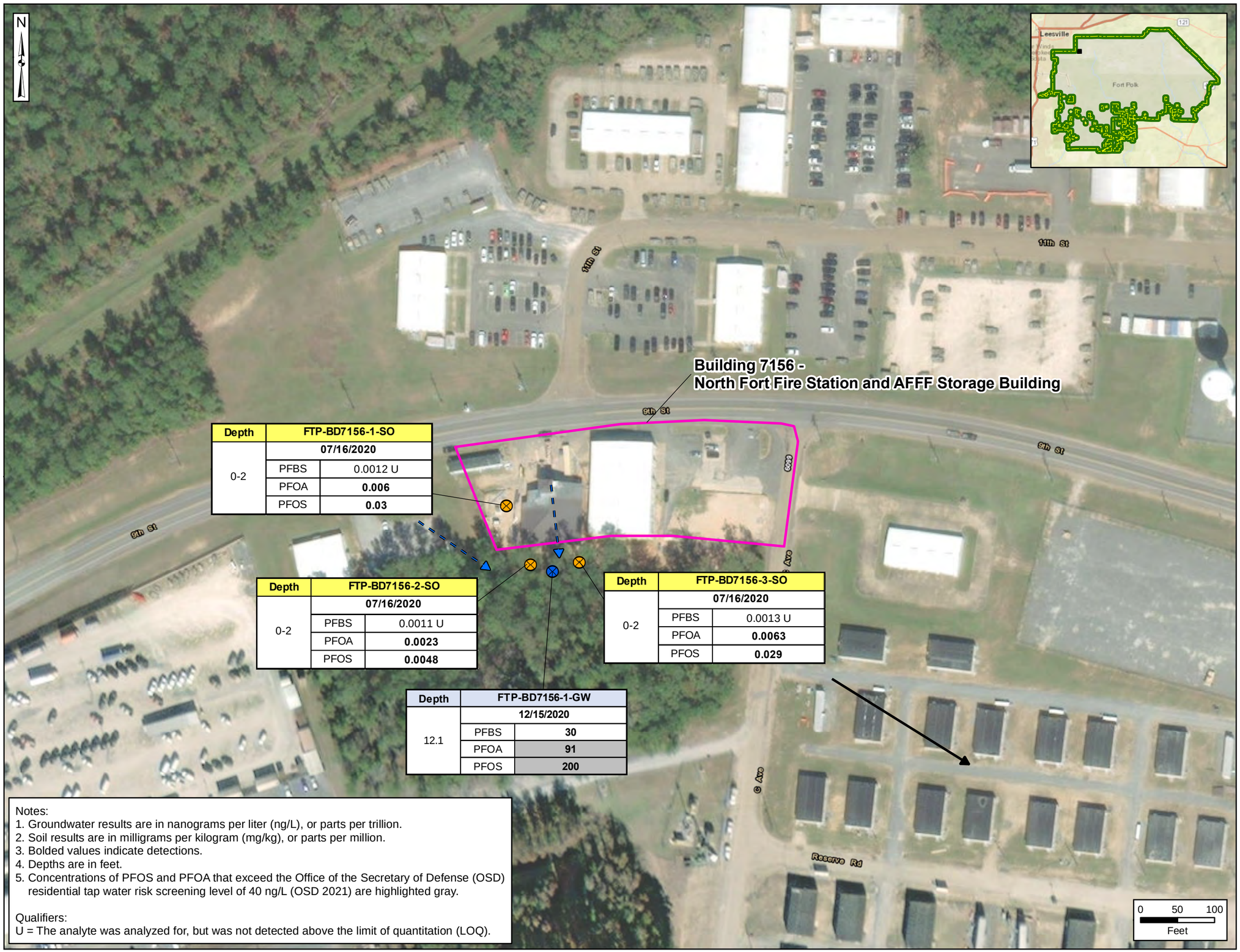
Legend

- Installation Boundary
- AOPI
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Soil Boring
- Groundwater Sampling Location

AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North



Depth	FTP-BD7156-1-SO	
	07/16/2020	
0-2	PFBS	0.0012 U
	PFOA	**0.006**
	PFOS	**0.03**

Depth	FTP-BD7156-2-SO	
	07/16/2020	
0-2	PFBS	0.0011 U
	PFOA	**0.0023**
	PFOS	**0.0048**

Depth	FTP-BD7156-3-SO	
	07/16/2020	
0-2	PFBS	0.0013 U
	PFOA	**0.0063**
	PFOS	**0.029**

Depth	FTP-BD7156-1-GW	
	12/15/2020	
12.1	PFBS	**30**
	PFOA	**91**
	PFOS	**200**

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion.
2. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Depths are in feet.
5. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

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Figure 7-9
Building 7156 – North Fort Fire Station and AFFF Storage Building AOPI
PFOS, PFOA, and PFBS Analytical Results

Legend
- Installation Boundary
- AOPI
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Soil Boring
- Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North

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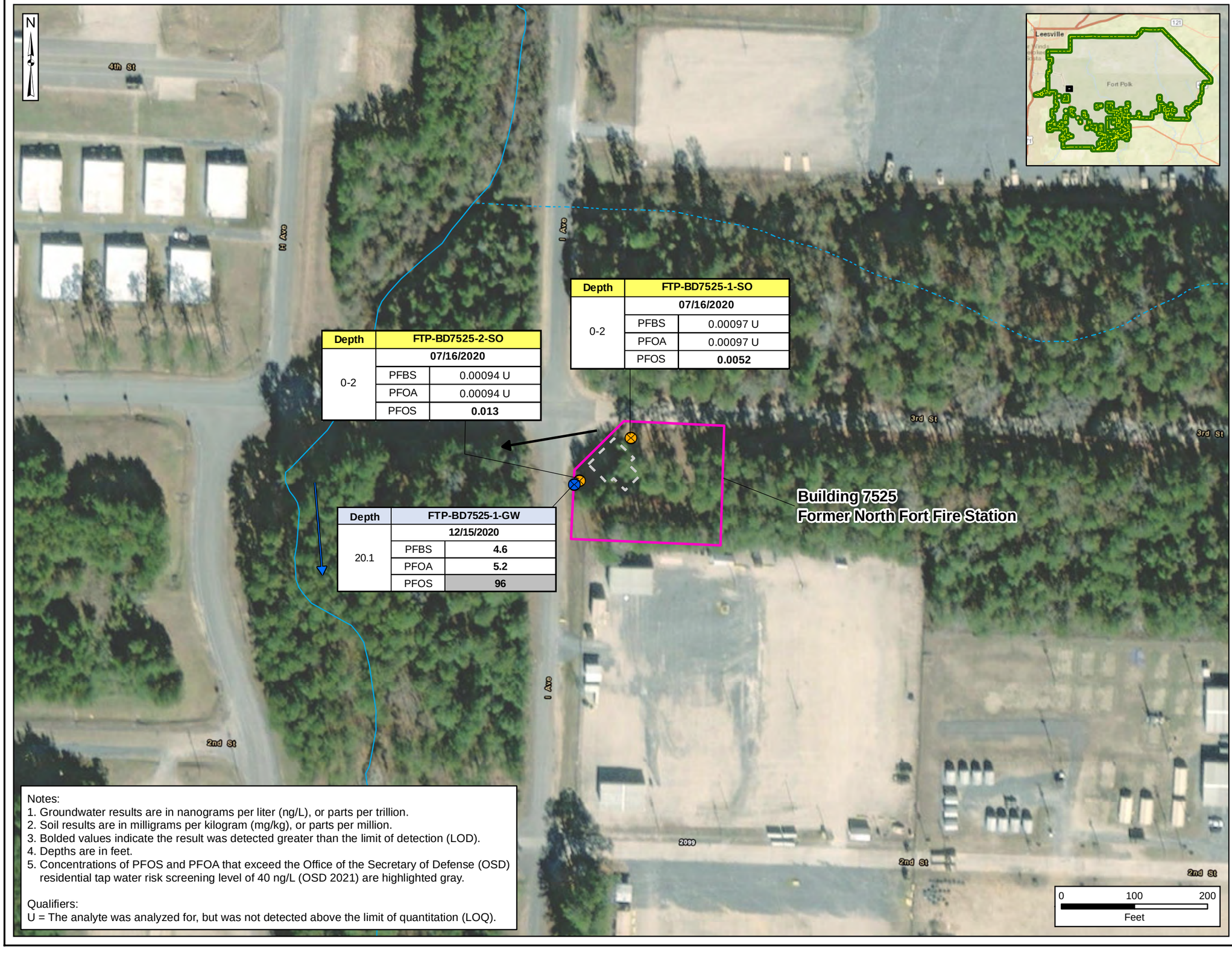
Figure 7-10 Building 7525 - Former North Fort Fire Station AOPI PFOS, PFOA, and PFBS Analytical Results



Depth	FTP-BD7525-2-SO	
	07/16/2020	
0-2	PFBS	0.00094 U
	PFOA	0.00094 U
	PFOS	**0.013**

Depth	FTP-BD7525-1-SO	
	07/16/2020	
0-2	PFBS	0.00097 U
	PFOA	0.00097 U
	PFOS	**0.0052**

Depth	FTP-BD7525-1-GW	
	12/15/2020	
20.1	PFBS	**4.6**
	PFOA	**5.2**
	PFOS	**96**

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion.
2. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate the result was detected greater than the limit of detection (LOD).
4. Depths are in feet.
5. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

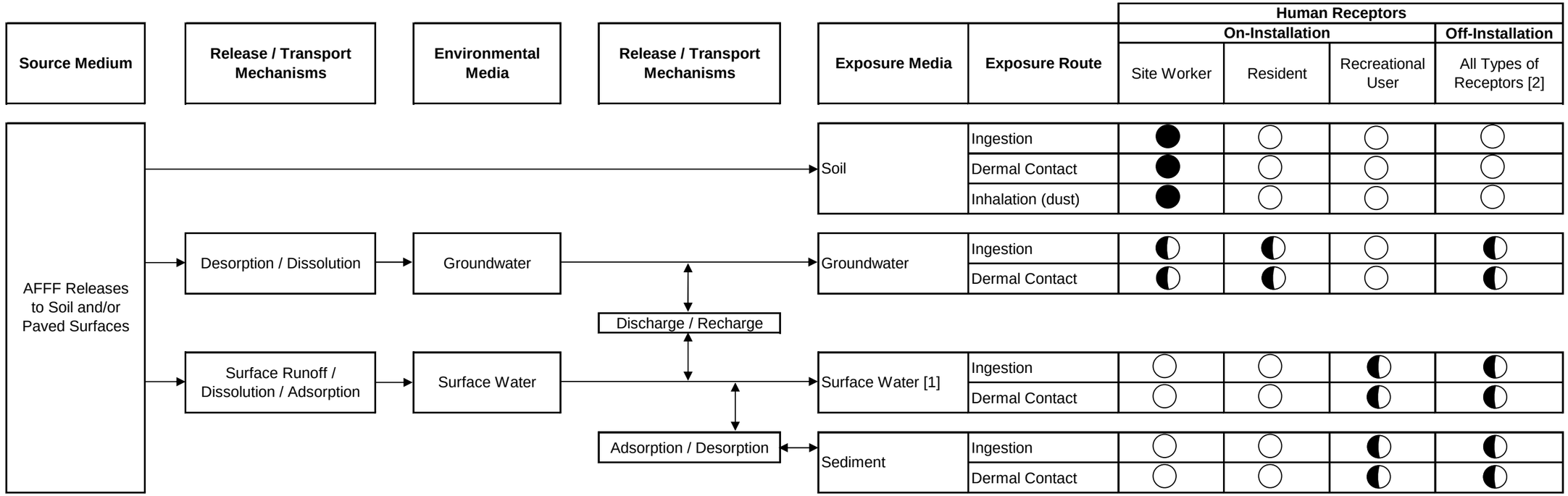
Legend

- Installation Boundary
- AOPI
- Historical Building Footprint
- River/Stream (Perennial)
- Stream (Intermittent)
- Surface Water Flow Direction
- Groundwater Flow Direction
- Soil Boring
- Groundwater Sampling Location

AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Fort Polk, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 15 North



Legend:

- = Complete Exposure Pathway
- = Potentially Complete Exposure Pathway
- = Incomplete Exposure Pathway

Notes:
The following seven AOPIs are addressed by this figure: Building 4239 – Aircraft Maintenance Hangar and Adjacent Nozzle Test Location, Building 4256 – Former Airfield Fire Station (Crash Station) Location and Current Airfield Fire Station (Crash Station), Original Firefighter Training Area, Former Firefighter Training Area, Building 7525 – Former North Fort Fire Station, Building 4172 – Current Firefighter Training Area, Building 1736 – Former Fire Station #1, and Building 7156 – North Fort Fire Station and AFFF Storage Building.

[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

Conceptual Site Model for Eight AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
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Figure 7-11

Source Medium	Release / Transport Mechanisms	Environmental Media	Release / Transport Mechanisms	Exposure Media	Exposure Route	Human Receptors: On-Installation: Site Worker	On-Installation: Resident	On-Installation: Recreational User	Off-Installation: All Types of Receptors [2]
AFFF Releases to Soil and/or Paved Surfaces				Soil	Ingestion	○	○	○	○
					Dermal Contact	○	○	○	○
					Inhalation (dust)	○	○	○	○
	Desorption / Dissolution	Groundwater		Groundwater	Ingestion	○	○	○	○
					Dermal Contact	○	○	○	○
			Discharge / Recharge						
	Surface Runoff / Dissolution / Adsorption	Surface Water		Surface Water [1]	Ingestion	○	○	○	○
					Dermal Contact	○	○	○	○
			Adsorption / Desorption	Sediment	Ingestion	○	○	○	○
					Dermal Contact	○	○	○	○

Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

AOPI = Area of Potential Interest, AFFF = aqueous film forming foam

Conceptual Site Model for Bradley Tank Fire Location AOPI
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Fort Polk, LA

Figure 7-12

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