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

Fort Rucker, Alabama

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Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

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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 Rucker PA/SI was completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), The National Oil and Hazardous Substances Pollution Contingency Plan, and Army/Department of Defense policy and guidance.

Fort Rucker is in the southeast region of Alabama, approximately 20 miles northwest of the City of Dothan. The installation footprint covers portions of Dale and Coffee counties. Relative to major regional cities, the installation is approximately 160 miles east of Mobile, Alabama, 90 miles southwest of Columbus, Georgia, 80 miles southeast of Montgomery, Alabama, 10 miles east of Enterprise, Alabama, and 0.5 mile north of Daleville, Alabama. Fort Rucker is bordered to the north and west by agricultural land, to the south by the towns of Daleville and Enterprise, and to the east by the town of Ozark. The installation encompasses an approximate total of 63,000 acres, with most of the land comprised of the main cantonment, airfields, stage fields (SFs), and tactical sites. Of the total acreage, 3,626 acres are owned outside the main cantonment and 1,674 acres are leased[1]. This PA/SI focused on the main cantonment and the non-contiguous outlying rotary-wing pads and fixed-wing airstrips.

The Fort Rucker PA identified 38 AOPIs (28 operational locations) for investigation during the SI phase. Operational locations refer to areas (i.e., Stage Fields [SFs], Army Heliports [AHPs], or Army Airfields [AAF]) where multiple AOPIs were identified in close proximity. SI sampling results from the 38 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 38 AOPIs. Thirty-five of the 38 AOPIs (25 of the 28 operational locations) had PFOS, PFOA, and/or PFBS present at concentrations greater than the risk-based screening levels. The Fort Rucker PA/SI identified the need for further study in a CERCLA remedial investigation. **Table ES-1** below summarizes the PA/SI sampling results and provides recommendations for further study in a remedial investigation, recommendations for supplemental SI sampling, or no action at this time at each AOPI.

[1] Rucker. 2009. Fort Rucker/Wiregrass Area Joint Land Use Study. October

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

AOPIs	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Allen SF	Yes	No	Further study in a remedial investigation
Brown SF	Yes	No	Further study in a remedial investigation
Cairns Army Airfield ([AAF]; Hangar 30104, Hangar 30106, Hangar 30108, Fire Station, and Cairns Wastewater Treatment Plant)	Yes	No	Further study in a remedial investigation
Ech SF	Yes	Yes	Further study in a remedial investigation
Former Fire Training Area/Solid Waste Management Unit -15	Yes	No	Further study in a remedial investigation
Former Metal Plating Shop	NS[1]	No	Supplemental SI groundwater sampling
Fire Truck Staging Area	NS[2]	No	Supplemental SI groundwater sampling
Fire Training Area	Yes	Yes	Further study in a remedial investigation
Goldberg SF	Yes	No	Further study in a remedial investigation
Hanchey ArmyHeliport (AHP) (Hangar 50202, Hangar 50204, and Fire Station)	Yes	No	Further study in a remedial investigation
Hatch SF	Yes	No	Further study in a remedial investigation
Highbluff SF	Yes	Yes	Further study in a remedial investigation
Hooper SF	Yes	No	Further study in a remedial investigation
Hunt SF	Yes	Yes	Further study in a remedial investigation
Knox AHP (Hangar 25165 and Fire Station)	Yes	No	Further study in a remedial investigation
Louisville SF	Yes	ND	Further study in a remedial investigation
Lowe AHP (Hangar 40120 and Fire Station)	Yes	No	Further study in a remedial investigation

AOPIs	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Lucas SF	No	No	No action at this time.
Molinelli Forward Area Refueling Point	Yes	No	Further study in a remedial investigation
Rucker Fire Station	Yes	No	Further study in a remedial investigation
Runkle SF	Yes	Yes	Further study in a remedial investigation
Shell AHP (Hangar 60104, Hangar 60105, and Fire Station)	Yes	No	Further study in a remedial investigation
Skelly SF	Yes	ND	Further study in a remedial investigation
Stinson SF	Yes	No	Further study in a remedial investigation
Tabernacle SF	Yes	No	Further study in a remedial investigation
Tac X SF	Yes	No	Further study in a remedial investigation
Toth SF	Yes	No	Further study in a remedial investigation
Rucker Wastewater Treatment Plant	Yes	No	Further study in a remedial investigation

Notes:

1. Investigation efforts were focused on soil at the Former Metal Plating Shop. Groundwater samples were not taken due to limited site knowledge regarding the location of any potential use, storage, and/or discharge of potentially PFAS-containing material and due to lack of information on groundwater flow direction.
2. Investigation efforts at the Fire Truck Staging Area were focused on soil since the AFFF release occurred in 2019 and the specific location was known. In addition, limited information was available on groundwater flow direction.

Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
ND – not detected
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 Rucker 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 Rucker 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 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 2019 OSD memo, on 08 April 2021, USEPA published an updated toxicity assessment for PFBS (USEPA 2021). Based on the updated toxicity assessment for PFBS, the OSD issued a memorandum on 15 September 2021 to include updated 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 (also 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 Rucker, PA/SI development followed the process described below. **Section 3** provides a summary of the PA activities completed, and **Section 6** provides a summary of the SI activities completed for Fort Rucker. 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 the Army PA Team (United States Army Environmental Command [USAEC], United States Army Corps of Engineers [USACE], Arcadis U.S., Inc. [Arcadis]) and Fort Rucker. The kickoff call occurred 10 July 2018, six 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 Rucker.

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

- The Installation Management Command (IMCOM)/Army Materiel Command 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, that may be evaluated as AOPIs, 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 20 to 23 August 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 Rucker. 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, were 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 23 August 2018 with the installation to discuss preliminary findings of the PA site visit. A brief overview of the areas visited was discussed with Fort Rucker personnel.

1.3.3 Post-Site Visit

After the 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 Rucker.

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 requirements or preferences
- identify overlapping unexploded ordnance or cultural resource areas
- discuss the plan for investigation derived waste (IDW) handling and disposal
- identify specific installation access requirements and potential schedule conflicts
- 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 management of IDW handling and disposal
- finalize 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 Rucker (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 Table B-15 of 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 Rucker, 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 Rucker is located approximately 20 miles northwest of Dothan, Alabama. It is surrounded by the towns of Enterprise on the west, Daleville on the south and Ozark on the east (**Figure 2-1**). Fort Rucker covers a total of approximately 63,000 acres, with most of the land comprised of the main cantonment, airfields, stage fields (SFs), and tactical sites. The majority of Fort Rucker property is situated in Dale and Coffee counties. Fort Rucker encompasses approximately 57,772 acres at the main cantonment, 3,626 acres at stage-fields within a four-county area, and 1,674 acres of leases and easements (**Figure 2-2**).

2.2 Mission and Brief Site History

The installation began operations on 01 May 1942 as the Ozark Triangular Division Camp. In 1955, Fort Rucker was designated as the U.S. Army Aviation Center and a permanent U.S. military fort. In 1973, Fort Rucker became the center for all U.S. Army aviation flight training with the mission to maintain and operate facilities and provide services and material to support the helicopter pilot training for the Army. Fort Rucker is the largest helicopter training installation in the world. As the U.S. Army Aviation Center of Excellence and the home of the Aviation Branch, Fort Rucker is charged with producing aviation soldiers for the world's premier aviation force.

In addition to this role as the U.S. Army Aviation Center of Excellence, Fort Rucker houses several tenant activities and directorates. It is the home for the U.S. Army Combat Readiness Center, Warrant Officer Career College, Air Traffic Services Command, Army Aviation Flight Test Directorate, Army School of Aviation Medicine, and Aeromedical Research Laboratory.

2.3 Current and Projected Land Use

The current land use includes numerous satellite training facilities, airfields, SFs and properties that are associated with Fort Rucker. There are no projected changes to the current land use. The various facilities at, or otherwise operated by Fort Rucker include:

- Allen Stagefield (SF)
- Andalusia Repeater
- Ariton Repeater
- Blue Springs
- Brown SF
- Cantonment Area (North and South Fort Rucker)
- Cairns Army Airfield (AAF)
- Ech SF

- Goldberg SF
- Hammond SF
- Hanchey Army Heliport (AHP)
- Hatch SF
- High Bluff SF
- Highfalls SF
- Hooper SF
- Hunt SF
- Knox AHP
- Lake Tholocco
- Louisville SF
- Lowe AHP
- Lucas SF
- Molinelli SF
- National Guard Unit Training Equipment Site
- Nexrad Echo
- Range Operations
- Runkle Federal Communications Commission
- Runkle SF
- Shell AHP
- Skelly SF
- Stinson SF
- Tabernacle SF
- Tac-X SF
- Toth SF

In addition to the facilities owned by Fort Rucker, the installation also utilizes several airfields in southern Alabama through long-term leases. These airfields include:

- Enterprise Airport
- Florala Municipal Airport
- Southeast Alabama Regional Airport (Trinity Analysis & Development Corp. 2016)

2.4 Climate

Fort Rucker's weather is mild and humid. The average annual rainfall is approximately 55 inches. The temperature range is an average high of 85 degrees Fahrenheit in the summer months and an average low of 40 degrees Fahrenheit in the winter months.

2.5 Topography

Fort Rucker is positioned in a topographical area of southeastern Alabama that consists of moderately rolling lands with elevations ranging from 200 to 300 feet above mean sea level. The topography varies throughout the installation. Portions of the facility consist of low hills with narrow drainage ways and other

portions consist of level or gently sloping ridges with moderately sloping sides and narrow drainage ways (**Figure 2-3**).

2.6 Geology

Geologic formations that outcrop at Fort Rucker are all tertiary in age. The cretaceous formations are the Ripley Formation overlain by the Providence Sand. These formations, from oldest to youngest, are Tuscahoma Sand, Hatchetigbee Formation, Tallahatta Formation and Lisbon Formation. The formations are placed in two groups because of their lithologic similarities. All AOPIs are located where the Tallahatta and Lisbon formations outcrop. These units are 50 to 250 feet thick and consist of beds of sand and clay with thin beds of siltstone, sandstone overlain by sand, clay and limestone. The clay unit at the base of the Tuscahoma Sands acts as a confining layer. The depth of the confining unit varies but is estimated around 120 to 180 feet below ground surface (bgs) in the region (CCI and Arcadis 2005) and 200 to 300 feet bgs within the main installation of Fort Rucker (Scott et al. 1984). The total thickness of the Coastal Plain formations in this area is approximately 1,200 feet (CCI and Arcadis 2005).

2.7 Hydrogeology

Fort Rucker is drained by tributaries of Claybank Creek and the Choctawhatchee River. The northwestern area is drained by Shivers Creek, Pumpkin Creek, Bowles Creek and Tanyard Branch. These creeks flow into Harris Mill Creek, which flows southeastward into Steep Head Creek. In the central area, Black Mill Creek and Claybank Creek flow southward and collect drainage from the west. The southeast is drained by Brooking Mill Creek, Gin Branch and other small tributaries that flow southward into the Choctawhatchee River. South of Fort Rucker in Daleville, Claybank Creek flows into the Choctawhatchee River, which continues southward through southern Alabama and Florida into the Gulf of Mexico.

Three aquifers have been identified in the vicinity of Fort Rucker within the interbedded sands, clays and limestones that characterize the regional geology. These aquifers are the Lisbon, Nanafalia-Clayton, and Providence-Ripley aquifers. Groundwater for these aquifers is derived from rainfall or streams flowing to the recharge zone, which is located approximately 20 to 50 miles north of Fort Rucker.

The Lisbon aquifer is the uppermost “water table” aquifer and consists of sand beds in the Lisbon, Tallahatta and Hatchetigbee formations. The thickness of these beds varies, and the beds are laterally discontinuous. Water levels in the Lisbon aquifer range from the land surface in marshy areas to a depth of 40 feet bgs in higher, well-drained areas. Recharge to the Lisbon aquifer is exclusively from precipitation. Discharge is to surface streams and seeps at low points within stream valleys. Regionally, groundwater in the Lisbon aquifer flows to the south. The Lisbon aquifer is separated from the lower aquifer by the Tuscahoma confining unit.

The Nanafalia-Clayton aquifer is a continuous aquifer composed of sand beds in the Clayton formation. Confining layers separate this aquifer from the surficial Lisbon aquifer and the underlying Providence - Riley aquifer. Recharge occurs in areas north of Fort Rucker where surface exposures of the Nanafalia and Clayton formations are present. Some discharge occurs through well pumping. Regionally, groundwater flows to the south but local cones of depression have developed at Fort Rucker and in the surroundings towns as a result of excessive well pumping. For the past 40 years, the potentiometric surface at Fort Rucker has declined 50 to 60 feet below its original elevation.

The Providence-Riley aquifer is a confined aquifer composed of sand beds in the Providence Sand and Riley Formation. A confining clay separates the aquifer from the overlying Nanafalia-Clayton aquifer. Like the Nanafalia-Clayton aquifer, recharge occurs in areas to the north of Fort Rucker where the Providence and Riley formations are exposed at the surface. Groundwater flows to the south. There are no instances of a depressed potentiometric surface within the Providence-Riley aquifer due to excessive well pumping (CCI and Arcadis 2005).

2.8 Surface Water Hydrology

If stormwater becomes contaminated with pollutants due to a significant spill or off-site migration of sediment, the polluted runoff will discharge through an outfall or flow directly to the nearest creek, stream, or river. On the main cantonment, the general flow of stormwater and the subsequent flow of any product ultimately enter the Choctawhatchee River. Fort Rucker's training facilities are located both on and around the main cantonment. Drainage and runoff from these sites feed the numerous creeks, streams, and tributaries located near these facilities. Ultimately, the Choctawhatchee, Pea, and Conecuh Rivers receive the drainage and runoff from training areas and carry it southward through southern Alabama and Florida, subsequently depositing it in the Gulf of Mexico (Trinity Analysis & Development Corp. 2016).

The Choctawhatchee, Pea, and Conecuh Rivers are part of the Choctawhatchee Watershed. The Choctawhatchee Watershed is a critical area and may act as a conveyance if drainage or runoff becomes contaminated. In the event of contamination, the accurate delineation of this watershed will allow first responders to properly maneuver response equipment and respond in a manner that reduces the ecological, social, cultural, and community impacts of any release of pollutants (Trinity Analysis & Development Corp. 2016).

As mentioned above, several prominent streams and rivers crosscut Fort Rucker and the surrounding region such as Claybank Creek and the Choctowhatchee River. Numerous surface streams are located at Fort Rucker. Surface streams are not used for recreational purposes (e.g., swimming, fishing, or boating) or for water supply. These streams primarily serve as wildlife habitat (CCI and Arcadis 2005).

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 constituents at Fort Rucker.

2.9.1 Stormwater Management System Description

In general, stormwater at Fort Rucker is conveyed to outfalls and/or directly to the nearest creek, stream, or river. The outfalls at Fort Rucker are typically directed toward a surface water body or ephemeral retention ponds where stormwater can infiltrate to groundwater.

2.9.2 Sewer System Description

In September 2003, under the DoD's Utility Privatization Program, American Water was awarded ownership and a long-term contract for the operations and maintenance, upgrades and renewal and

replacement of the water and wastewater distribution and collections systems and treatment facilities at Fort Rucker.

Two wastewater treatment plants (WWTPs) are in service at Fort Rucker, both of which are maintained by American Water. The main WWTP is located on the main installation and a smaller WWTP is located at the Cairns AAF.

2.10 Potable Water Supply and Drinking Water Receptors

There are numerous production wells on the main installation serving an estimated population of 20,000. The shallow aquifer does not have sufficient saturated thickness to be a major aquifer and may yield 10 gpm in select areas in the region (CCI and Arcadis 2005).

For outlying Fort Rucker properties (e.g., SF and AAF), water is supplied by local city or county water services or local municipal wells. Based off documentation received by Fort Rucker personnel, water supply wells are located at some outlying properties.

Within the region surrounding Fort Rucker, numerous wells have been identified (**Figure 2-4**). These wells range in depth from less than 50 feet to more than 1,000 feet. Based on the regional geology, a confining unit rests atop of the Tuscahoma formation that separates the upper water bearing units (Lisbon, Tallahatta, and Hatchetigbee Formations) from the aquifers below (Tuscahoma, Nanafalia, Clayton, and Providence Formations). The depth of the confining unit varies but regionally has an approximate range of 120 to 180 feet bgs. Within the main installation of Fort Rucker, the confining unit has been recorded between 200 to 300 feet bgs (Scott et al. 1984). In addition to the private and public wells, approximately 19 public supply wells were identified through an Environmental Data Resources, Inc. (EDR) report (**Appendix E)**, which includes search results from a variety of environmental, state, city, and other publicly available databases for a referenced property.

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.

The Fort Rucker Directorate of Public Works (DPW) Environmental and Natural Resources Division in partnership with the U.S. Fish and Wildlife Service determined that the following federally listed reptiles and clams have been identified at Fort Rucker (Rucker 2021). The endangered Choctaw Bean and Southern Kidneyshell and the threatened Fuzzy Pigtoe, Tapered Pigtoe, and Southern Sandshell have been identified in Claybank Creek and Steephead Creek. A Species of Concern, the Gopher Tortoise is under consideration for an official listing of endangered or threatened. In addition, breeding grounds for the threatened Atlantic Sturgeon and habitat for the threatened Eastern Indigo Snake are in the vicinity of Fort Rucker (IPaC 2021). Wetlands are located on Fort Rucker alongside the tributaries of the Choctawhatchee River. Several flood-prone areas are located along Claybank Creek and a few other locations.

2.12 Previous PFAS Investigations

Previous (i.e., pre-PA) PFAS investigations relative to Fort Rucker, including both those conducted and not conducted by the Army, are summarized to provide full context of available PFAS data for Fort Rucker. However, only data collected by the Army will be used to make recommendations for further investigation. In response to the third Unregulated Contaminant Monitoring Rule (UCMR3) and IMCOM Operations Order 16-088, water systems serving the Fort Rucker main cantonment were sampled by USEPA Method 537. The primary water supply wells serving the main cantonment were sampled and tested for select PFAS compounds (PFOS, PFOA, and PFBS). No detections were found in these water systems (**Table 2-1**). The laboratory that analyzed samples under UCMR3 met the USEPA's UCMR3 Laboratory Approval Program application and Proficiency Testing criteria for USEPA Method 537 Version 1.1. Most regions surrounding Fort Rucker were not tested under this third Unregulated Contaminant Monitoring Rule sampling.

In June 2018, the installation tested the on-post water supply systems for PFOS, PFOA, and PFBS by USEPA Method 537. All the water supply systems are treated systems, and all samples were collected post-treatment. PFAS compounds were not detected (**Table 2-1**).

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 Rucker, data was collected from three principal sources of information and are described in the subsections below:

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

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 H**) during the PA process for Fort Rucker are 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.**

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 Rucker fire department documents, Fort Rucker DPW documents, and GIS files. Internet searches were also conducted to identify publicly available and other relevant information. Additionally, an EDR report (**Appendix E**) generated for Fort Rucker was reviewed to obtain off-post water supply well information. A list of the specific documents reviewed for Fort Rucker 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 Rucker is presented below.

- Fort Rucker, Chief Environment and Natural Resource Division and Pesticide Manager
- Fort Rucker, Chief, Environment Management Branch
- Fort Rucker, Spill Prevention, Control and Countermeasures, Spill Response and Compliance Inspection Manager
- Fort Rucker, Hazardous Waste, Hazardous Materials Manager
- Fort Rucker, National Environmental Policy Act Manager

- Fort Rucker, Recycling, Storm/Wastewater and Solid Waste Manager.
- Fort Rucker, IRP and Historic Archeological Resource Manager
- Fort Rucker, Assistant Fire Chief
- Fort Rucker, Aviation Center Logistics Command Environmental Specialist
- Fort Rucker, Aircraft Component Plater
- M1 Support Services (Subcontractor to Fort Rucker), Environmental Head
- Fort Rucker, DPW, Operations Maintenance Division Manger
- Pride (Subcontractor to Fort Rucker), Manager

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

3.3 Site Reconnaissance

Site reconnaissance and visual surveys were conducted at preliminary locations identified at Fort Rucker during the records review process, the installation in-brief meeting, and/or during the installation personnel interviews. The site reconnaissance logs are provided in **Appendix H**.

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.

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

Fort Rucker 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.

As identified in the current assets file and confirmed during site reconnaissance with fire department personnel, AFFF is stored at the Fire Training Area (FTA). IMCOM documentation originating from the 2016 AFFF data call indicates that the AFFF storage as of 2016 at Fort Rucker totaled 1,769 gallons and is specific to firefighting vehicle storage. The total volume increases to 9,569 gallons when including the AFFF volume in 11 Fort Rucker hangar suppression systems (**Table 4-1**). Additionally, according to Fort Rucker Fire Department personnel, each of the outlying SFs house rapid intervention vehicles (RIVs). Each RIV holds between 70 and 120 gallons of AFFF. Presumably, the total reported AFFF volume does not include AFFF from outlying SF firefighting vehicles. Across 16 outlying SFs, an additional 1,120 to 1,920 gallons of AFFF may be present at Fort Rucker. Therefore, the total estimated volume of AFFF at Fort Rucker and installation property may range from 10,689 to 11,489 gallons.

Table 4-1. Summary of Foam Inventory

Hangar	Volume (gallons) [1]	Current Product	Notes
Building 25165	500	CHEMGUARD® 2%	Not Available (N/A)
Building 30104	700	ANSULITE® 3%	N/A
Building 30106	700	CHEMGUARD® 3%	N/A
Building 30108	700	Not listed	N/A

Hangar	Volume (gallons) [1]	Current Product	Notes
Building 50400	1,400	CHEMGUARD® 2%	Includes two systems; contains High Expansion foam
Building 50202	750	ANSULITE® 3%	N/A
Building 50204	1,050	ANSULITE® 3%	N/A
Building 40120	1,000	ANSULITE® 3%	N/A
Building 60104	500	CHEMGUARD® 3%	N/A
Building 60105	500	CHEMGUARD® 3%	N/A
Total in Vehicles	1,769	C6 MIL-SPEC AFFF 3%	21 Vehicles
Total	**9,569**	Total Volume of AFFF Capable Systems	

Source: Master IM1COM FES Annex A to OPORD 16-040 13 Apr 2016

[1] The volumes listed represent the total volume of AFFF capable systems.

Table includes an estimate for emergency fire response vehicles at off-post SFs.

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

Following document research, personnel interviews, and site reconnaissance at Fort Rucker, metal-plating processes, and WWTPs were also 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**.

Potential PFAS use associated with metal plating activities may also be relevant to Army installations. During metal plating operations, a metal surface may be treated with a layer of electrochemically deposited metals in an acid bath. PFAS, specifically PFOS, have been used in metal plating operations as surface tension-reducing wetting agents to mitigate the release of aerosolized chemicals into a working environment. Hard chromium plating is one type of metal plating operation where PFAS-containing mist suppressants were commonly used. Historically, it was common for spent plating baths from metal plating operations to be disposed of in a lined or unlined pit or into a sanitary or storm sewer. Therefore, PFAS present in mist suppressants during the metal plating process could be released to the environment.

Of the metal-plating processes, cadmium-plating was the most common. Current plating operations at Fort Rucker since 2006 are only cadmium-based, confined to Building 1001, and use an electro-brush plating process that eliminates the need for a potentially PFAS-containing mist suppressant. Prior to the construction of Building 1001, plating operations occurred in Building 415. The Building 415 facility appears to have previously had a roof-mounted ventilation system for fume management, implying hazardous plating operations were likely. Building 415 operations ended in approximately 1990, however no current personnel have knowledge of historical plating activities. If chromium plating operations

occurred, there is no information regarding the chromium plating wastewater operations or the use of PFAS-containing mist suppressants.

Two WWTPs are in service at Fort Rucker, both of which are maintained by American Water. The main WWTP is located on the main installation and a smaller WWTP is located at the Cairns AAF. The Cairns WWTP received an AFFF release to the environment on 23 September 2019 (volume unknown). The aerators at the Cairns WWTP caused the AFFF to foam which may have overflowed into the surrounding soil. In 2014, a contractor emptied the Hangar 25165 AFFF concentrate tank into the sanitary system. This event resulted in a large secondary release of PFAS-containing materials at the main WWTP.

During a telephonic interview with the IMCOM Pest Management Consultant, it was noted that products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS and were phased out in 1996. During the PA record review, the IMCOM Pest Management Consultant provided records of potentially PFAS-containing pesticides and insecticides used and/or stored at Army installations and did not identify Fort Rucker as an installation having used or stored PFAS-containing pesticides/insecticides. Interviews with Fort Rucker personnel conducted during the PA site visit did not indicate that potentially PFAS containing pesticides were used at Fort Rucker. Interview logs and site reconnaissance records are included in **Appendix G** and **Appendix H**, respectively.

Following document research, personnel interviews, and site reconnaissance at Fort Rucker, no additional AOPIs were identified related to other potential PFAS sources.

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 Rucker) 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.

The Fort Rucker Fire Department holds mutual aid agreements with several civilian municipalities. On at least two occasions, the Fort Rucker Fire Department has assisted local municipalities in response fire emergencies where AFFF was deployed. In 1997 or 1998, the Fort Rucker Fire Department assisted the City of Troy in response to a fuel tanker truck fire near the intersection of Route 231 and Route 87 (approximate coordinates: 31.7815° N, -85.9678° W). AFFF was utilized to contain this fuel fire. In the early 2000s, the Fort Rucker Fire Department responded to a plant fire (or fuel depot, details are limited) where a large, but unknown, volume of AFFF was deployed (approximate coordinates: 31.4941° N, -85.6909° W).

5 SUMMARY AND DISCUSSION OF PRELIMINARY ASSESSMENT RESULTS

The preliminary locations evaluated for potential use, storage and/or disposal of PFAS-containing materials at Fort Rucker 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, 38 areas have been identified as AOPIs. The process used for refining these areas is presented on **Figure 5-1**, below.

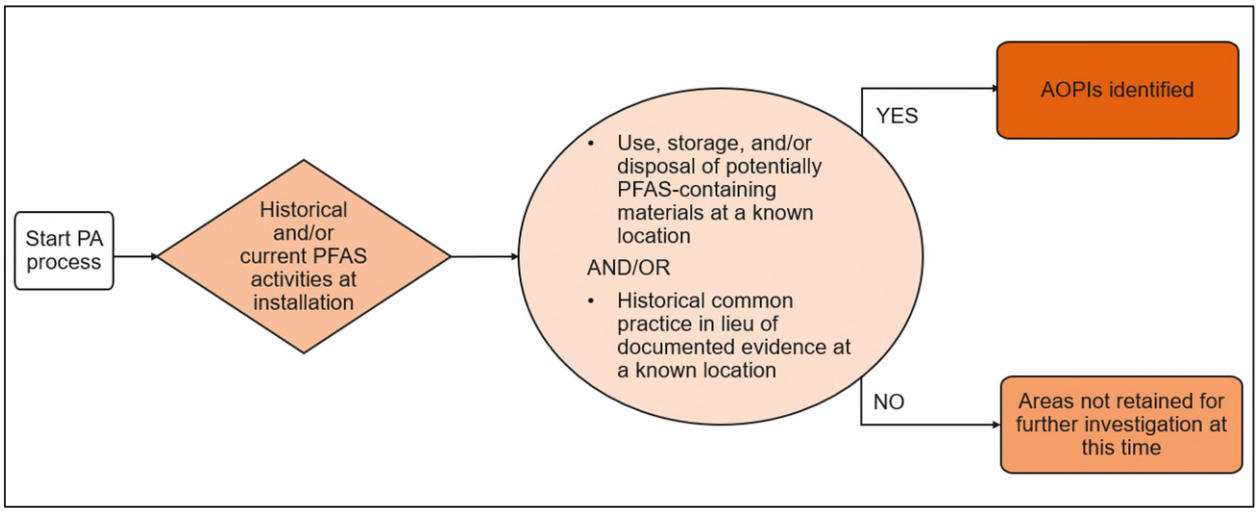

Figure 5-1: AOPI Decision Flowchart

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 Rucker are presented in **Section 9**.

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 are 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
Current Metal Plating Shop	Active since 2012	Room 203 in building 1001. Only cadmium plating	Use of electro-brush during plating activities, eliminating the use of potentially PFAS-containing mist suppressant.
Highfalls SF	Open since 27 February 1967; currently active	No evidence of structures at this site	No evidence of storage or use of PFAS-containing materials

5.2 AOPIs

Overviews for each AOPI identified during the PA process are presented in this section. One of the AOPIs overlap with Fort Rucker IRP sites and/or Headquarters Army Environmental System (HQAES) sites: Former Fire Training Area (FFTA), Solid Waste Management Unit (SWMU-15). The AOPI, overlapping IRP site identifier, HQAES number, and current site status are discussed within each AOPI subsection presented below. At the time of this PA, none of the Fort Rucker IRP sites have historically been or are currently being investigated for the possible presence of PFAS constituents.

The AOPI locations are shown on **Figure 5-2**. Aerial photographs of each AOPI are presented on **Figures 5-3** through **5-30** and include active monitoring wells in the vicinity of each AOPI.

5.2.1 Allen Stage Field

Allen SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. Allen SF is located south of the main cantonment, is approximately 115 acres and houses three permanent structures, including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-3**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the Allen SF, it was noted that AFFF concentrate was changed out and/or nozzle testing potentially occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil.

5.2.2 Brown Stage Field

Brown SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The SF is located west of the main cantonment, is approximately 165 acres, and houses five permanent structures, including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-4**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing occurred annually (likely) and that the AFFF may have been released to the environment via paved surfaces and/or soil at the SF.

5.2.3 Cairns Army Airfield

Cairns AAF consists of five AOPIs: Hangar 30104, Hangar 30106, Hangar 30108, Cairns Fire Station, and Cairns WWTP. These locations were identified as AOPIs following records research, personnel interviews, and site reconnaissance due to the presence of AFFF fire suppression systems in the hangars, AFFF capable emergency service equipment in the fire station, and confirmed releases of AFFF to the WWTP. Cairns AAF is located south of the main cantonment (**Figure 5-5**). The airfield is approximately 800 acres and houses dozens of permanent structures. The Cairns WWTP encompasses an area of approximately 0.5-acres and is located on the north side of the Cairns AAF access road. The current and future land use is classified as industrial. All hangar AFFF systems are required by the National Fire Protection Association (NFPA) code to be tested periodically, however frequency and procedure of this testing is unknown. AFFF releases from the hangars, fire station, or via emergency response would potentially impact paved surfaces and surface soil. No AFFF releases for emergency response have been documented. Several non-emergency releases of AFFF to the environment have been identified: Hangar 30104 AFFF fire suppression system was leaking during the Army PA team site reconnaissance in 2018, Hangar 30106 AFFF fire suppression system has leaked historically (volume unknown), Hangar 30108 AFFF fire suppression system was tested within the last three years with AFFF at the airfield, and the Cairns WWTP received an AFFF release to the environment on 23 September 2019 (volume unknown). The aerators at the WWTP caused the AFFF to foam which may have overflowed into the surrounding soil.

5.2.4 Ech Stage Field

Ech SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Ech SF, located in the middle of the main cantonment, is approximately 105 acres, and houses three permanent structures, including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-6**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the Ech SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and the AFFF may have been released to the environment via paved surfaces and/or soil.

5.2.5 Former Fire Training Area (SWMU-15; HQAES 1252.1035)

The FFTA (SWMU-15) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical AFFF training activities. The current and future land use is classified as industrial, and the site is closed and under restricted land use controls. FFTA (SWMU-15) is approximately 4 acres and located in the southeast portion of the main cantonment, within SWMU-11 (former landfill) and adjacent to Knox AHP (**Figure 5-7**). The site was operable from the 1950s until 1994. From the 1950s to 1986 the training pit was approximately 60-feet in diameter and 3 feet deep and lined with clay. In 1986, the FFTA was reconstructed to include a brick liner. During this construction phase, a portion of the original site was excavated and buried nearby. During training, waste petroleum, oil, and lubricants (jet propellant 4, motor gasoline, and other fuels) were poured onto a water buffer inside the pit, ignited, and extinguished. AFFF was reportedly used during weekly fire training exercises conducted between approximately 1970 through 1994.

As part of the IRP, the FFTA is identified as SWMU-15 (FTRU-051, HQAES: 1252.1035). The site has undergone several remedial investigatory steps. Current remedial action consists of monitored natural attenuation of contaminants of concern (volatile organic compounds); land use controls are to continue for the next 30 years (Fiscal Year 2045; Rucker 2016).

5.2.6 Former Metal Plating Shop

The Former Metal Plating Shop is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the possible use of PFAS-containing mist suppressants during historical metal plating processing. This operation was originally housed in building 415 which is located along the southern boundary of the main cantonment (**Figure 5-8**). The building is currently not used for metal plating operations. It is unknown if and how waste potentially containing PFAS constituents was discharged.

5.2.7 Firetruck Staging Area

The Firetruck Staging Area is identified as an AOPI following personnel interviews due to an AFFF leak from a staged firetruck to soil in 2019. An estimated 100 to 200 gallons of AFFF leaked over an unknown amount of time. It is unknown if other leaks have occurred. The site is currently used as a storage area for fire trucks. Prior use of the site is unknown. The staging area is located along the southern boundary of the main cantonment and consists of an approximately 3.5-acre open field (**Figure 5-9**).

5.2.8 Fire Training Area and Foam Storage (Building 8106)

The FTA and Foam Storage (Building 8106) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to confirmed AFFF training, nozzle/proportioner testing, and AFFF storage. Operations at the FTA began in March 2010, with the current and future land use classified as industrial. The site is located along the southern boundary of the main cantonment (**Figure 5-10**). The total area used for training covers approximately 1.5 acres. AFFF-specific training occurs in an approximately 0.5-acre linear parcel along the fence line in the southwest corner of the site. An old tanker truck is used as a target. Nozzle testing is reported to be performed annually on each AFFF-capable vehicle (30 trucks), during which 5-gallons of AFFF is released per vehicle. Adjacent to the FTA, Building 8106 serves as the storage area for AFFF. Impacted media includes paved surfaces, soil, and potentially surface water. The latter being an ephemeral stream system to the south of the training site with two associated outfalls at the site.

5.2.9 Goldberg Stage Field

Goldberg SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Goldberg SF is located east of the main cantonment, is approximately 110 acres, and houses two permanent structures: an air traffic control tower and an operation building where emergency service equipment is stored (**Figure 5-11**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing may have

occurred annually and that AFFF may have been released to the environment via soil and paved surfaces.

5.2.10 Hanchey Army Heliport

Hanchey AHP consists of three AOPIs: Hangar 50202, Hangar 50204, and the Hanchey AHP Fire Station (Building 50125). These locations are identified as AOPIs following records research, personnel interviews, and site reconnaissance due to the presence of AFFF fire suppression systems and AFFF-capable emergency service equipment.

Hanchey AHP is located in the southeast portion of the main cantonment, covers an area of approximately 0.8 square mile, and houses approximately two dozen buildings (**Figure 5-12**). The current and future land use of this site is and will remain industrial. Hangars 50202 and 50204 are equipped with 750-gallons and 1,050-gallons of AFFF, respectively. The hangars began operation in July 1959 and it is unknown when the AFFF fire suppression systems were installed. All hangar AFFF systems are required by NFPA code to be tested periodically; however, the frequency and procedure of this testing is unknown. Through personnel interviews, AFFF releases to the environment via low lying drainage/infiltration areas at Hanchey AHP was confirmed. The volume and timeframe of the release event(s) is unknown. There is no separate storage of AFFF at the fire station. AFFF is stored only in the trucks with a maximum of approximately 200 gallons at any time. It is unknown if any releases have occurred.

AFFF releases to the environment at Hangar 50202 or Hangar 50204 would mostly be contained to paved surfaces but impacts to soil are possible at the fire station. Several stormwater drop inlets are located outside of the hangars. It was noted that the stormwater drainage network at Hanchey AHP is damaged (e.g., collapsed or cracked), so AFFF entering the stormwater system could directly impact subsurface soil.

5.2.11 Hatch Stage Field

Hatch SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Hatch SF is located on the eastern boundary of the main cantonment, consists of approximately 175 acres, and houses four permanent structures including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-13**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil.

5.2.12 Highbluff Stage Field

Highbluff SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Highbluff SF is located south of the main cantonment, contains approximately 95 acres, and houses three permanent structures including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-14**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out

and/or nozzle testing likely occurred annually and the AFFF may have been released to the environment via paved surfaces and/or soil at the SF.

5.2.13 Hooper Stage Field

Hooper SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Hooper SF is located east of the main cantonment, contains approximately 125 acres and houses two permanent structures: an air traffic control tower and an operation building where emergency service equipment is stored (**Figure 5-15**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil at the SF.

5.2.14 Hunt Stage Field

Hunt SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Hunt SF is located east of the main cantonment, consists of approximately 125 acres and houses three permanent structures: an air traffic control tower, an operation building where emergency service equipment is stored, and what appears to be a well pump house (**Figure 5-16**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil at the SF.

5.2.15 Knox Army Heliport

Two AOPIs are associated with Knox AHP: Hangar 25165 and the Knox AHP Fire Station (Building 25107). These two areas are identified as AOPIs following records research, personnel interviews, and site reconnaissance due to the presence of a 500-gallon AFFF fire suppression system and AFFF-capable emergency service equipment.

Knox AHP is located in the southeast portion of the main cantonment (**Figure 5-17**). The current and future land-use is industrial. Knox AHP began operation in 1982 and it is unknown when Hangar 25165 was built or when the AFFF fire suppression system was installed. All hangar AFFF systems are required by NFPA code to be tested periodically; however, the frequency and procedure of this testing is unknown. Release of AFFF would typically be to paved surfaces, soil and/or the unlined retention pond. It is unknown if the hangar is designed to drain to the adjacent retention pond via sanitary lines, or if the general surface conveyance is towards the retention pond. In 2014, a contractor emptied the Hangar 25165 AFFF concentrate tank into the sanitary system. This event resulted in a large secondary release of PFAS-containing materials at the WWTP.

There have been no documented releases of PFAS-containing materials to the environment from the Fire Station at Knox AHP. AFFF has been stored at Knox AHP onboard emergency response vehicles. The old fire station was replaced by the current fire station in 2018.

5.2.16 Louisville Stage Field

Louisville SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Louisville SF is located northeast of the main cantonment, consists of approximately 105 acres and houses four permanent structures, including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-18**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil. The SF was not in operation at the time of the Army PA team site reconnaissance.

5.2.17 Lowe Army Heliport

Lowe AHP consists of two AOPIs: Hangar 40120 and the Lowe AHP Fire Station (Building 40111). These locations are identified as AOPIs following records research and personnel interviews due to the presence of an AFFF fire suppression system and AFFF-capable emergency service equipment. The airfield is located along the western portion of the main cantonment, consists of approximately 320 acres, and about three dozen permanent structures (**Figure 5-19**). The current and future land use is classified as industrial. Operations at Lowe AHP began in 1942. Hangar 40120 was constructed in July 1958. It is unknown when the hangar was outfitted with the AFFF fire suppression system. All hangar AFFF systems are required by NFPA code to be tested periodically; however, the frequency and procedure of this testing is unknown. Therefore, the history of the AFFF fire suppression system is unknown, but these testing events would have released AFFF to the environment via impacted paved surfaces and/or soil.

It is unknown when the Lowe AHP Fire Station was built and began operation. Historical fire station activities are unknown, but it is highly probable that AFFF was stored at the fire station or on fire trucks and crash trucks.

5.2.18 Lucas Stage Field

Lucas SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Lucas SF is approximately 170 acres and houses five permanent structures, including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-20**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil.

5.2.19 Molinelli Forward Area Refueling Point

Molinelli Forward Area Refueling Point (FARP) is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The airfield is located along the northern boundary within the main cantonment, consists of approximately 160 acres and houses eight permanent structures and several large volume fuel storage tanks (**Figure 5-21**). The current and future land use is classified as industrial.

One crash occurred on 12 December 2010, where a reported 50 to 75 gallons of AFFF was deployed to extinguish this fire. The exact location of this crash is unknown. AFFF releases to the environment at Molinelli FARP would likely impact paved surfaces and/or surface soil.

5.2.20 Rucker Fire Station

The Rucker Fire Station is identified as an AOPI following records research and personnel interviews due to the high probability that AFFF was stored at the fire station or on fire trucks and/or crash trucks. The AOPI is located along the southern boundary within the main cantonment and consists of two permanent buildings and fire trucks (**Figure 5-22**). The fire station is active; however, historical fire station activities and dates of operations are unknown. According to site personnel no range fires are known to have been put out by the Fire Department since 2000 using AFFF and there is no knowledge of AFFF spills.

5.2.21 Runkle Stage Field

Runkle SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Runkle SF is located west of the main cantonment, consists of approximately 150 acres and houses five permanent structures including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-23**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and the AFFF may have been released to the environment via paved surfaces and/or soil at the SF.

5.2.22 Shell Army Heliport

Shell AHP consists of three AOPIs: Hangar 60104, Hangar 60105, and the Shell AHP Fire Station (Building 60101). These were identified as AOPIs following records research and personnel interviews due to the presence of AFFF fire suppression systems and AFFF-capable emergency service equipment. The airfield is located west of the main cantonment, consists of approximately 225 acres and 17 permanent structures (**Figure 5-24**). The current and future land use is classified as industrial. Operations at Shell AHP began in November 1960 and the site is currently active. Hangars 60104 and 60105 were constructed in July 1963. The hangars were outfitted with AFFF fire suppression systems at an unknown date, each are equipped with a 500-gallon AFFF tank. All hangar AFFF systems are required by NFPA code to be tested periodically, the frequency of and procedure followed during these tests is unknown. While historical fire station activities are unknown, it is highly probable that AFFF was stored at the fire station or on fire trucks and crash trucks. AFFF releases to the environment from the hangars, fire station, or during emergency response would impact paved surfaces and/or surface soils.

5.2.23 Skelly Stage Field

Skelly SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Skelly SF is located west of the main cantonment, consists of approximately 165 acres and houses two permanent structures: an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-25**). The

current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil.

5.2.24 Stinson Stage Field

Stinson SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Stinson SF is located west of the main cantonment, consists of approximately 175 acres and houses five permanent structures, including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-26**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil.

5.2.25 Tabernacle Stage Field

Tabernacle SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Tabernacle SF is located along the northwest boundary of the main cantonment, consists of approximately 115 acres and houses four permanent structures, including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-27**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil.

5.2.26 Tac X Stage Field

Tac X SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The SF is located southwest of the main cantonment, consists of approximately 55 acres and houses several permanent structures (**Figure 5-28**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely occurred annually and that the AFFF may have been released to the environment.

5.2.27 Toth Stage Field

Toth SF is identified as an AOPI following records research and personnel interviews due to presence of an RIV equipped with between 70 and 120 gallons of AFFF. The Toth SF is located southeast of the main cantonment, consists of approximately 125 acres and houses three permanent structures, including an air traffic control tower and an operation building that houses emergency response equipment (**Figure 5-29**). The current and future land use is classified as industrial. While there is no indication of emergency use of AFFF at the SF, it was noted that AFFF concentrate was changed out and/or nozzle testing likely

occurred annually and that the AFFF may have been released to the environment via paved surfaces and/or soil.

5.2.28 Rucker Wastewater Treatment Plant

The main WWTP at Fort Rucker is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the confirmed release of AFFF impacting the WWTP and the potential for PFAS compounds in the biosolid drying beds. The site is located in the western portion of the main cantonment and consists of approximately seven acres of land (**Figure 5-30**). The WWTP is currently active and serves the main cantonment of Fort Rucker. It is not known when site operations began. In 2014, an unknown volume of AFFF released from Knox AHP, which impacted the oxygenators at the WWTP. The AFFF foamed and overflowed, impacting surface soils. Additionally, PFAS compounds are not removed during the treatment process and can be potentially found in biosolids/sludge.

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at Fort Rucker, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at Fort Rucker at all 38 AOPIs at 28 operational locations 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 and groundwater pathways as potentially complete which guided the SI sampling. Surface water and sediment samples were not collected as waterbodies were not located on or immediately adjacent to the AOPIs. The QAPP Addendum details the sampling design and rationale based on each AOPI's preliminary CSM. The SI scope of work was completed in January 2021 through the collection of field data and analytical samples.

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 Rucker. Non-conformances to the prescribed procedures in the PQAPP and QAPP Addendum are described in **Section 6.3.4**. 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 groundwater and soil 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.

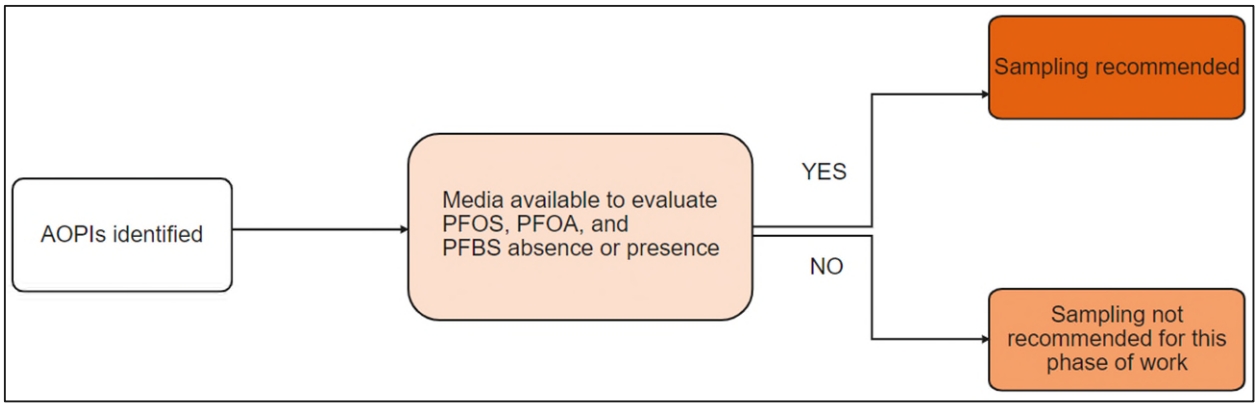

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI sampling activities at Fort Rucker is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2020). Groundwater samples were collected at 36 of the 38 AOPIs (26 of the 28 operational locations) from either existing monitoring wells, discrete interval screen point samplers and/or temporary wells installed via direct-push technology (DPT) or sonic drilling. Soil samples were collected via hand auger at all 38 AOPIs (28 operational locations).

It is unknown if or where potentially PFAS-containing waste was produced or discharged at the Former Metal Plating Shop. Due to limited site knowledge of use, storage, and/or discharge of PFAS-containing material at the Former Metal Plating Shop and limited information on groundwater flow direction, investigation efforts were focused on soil only at this AOPI. During the SI Kick-off Call, the installation identified a recent AFFF leak of an estimated 100 to 200 gallons at the Fire Truck Staging Area and requested the site be included during the SI. Since the AFFF release location was known, soil samples were collected directly at the release area to evaluate presence or absence of PFOS, PFOA, and PFBS at this AOPI. Because the release was a recent discreet event involving a low quantity, impact to groundwater was considered unlikely. Additionally, groundwater flow direction in this area was not known.

The sampling depths at existing monitoring wells were at approximately the center of the saturated screened interval. **Table 6-1** includes the monitoring well construction details for the existing wells sampled during the SI.

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 **Appendix I** and **J**, respectively.

6.3.1 Field Methods

At AOPIs where the groundwater flow direction was unknown and could not be readily determined from topographic maps, piezometer (PZ) wells were installed via DPT and surveyed during Phase I of the SI field event. Prior to Phase II, groundwater flow direction was evaluated from the PZ wells to plan groundwater sample collection. During Phase II of the SI field event, groundwater samples were collected by either discrete interval screen point samplers via DPT, rotosonic (Rucker Fire Station only), or from the temporary wells (e.g., PZ wells) installed during Phase I. Well construction details for the temporary wells and sample depth intervals for the grab groundwater samples are provided in **Table 6-1**. Groundwater samples were collected from existing monitoring wells using low-flow purging methods from approximately the center of the saturated screened interval.

Groundwater samples were collected with a peristaltic pump with PFAS-free disposable high-density polyethylene tubing with two exceptions. The groundwater sample at Rucker Fire Station was collected from a screen point sampler set via sonic drilling methods. The sample was collected via bailer due to depth and silt obstructing the screen. A groundwater sample at Tac X SF was collected via direct fill from a dedicated pump.

Soil samples were collected with a stainless-steel hand auger. All boreholes and temporary wells were abandoned with bentonite grout upon completion of the SI field event.

Decontamination procedures for non-dedicated equipment used during sampling are described in **Section 6.3.5**.

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 total organic carbon (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 from which EBs were collected include water level meters, hand augers, drill casing and cutting shoes, screen-point samplers, and bladder pump as applicable to the

sampled media. Source blanks were collected from different water sources that were used for decontamination and drilling. Analytical results for QA/QC samples are discussed in **Section 7.31**.

6.3.3 Dedicated Equipment Background

Dedicated equipment background (DEB) samples were collected at a frequency of one DEB sample per AOPI at AOPIs where groundwater sampling was conducted at existing monitoring wells that contained dedicated, down-hole equipment. When collecting samples from monitoring wells with dedicated, down-hole equipment, two water samples were collected. As it was unknown if the dedicated equipment was comprised of PFAS-containing components; PFOS, PFOA, and/or PFBS concentrations in the DEB samples reflect concentrations of stagnant groundwater, and they may be biased high by contributions from equipment that contains PFOS, PFOA, and/or PFBS components. The parent sample was collected after the well was purged until the field parameters stabilized. One DEB sample was collected from the first water produced for sample FTRK-TACX-1-DW from the pump prior to purging. The DEB results are discussed in **Section 7.29**.

6.3.4 Field Change Reports

No instances of major scope modifications (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 Fort Rucker SI work.

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. 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 K** and are summarized below:

- FCR-FTR-01: At FFTA/SWMU-15, the proposed subsurface soil sample was collected from 4 to 6 feet bgs, due to encountering the water table before reaching the proposed sample depth of 10 to 12 feet bgs.
- FCR-FTR-02: A groundwater sample was unable to be collected via DPT at the Rucker Fire Station; therefore, a remobilization event was conducted on 05 January 2021 to collect a groundwater sample using rotosonic drilling.
- FCR-FTR-03: An extra groundwater sample was collected from three AOPIs (Knox AHP, Tac X SF, and Hunt SF) following evaluation of localized groundwater flow using elevations collected from installed PZ wells along with topography.
- FCR-FTR-04: During the field event, drinking water supply wells were not sampled at two SF's. The wells were not found during the field event and on-site Fort Rucker personnel and American Water Supply indicated that any drinking water supply wells would have been abandoned.
- FCR-FTR-05: FTRK-LAHP-1-GW-082720' and 'FTRK-LAHP-2-GW-082720' were mislabeled as FTRK-LOWE-1-GW-082720' and 'FTRK-LOWE-2-GW-082720,' respectively, in the chain of custody associated with lab report number VH28031. Per the QAPP Addendum (Arcadis 2020), the sample identification abbreviations were revised to 'LAHP'.

6.3.5 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).

6.3.6 Investigation-Derived Waste

IDW, including soil cuttings, groundwater, and decontamination fluids were collected and placed in Department of Transportation-approved 55-gallon drums. IDW collected from the FFTA/SWMU-15 were analyzed for toxicity characteristic leaching procedure volatile organic compounds by USEPA Method 1311/8260 and identified as non-hazardous prior to disposal. The drums were labeled as non-hazardous, segregated by medium: waters and soil, and transported to a staging area. IDW was transported by Hazmat Emergency Response Remediation, Inc, based in Greensboro, North Carolina, under waste tracking number W200893W#1.

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.

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 for in groundwater and soil samples using a liquid chromatography with tandem mass spectrometry analytical method that is ELAP-accredited and compliant with Table B-15 of the DoD 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 L**).

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 L**. The Level IV analytical reports are included within **Appendix L** in the final electronic deliverable only.

6.4.3 Data Usability Assessment and Summary

A data usability assessment was completed for all analytical data associated with SI sampling at Fort Rucker. Documentation generated during the data usability assessments, which were compiled into a DUSR (**Appendix L**), 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.

During the validation process, PFOS and PFBS detections in sample FTRK-RFS-1-GW-010521 and the PFOS detection in sample FTRK-SHELL-1-GW-091320 have been qualified as ‘X”. The data qualified as “X” was due to extracted internal standards (EIS) exhibiting recoveries less than 20%, which is indicative of matrix interference. PFOS and/or PFBS are considered present in the affected samples; however, the reported concentrations have potential unknown bias and therefore these detected results are unable to be evaluated against screening criteria. Therefore, PFOS and PFBS sample results in FTRK-RFS-1-GW-010521 and the PFOS sample result in sample FTRK-SHELL-1-GW-091320 were deemed unusable and not used in the evaluation of recommendations for future study at AOPIs Rucker Fire Station and Shell SF.

Based on the final data usability assessment, the remaining environmental data collected at Fort Rucker 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 L**), and as indicated in the

full analytical tables (**Appendix M**) provided for the SI results. The completeness for this data set met the criteria of 90%. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019) and Fort Rucker QAPP Addendum (Arcadis 2020). Data qualifiers applied to laboratory analytical results for samples collected during the SI at Fort Rucker 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, and 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 PFAS 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. Soil samples collected from greater than 2 feet but less than 15 feet bgs will be compared to the industrial/commercial risk screening levels only.
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 Rucker 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 9**.

7 SUMMARY AND DISCUSSION OF SI RESULTS

This section summarizes the analytical results obtained from samples collected during the SI at Fort Rucker. 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 groundwater and soil analytical results for PFOS, PFOA, and PFBS. **Table 7-3** summarizes AOPIs and whether their SI results exceed the OSD risk screening levels. **Appendix M** includes the full suite of analytical results for these media, as well as for the QA/QC samples. An overview of AOPIs at Fort Rucker with OSD risk screening level exceedances is depicted on **Figure 7-1**. **Figures 7-2** through **7-29** show the PFOS, PFOA, and PFBS analytical results in groundwater and soil 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 collected during the SI are reported in ng/L, or parts per trillion, and soil data are 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 J**. Soil descriptions are provided on the field forms in **Appendix J**. The results of the SI are grouped by AOPI and discussed for each medium as applicable. Groundwater was first encountered at depths which ranged from 2 to 68.5 feet bgs across all AOPIs. Depth to groundwater at each AOPI location is provided in the sections below and in **Table 6-1**.

Surface water and sediment were not sampled. The soil and groundwater samples are used to make inferences about the potential for surface water and sediment impacts via surface runoff or groundwater discharge to surface water.

Table 7-3 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
Allen SF	Yes
Brown SF	Yes
Cairns AAF (Hangar 30104, Hangar 30106, Hangar 30108, Fire Station, and Cairns Wastewater Treatment Plant)	Yes
Ech SF	Yes
FFTA/SWMU-15	Yes
Former Metal Plating Shop	No
Fire Truck Staging Area	No
FTA	Yes

AOPI Name	OSD Exceedances (Yes/No)
Goldberg SF	Yes
Hanchey AHP (Hangar 50202, Hangar 50204, and Fire Station)	Yes
Hatch SF	Yes
Highbluff SF	Yes
Hooper SF	Yes
Hunt SF	Yes
Knox AHP (Hangar 25165 and Fire Station)	Yes
Louisville SF	Yes
Lowe AHP (Hangar 40120 and Fire Station)	Yes
Lucas SF	No
Molinelli FARP	Yes
Rucker Fire Station	Yes
Runkle SF	Yes
Shell AHP (Hangar 60104, Hangar 60105, and Fire Station)	Yes
Skelly SF	Yes
Stinson SF	Yes
Tabernacle SF	Yes
Tac X SF	Yes
Toth SF	Yes
Rucker WWTP	Yes

7.1 Allen Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Allen SF.

7.1.1 Groundwater

Three groundwater samples were collected via temporary wells installed by DPT at Allen SF (FTRK-ALLEN-1-PZ through FTRK-ALLEN-3-PZ; **Figure 7-2)**. The groundwater sample was collected at the first-encountered groundwater in each boring which ranged from 28 to 44 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS and PFOA were detected in all samples. PFOS was detected at concentrations above the OSD risk screening level of 40 ng/L in samples FTRK-ALLEN-1-PZ (5,700 DJ[2,3] ng/L) and FTRK-ALLEN-3-PZ (720 ng/L). PFOA was detected at concentrations above the OSD risk screening level of 40 ng/L in sample FTRK-ALLEN-1-PZ (370 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample FTRK-ALLEN-1-PZ (62 ng/L).

7.1.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Allen SF (FTRK-ALLEN-1; **Figure 7-2**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.2 Brown Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Brown SF.

7.2.1 Groundwater

Three groundwater samples were collected with discrete interval screen point samplers advanced by DPT, and temporary well sampling at Brown SF (FTRK-BROWN-1-GW, FTRK-BROWN-2-GW, and FTRK-BROWN-1-PZ; **Figure 7-3)**. The groundwater sample was collected at the first-encountered groundwater in each boring which ranged from 15 to 40 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all three samples and exceeded the OSD risk screening level of 40 ng/L in sample FTRK-BROWN-1-PZ (960 DJ ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in sample FTRK-BROWN-1-PZ (140 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in all samples with concentrations ranging from 2.6 ng/L at FTRK-BROWN-1-GW to 210 ng/L at FTRK-BROWN-1-PZ.

7.2.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Brown SF (FTRK-BROWN-1-SO; **Figure 7-3**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

[2] D qualifier indicates sample was diluted. See DUSR in **Appendix L** for sample-specific details.
[3] J/J+/J- qualifier indicates the sample result is estimated. See DUSR in **Appendix L** for sample-specific details.

PFOS was detected below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.3 Cairns Army Airfield

The subsections below summarize the soil and groundwater PFOS and PFOA analytical results associated with five AOPIs at Cairns AAF: Cairns Fire Station (Building 30200), Hangar 30104, Hangar 30106, Hangar 30108 and the Cairns WWTP.

7.3.1 Groundwater

Four groundwater samples were collected with discrete interval screen point samplers advanced by DPT at Cairns AAF (FTRK-CAAF-1-GW through FTRK-CAAF-4-GW; **Figure 7-4)**. The groundwater sample was collected at the first-encountered groundwater in each boring which ranged from 15 to 45 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all four samples and exceeded the OSD risk screening level of 40 ng/L in sample FTRK-CAAF-4-GW (42 ng/L). PFOA was detected in all four samples and exceeded the OSD risk screening level of 40 ng/L in samples FTRK-CAAF-1-GW (42 ng/L) and FTRK-CAAF-2-GW (53 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in three of the four samples with concentrations ranging from 9.8 ng/L in sample FTRK-CAAF-1-GW to 17 ng/L in sample FTRK-CAAF-3-GW.

7.3.2 Soil

Eight soil samples were collected from 0 to 2 feet bgs from Cairns AAF (FTRK-CAAF-1-SO through FTRK-CAAF-8-SO; **Figure 7-4).** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg) for all samples with concentrations ranging from 0.00061 J mg/kg (FTRK-CAAF-3-SO) to 0.073 mg/kg (FTRK-CAAF-4-SO). PFOA was detected below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg) for two samples: FTRK-CAAF-2-SO (0.0012 mg/kg) and FTRK-CAAF-4-SO (0.00079 J mg/kg). PFBS were not detected at this AOPI.

7.4 Ech Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Ech SF.

7.4.1 Groundwater

One groundwater sample was collected with a discrete interval screen point sampler advanced by DPT and two samples were collected from PZ wells at Ech AAF (FTRK-ECH-1-GW, FTRK-ECH-2-PZ, and FTRK-ECH-3-PZ; **Figure 7-5)**. The groundwater sample was collected at the first-encountered

groundwater in each boring which ranged from 8 to 24 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS and PFOA were detected in all samples and exceeded the OSD risk screening level for PFOS and PFOA of 40 ng/L in one sample, FTRK-ECH-1-GW (8,100 DJ ng/L and 470 ng/L, respectively). PFBS was detected below the OSD risk screening level of 600 ng/L in one sample, FTRK-ECH-1-GW (160 ng/L).

7.4.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Ech SF (FTRK-ECH-1-SO; **Figure 7-5**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in the sample at a concentration of 0.21 mg/kg, above the OSD risk screening level for residential (0.13 mg/kg), but below the OSD risk screening level for industrial/commercial (1.6 mg/kg). PFOA was detected (0.0052 mg/kg) below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected at this AOPI.

7.5 Former Fire Training Area (SWMU-15)

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the FFTA (SWMU-15).

7.5.1 Groundwater

Groundwater samples were collected from five existing monitoring wells at the FFTA (SWMU-15) (FTRK-SWMU15-10G1, FTRK-SWMU15-11G1, FTRK-SWMU15-11G2, FTRK-SWMU15-11G3, FTRK-SWMU15-15G1; **Figure 7-6).** Groundwater samples were collected from approximately the center of the saturated screened interval. Depth to groundwater ranged from 8 to 25 feet bgs in these wells. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical PFAS results is included in **Appendix M.**

PFOS and PFOA were detected at concentrations exceeding the OSD risk screening level of 40 ng/L in all five samples. PFOS concentrations ranged from 1,000 DJ ng/L at FTRK-SWMU15-11G3 to 93,000 DJ ng/L at FTRK-SWMU15-15G1. PFOA concentrations ranged from 360 ng/L at FTRK-SWMU15-10G1 to 11,000 DJ ng/L at FTRK-SWMU15-15G1. PFBS was detected in all samples and exceeded the OSD risk screening level of 600 ng/L in one sample, FTRK-SWMU15-15G1 (1,400 ng/L).

7.5.2 Soil

Soil samples were collected from two locations at FFTA (SWMU-15). One soil sample was collected from 0 to 2 feet bgs (FTRK-SWMU15-1-SO; **Figure 7-6**) and one soil sample was collected from 4 to 6 feet bgs (FTRK-SWMU15-2-SO; **Figure 7-6**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS and PFOA were detected below the OSD risk screening levels for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg) in the sample collected from 0 to 2 feet bgs with concentrations of 0.019 mg/kg and 0.00071 J mg/kg, respectively. PFOS and PFOA were detected below the OSD risk screening level for industrial/commercial (1.6 mg/kg) in the sample collected from 4 to 6 feet bgs with concentrations of 0.18 mg/kg and 0.025 mg/kg, respectively. PFBS was not detected in any sample at this AOPI.

7.6 Former Metal Plating Shop

The subsection below summarizes the soil PFOS, PFOA, and PFBS analytical results associated with the Former Metal Plating Shop.

7.6.1 Soil

Three soil samples were collected from 0 to 2 feet bgs at the Former Metal Plating Shop (FTRK-METAL-1-SO through FTRK-METAL-3-SO; **Figure 7-7**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in one sample, but the concentration (0.00059 J mg/kg) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.7 Firetruck Staging Area

The subsection below summarizes the soil PFOS, PFOA, and PFBS analytical results associated with the Firetruck Staging Area.

7.7.1 Soil

A soil sample was collected from 0 to 2 feet bgs from the Firetruck Staging Area (FTRK-FTSA-1-SO; **Figure 7-8**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected (0.00071 J mg/kg) below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.8 Fire Training Area

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with FTA.

7.8.1 Groundwater

One groundwater sample was collected with a discrete interval screen point sampler advanced by DPT and two samples were collected from PZ wells at the FTA (FTRK-FTA-1-GW, FTRK-FTA-2-PZ, FTRK-FTA-3-PZ; **Figure 7-9)**. The groundwater sample was collected at the first-encountered groundwater in

each boring which ranged from 17 to 24 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected at concentrations exceeding the OSD risk screening level of 40 ng/L in all three samples with concentrations ranging from 210 ng/L (FTRK-FTA-2-PZ) to 61,000 DJ ng/L (FTRK-FTA-3-PZ). PFOA was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-FTA-1-GW (730 DJ ng/L) and FTRK-FTA-3-PZ (2,500 DJ ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in all three samples with concentrations ranging from 110 ng/L (FTRK-FTA-2-PZ) to 560 DJ ng/L (FTRK-FTA-3-PZ).

7.8.2 Soil

Three soil samples were collected from 0 to 2 feet bgs from the FTA (FTRK-FTA-1-SO through FTRK-FTA-3-SO; **Figure 7-9**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected below the OSD risk screening level for industrial/commercial (1.6 mg/kg) for all samples and exceeded the OSD risk screening level for residential (0.13 mg/kg) in one sample, FTRK-FTA-1-SO (1.1 DJ mg/kg). PFOA was detected in two samples, but the maximum concentration (0.017 mg/kg; FTRK-FTA-1-SO) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was detected in one sample (0.0048 mg/kg; FTRK-FTA-1-SO) below the OSD risk screening levels for residential (1.9 mg/kg) and industrial/commercial (25 mg/kg).

7.9 Goldberg Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Goldberg SF.

7.9.1 Groundwater

Three groundwater samples were collected with discrete interval screen point samplers advanced by DPT at Goldberg SF (FTRK-GOLD-1-GW through FTRK-GOLD-3-GW; **Figure 7-10)**. The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 16 to 25 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in two of the three samples and exceeded the OSD risk screening level of 40 ng/L in sample FTRK-GOLD-2-GW at 50 ng/L. PFOA and PFBS were not detected in any sample.

7.9.2 Soil

Three soil samples were collected from 0 to 2 feet bgs from the Goldberg SF (FTRK-GOLD-1-SO through FTRK-GOLD-3-SO; **Figure 7-10)**. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in all samples, but the maximum concentration (0.12 mg/kg; FTRK-GOLD-2-SO) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg).

PFOA was detected in one sample, but the concentration (0.00068 J mg/kg; FTRK-GOLD-1-SO) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected in any sample at this AOPI.

7.10 Hanchey Army Heliport

The subsections below summarize the soil and groundwater PFOS and PFOA analytical results associated with three AOPIs at Hanchey AHP: Hanchey Fire Station, Hangar 50202, and Hangar 50204.

7.10.1 Groundwater

Three groundwater samples were collected from PZ wells installed by DPT at Hanchey AHP (FTRK-HAHP-1-PZ through FTRK-HAHP-3-PZ; **Figure 7-11**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 3.5 to 17 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-HAHP-1-PZ (48,000 DJ ng/L) and FTRK-HAHP-3-PZ (93 ng/L). PFOA was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-HAHP-1-PZ (2,200 DJ ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in two samples: FTRK-HAHP-3-PZ (3.2 J ng/L) and FTRK-HAHP-1-PZ (56 DJ ng/L).

7.10.2 Soil

Soil samples were collected from four locations at Hanchey AHP (FTRK-HAHP-1 through -4; **Figure 7-11**). Each boring included one surface soil sample collected from 0 to 2 feet bgs. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg) at samples FTRK-HAHP-1-SO (0.0020 mg/kg), FTRK-HAHP-2-SO (0.018 mg/kg), and field duplicate associated with FTRK-HAHP-4-SO (0.00048 J mg/kg). PFOA was detected below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg) at sample FTRK-HAHP-2-SO (0.00053 J mg/kg). PFBS was not detected in any sample.

7.11 Hatch Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Hatch SF.

7.11.1 Groundwater

One groundwater sample was collected with a discrete interval screen point sampler advanced by DPT, and two samples from PZ wells at Hatch SF (FTRK-HATCH-1-GW, FTRK-HATCH-1-PZ, and FTRK-HATCH-3-PZ; **Figure 7-12**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 13 to 20 feet bgs. A summary of PFOS, PFOA, and PFBS

groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-HATCH-1-PZ (2,400 DJ ng/L). PFOA was detected in two of the three samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-HATCH-1-PZ (110 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in one sample: FTRK-HATCH-1-PZ (15 ng/L).

7.11.2 Soil

Two soil samples were collected from 0 to 2 feet bgs from Hatch SF (FTRK-HATCH-1-SO, FTRK-HATCH-2-SO; **Figure 7-12**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in both samples, but the maximum concentration (0.0052 mg/kg; FTRK-HATCH-1-SO) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.12 Highbluff Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Highbluff SF.

7.12.1 Groundwater

Two groundwater samples were collected with discrete interval screen point samplers advanced by DPT, and one sample from a PZ well at Highbluff SF (FTRK-HGHBLF-1-GW, FTRK-HGHBLF-2-GW, and FTRK-HGHBLF-1-PZ; **Figure 7-13**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 28 to 35 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-HGHBLF-2-GW (4,200 DJ ng/L) and FTRK-HGHBLF-1-PZ (1,900 DJ ng/L). PFOA was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-HGHBLF-2-GW (220 ng/L) and FTRK-HGHBLF-1-PZ (280 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in all three samples with concentrations ranging from 10 ng/L at FTRK-HGHBLF-1-GW to 220 J+ ng/L at FTRK-HGHBLF-1-PZ.

7.12.2 Soil

Two soil samples were collected from 0 to 2 feet bgs from Highbluff SF (FTRK-HGHBLF-1-SO, FTRK-HGHBLF-2-SO; **Figure 7-13**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected below the OSD risk screening level for industrial/commercial (1.6 mg/kg) for both samples and exceeded the OSD risk screening level for residential (0.13 mg/kg) in one sample: FTRK-

HGHBLF-1-SO (0.33 DJ mg/kg). PFOA was detected in both samples, but the maximum concentration (0.0017 mg/kg; FTRK-HGHBLF-1-SO) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected in any sample at this AOPI.

7.13 Hooper Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Hooper SF.

7.13.1 Groundwater

Two groundwater samples were collected with discrete interval screen point samplers advanced by DPT, and one sample from a PZ well at Hooper AHP (FTRK-HOOP-1-GW, FTRK-HOOP-2-GW, FTRK-HOOP-2-PZ; **Figure 7-14**). The groundwater samples were collected at the first-encountered groundwater in each boring, which ranged from 24 to 37 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected at concentrations exceeding the OSD risk screening level of 40 ng/L in all three samples with concentrations ranging from 460 ng/L (FTRK-HOOP-1-GW) to 2,300 DJ ng/L (FTRK-HOOP-2-PZ). PFOA was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-HOOP-2-GW (110 ng/L) and FTRK-HOOP-2-PZ (140 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in all samples with concentrations ranging from 3.9 J ng/L at FTRK-HOOP-1-GW to 22 ng/L at FTRK-HOOP-2-GW.

7.13.2 Soil

Three soil samples were collected from 0 to 2 feet bgs from Hooper SF (FTRK-HOOP-1-SO through FTRK-HOOP-3-SO; **Figure 7-14**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in all samples, but the maximum concentration (0.026 mg/kg; FTRK-HOOP-2-SO) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA was detected in one sample (FTRK-HOOP-2-SO; 0.00077 J mg/kg) but below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected in any sample at this AOPI.

7.14 Hunt Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Hunt SF.

7.14.1 Groundwater

One groundwater sample was collected with a discrete interval screen point sampler advanced by DPT, and three samples from PZ wells at Hunt SF (FTRK-HUNT-1-GW, FTRK-HUNT-1-PZ through FTRK-HUNT-3-PZ; **Figure 7-15**). The groundwater samples were collected at the first-encountered groundwater

in each boring which ranged from 5 to 12 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-HUNT-1-GW (3,500 DJ ng/L) and FTRK-HUNT-2-PZ (170 J- ng/L). PFOA was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-HUNT-1-GW (750 ng/L) and FTRK-HUNT-2-PZ (340 J- ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in two samples: FTRK-HUNT-1-GW (41 ng/L) and FTRK-HUNT-2-PZ (30 J- ng/L).

7.14.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Hunt SF (FTRK-HUNT-1-SO; **Figure 7-15**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in the sample at a concentration (0.98 DJ mg/kg), above the OSD risk screening level for residential (0.13 mg/kg), but below the OSD risk screening level for industrial/commercial (1.6 mg/kg). PFOA was detected (0.0015 mg/kg) below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected at this AOPI.

7.15 Knox Army Heliport

The subsections below summarize the soil and groundwater PFOS and PFOA analytical results associated with two AOPIs at Knox AHP: Knox Fire Station (Building 25107) and Hangar 25165.

7.15.1 Groundwater

Two groundwater samples were collected with discrete interval screen point samplers advanced by DPT, and two samples from PZ wells at Knox SF (FTRK-KAHP-1-GW; FTRK-KAHP-2-GW, FTRK-KAHP-1-PZ, FTRK-KAHP-2-PZ; **Figure 7-16**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 9 to 13 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in three samples with concentrations ranging from 250 ng/L (FTRK-KAHP-1-GW and FTRK-KAHP-2-GW) to 5,300 DJ ng/L (FTRK-KAHP-1-PZ). PFOA was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-KAHP-2-GW (69 ng/L) and FTRK-KAHP-1-PZ (730 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in all four samples with concentrations ranging from 5.6 ng/L (FTRK-KAHP-2-GW) to 300 ng/L (FTRK-KAHP-1-PZ).

7.15.2 Soil

Two soil samples were collected from 0 to 2 feet bgs from Knox AHP (FTRK-KAHP-1-SO, FTRK-KAHP-2-SO; **Figure 7-16**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in one sample (FTRK-KAHP-1-SO; 0.0055 mg/kg), below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.16 Louisville Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Louisville SF.

7.16.1 Groundwater

Three groundwater samples were collected with discrete interval screen point samplers advanced by DPT at Louisville SF (FTRK-LOUVL-1-GW, FTRK-LOUVL-2-GW, FTRK-LOUVL-3-GW; **Figure 7-17**). The groundwater samples were collected at the first-encountered groundwater in the boring which ranged from 17 to 21 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in two samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-LOUVL-3-GW (250 ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in one sample: FTRK-LOUVL-3-GW (9.8 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in one sample: FTRK-LOUVL-3-GW (3.2J ng/L).

7.16.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Louisville SF (FTRK-LOUVL-1-SO; **Figure 7-17**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**. PFOS, PFOA, and PFBS were not detected at this AOPI.

7.17 Lowe Army Heliport

The subsections below summarize the soil and groundwater PFOS and PFOA analytical results associated with two AOPIs at Lowe AHP: Lowe Fire Station (Building 40111) and Hangar 40120.

7.17.1 Groundwater

Two groundwater samples were collected with discrete interval screen point samplers advanced by DPT, and one from a PZ well at Lowe AHP (FTRK-LAHP-1-GW, FTRK-LAHP-2-GW, FTRK-LAHP-2-PZ; **Figure 7-18**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 6 to 14 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS concentrations exceeded the OSD risk screening level of 40 ng/L in all samples with concentrations ranging from 43 ng/L (FTRK-LAHP-2-GW) to 24,000 DJ ng/L (FTRK-LAHP-1-GW). PFOA was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-LAHP-1-GW (6,100 DJ ng/L) and FTRK-LAHP-2-PZ (94 ng/L). PFBS was detected in two of the

three groundwater samples and exceeded the OSD risk screening level of 600 ng/L in one sample: FTRK-LAHP-1-GW (1,400 DJ ng/L).

7.17.2 Soil

Four soil samples were collected from 0 to 2 feet bgs from Lowe AHP (FTRK-LAHP-1-SO through FTRK-LAHP-4-SO; **Figure 7-18).** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in three samples, but the maximum concentrations (0.017 mg/kg; FTRK-LAHP-4-SO) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA was detected in two samples, but the maximum concentrations (0.0013 mg/kg; FTRK-LAHP-4-SO) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected in any sample at this AOPI.

7.18 Lucas Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Lucas SF.

7.18.1 Groundwater

Three groundwater samples were collected from PZ wells installed by DPT at Lucas SF (FTRK-LUCAS-1-PZ through FTRK-LUCAS-3-PZ; **Figure 7-19**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 27 to 40 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected below the OSD risk screening level of 40 ng/L in all three samples with concentrations ranging from 3.7 J ng/L (FTRK-LUCAS-3-PZ) to 11 ng/L (FTRK-LUCAS-1-PZ). PFOA was detected below the OSD risk screening level of 40 ng/L in one sample: FTRK-LUCAS-1-PZ (9.5 J ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in all three samples with concentrations ranging from 2.7 ng/L at FTRK-LUCAS-3-PZ to 46 ng/L at FTRK-LUCAS-1-PZ.

7.18.2 Soil

Two soil samples were collected from 0 to 2 feet bgs from Lucas SF (FTRK-LUCAS-1-SO, FTRK-LUCAS-2-SO; **Figure 7-19**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS and PFOA were detected in one sample (FTRK-LUCAS-1-SO), but the concentrations (0.049 mg/kg and 0.0043 mg/kg, respectively) were below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected at this AOPI.

7.19 Molinelli Forward Area Refueling Point

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Molinelli FARP.

7.19.1 Groundwater

Three groundwater samples were collected from PZ wells installed by DPT at Molinelli FARP (FTRK-MFARP-1-PZ through FTRK- MFARP-3-PZ; **Figure 7-20**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 34 to 47 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-MFARP-1-PZ (610 ng/L). PFOA was detected at all samples, but the maximum concentration (16 ng/L; FTRK-MFARP-1-PZ) was below the OSD risk screening level of 40 ng/L. PFBS was detected in all samples, but the maximum concentration (5.5 ng/L; FTRK-MFARP-3-PZ) was below the OSD risk screening level of 600 ng/L.

7.19.2 Soil

Three soil samples were collected from 0 to 2 feet bgs from Molinelli FARP (FTRK-MFARP-1-SO through FTRK-MFARP-3-SO; **Figure 7-20**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in one sample (FTRK-MFARP-1-SO), but the concentration (0.0037 mg/kg) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.20 Rucker Fire Station

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the Rucker Fire Station.

7.20.1 Groundwater

One groundwater sample was collected via sonic drilling and screen point sampling using a bailer at the Rucker Fire Station (FTRK-RFS-1-GW; **Figure 7-21**). The groundwater sample was collected at the first-encountered groundwater in the boring which was approximately 68.5 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOA exceeded the OSD risk screening level of 40 ng/L in the sample (93 J- ng/L). During the validation process, PFOS and PFBS were qualified as “X” due to EIS recoveries of less than 20%. Per guidance from the USACE chemist, the analytical results for PFOS and PFBS were determined to be unusable for its intended purpose (see **Section 6.4.3** and **Appendix L** for more information).

7.20.2 Soil

A soil sample was collected from 0 to 2 feet bgs from the Rucker Fire Station (FTRK-RFS-1-SO; **Figure 7-21**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected (0.0020 mg/kg) below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.21 Runkle Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Runkle SF.

7.21.1 Groundwater

Two groundwater samples were collected with discrete interval screen point samplers advanced by DPT, and one sample from a PZ well at Runkle SF (FTRK-RUNKLE-1-GW, FTRK-RUNKLE-2-GW, and FTRK-RUNKLE-1-PZ; **Figure 7-22**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 11 to 19 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS and PFOA were detected at concentrations exceeding the OSD risk screening level of 40 ng/L in all samples. Detected PFOS ranged from 400 ng/L (FTRK-RUNKLE-2-GW) to 2,600 DJ ng/L (FTRK-RUNKLE-1-PZ). Detected PFOA ranged from 57 ng/L (FTRK-RUNKLE-2-GW) to 310 ng/L (FTRK-RUNKLE-1-PZ). PFBS was detected below the OSD risk screening level of 600 ng/L in all samples with concentrations ranging from 7.5 ng/L (FTRK-RUNKLE-1-GW) to 26 ng/L (FTRK-RUNKLE-1-PZ).

7.21.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Runkle SF (FTRK-RUNKLE-1-SO; **Figure 7-22**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in the sample at a concentration (0.50 DJ mg/kg), above the OSD risk screening level for residential (0.13 mg/kg), but below the OSD risk screening level for industrial/commercial (1.6 mg/kg). PFOA was detected (0.0068 mg/kg) below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected at this AOPI.

7.22 Shell Army Heliport

The subsections below summarize the soil and groundwater PFOS and PFOA analytical results associated with three AOPIs at Shell AHP: Shell Fire Station (Building 60101), Hangar 60104, and Hangar 60105.

7.22.1 Groundwater

Three groundwater samples were collected with discrete interval screen point samplers advanced by DPT at Shell AHP (FTRK-SHELL-1-GW through FTRK-SHELL-3-GW; **Figure 7-23**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 36 to 45 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all samples, but the maximum concentration (18 J+ ng/L; FTRK-SHELL-2-GW) was below the OSD risk screening level of 40 ng/L. During the validation process, PFOS in sample FTRK-SHELL-1-GW was qualified as "X" due to EIS recoveries of less than 20%. Per guidance from the USACE chemist, the analytical results for PFOS were determined to be unusable for its intended purpose (see **Section 6.4.3** and **Appendix L** for more information). PFOA was detected in two samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-SHELL-2-GW (100 ng/L). PFBS was detected in all samples, but the maximum concentration (43 ng/L; FTRK-SHELL-2-GW) was below the OSD risk screening level of 600 ng/L.

7.22.2 Soil

Four soil samples were collected from 0 to 2 feet bgs from Shell AHP (FTRK-SAHP-1-SO through FTRK-SAHP-4-SO; **Figure 7-23**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in all samples, but the maximum concentration (0.063 mg/kg; FTRK-SAHP-1-SO) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA was detected in one sample (FTRK-SAHP-1-SO), but the concentration (0.0026 mg/kg) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected in any sample at this AOPI.

7.23 Skelly Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Skelly SF.

7.23.1 Groundwater

One groundwater sample was collected with a discrete interval screen point sampler advanced by DPT, and two samples from PZ wells at Skelly SF (FTRK-SKELLY-1-GW, FTRK-SKELLY-1-PZ, FTRK-SKELLY-3-PZ; **Figure 7-24**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 6 to 17 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS and PFOA were detected in all samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-SKELLY-1-PZ (6,400 DJ ng/L and 180 ng/L, respectively). PFBS was detected below the OSD risk screening level of 600 ng/L in one sample: FTRK-SKELLY-1-PZ (63 ng/L).

7.23.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Skelly SF (FTRK-SKELLY-1-SO; **Figure 7-24**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**. PFOS, PFOA, and PFBS were not detected at this AOPI.

7.24 Stinson Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Stinson SF.

7.24.1 Groundwater

Three groundwater samples were collected with discrete interval screen point samplers advanced by DPT at Stinson SF (FTRK-STINSON-1-GW through FTRK-STINSON-3-GW; **Figure 7-25**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 38 to 43 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected at concentrations exceeding the OSD risk screening level of 40 ng/L in all samples with concentrations ranging from 89 J+ ng/L (FTRK-STINSON-3-GW) to 20,000 DJ ng/L (FTRK-STINSON-1-GW). PFOA was detected in two of the three samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-STINSON-1-GW (1,600 DJ ng/L). PFBS was detected in two of the three groundwater samples and exceeded the OSD risk screening level of 600 ng/L in one sample, FTRK-STINSON-1-GW (2,200D J ng/L).

7.24.2 Soil

Two soil samples were collected from 0 to 2 feet bgs from Stinson SF (FTRK-STINSON-1, FTRK-STINSON-2-SO; **Figure 7-25**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected in one sample, but the concentration (0.0070 mg/kg) was below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.25 Tabernacle Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Tabernacle SF.

7.25.1 Groundwater

One groundwater sample was collected with a discrete interval screen point sampler advanced by DPT, and two PZ wells at Tabernacle SF (FTRK-TAB-1-GW, FTRK-TAB-1-PZ, FTRK-TAB-2-PZ; **Figure 7-26**). The groundwater samples were collected at the first-encountered groundwater in each boring which

ranged from 15 to 33 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in all samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-TAB-1-PZ (570 ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in two samples: FTRK-TAB-1-GW (2.4 J ng/L) and FTRK-TAB-1-PZ (13 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in two samples: FTRK-TAB-1-PZ (12 ng/L) and FTRK-TAB-2-PZ (59 J ng/L).

7.25.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Tabernacle SF (FTRK-TAB-1-SO; **Figure 7-26**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected (0.00090 J mg/kg) below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.26 Tac X Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Tac X SF.

7.26.1 Groundwater

One groundwater sample was collected with a discrete interval screen point sampler advanced by DPT, and three samples were collected from PZ wells at Tac X SF (FTRK-TACX-1-GW, FTRK-TACX-1-PZ through FTRK-TACX-3-PZ; **Figure 7-27**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 3 to 7 feet bgs. One sample was collected from an existing well via direct fill from dedicated equipment (FTRK-TACX-1-DW; **Figure 7-27**). A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS was detected in two of the four groundwater samples and exceeded the OSD risk screening level of 40 ng/L in one sample: FTRK-TACX-1-PZ (79 ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in two of the four groundwater samples: FTRK-TACX-1-PZ (3.4 J ng/L) and FTRK-TACX-2-PZ (5.8 ng/L). PFBS was not detected in any of the groundwater samples.

7.26.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Tac X SF (FTRK-TACX-1-SO; **Figure 7-27**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS was detected (0.010 mg/kg) below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected at this AOPI.

7.27 Toth Stage Field

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Toth SF.

7.27.1 Groundwater

Two groundwater samples were collected with discrete interval screen point samplers advanced by DPT, and one sample from a PZ well at Toth SF (FTRK-TOTH-1-GW, FTRK-TOTH-2-GW, FTRK-TOTH-1-PZ; **Figure 7-28**). The groundwater samples were collected at the first-encountered groundwater in each boring which ranged from 20 to 34 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS and PFOA were detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-TOTH-2-GW (660 ng/L and 57 ng/L, respectively) and FTRK-TOTH-1-PZ (330 ng/L and 59 ng/L, respectively). PFBS was detected below the OSD risk screening level of 600 ng/L in all three samples with concentrations ranging from 7.8 ng/L (FTRK-TOTH-1-GW) to 34 ng/L (FTRK-TOTH-2-GW and FTRK-TOTH-1-PZ).

7.27.2 Soil

A soil sample was collected from 0 to 2 feet bgs from Toth SF (FTRK-TOTH-1-SO; **Figure 7-28**)**.** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS and PFOA were detected (0.051 mg/kg and 0.00087 J mg/kg, respectively) below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected at this AOPI.

7.28 Rucker Wastewater Treatment Plant

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the Rucker WWTP.

7.28.1 Groundwater

Three groundwater samples were collected with discrete interval screen point samplers advanced by DPT at the Rucker WWTP (FTRK-WWTP-1-GW through FTRK-WWTP-3-GW; **Figure 7-29**). The groundwater samples were collected at the first-encountered groundwater in the boring which ranged from 16 to 19 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**.

PFOS and PFOA were detected in all samples and exceeded the OSD risk screening level of 40 ng/L in two samples: FTRK-WWTP-1-GW (170 ng/L and 200 ng/L, respectively) and FTRK-WWTP-2-GW (220 ng/L and 280 ng/L, respectively). PFBS was detected below the OSD risk screening level of 600 ng/L in two samples: FTRK-WWTP-1-GW (69 ng/L) and FTRK-WWTP-2-GW (160 ng/L).

7.28.2 Soil

Two soil samples were collected from 0 to 2 feet bgs from the Rucker WWTP (FTRK-WWTP-1-SO and FTRK-WWTP-2-SO; **Figure 7-29).** A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical PFAS results is included in **Appendix M**.

PFOS and PFOA were detected in both samples, but the maximum concentrations (0.0014 mg/kg and 0.0015 mg/kg, respectively) were below the OSD risk screening level for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFBS was not detected at this AOPI.

7.29 Dedicated Equipment Background Samples

One DEB sample was collected during the SI, at Tac X SF. PFOS, PFOA, and PFBS were not detected in the parent sample (FTRK-TACX-1-DW-083120) or the DEB sample (FTRK-TACX-1-DW-083120-A) (**Table 7-1** and **Appendix M**, respectively).

7.30 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 813 to 36,000 mg/kg. The TOC at Fort Rucker was within range of typical organic content in topsoil (topsoil: 5,000 to 30,000 mg/kg). The combined percentage of fines in soils at Fort Rucker collected during the SI ranged from 8.9 to 44.3% with an average of 22%. 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 ranged from 2.5 to 16.7% with an average of 8%, which is typical for sandy soil (0 to 10%). The pH of the soil was slightly acidic to neutral as pH values ranged from 5 to 7.7 standard units.

7.31 Blank Samples

PFOS and PFOA were detected in 1 of the 27 blank samples collected during the SI. PFOS and PFOA were detected in the source blank sample collected on 01 July 2020 (FTRK-SB-1-063020) at 1.8 J ng/L and 2.3 J ng/L, respectively. PFBS was not detected in the source blank sample. This source water was used to decontaminate DPT drilling tools, however PFOS and PFOA were not detected in the EB associated with the DPT drilling tools. Therefore, due to the low-level detections of PFOS and PFOA in the source blank and no detection of PFOS or PFOA in the EB, it was not deemed necessary to qualify the data due to PFOS and PFOA detections in the source blank.

The full analytical results for blank samples collected during the SI are included in **Appendix M**.

7.32 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 7-30** through **7-36** 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 and metal plating operations 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, groundwater, 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.

CSMs were developed for each individual AOPI and were combined where source media, potential migration pathways and exposure media, and human exposure pathway determinations are congruent. The following exposure pathway determinations apply to all CSMs:

- The AOPIs are not likely to be accessed by on-installation residents and recreational users, or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at 36 of 38 AOPIs (26 of 28 operational locations). Groundwater samples were not collected at the Former Metal Plating Shop or Fire Truck Staging Area per the approved QAPP Addendum (Arcadis 2020). PFOS, PFOA, and/or PFBS have not been detected in water supply wells. In addition, an evaluation of local geology indicates a confining unit around 120 to 180 feet bgs; therefore, water supply wells screened below 250 feet bgs are not likely affected by releases at the surface. 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 downgradient on-post groundwater that is screened above the confining unit.

- On-installation recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-installation recreational users is incomplete.
- Groundwater originating at the AOPIs flows off post. Due to the absence of land use controls preventing potable use of the off-post groundwater, the groundwater pathway for off-installation drinking water receptors is potentially complete for all AOPIs except Ech SF, which is located more than 5 miles from the installation boundary.
- Shallow groundwater could discharge to surface water that flows off post via tributaries. Surface water is not used for drinking water off post. However, recreational users could contact constituents in off-post surface water bodies through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Additional exposure pathway descriptions for each CSM are listed below by figure.

Figure 7-30 presents the CSM for AOPIs Ech SF, Hooper SF, Lowe SF, FTA and Foam Storage (Building 8106), Hanchey AHP, Fire Truck Staging Area, Knox AHP, Former FTA, Cairns AAF (Hangars 30104, 30106, 30108, and Fire Station), Rucker Fire Station, Molinelli FARP, and Hatch SF. AFFF was historically released at the AOPIs during equipment/nozzle testing, AFFF-carrying fire truck washing, and/or AFFF filling in truck tanks.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs, 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.
- Migration of PFOS, PFOA, and/or PFBS from soil to nearby surface water bodies could occur via surface runoff, and transport from groundwater to surface water could occur via shallow groundwater discharge. Surface water bodies on-post are not used for drinking water. On-installation site workers and residents are not likely to otherwise contact surface water and sediment in the on-post surface water bodies; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in nearby surface water bodies through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete.

Figure 7-31 presents the CSM for AOPIs Goldberg SF, Hunt SF, Stinson SF, Brown SF, and Runkle SF. AFFF was historically released at the AOPIs during equipment/nozzle testing, AFFF-carrying fire truck washing, and/or AFFF filling in fire truck tanks.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs, 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.
- Migration of PFOS, PFOA, and/or PFBS from soil to nearby surface water bodies could occur via surface runoff, and transport from groundwater to surface water could occur via shallow groundwater discharge. However, the AOPIs are in restricted access areas where human

receptors are unlikely to access surface water bodies. Therefore, the surface water and sediment exposure pathways for all on-installation receptors are incomplete.

Figure 7-32 presents the CSM for the Skelly SF AOPI. AFFF was historically released at this AOPI during equipment/nozzle testing, AFFF-carrying fire truck washing, and/or AFFF filling in fire truck tanks.

- PFOS, PFOA, and/or PFBS were not detected in soil samples from this AOPI, however due to limited site knowledge, soil samples may not have been collected at the historical release areas. In addition, groundwater detections at this AOPI indicate a potential for soil impacts. If PFOS, PFOA, and/or PFBS are present in soil at this AOPI, site workers could contact constituents via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers remains potentially complete.
- Transport of PFOS, PFOA, and/or PFBS from groundwater to surface water could occur via shallow groundwater discharge. However, the AOPI is in a restricted access area where human receptors are unlikely to access surface water bodies. Therefore, the surface water and sediment exposure pathways for all on-installation receptors are incomplete.

Figure 7-33 presents the CSM for AOPIs Shell AHP, Tac X SF, Lucas SF, Highbluff SF, Tabernacle SF, Allen SF, and Toth SF. AFFF was historically released at these AOPIs during equipment/nozzle testing, AFFF-carrying fire truck washing, and/or AFFF filling in fire truck tanks.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs, 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.
- Transport of PFOS, PFOA, and/or PFBS from groundwater to surface water could occur via shallow groundwater discharge. However, the AOPIs are in restricted access areas or non-recreational areas where human receptors are unlikely to access surface water bodies. Therefore, the surface water and sediment exposure pathways for all on-installation receptors are incomplete.

Figure 7-34 presents the CSM for the Louisville SF AOPI. AFFF was historically released at this AOPI during equipment/nozzle testing, AFFF-carrying fire truck washing, and/or AFFF filling in fire truck tanks.

- PFOS, PFOA, and/or PFBS were not detected in soil samples from this AOPI, however due to limited site knowledge, soil samples may not have been collected at the historical release areas. In addition, groundwater detections at this AOPI indicate a potential for soil impacts. If PFOS, PFOA, and/or PFBS are present in soil at this AOPI, site workers could contact constituents via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers remains potentially complete.
- Transport of PFOS, PFOA, and/or PFBS from groundwater to surface water could occur via shallow groundwater discharge. However, the AOPI is in a restricted access area where human receptors are unlikely to access surface water bodies. Therefore, the surface water and sediment exposure pathways for all on-installation receptors are incomplete.

Figure 7-35 presents the CSM for AOPIs Rucker WWTP and Cairns AAF (WWTP only). AFFF was historically released to soil and/or paved surfaces and biosolids potentially containing PFAS constituents were released to sludge drying beds at these AOPIs.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs, 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.
- Transport of PFOS, PFOA, and/or PFBS from groundwater to surface water could occur via shallow groundwater discharge. Surface water bodies on-post are not used for drinking water. On-installation site workers and residents are not likely to otherwise contact surface water and sediment in the on-post surface water bodies; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in nearby surface water bodies through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete.

Figure 7-36 presents the CSM for AOPI Former Metal Plating Shop. Releases of potentially PFAS-containing wastes related to chromium plating mist suppressants to shallow subsurface soil from broken subsurface utilities could migrate to groundwater via desorption and/or dissolution.

- PFOS, PFOA, and/or PFBS were detected in soil at this AOPI, 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.
- Groundwater samples were not collected at this AOPI. If PFOS, PFOA, and/or PFBS are present in groundwater, transport from groundwater to surface water could occur via shallow groundwater discharge. Surface water bodies on-post are not used for drinking water. On-installation site workers and residents are not likely to otherwise contact surface water and sediment in the on-post surface water bodies; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in nearby surface water bodies through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete.

Following the SI sampling, all AOPIs 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 OFF-POST PRIVATE POTABLE WELL INVESTIGATION

Based on SI sampling results, off-post private potable wells were identified for potential sampling as part of the PA/SI investigation at Fort Rucker to determine whether there are off-post impacts to drinking water due to Army operations. These wells are downgradient of AOPIs where PFOS and/or PFOA concentrations were detected at concentrations greater than the USEPA lifetime health advisory. To identify potential potable wells that were downgradient of the main and outlying installation boundaries to include in this sampling effort, an off-post well survey was completed using readily available information from the Geologic Society of Alabama. County records were also reviewed to identify wells that may not be included in the state database, and relevant parcels were reviewed to compile a list of property owners. After reviewing the available information in groundwater modeling reports (i.e., United States Geologic Survey (USGS) reports or others) for the area, numerous off-post private potable wells were identified for possible sampling as part of this investigation based on the understanding of the relationship between on- and off-post hydrogeological conditions.

The Fort Rucker installation team confirmed that approximately 200 parcels were located within 0.1-mile downgradient of AOPIs with PFOS and/or PFOA exceedances, and the team agreed that all property owners included in this area would be contacted by Fort Rucker personnel via the United States Postal Service mail to ensure that the drinking water wells are included for sampling during this investigation.

Fort Rucker personnel notified the property owners of this sampling event by letter delivered by the United States Postal Service. The letter included a questionnaire regarding the presence of a drinking water well on the property, whether the owner would allow access to the property for sampling, and, if access is allowed, requested the owner determine an available date for their well to be sampled. Property access and permission to sample the wells on the properties was obtained by Fort Rucker personnel prior to or during the sampling event.

Sampling protocols will follow those outlined in this PA/SI report, the Fort Rucker PA/SI QAPP Addendum (Arcadis 2020), and the Fort Rucker Off-Post Sampling QAPP Addendum (Seres-Arcadis Joint Venture 2021). A letter report presenting a summary of the off-post private well investigation results and the associated laboratory reports will be included in a subsequent addendum.

9 CONCLUSIONS AND RECOMMENDATIONS

The PFAS PA/SI included two distinct efforts. The PA identified AOPIs at Fort Rucker 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/or PFBS to the environment 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/or PFBS use, storage, and/or disposal at Fort Rucker. Following the evaluation, 38 AOPIs at 28 operational locations were identified.

Drinking water for Fort Rucker is supplied by public water supply wells located on installation and the infrastructure is operated and maintained by American Water. Numerous wells are located on the main installation and serve an estimated population of 20,000. PFOS, PFOA, and PFBS have not been detected in these wells. An evaluation of local geology indicates a confining unit around 120 to 180 feet bgs, however, the confining unit has been recorded between 200 to 300 feet bgs within the main installation of Fort Rucker. Therefore, due to limited site knowledge regarding the depth of the confining layer at each AOPI, it is conservatively estimated that water supply wells screened greater than 250 feet bgs are not likely affected by releases at the surface. Some wells are either inactive or provide water for training, firefighting, and recreation.

Before the SI sampling, a preliminary CSM was developed for each AOPI based on an assessment of existing records, personnel interviews, and site reconnaissance. The preliminary CSMs identified potential human receptors and exposure pathways for groundwater and surface water that is known to be used, or could realistically be used in the future, as a source of drinking water and identified potential soil and sediment exposure pathways.

All AOPIs were sampled during the SI at Fort Rucker to identify whether PFOS, PFOA, and PFBS were present at concentrations that exceed the OSD risk screening levels. The SI scope of work was completed in accordance with the Final PQAPP (Arcadis 2019) and the Fort Rucker QAPP Addendum (Arcadis 2020). The SI was conducted in multiple phases between 2020 and 2021. Groundwater and soil samples were collected during Phase 1 from 17 June 2020 to 29 July 2020, during Phase 2 from 03 August 2020 to 16 September 2020 and 05 January 2021. PFOS, PFOA, and PFBS detections and maximum concentrations in each sampled medium are summarized below:

Groundwater:

- PFOS, PFOA, and/or PFBS compounds were detected in groundwater above the laboratory detection limits at all 36 AOPIs sampled (26 operational locations). PFOS and/or PFOA were detected above the OSD risk screening level (40 ng/L) at 35 AOPIs (25 of the 26 operational locations). Exceedances of PFOS, PFOA, and PFBS were not identified at Lucas SF. The maximum PFOS and PFOA detections were at the FFTA (SWMU-15) at 93,000 DJ ng/L and 11,000 DJ ng/L, respectively. The maximum PFBS detection was at the Stinson SF at a concentration of 2,200 DJ ng/L. PFBS

exceeded the OSD risk screening level of 600 ng/L at three AOPIs [FFTA (SWMU-15), Lowe SF, and Stinson SF].

Soil:

- PFOS, PFOA, and/or PFBS compounds were detected in soil above the laboratory detection limits in soil samples at 36 AOPIs (26 of the 28 AOPI locations). PFOS, PFOA, and/or PFBS compounds were not detected at the Louisville SF and Skelly SF.
- For soil samples collected between 0 to 2 feet bgs, PFOS was detected above the residential OSD risk screening level (0.13 mg/kg), but below the industrial/commercial OSD risk screening level (1.6 mg/kg), at five AOPIs (Ech SF, FTA, Highbluff SF, Hunt SF, and Runkle SF). The maximum PFOS detection was at the FTA at a concentration of 1.1 DJ mg/kg. The maximum PFOA detection (0.017 mg/kg; FTA) was below the residential OSD risk screening level (0.13 mg/kg) and the industrial/commercial OSD risk screening level (1.6 mg/kg). PFBS was detected at one AOPI (FTA; 0.0048 mg/kg) at a concentration below the residential OSD risk screening level (1.9 mg/kg) and the industrial/commercial OSD risk screening level (25 mg/kg).
- One subsurface (greater than 2 feet bgs) soil sample was collected during the SI, at the FFTA (SWMU-15). PFOS and PFOA were detected at concentrations of 0.18 mg/kg and 0.025 mg/kg, respectively, which is below the industrial/commercial OSD risk screening level (1.6 mg/kg). PFBS was not detected.

The preliminary CSMs prepared for the PA were re-evaluated and updated, if necessary, as part of the SI. Following the SI sampling, 38 AOPIs (28 AOPI locations) with confirmed PFOS, PFOA, and/or PFBS presence were considered to have complete or potentially complete exposure pathways.

- PFOS, PFOA, and/or PFBS was detected in soil and/or groundwater at all AOPIs.
- Soil exposure pathways for on-installation site workers are complete at 36 AOPIs (26 operational locations) and potentially complete at two AOPIs (Louisville SF and Skelly SF).
- PFOS, PFOA, and/or PFBS were detected in groundwater at all 36 AOPIs sampled. An evaluation of local geology indicates a confining unit at an average depth of approximately 250 feet bgs; therefore, on-installation water supply wells screened below 250 feet bgs are not likely affected by releases at the surface. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete at all AOPIs to account for potential future use of the downgradient on-post groundwater from wells screened above the confining unit.
- Groundwater originating at the AOPIs flows off post. Due to the absence of land use controls preventing potable use of the off-post groundwater, the groundwater pathway for off-installation drinking water receptors is potentially complete for all AOPIs except Ech SF which is located more than 5 miles from the installation boundary.
- Shallow groundwater could discharge to surface water that flows off post via tributaries. Surface water is not used for drinking water off post. However, recreational users could contact constituents in off-post surface water bodies through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete at all 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**). The recommendation for supplemental SI groundwater sampling is based on the presence of PFAS in soil at trace concentrations at AOPIs where groundwater was not sampled. **Table 9-1** below summarizes the AOPIs identified at Fort Rucker, PFOS, PFOA, and PFBS sampling, and recommendations for each AOPI. Further investigation is warranted at Fort Rucker. In accordance with CERCLA, site-specific risk will be assessed during a future phase to evaluate whether remedial actions are required.

Table 9-1 Summary of PFOS, PFOA, and PFBS Sampling at Fort Rucker and Recommendations

AOPIs	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Allen SF	Yes	No	Further study in a remedial investigation
Brown SF	Yes	No	Further study in a remedial investigation
Cairns AAF (Hangar 30104, Hangar 30106, Hangar 30108, Fire Station, and Cairns WWTP)	Yes	No	Further study in a remedial investigation
Ech SF	Yes	Yes	Further study in a remedial investigation
FFTA/SWMU-15	Yes	No	Further study in a remedial investigation
Former Metal Plating Shop	NS[1]	No	Supplemental SI groundwater sampling
Fire Truck Staging Area	NS[2]	No	Supplemental SI groundwater sampling
FTA	Yes	Yes	Further study in a remedial investigation
Goldberg SF	Yes	No	Further study in a remedial investigation
Hanchey AHP (Hangar 50202, Hangar 50204, and Fire Station)	Yes	No	Further study in a remedial investigation
Hatch SF	Yes	No	Further study in a remedial investigation
Highbluff SF	Yes	Yes	Further study in a remedial investigation
Hooper SF	Yes	No	Further study in a remedial investigation

AOPIs	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Hunt SF	Yes	Yes	Further study in a remedial investigation
Knox AHP (Hangar 25165 and Fire Station)	Yes	No	Further study in a remedial investigation
Louisville SF	Yes	ND	Further study in a remedial investigation
Lowe AHP (Hangar 40120 and Fire Station)	Yes	No	Further study in a remedial investigation
Lucas SF	No	No	No action at this time.
Molinelli FARP	Yes	No	Further study in a remedial investigation
Rucker Fire Station	Yes	No	Further study in a remedial investigation
Runkle SF	Yes	Yes	Further study in a remedial investigation
Shell AHP (Hangar 60104, Hangar 60105, and Fire Station)	Yes	No	Further study in a remedial investigation
Skelly SF	Yes	ND	Further study in a remedial investigation
Stinson SF	Yes	No	Further study in a remedial investigation
Tabernacle SF	Yes	No	Further study in a remedial investigation
Tac X SF	Yes	No	Further study in a remedial investigation
Toth SF	Yes	No	Further study in a remedial investigation
Rucker WWTP	Yes	No	Further study in a remedial investigation

Notes:

1. Investigation efforts were focused on soil at the Former Metal Plating Shop due to limited site knowledge regarding use, storage, and/or discharge of potentially PFAS-containing material and limited information on groundwater flow direction.
2. Investigation efforts at the Fire Truck Staging Area were focused on soil since the AFFF release occurred in 2019 and the location was known. In addition, limited information was available on groundwater flow direction.

Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
ND – not detected
NS – not sampled

SO – soil

Data collected during the PA (**Section 3**, **Section 4**, and **Section 5**) and SI (**Section 6 and Section 7**) were sufficient to draw the conclusions summarized above. The data limitations relevant to the development of this PA/SI for PFOS, PFOA, and PFBS at Fort Rucker 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 crash 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. Material used during metal plating activities and the waste discharge process at the Former Metal Plating Shop is unknown. Geological data limitations include a limited understanding of localized groundwater flow at each AOPI and the depth of confining layers in the area.

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 EDR 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 is limited to results from historical PFAS sampling for on-post water-supply wells (**Section 2.12**) and this SI. Surface water and sediment samples were not collected as surface water bodies were not located on the AOPIs. However, numerous tributaries are located throughout the Fort Rucker area. Additionally, the available PFAS data, including PFOS, PFOA, and PFBS, is limited to the 18 PFAS-related compounds as listed in **Appendix M**, which were analyzed per the selected analytical method. The limited sampling scope of the SI focused on identifying presence or absence of PFOS, PFOA, and PFBS at the AOPIs. SI sampling at locations at or in close proximity of the AOPIs and drinking water wells did not delineate the extent of PFOS, PFOA, and PFBS impacts or identify the primary migration pathways for the chemicals. Available data, including PFOS, PFOA, and PFBS, is listed in **Appendix M**, which were analyzed per the selected analytical method.

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

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ACRONYMS

%	percent
AAF	Army Airfield
AFFF	aqueous film-forming foam
AHP	Army Heliport
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
DEB	dedicated equipment background
DoD	Department of Defense
DPT	direct-push technology
DPW	Directorate of Public Works
DQO	data quality objective
DUSR	Data Usability Summary Report
EB	equipment blank
EDR	Environmental Data Resources, Inc.
EIS	Extracted Internal Standards
ELAP	Environmental Laboratory Accreditation Program
FARP	Forward Area Refueling Point
FCR	Field Change Report
FTA	fire training area
FFTA	former fire training area
GIS	geographic information system
gpm	gallons per minute
GW	groundwater
HQAES	Headquarters Army Environmental System
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
N/A	not available
ND	not detected
NFPA	National Fire Protection Association
ng/L	nanograms per liter
NS	not sampled
OSD	Office of the Secretary of Defense
PA	preliminary assessment
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
PZ	piezometer
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RIV	rapid intervention vehicle
RSL	Regional Screening Level
SF	Stage Field
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
UCMR3	third Unregulated Contaminant Monitoring Rule
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
WWTP	wastewater treatment plant

TABLES

Table 2-1 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

			Analyte:	PFOS (ng/L)	PFOA (ng/L)	PFBS (ng/L)
			OSD risk screening level*:	**40**	**40**	**40000**
Well Location	**Sample ID**	**Type of Well**	**Sample Date**	**Result**	**Result**	**Result**
Fort Rucker Primary Water Supply Wells	NP	Garrison WSW	6/23/2014	<40	<20	<90
			12/2/2014	<40	<20	<90
	NP		9/10/2013	<40	<20	<90
			3/10/2014	<40	<20	<90
	NP		10/3/2013	<40	<20	<90
			3/11/2014	<40	<20	<90
	NP		9/10/2013	<40	<20	<90
			3/10/2014	<40	<20	<90
	NP		9/11/2013	<40	<20	<90
			3/10/2014	<40	<20	<90
	NP		10/3/2013	<40	<20	<90
			3/11/2014	<40	<20	<90
	NP		9/11/2013	<40	<20	<90
			3/11/2014	<40	<20	<90
On-Post Water Supply Wells	NP	Garrison PWS - TNCWS	6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0
	NP		6/11/2018	<2.0	<2.0	<2.0

Acronyms:
ng/L - nanograms per liter
NP - Not provided based on OPSEC review.
OSD - Office of the Secretary of Defense
PFAS - per- and polyfluoroalkyl substances
PFBS - perfluorobutanesulfonic acid
PFOA - perfluorooctanoic acid
PFOS - perfluorooctane sulfonate
PWS - Public Water System
TNCWS - Transient, Non-Community Water System
WSW - Water Supply Well

* Risk screening level for tap water. To be conservative, the OSD tap water risk screening levels will be used to compare all groundwater and potable-use surface water for the Army PFAS PA/SIs.
Historical results are provided from the Fort Rucker 2013-2014 UCMR3 and 2018 IMCOM.

Table 6-1 - Monitoring Well and Piezometer Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

Area of Potential Interest	Sampling Location ID[1]	Screened Interval (ft bgs)	Total Well Depth (ft bgs)	Casing Diameter (inches)	Measuring Point Elevation (ft amsl)	Measuring Point	Depth to Groundwater from MP (ft)	Groundwater Elevation (ft amsl)	Sampling Depth (ft bgs)	PFAS Samples Collected (Y/N)
Allen SF	FTRK-ALLEN-1-PZ-090120	40 - 50	50	0.75	356.92	TOC	44.24	312.68	48	Y
	FTRK-ALLEN-2-PZ-090120	30 - 40	40	0.75	345.12	TOC	35.59	309.53	38	Y
	FTRK-ALLEN-3-PZ-090120	25 - 35	35	0.75	337.36	TOC	28.3	309.06	33	Y
Brown SF	FTRK-BROWN-1-GW-090220	26 - 30	30	0.75	NM	GS	25.51	NC	29	Y
	FTRK-BROWN-2-GW-090220	18 - 22	22	0.75	NM	GS	15.51	NC	20	Y
	FTRK-BROWN-1-PZ-082820	15 - 25	25	0.75	396.77	TOC	18.35	378.42	24	Y
	FTRK-BROWN-2-PZ-071420	35-45	45	0.75	391.81	TOC	29.34	362.47	N/A	N
	FTRK-BROWN-3-PZ-071420	35-45	45	0.75	403.63	TOC	39.55	364.08	N/A	N
Cairns AAF (Hangar 30104, Hangar 30106, Hangar 30108, Cairns Fire Station, and Cairns WWTP)	FTRK-CAAF-1-GW-090820	36 - 40	40	0.75	NM	GS	35.22	NC	38	Y
	FTRK-CAAF-2-GW-082920	36 - 40	40	0.75	NM	GS	32.14	NC	38	Y
	FTRK-CAAF-3-GW-082920	41 - 45	45	0.75	NM	GS	39.28	NC	43	Y
	FTRK-CAAF-4-GW-082820	24.5 - 28.5	28.5	0.75	NM	GS	24.21	NC	26	Y
	FTRK-CAAF-1-PZ-071220	15 - 25	25	0.75	298.75	TOC	15.69	283.06	N/A	N
	FTRK-CAAF-2-PZ-071220	40-50	50	0.75	303.17	TOC	45.48	257.69	N/A	N
	FTRK-CAAF-3-PZ-	25 - 35	35	0.75	282.47	TOC	28.22	254.25	N/A	N
Ech SF	FTRK-ECH-1-GW-082620	23 - 27	27	0.75	NM	GS	21.82	NC	25	Y
	FTRK-ECH-1-PZ-071020	13 - 23	23.5	0.75	269.52	TOC	17.86	251.66	N/A	N
	FTRK-ECH-2-PZ-082920	8 - 18	18.5	0.75	254.86	TOC	7.9	246.96	13	Y
	FTRK-ECH-3-PZ-082620	20 - 30	30	0.75	265.46	TOC	23.63	241.83	28	Y
FFTA (SWMU-15)	FTRK-SWMU15-10G1-GW-070120	unknown	24.5	2	N/A	GS	11.5	NC	20	Y
	FTRK-SWMU15-11G1-GW-070120	unknown	39.65	2	N/A	GS	25.6	NC	35	Y
	FTRK-SWMU15-11G2-GW-070120	unknown	39.65	2	N/A	GS	18.08	NC	35	Y
	FTRK-SWMU15-11G3-GW-070120	unknown	20.15	2	N/A	GS	7.75	NC	17	Y
	FTRK-SWMU15-15G1-GW-070120	unknown	29.65	2	N/A	GS	18.8	NC	25	Y
Fire Training Area and Storage	FTRK-FTA-1-GW-082820	19.5 - 23.5	23.5	0.75	NM	GS	19.68	NC	21.5	Y
	FTRK-FTA-1-PZ-071120	15 - 25	25	0.75	230.94	TOC	16.88	214.06	N/A	N
	FTRK-FTA-2-PZ-082920	20 - 30	30	0.75	247.35	TOC	23.86	223.49	28	Y
	FTRK-FTA-3-PZ-082920	15 - 25	25	0.75	239.22	TOC	17.19	222.03	25	Y
Goldberg SF	FTRK-GOLD-1-GW-091120	19.5 - 23.5	23.5	0.75	NM	GS	19.31	NC	23	Y
	FTRK-GOLD-2-GW-091120	25 - 29	29	0.75	NM	GS	24.23	NC	28	Y
	FTRK-GOLD-3-GW-091120	17.5 - 21.5	21.5	0.75	NM	GS	16.21	NC	20.5	Y
Hanchey AHP (Hanger 50202, Hanger 50204, and Fire Station)	FTRK-HAHP-1-PZ-082520	10 - 20	20	0.75	305.27	TOC	10.39	294.88	18	Y
	FTRK-HAHP-2-PZ-082520	10 - 20	20	0.75	251.25	TOC	3.52	247.73	18	Y
	FTRK-HAHP-3-PZ-082520	15 - 25	25	0.75	247.59	TOC	16.67	230.92	24	Y
Hatch SF	FTRK-HATCH-1-GW-082520	20 - 24	24	0.75	NM	GS	20	NC	20	Y
	FTRK-HATCH-1-PZ-082620	20 - 30	30	0.75	228.04	TOC	19.3	208.74	28	Y
	FTRK-HATCH-2-PZ-070120	15 - 25	25	0.75	220.48	TOC	12.95	207.53	N/A	N
	FTRK-HATCH-3-PZ-082620	14 - 24	24	0.75	217.55	TOC	15.79	201.76	20	Y
Highbluff SF	FTRK-HGHBLF-1-GW-090320	28 - 32	32	0.75	NM	GS	28.25	NC	30	Y
	FTRK-HGHBLF-2-GW-090320	33 - 37	37	0.75	NM	GS	29.31	NC	36	Y
	FTRK-HGHBLF-1-PZ-083120	30 - 40	40	0.75	252.14	TOC	30.48	221.66	38	Y
	FTRK-HGHBLF-2-PZ-072420	30 - 40	40	0.75	255.79	TOC	34.79	221	N/A	N
	FTRK-HGHBLF-3-PZ-072420	30 - 40	40	0.75	258.24	TOC	30.77	227.47	N/A	N

Table 6-1 - Monitoring Well and Piezometer Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

Area of Potential Interest	Sampling Location ID[1]	Screened Interval (ft bgs)	Total Well Depth (ft bgs)	Casing Diameter (inches)	Measuring Point Elevation (ft amsl)	Measuring Point	Depth to Groundwater from MP (ft)	Groundwater Elevation (ft amsl)	Sampling Depth (ft bgs)	PFAS Samples Collected (Y/N)
Hooper SF	FTRK-HOOP-1-GW-082620	28 - 32	32	0.75	NM	GS	27.2	NC	30	Y
	FTRK-HOOP-2-GW-082620	28 - 32	32	0.75	NM	GS	29.6	NC	30	Y
	FTRK-HOOP-1-PZ-070220	35 - 45	45		363.23	TOC	36.55	326.68	N/A	N
	FTRK-HOOP-2-PZ-082620	25 - 35	35	0.75	358	TOC	23.76	334.24	30	Y
	FTRK-HOOP-3-PZ-070820	25 - 35	35		351.35	TOC	26.22	325.13	N/A	N
Hunt SF	FTRK-HUNT-1-GW-091020	10 - 14	14	0.75	NM	GS	7.6	NC	13	Y
	FTRK-HUNT-1-PZ-082820	10 - 20	20	0.75	232.86	TOC	4.8	228.06	15	Y
	FTRK-HUNT-2-PZ-082820 / FTRK-FD-1-GW-082820	10 - 20	20	0.75	246	TOC / GS	11.85	234.15	18	Y
	FTRK-HUNT-3-PZ-082820	15 - 25	25	0.75	235.15	TOC	7.17	227.98	20	Y
Knox AHP (Hangar 25165 and Fire Station)	FTRK-KAHP-1-GW-082520	13 - 17	17	0.75	NM	GS	10.51	NC	15	Y
	FTRK-KAHP-2-GW-082520	13 - 17	17	0.75	NM	GS	12.83	NC	15	Y
	FTRK-KAHP-1-PZ-082520	10 - 20	20	0.75	213.66	TOC	10.03	203.63	18	Y
	FTRK-KAHP-2-PZ-082520	14 - 24	24	0.75	212.68	TOC	10.69	201.99	20	Y
	FTRK-KAHP-3-PZ-06/29/20	9 - 20	20	0.75	208.59	TOC	8.85	199.74	N/A	N
Louisville SF	FTRK-LOUVL-1-GW-091220	24.5 - 29.5	29.5	0.75	NM	GS	20.62	NC	28	Y
	FTRK-LOUVL-2-GW-091220 / FTRK-FD-4-GW-091220	20 - 24	24	0.75	NM	GS	19.74	NC	22	Y
	FTRK-LOUVL-3-GW-091220	15 - 19	19	0.75	NM	GS	16.59	NC	19	Y
Lowe AHP (Hangar 40120 and Fire Station)	FTRK-LAHP-1-GW-082720	16 - 20	18	0.75	NM	GS	13.73	NC	18	Y
	FTRK-LAHP-2-GW-082720	6 - 10	10	0.75	NM	GS	5.62	NC	8	Y
	FTRK-LAHP-1-PZ-070620	40 -50	50	0.75	299.33	TOC	41.11	258.22	N/A	N
	FTRK-LAHP-2-PZ-082720	10 - 20	20	0.75	252.19	TOC	10.65	241.54	18	Y
	FTRK-LAHP-3-PZ-	5 - 15	15	0.75	244.52	TOC	1.94	242.58	N/A	N
Lucas SF	FTRK-LUCAS-1-PZ-090120 / FTRK-FD-2-GW-090120	40 - 50	50	0.75	324.88	TOC	39.63	285.25	48	Y
	FTRK-LUCAS-2-PZ-090120	30 - 40	40	0.75	302.71	TOC	26.46	276.25	35	Y
	FTRK-LUCAS-3-PZ-083020	25 - 35	35	0.75	301.55	TOC	27.23	274.32	34	Y
Molinelli FARP	FTRK-MFARP-1-PZ-090220	30 - 40	40	0.75	481.77	TOC	33.56	448.21	38	Y
	FTRK-MFARP-2-PZ-090220	35 - 45	45	0.75	480.92	TOC	36.49	444.43	42	Y
	FTRK-MFARP-3-PZ-090220	45 - 55	55	0.75	490.7	TOC	46.75	443.95	53	Y
Rucker Fire Station	FTRK-RFS-1-GW-010521	67 - 77	77	0.75	NM	GS	68.5	NC	76	Y
Runkle SF	FTRK-RUNKLE-1-GW-083120	19.5 - 23.5	23.5	0.75	NM	GS	19.42	NC	21.5	Y
	FTRK-RUNKLE-2-GW-083120	11 - 15	15	0.75	NM	GS	11.22	NC	13	Y
	FTRK-RUNKLE-1-PZ-082820	13 - 23	23	0.75	179.91	TOC	19.35	160.56	23	Y
	FTRK-RUNKLE-2-PZ-072320	12 - 22	25	0.75	164.77	TOC	12.06	152.71	N/A	N
	FTRK-RUNKLE-3-PZ-072320	19.5 - 29.5	30	0.75	171.76	TOC	18.74	153.02	N/A	N
	FTRK-RUNKLE-3b-PZ-072320	10 - 20	20	0.75	171.67	TOC	15.28	156.39	N/A	N

Table 6-1 - Monitoring Well and Piezometer Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

Area of Potential Interest	Sampling Location ID[1]	Screened Interval (ft bgs)	Total Well Depth (ft bgs)	Casing Diameter (inches)	Measuring Point Elevation (ft amsl)	Measuring Point	Depth to Groundwater from MP (ft)	Groundwater Elevation (ft amsl)	Sampling Depth (ft bgs)	PFAS Samples Collected (Y/N)
Shell AHP (Hangar 60104, Hangar 60105, and Fire Station)	FTRK-SAHP-1-GW-091320	44 - 48	48	0.75	NM	GS	44.72	NC	48	Y
	FTRK-SAHP-2-GW-083020	44 - 48	48	0.75	NM	GS	44.18	NC	46	Y
	FTRK-SAHP-3-GW-083020	39 - 43	43	0.75	NM	GS	36.29	NC	41	Y
	FTRK-SAHP-1-PZ-071320	40 - 50	50	0.75	405.29	TOC	42.38	362.91	N/A	N
	FTRK-SAHP-2-PZ-071320	40 - 50	50	0.75	383.35	TOC	41.53	341.82	N/A	N
	FTRK-SAHP-3-PZ-071320	45-55	55	0.75	376.63	TOC	44.65	331.98	N/A	N
Skelly SF	FTRK-SKELLY-1-GW-090220	13 - 17	17	0.75	NM	GS	13.17	NC	15	Y
	FTRK-SKELLY-1-PZ-083020	19 - 29	28	0.75	189.68	TOC	16.89	172.79	28	Y
	FTRK-SKELLY-2-PZ-072020	10 - 20	20	0.75	185.95	TOC	12.81	173.14	N/A	N
	FTRK-SKELLY-3-PZ-083020	5 - 15	15	0.75	168.86	TOC	5.89	162.97	13	Y
Stinson SF	FTRK-STINSON-1-GW-090120	45 - 49	49	0.75	NM	GS	43.34	NC	47	Y
	FTRK-STINSON-2-GW-090120	42.5 - 46.5	46.5	0.75	NM	GS	41.81	NC	44.5	Y
	FTRK-STINSON-3-GW-090120	39 - 43	43	0.75	NM	GS	38.33	NC	41	Y
	FTRK-STINSON-1-PZ-071520	40-50	50	0.75	362.58	TOC	43.89	318.69	N/A	N
	FTRK-STINSON-2-PZ-072820	30 - 40	40.5	0.75	350.8	TOC	32.01	318.79	N/A	N
	FTRK-STINSON-3-PZ-072820	40 - 50	50.5	0.75	365.28	TOC	43.79	321.49	N/A	N
Tabernacle SF	FTRK-TAB-1-GW-082720	16 - 20	20	0.75	NM	GS	15.24	NC	18	Y
	FTRK-TAB-1-PZ-082620	25 - 35	35	0.75	478.72	TOC	25.44	453.28	31	Y
	FTRK-TAB-2-PZ-082720	30 - 40	40	0.75	451.35	TOC	33.12	418.23	39	Y
	FTRK-TAB-3-PZ-082720	14 - 24	24.7	0.75	430.29	TOC	16.86	413.43	N/A	N
Tac X SF	FTRK-TACX-1-DW-083120	Unknown	140	N/A	NM	GS	N/A	NC	N/A	Y
	FTRK-TACX-1-GW-083120	6 - 10	10	0.75	NM	GS	3.05	NC	8	Y
	FTRK-TACX-1-PZ-083120	4 - 14	14	0.75	110.76	TOC	2.81	107.95	12	Y
	FTRK-TACX-2-PZ-083120	4 - 14	14	0.75	113.07	TOC	6.56	106.51	12	Y
	FTRK-TACX-3-PZ-083120	2.5 - 12.5	12.5	0.75	116.18	TOC	4.32	111.86	10	Y
Toth SF	FTRK-TOTH-1-GW-091020	29 - 33	33	0.75	NM	GS	28.26	NC	32	Y
	FTRK-TOTH-2-GW-091020	25 - 29	29	0.75	NM	GS	19.61	NC	27	Y
	FTRK-TOTH-1-PZ-090120	30 - 40	40	0.75	309.86	TOC	34.6	275.26	38	Y
	FTRK-TOTH-2-PZ-072620	40 - 50	50	0.75	319.58	TOC	43.85	275.73	N/A	N
	FTRK-TOTH-3-PZ-072920	45 - 55	55.5	0.75	324.19	TOC	47.25	276.94	N/A	N
WWTP	FTRK-WWTP-1-GW-090920	18 - 22	22	0.75	NM	GS	18.75	NC	22	Y
	FTRK-WWTP-2-GW-090920	16 - 20	20	0.75	NM	GS	16.37	NC	19	Y
	FTRK-WWTP-3-GW-090920 / FTRK-FD-3-GW-090920	18 - 22	22	0.75	NM	GS	18.3	NC	21	Y

Table 6-1 - Well Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

Notes:

1. 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 at which the drill casing was retracted for collection of a grab groundwater sample through a decontaminated screen-point sampler.
2. Potable water supply wells were sampled through the sampling port. Depths to water could not be measured.
3. All PZ wells were surveyed by Arcadis to evaluate groundwater flow.
4. All groundwater samples were collected via paratalitic pump, except the Rucker Fire Station. A bailer was used at the Rucker Fire Station due to a silted well screen.

Acronyms/Abreviations:

AAF - Army Airfield
AHP - Army Heliport
amsl - above mean sea level
bgs - below ground surface
DPT - direct push technology
FARP - Forward Arming and Refueling
ft - feet
GS - ground surface
ID - identification
MP - measuring point
N - no
N/A - not available
NC - not calculated
NM - not measured (not surveyed)
PFAS - per- and polyfluoroalkyl substances
PZ - piezometer
SF - stagefield
SWMU - Solid Waste Management Unit
TOC - top of casing
WWTP - wastewater treatment plant
Y - yes

Table 7-1 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

AOPI Location	Sample ID / Parent Sample ID	Analyte		PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
		OSD Tapwater Risk Screening Level		40		40		600	
		Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Allen SF	FTRK-ALLEN-1-PZ-090120	09/01/2020	N	**5,700**	DJ	**370**		**62**	
	FTRK-ALLEN-2-PZ-090120	09/01/2020	N	**16**		**2.0**	J	4.0	U
	FTRK-ALLEN-3-PZ-090120	09/01/2020	N	**720**		**12**		4.0	U
Brown SF	FTRK-BROWN-1-GW-090220	09/02/2020	N	**20**		4.0	U	**2.6**	J
	FTRK-BROWN-2-GW-090220	09/02/2020	N	**7.8**		3.9	U	**5.8**	
	FTRK-BROWN-1-PZ-082820	08/28/2020	N	**960**	DJ	**140**		**210**	
Cairns AAF (5 AOPIs)	FTRK-CAAF-1-GW-090820	09/08/2020	N	**8.1**		**42**		**9.8**	
	FTRK-CAAF-2-GW-082920	08/29/2020	N	**3.4**	J	**53**		**16**	
	FTRK-CAAF-3-GW-082920	08/29/2020	N	**19**	J+	**15**		**17**	
	FTRK-CAAF-4-GW-082820	08/28/2020	N	**42**		**3.2**	J	3.8	U
Ech SF	FTRK-ECH-1-GW-082620	08/26/2020	N	**8,100**	DJ	**470**		**160**	
	FTRK-ECH-2-PZ-082920	08/29/2020	N	**3.0**	J	**6.0**		3.5	U
	FTRK-ECH-3-PZ-082620	08/26/2020	N	**7.8**		**1.8**	J	3.5	U
FFTA (SWMU-15)	FTRK-SWMU15-10G1-GW-070120	07/01/2020	N	**3,300**	DJ	**360**		**69**	
	FTRK-SWMU15-11G1-GW-070120	07/01/2020	N	**1,400**	DJ	**10,000**	DJ	**540**	DJ
	FTRK-SWMU15-11G2-GW-070120	07/01/2020	N	**2,400**	DJ	**2,800**	DJ	**540**	
	FTRK-SWMU15-11G3-GW-070120	07/01/2020	N	**1,000**	DJ	**410**		**200**	
	FTRK-SWMU15-15G1-GW-070120	07/01/2020	N	**93,000**	DJ	**11,000**	DJ	**1,400**	DJ
Fire Training Area	FTRK-FTA-1-GW-082820	08/28/2020	N	**5,300**	DJ	**730**	DJ	**140**	DJ
	FTRK-FTA-2-PZ-082920	08/29/2020	N	**210**		**30**		**110**	
	FTRK-FTA-3-PZ-082920	08/29/2020	N	**61,000**	DJ	**2,500**	DJ	**560**	DJ
Goldberg SF	FTRK-GOLD-1-GW-091120	09/11/2020	N	3.9	U	3.9	U	3.9	U
	FTRK-GOLD-2-GW-091120	09/11/2020	N	**50**		3.9	U	3.9	U
	FTRK-GOLD-3-GW-091120	09/11/2020	N	**4.2**		4.0	U	4.0	U
Hanchey AHP (3 AOPIs)	FTRK-HAHP-1-PZ-082520	08/25/2020	N	**48,000**	DJ	**2,200**	DJ	**56**	DJ
	FTRK-HAHP-2-PZ-082520	08/25/2020	N	**21**		**8.3**		3.4	U
	FTRK-HAHP-3-PZ-082520	08/25/2020	N	**93**		**7.3**		**3.2**	J
Hatch SF	FTRK-HATCH-1-GW-082520	08/25/2020	N	**2.1**	J	3.9	U	3.9	U
	FTRK-HATCH-1-PZ-082620	08/26/2020	N	**2,400**	DJ	**110**		**15**	
	FTRK-HATCH-3-PZ-082620	08/26/2020	N	**3.7**		**2.5**	J	3.4	U
Highbluff SF	FTRK-HGHBLF-1-GW-090320	09/03/2020	N	**28**		**10**		**10**	
	FTRK-HGHBLF-2-GW-090320	09/03/2020	N	**4,200**	DJ	**220**		**76**	
	FTRK-HGHBLF-1-PZ-083120	08/31/2020	N	**1,900**	DJ	**280**		**220**	J+
Hooper SF	FTRK-HOOP-1-GW-082620	08/26/2020	N	**460**		**13**		**3.9**	J
	FTRK-HOOP-2-GW-082620	08/26/2020	N	**810**	DJ	**110**		**22**	
	FTRK-HOOP-2-PZ-082620	08/26/2020	N	**2,300**	DJ	**140**		**18**	
Hunt SF	FTRK-HUNT-1-GW-091020	09/10/2020	N	**3,500**	DJ	**750**		**41**	
	FTRK-HUNT-1-PZ-082820	08/28/2020	N	**11**		**2.9**	J	3.6	U
	FTRK-HUNT-2-PZ-082820	08/28/2020	N	**170**	J-	**340**	J-	**30**	J-
	FTRK-FD-1-GW-082820 / FTRK-HUNT-2-PZ-082820	08/28/2020	FD	**140**		**290**		**23**	
	FTRK-HUNT-3-PZ-082820	08/28/2020	N	**12**		**1.9**	J	3.5	U
Knox AHP (2 AOPIs)	FTRK-KAHP-1-GW-082520	08/25/2020	N	**250**		**24**		**18**	
	FTRK-KAHP-2-GW-082520	08/25/2020	N	**250**		**69**		**5.6**	
	FTRK-KAHP-1-PZ-082520	08/25/2020	N	**5,300**	DJ	**730**		**300**	
	FTRK-KAHP-2-PZ-082520	08/25/2020	N	**35**		**11**		**12**	

Table 7-1 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

AOPI Location	Sample ID / Parent Sample ID	Analyte		PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
		OSD Tapwater Risk Screening Level		40		40		600	
		Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Louisville SF	FTRK-LOUVL-1-GW-091220	09/12/2020	N	3.9	U	3.9	U	3.9	U
	FTRK-LOUVL-2-GW-091220	09/12/2020	N	**9.7**		3.9	U	3.9	U
	FTRK-FD-4-GW-091220 / FTRK-LOUVL-2-GW-091220	09/12/2020	FD	**10**		3.8	U	3.8	U
	FTRK-LOUVL-3-GW-091220	09/12/2020	N	**250**		**9.8**		**3.2**	J
Lowe AHP (2 AOPIs)	FTRK-LAHP-1-GW-082720	08/27/2020	N	**24,000**	DJ	**6,100**	DJ	**1,400**	DJ
	FTRK-LAHP-2-GW-082720	08/27/2020	N	**43**		**28**		3.9	U
	FTRK-LAHP-2-PZ-082720	08/27/2020	N	**2,000**	DJ	**94**		**99**	
Lucas SF	FTRK-LUCAS-1-PZ-090120	09/01/2020	N	**11**		**9.5**	J	**46**	J
	FTRK-FD-2-GW-090120 / FTRK-LUCAS-1-PZ-090120	09/01/2020	FD	**11**		**19**	J	**84**	J
	FTRK-LUCAS-2-PZ-090120	09/01/2020	N	**5.7**		3.8	U	**6.8**	
	FTRK-LUCAS-3-PZ-083020	08/30/2020	N	**3.7**	J	3.8	U	**2.7**	J
Molinelli FARP	FTRK-MFARP-1-PZ-090220	09/02/2020	N	**610**		**16**		**3.5**	J
	FTRK-MFARP-2-PZ-090220	09/02/2020	N	**34**		**3.4**	J	**3.4**	J
	FTRK-MFARP-3-PZ-090220	09/02/2020	N	**18**		**5.7**		**5.5**	
Rucker Fire Station	FTRK-RFS-1-GW-010521	01/05/2021	N		J	**93**	J-		J
Runkle SF	FTRK-RUNKLE-1-GW-083120	08/31/2020	N	**610**		**82**		**7.5**	
	FTRK-RUNKLE-2-GW-083120	08/31/2020	N	**400**		**57**		**8.5**	
	FTRK-RUNKLE-1-PZ-082820	08/28/2020	N	**2,600**	DJ	**310**		**26**	
Shell AHP (3 AOPIs)	FTRK-SHELL-1-GW-091320	09/13/2020	N		J	**3.7**	J+	**4.2**	J+
	FTRK-SHELL-2-GW-083020	08/30/2020	N	**18**	J+	**100**		**43**	
	FTRK-SHELL-3-GW-083020	08/30/2020	N	**3.4**	J	4.0	U	**2.0**	J
Skelly SF	FTRK-SKELLY-1-GW-090220	09/02/2020	N	**21**		**1.9**	J	3.6	U
	FTRK-SKELLY-1-PZ-083020	08/30/2020	N	**6,400**	DJ	**180**		**63**	
	FTRK-SKELLY-3-PZ-083020	08/30/2020	N	**14**		**5.4**		3.6	U
Stinson SF	FTRK-STINSON-1-GW-090120	09/01/2020	N	**20,000**	DJ	**1,600**	DJ	**2,200**	DJ
	FTRK-STINSON-2-GW-090120	09/01/2020	N	**970**	DJ	**5.6**		**6.2**	
	FTRK-STINSON-3-GW-090120	09/01/2020	N	**89**	J+	4.0	U	4.0	U
Tabernacle SF	FTRK-TAB-1-GW-082720	08/27/2020	N	**24**	J+	**2.4**	J	4.0	U
	FTRK-TAB-1-PZ-082620	08/26/2020	N	**570**		**13**		**12**	
	FTRK-TAB-2-PZ-082720	08/27/2020	N	**6.4**	J+	5.8	UJ-	**59**	J-
Tac X SF	FTRK-TACX-1-DW-083120	08/31/2020	N	3.7	U	3.7	U	3.7	U
	FTRK-TACX-1-GW-083120	08/31/2020	N	3.8	U	3.8	U	3.8	U
	FTRK-TACX-1-PZ-083120	08/31/2020	N	**79**		**3.4**	J	3.6	U
	FTRK-TACX-2-PZ-083120	08/31/2020	N	**39**		**5.8**		3.5	U
	FTRK-TACX-3-PZ-083120	08/31/2020	N	3.7	U	3.7	U	3.7	U
Toth SF	FTRK-TOTH-1-GW-091020	09/10/2020	N	**14**	J	**6.0**		**7.8**	
	FTRK-TOTH-2-GW-091020	09/10/2020	N	**660**		**57**		**34**	
	FTRK-TOTH-1-PZ-090120	09/01/2020	N	**330**		**59**		**34**	
Rucker WWTP	FTRK-WWTP-1-GW-090920	09/09/2020	N	**170**		**200**		**69**	
	FTRK-WWTP-2-GW-090920	09/09/2020	N	**220**		**280**		**160**	
	FTRK-WWTP-3-GW-090920	09/09/2020	N	**8.6**		**6.6**		3.9	U
	FTRK-FD-3-GW-090920 / FTRK-WWTP-3-GW-090920	09/09/2020	FD	**8.5**		**5.5**		3.9	U

Table 7-1 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

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 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. Orange shaded values were qualified as J following direction from an USACE chemist. During validation sample results were qualified as 'X' indicating serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. Therefore, the analytical result has been deemed unusable and will not be screened against the OSD risk screening levels. Refer to Data Usability Summary Report (Appendix L) for additional information.
4. Sample ids 'FTRK-LAHP-1-GW-082720' and 'FTRK-LAHP-2-GW-082720' were mislabeled as FTRK-LOWE-1-GW-082720' and 'FTRK-LOWE-2-GW-082720,' respectively, in the chain of custody and lab report number VH28031. Per the QAPP Addendum (Rucker 2020), the sample id abbreivations were revised to 'LAHP.'

Acronyms/Abbreviations:
-- = not applicable
AAF = Army Airfield
AHP = Army Heliport
AOPI = area of potential interest
FARP = Forward Area Refueling Point
FTRK = Fort Rucker
FD = field duplicate sample
FFTA = former fire training area
GW = groundwater
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
SF = stage field
SWMU = Solid Waste Management Unit
WWTP = wastewater treatment plant

Qualifier	Description
DJ	The analyte was analyzed at dilution and the result is an estimated quantity
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).
UJ	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.
UJ-	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.

Table 7-2 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

AOPI Location	Sample ID / Parent Sample ID	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	
		Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Allen SF	FTRK-ALLEN-1-SO(0-2)-072720	07/27/2020	N	**0.0038**	J-	0.00090	U	0.00090	U
Brown SF	FTRK-BROWN-1-SO(0-2)-071420	07/14/2020	N	**0.0017**		0.00094	U	0.00094	U
	FTRK-FD-3-071420 / FTRK-BROWN-1-SO(0-2)-071420	07/14/2020	FD	**0.0023**		0.0011	U	0.0011	U
Cairns AAF (5 AOPIs)	FTRK-CAAF-1-SO(0-2)-071220	07/12/2020	N	**0.0012**		0.00099	U	0.00099	U
	FTRK-CAAF-2-SO(0-2)-071220	07/12/2020	N	**0.0013**		**0.0012**		0.00094	U
	FTRK-CAAF-3-SO(0-2)-071220	07/12/2020	N	**0.00061**	J	0.0011	U	0.0011	U
	FTRK-CAAF-4-SO(0-2)-071220	07/12/2020	N	**0.073**		**0.00079**	J	0.00097	U
	FTRK-CAAF-5-SO(0-2)-071220	07/12/2020	N	**0.0090**		0.0011	U	0.0011	U
	FTRK-CAAF-6-SO(0-2)-071320	07/13/2020	N	**0.0048**		0.0011	U	0.0011	U
	FTRK-CAAF-7-SO(0-2)-071320	07/13/2020	N	**0.013**		0.0011	U	0.0011	U
	FTRK-CAAF-8-SO(0-2)-071320	07/13/2020	N	**0.0072**		0.0010	U	0.0010	U
Ech SF	FTRK-ECH-1-SO(0-2)-070920	07/09/2020	N	**0.21**		**0.0052**		0.0011	U
FFTA/SWMU-15	FTRK-SWMU15-1-SO(0-2)-(063020)	06/30/2020	N	**0.019**		**0.00071**	J	0.00099	UJ
	FTRK-SWMU15-2-SO(4-6)-(063020)	06/30/2020	N	**0.18**		**0.025**		0.00096	U
Former Metal Plating Shop	FTRK-METAL-1-SO(0-2)-(062920)	06/29/2020	N	**0.00059**	J	0.0011	U	0.0011	U
	FTRK-METAL-2-SO(0-2)-(062920)	06/29/2020	N	0.00095	U	0.00095	U	0.00095	U
	FTRK-METAL-3-SO(0-2)-(062920)	06/29/2020	N	0.0010	U	0.0010	U	0.0010	U
Firetruck Staging Area	FTRK-FTSA-1-SO(0-2)-071120	07/11/2020	N	**0.00071**	J	0.00098	U	0.00098	U
Fire Training Area	FTRK-FTA-1-SO(0-2)-071120	07/11/2020	N	**1.1**	DJ	**0.017**		**0.0048**	
	FTRK-FTA-2-SO(0-2)-071120	07/11/2020	N	**0.0046**		0.00099	U	0.00099	U
	FTRK-FTA-3-SO(0-2)-071120	07/11/2020	N	**0.0023**		**0.0020**		0.0010	U
Goldberg SF	FTRK-GOLD-1-SO(0-2)091120	09/11/2020	N	**0.079**		**0.00068**	J	0.0011	U
	FTRK-GOLD-2-SO(0-2)091120	09/11/2020	N	**0.12**		0.0011	U	0.0011	U
	FTRK-GOLD-3-SO(0-2)091120	09/11/2020	N	**0.00077**	J	0.0010	U	0.0010	U
Hanchey AHP (3 AOPIs)	FTRK-HAHP-1-SO(0-2)-(063020)	06/30/2020	N	**0.0020**		0.0010	U	0.0010	U
	FTRK-HAHP-2-SO(0-2)-(063020)	06/30/2020	N	**0.018**		**0.00053**	J	0.00087	U
	FTRK-HAHP-3-SO(0-2)-(063020)	06/30/2020	N	0.00093	U	0.00093	U	0.00093	U
	FTRK-HAHP-4-SO(0-2)-(063020)	06/30/2020	N	0.00095	U	0.00095	U	0.00095	U
	FTRK-FD-1-063020 / FTRK-HAHP-4-SO(0-2)-(063020)	06/30/2020	FD	**0.00048**	J	0.00091	U	0.00091	U
Hatch SF	FTRK-HATCH-1-SO(0-2)-(070120)	07/01/2020	N	**0.0052**		0.00098	U	0.00098	U
	FTRK-HATCH-2-SO(0-2)-(070120)	07/01/2020	N	**0.0024**		0.0010	U	0.0010	U
Highbluff SF	FTRK-HGHBLF-1-SO(0-2)-072220	07/22/2020	N	**0.33**	DJ	**0.0017**		0.0011	U
	FTRK-HGHBLF-2-SO(0-2)-072720	07/27/2020	N	**0.11**		**0.0016**		0.0011	U

Table 7-2 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

AOPI Location	Sample ID / Parent Sample ID	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	
		Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Hooper SF	FTRK-HOOP-1-SO(0-2)-070220	07/02/2020	N	**0.0014**		0.00097	U	0.00097	U
	FTRK-HOOP-2-SO(0-2)-070220	07/02/2020	N	**0.026**		**0.00077**	J	0.00090	U
	FTRK-HOOP-3-SO(0-2)-070220	07/02/2020	N	**0.00063**	J	0.00091	U	0.00091	U
Hunt SF	FTRK-HUNT-1-SO(0-2)-072720	07/27/2020	N	**0.98**	DJ	**0.0015**		0.0011	U
Knox AHP (2 AOPIs)	FTRK-KAHP-1-SO(0-2)-(062920)	06/29/2020	N	**0.0055**		0.0010	U	0.0010	U
	FTRK-KAHP-2-SO(0-2)-(062920)	06/29/2020	N	0.0010	U	0.0010	U	0.0010	U
Louisville SF	FTRK-LOUVL-1-SO(0-2)091220	09/14/2020	N	0.0010	U	0.0010	U	0.0010	U
Lowe AHP (2 AOPIs)	FTRK-LAHP-1-SO(0-2)-070620	07/06/2020	N	0.00096	U	0.00096	U	0.00096	U
	FTRK-LAHP-2-SO(0-2)-070620	07/06/2020	N	**0.0027**		0.0010	U	0.0010	U
	FTRK-LAHP-3-SO(0-2)-070620	07/06/2020	N	**0.016**		**0.00057**	J	0.00095	U
	FTRK-LAHP-4-SO(0-2)-070620	07/06/2020	N	**0.017**		**0.0013**		0.00099	U
Lucas SF	FTRK-LUCAS-1-SO(0-2)-072120	07/21/2020	N	**0.049**		**0.0043**		0.00094	U
	FTRK-LUCAS-2-SO(0-2)-072120	07/21/2020	N	0.0011	U	0.0011	U	0.0011	U
Molinelli FARP	FTRK-MFARP-1-SO(0-2)-070720	07/07/2020	N	**0.0037**		0.0010	U	0.0010	U
	FTRK-MFARP-2-SO(0-2)-070720	07/07/2020	N	0.0011	U	0.0011	U	0.0011	U
	FTRK-FD-2-070720 / FTRK-MFARP-2-SO(0-2)-070720	07/07/2020	FD	0.00098	U	0.00098	U	0.00098	U
	FTRK-MFARP-3-SO(0-2)-070720	07/07/2020	N	0.00097	U	0.00097	U	0.00097	U
Rucker Fire Station	FTRK-RFS-1-SO(0-2)-082820	08/28/2020	N	**0.0020**		0.0011	U	0.0011	U
Runkle SF	FTRK-RUNKLE-1-SO(0-2)-072120	07/21/2020	N	**0.50**	DJ	**0.0068**		0.00098	U
Shell AHP (3 AOPIs)	FTRK-SAHP-1-SO(0-2)-071320	07/13/2020	N	**0.063**		**0.0026**		0.00092	U
	FTRK-SAHP-2-SO(0-2)-071320	07/13/2020	N	**0.0012**		0.00099	U	0.00099	U
	FTRK-SAHP-3-SO(0-2)-071320	07/13/2020	N	**0.0015**		0.0010	U	0.0010	U
	FTRK-SAHP-4-SO(0-2)-071320	07/13/2020	N	**0.034**		0.0010	U	0.0010	U
Skelly SF	FTRK-SKELLY-1-SO(0-2)-072020	07/20/2020	N	0.00097	U	0.00097	U	0.00097	U
Stinson SF	FTRK-STINSON-1-SO(0-2)-071520	07/15/2020	N	**0.0070**		0.0011	U	0.0011	U
	FTRK-STINSON-2-SO(0-2)-071520	07/15/2020	N	0.00097	U	0.00097	U	0.00097	U
Tabernacle SF	FTRK-TAB-1-SO(0-2)070820	07/08/2020	N	**0.00090**	J	0.0010	U	0.0010	U
Tac X SF	FTRK-TACX-1-SO(0-2)-072220	07/22/2020	N	**0.010**		0.0011	U	0.0011	U
Toth SF	FTRK-TOTH-1-SO(0-2)-072720	07/27/2020	N	**0.051**		**0.00087**	J	0.0010	U
Rucker WWTP	FTRK-WWTP-1-SO(0-2)-070820	07/08/2020	N	**0.0014**		**0.00092**	J	0.0011	U
	FTRK-WWTP-2-SO(0-2)-071120	07/11/2020	N	**0.0012**		**0.0015**		0.00098	U

Table 7-2 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Rucker, Alabama

Notes:
1. Bolded values indicate the result was detected greater than the limit of detection
2. Data are compared to the Office of the Secretary of Defense (OSD) risk screening levels for the residential and commerical/industrial scenario (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September). All soil data will be screened against both the Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet below ground surface), regardless of the current and projected land use of the AOPI. Soil samples collected from greater than two feet but less than 15 feet below ground surface will be compared to the Industrial/Commercial risk screening levels only. No concentrations of PFBS, PFOS, or PFOA exceeded the OSD risk screening levels for indusrial/commercial.
3. Gray shaded values indicate the result was detected greater than the residential scenario OSD risk screening levels.
4. Gray shaded and italicized values indicate the result was detected greater than the industrial/commercial scenario (i.e., and therefore greater than the residential scenario) OSD risk screening levels.

Acronyms/Abbreviations:
-- = not applicable
AAF = Army Airfield
AHP = Army Heliport
AOPI = area of potential interest
FARP = Forward Area Refueling Point
FD = field duplicate sample
FFTA = former fire training area
FTRK = Fort Rucker
ID = identification
N = primary sample
mg/kg = milligrams per kilogram
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier
SF = stage field
SO = soil
SWMU = Solid Waste Management Unit
WWTP = wastewater treatment plant

Qualifier	Description
DJ	The analyte was analyzed at dilution and the result is an estimated quantity
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 low.
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).
UJ	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.
UJ-	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise

FIGURES

USAEC PFAS Preliminary Assessment / Site Inspection Fort Rucker, AL

ARCADIS

Figure 2-1 Site Location

Legend

- Main Post
- Outlying Range

AAF = Army Airfield
AHP = Army Heliport
PA/SI = Preliminary Assessment/Site Inspection
SF = Stage Field

Note: Unlabeled outlying ranges were not included in the PA/SI.

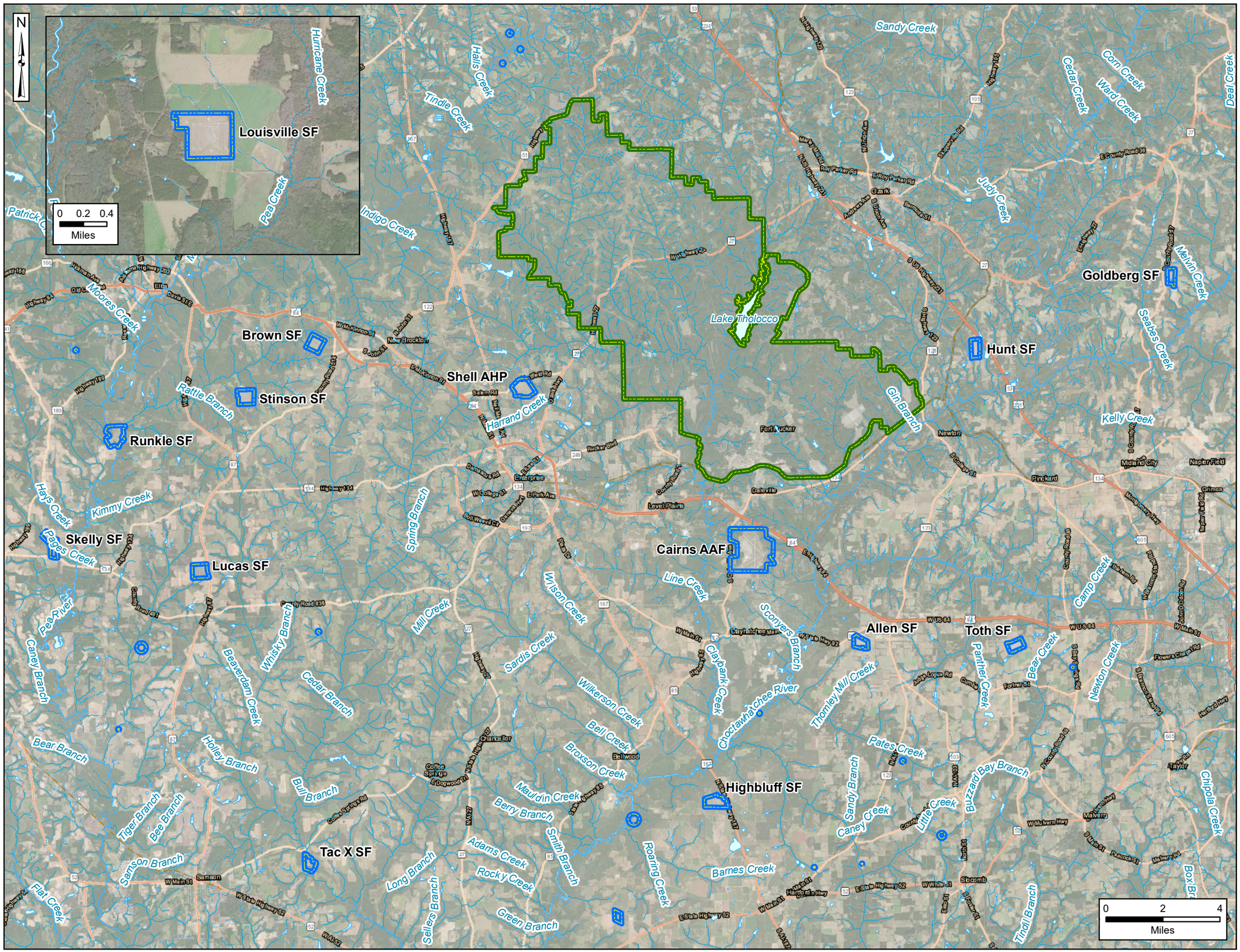
Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection Fort Rucker, AL

ARCADIS

Figure 2-2 Site Layout



Legend

- Main Post
- Outlying Range
- River/Stream (Perennial)
- Stream (Intermittent)
- Canal/Ditch
- Water Body

AAF = Army Airfield
AHP = Army Heliport
SF = Stage Field

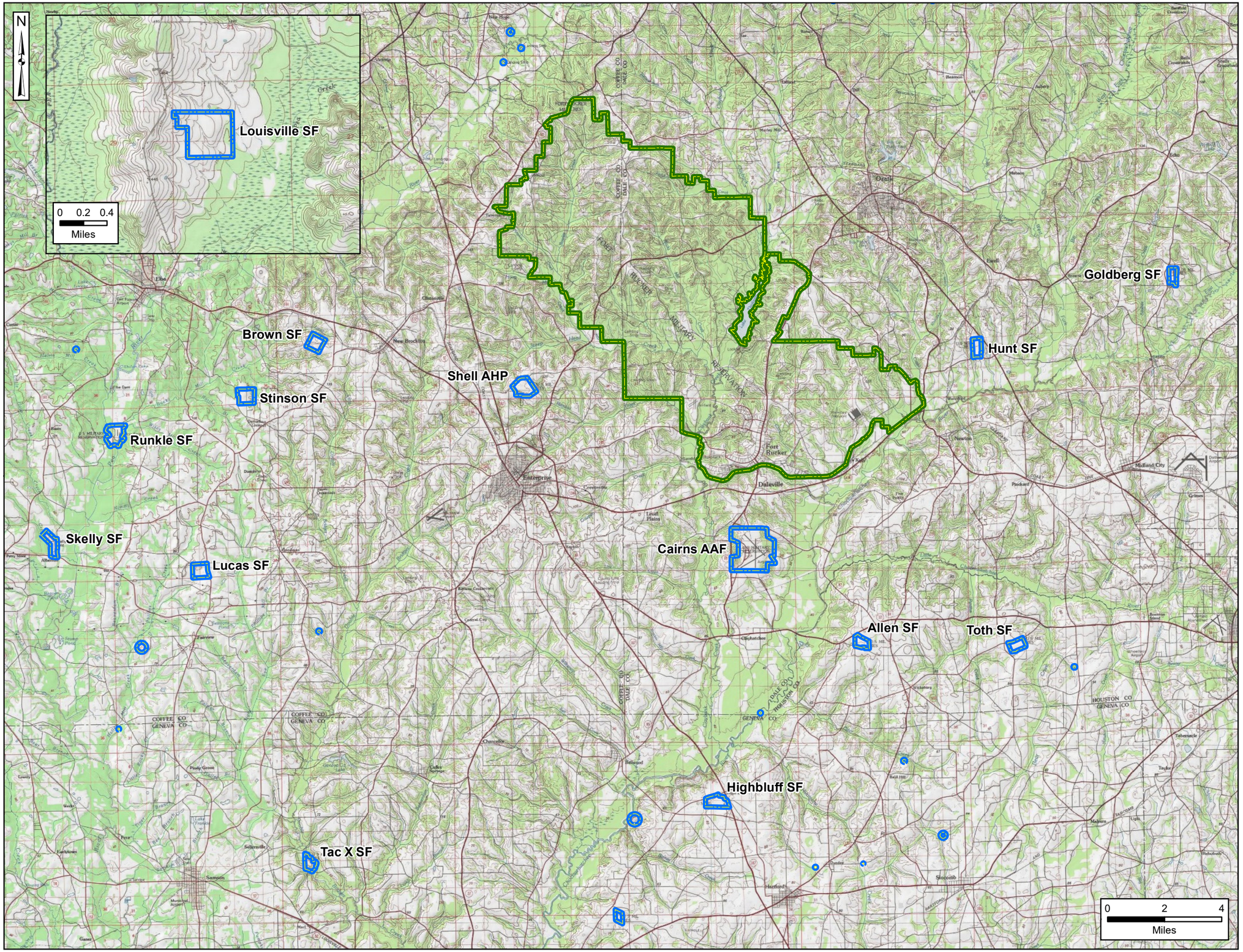
Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection Fort Rucker, AL

ARCADIS

Figure 2-3 Topographic Map



Legend

- Main Post
- Outlying Range

AAF = Army Airfield
AHP = Army Heliport
SF = Stage Field

Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, USA Topo Maps

Coordinate System:
WGS 1984, UTM Zone 16 North

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Preliminary Assessment / Site Inspection
Fort Rucker, AL

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Figure 2-4
Off-Post Potable Supply Wells

Legend

- Main Post
- 5-Mile Radius
- Outlying Range
- River/Stream (Perennial)
- Stream (Intermittent)
- Canal/Ditch
- Water Body
- Public Water System Supply Well
- Domestic/Private Well

AAF = Army Airfield
AHP = Army Heliport
SF = Stage Field

Note: Public water system supply wells data only displayed within five miles of Fort Rucker Main Post.

Data Sources:
Fort Rucker, GIS Data, 2019
EDR, Well Data, 2018
GSA, Well Data, 2020
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 16 North

0 2 4 Miles

USAEC PFAS Preliminary Assessment / Site Inspection Fort Rucker, AL

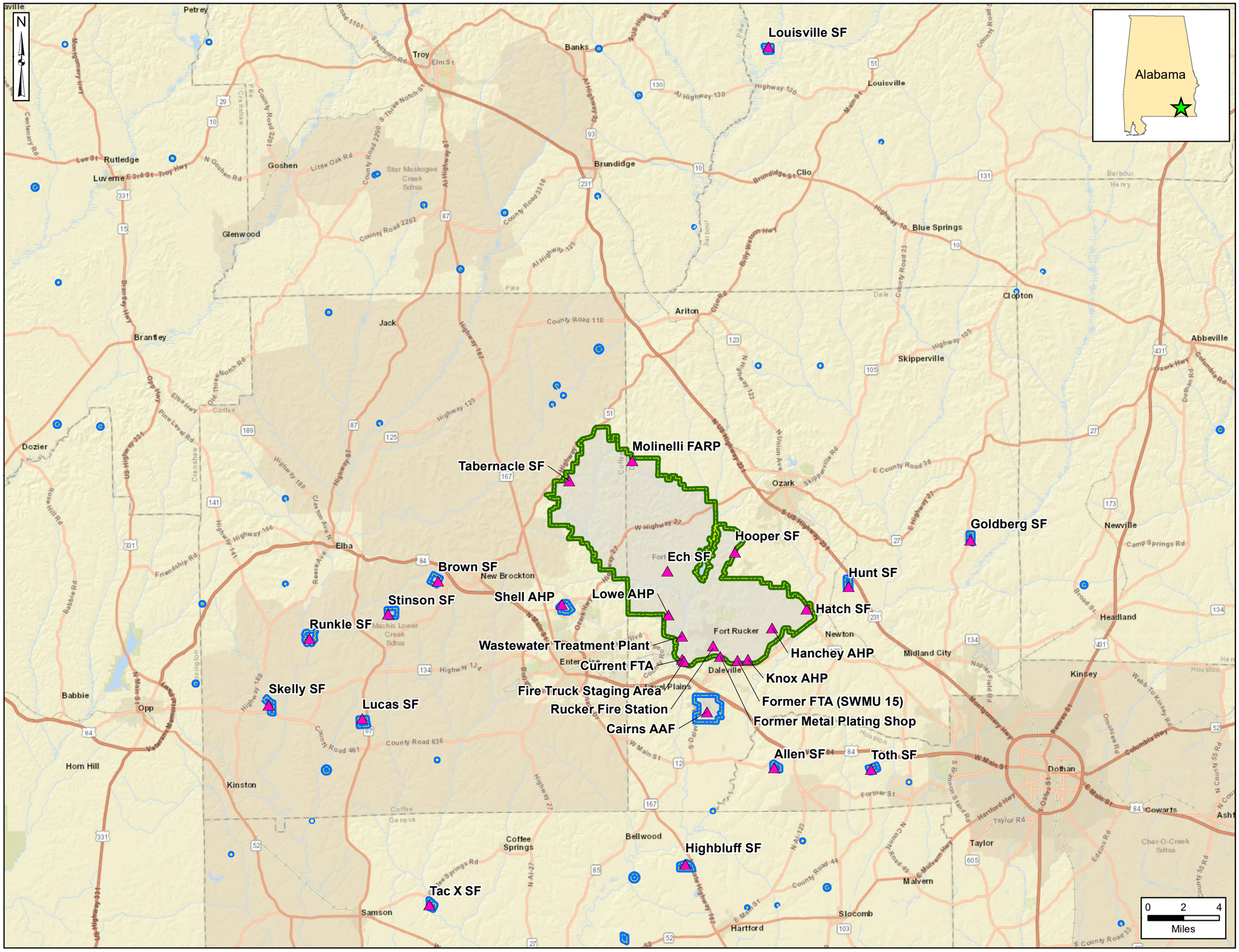


Figure 5-2
AOPI Locations

Legend

- Main Post
- Outlying Range
- AOPI Location

AAF = Army Airfield
AHP = Army Heliport
AOPI = area of potential interest
FARP = Forward Area Refueling Point
FTA = Fire Training Area
FFTA = Former Fire Training Area
SF = Stage Field
SWMU = solid waste management unit

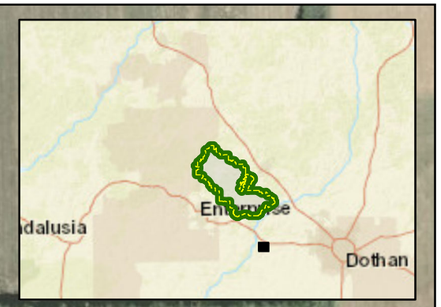
Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 16 North

N

Allen Stage Field

Building 26402



0 200 400
Feet

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Fort Rucker, AL

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Figure 5-3
Aerial Photo of
Allen Stage Field

Legend

- AOPI / Army Property Boundary
- Main Post
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

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Fort Rucker, AL

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Figure 5-4
Aerial Photo of
Brown Stage Field

Legend

- AOPI / Army Property Boundary
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

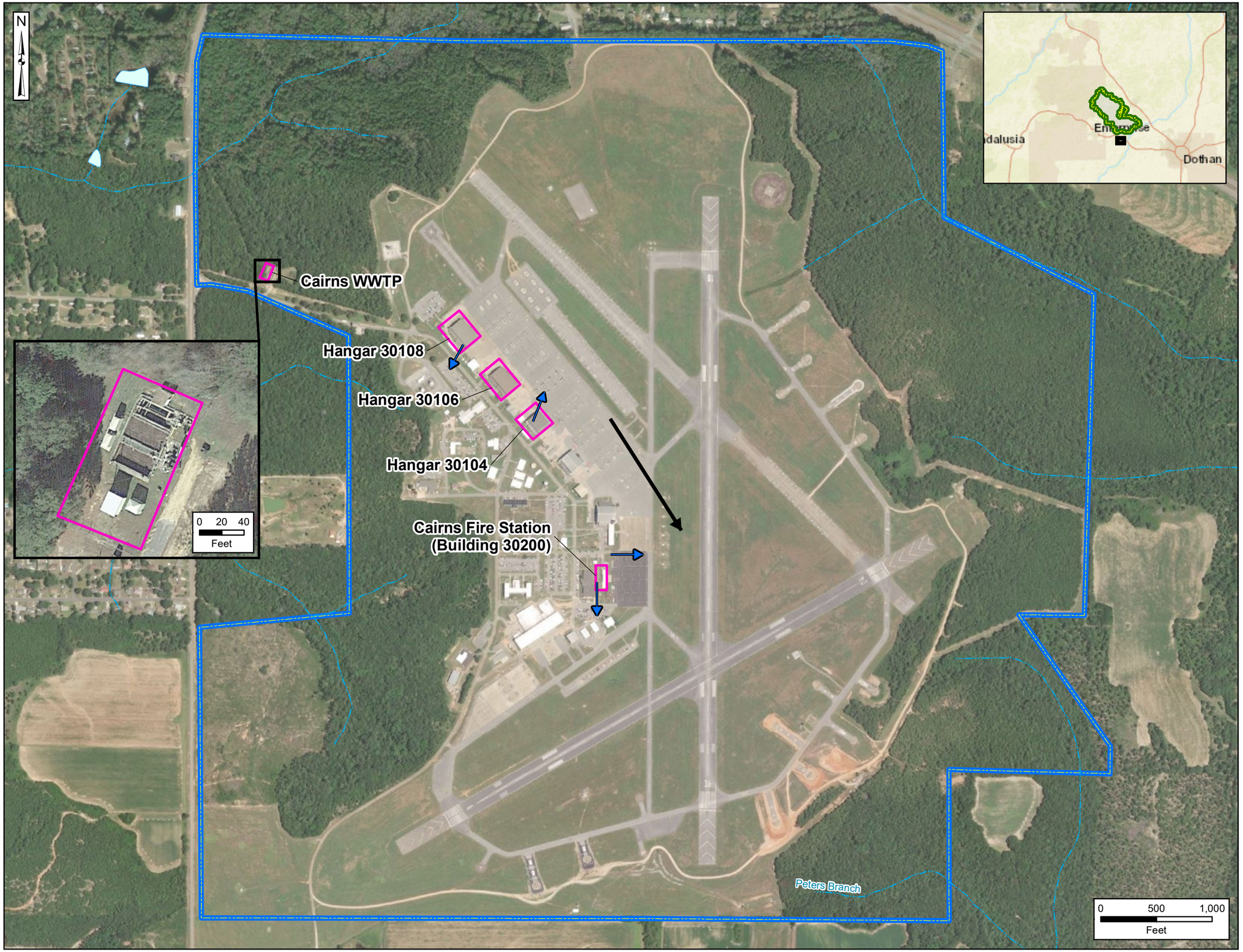

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Figure 5-5
Aerial Photo of Cairns AAF and WWTP

Legend

- Main Post
- Army Property Boundary
- AOPI
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AAF = Army Airfield
AOPI = area of potential interest
WWTP = Wastewater Treatment Plant

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

Coordinate System:
WGS 1984, UTM Zone 16 North

N

Ech Stage Field

Building 25404

Blacks Mill Creek

dalusia

Dothan

0 200 400
Feet

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Figure 5-6
Aerial Photo of
Ech Stage Field

Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Fort Rucker, AL

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Figure 5-7
Aerial Photo of Former Fire Training Area (SWMU 15)

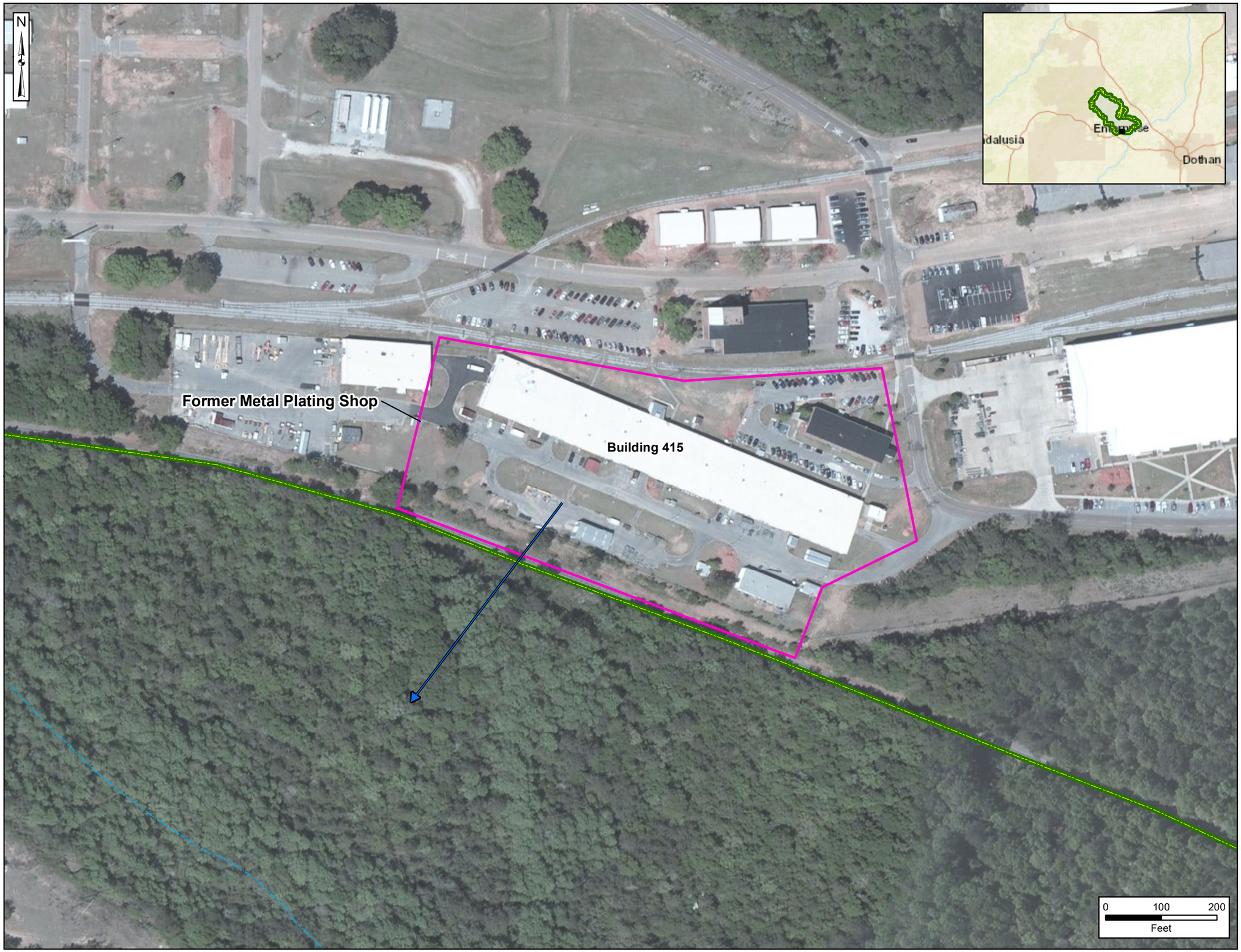
Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Monitoring Well

AOPI = area of potential interest
SWMU = solid waste management unit

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

Coordinate System:
WGS 1984, UTM Zone 16 North



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Fort Rucker, AL

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Figure 5-8
Aerial Photo of
Former Metal Plating Shop

Legend

- AOPI
- Main Post
- Stream (Intermittent)
- Surface Runoff Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Figure 5-9
Aerial Photo of
Fire Truck Staging Area

Legend

- AOPI
- Main Post

AOPI = area of potential interest

Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

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Figure 5-10 Aerial Photo of Fire Training Area

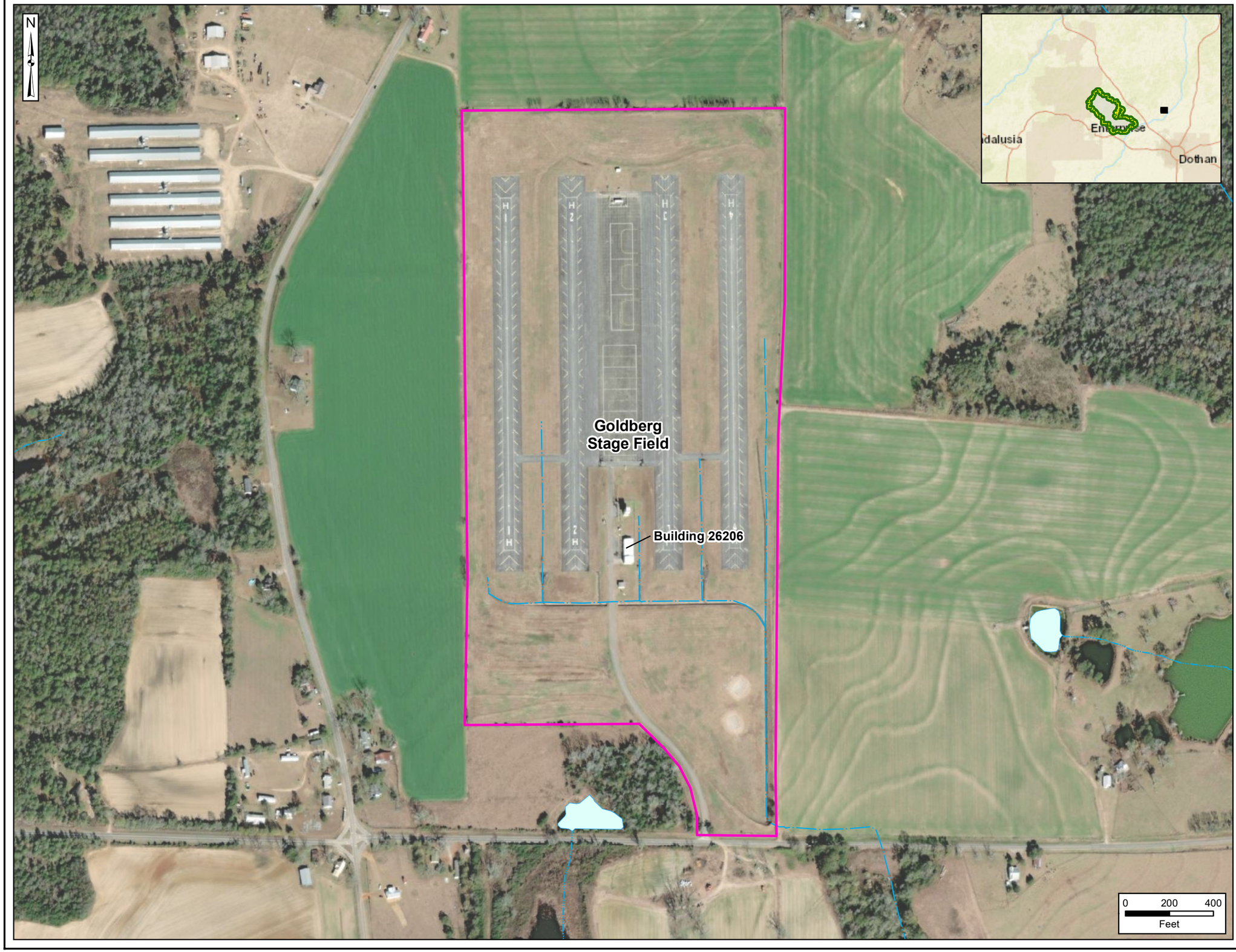
Legend

- Main Post
- AOPI
- Stream (Intermittent)
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North



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Fort Rucker, AL

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Figure 5-11
Aerial Photo of
Goldberg Stage Field

Legend

- Main Post
- AOPI / Army Property Boundary
- Stream (Intermittent)
- Canal/Ditch
- Water Body

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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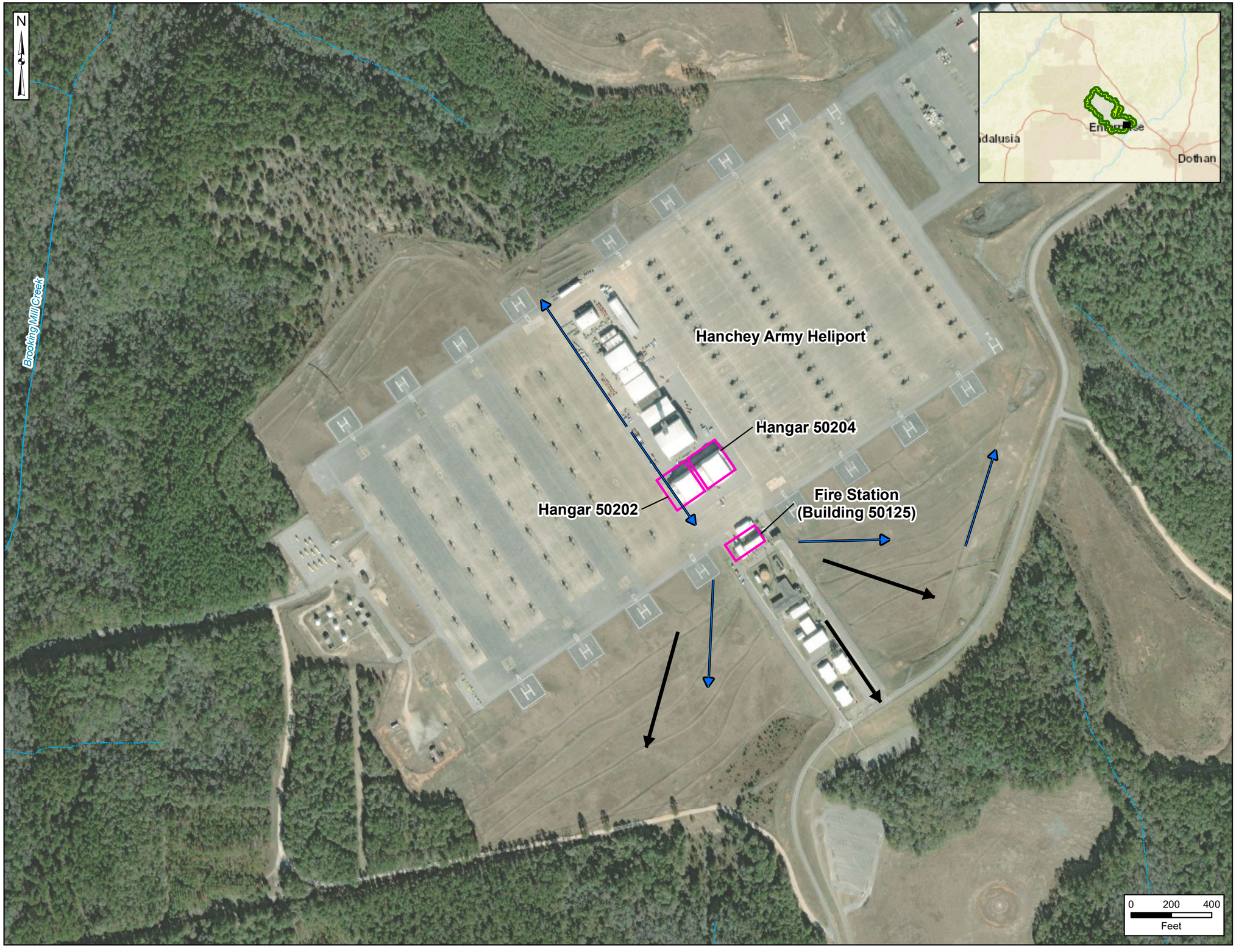
Figure 5-12 Aerial Photo of Hanchey Army Heliport



Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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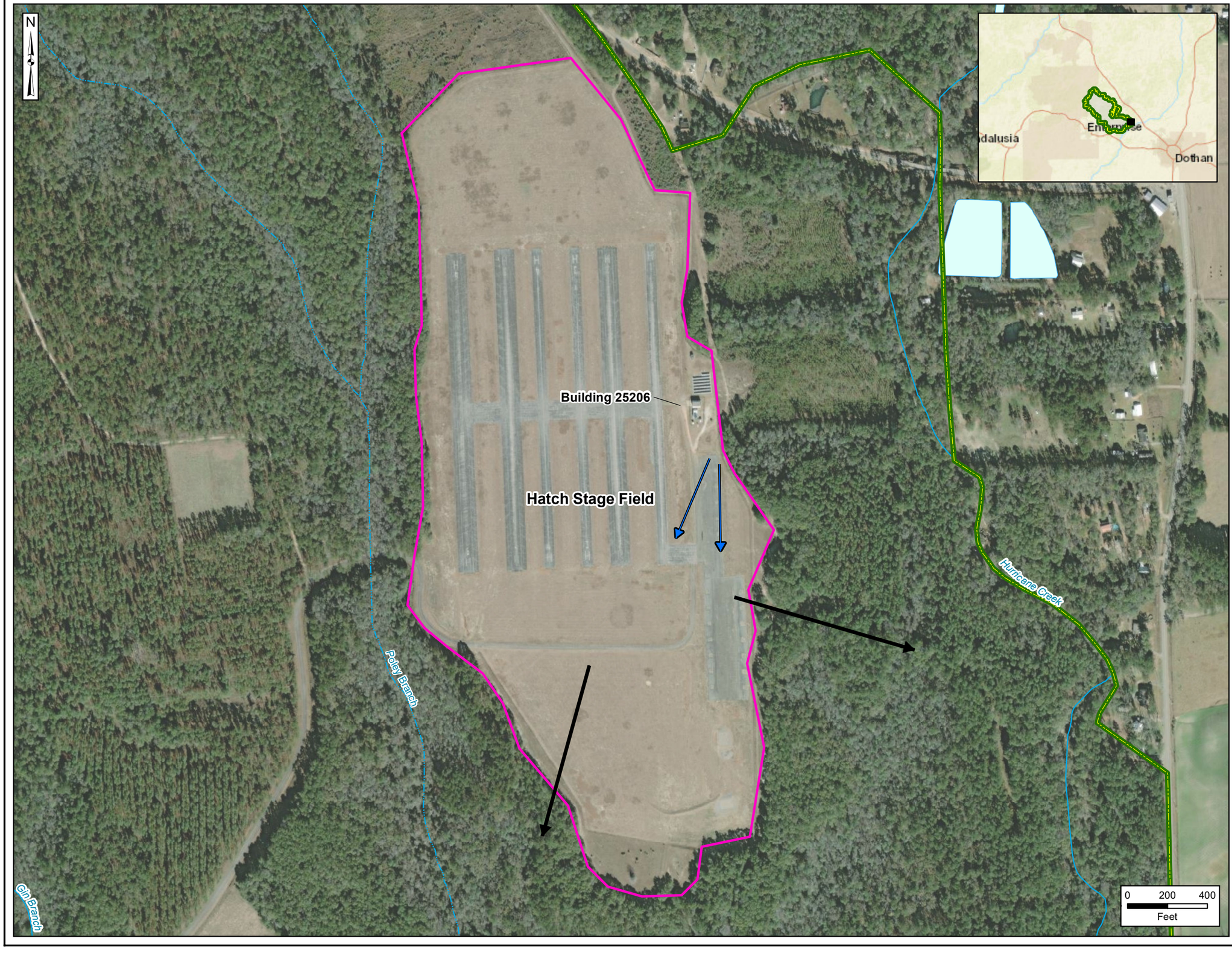

Figure 5-13
Aerial Photo of
Hatch Stage Field

Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Fort Rucker, AL

Figure 5-14
Aerial Photo of Highbluff Stage Field

Legend

- AOPI
- Main Post
- Army Property Boundary
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

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Figure 5-15 Aerial Photo of Hooper Stage Field

Legend

- Main Post
- AOPI
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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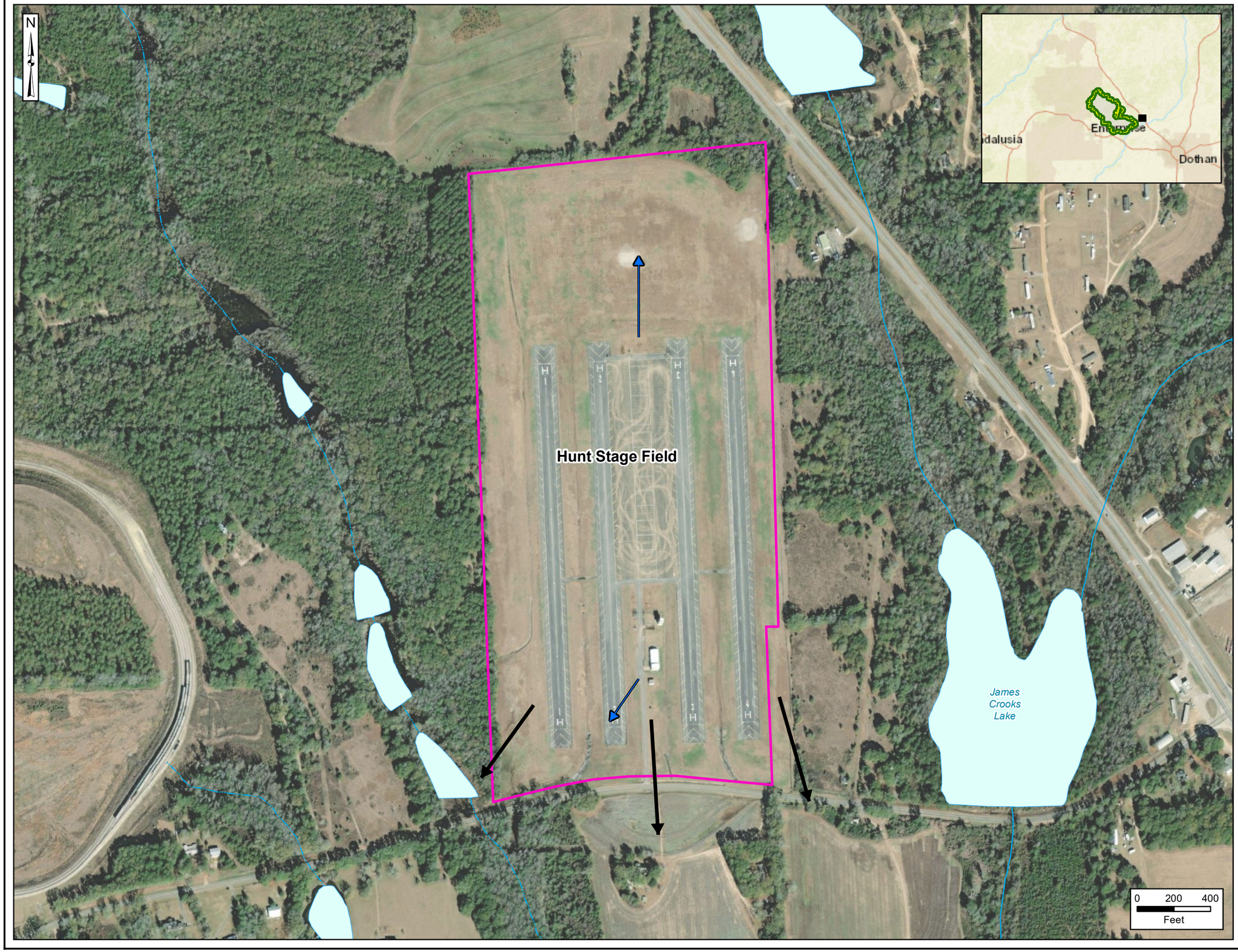
Figure 5-16 Aerial Photo of Hunt Stage Field



Legend

- Main Post
- AOPI / Army Property Boundary
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

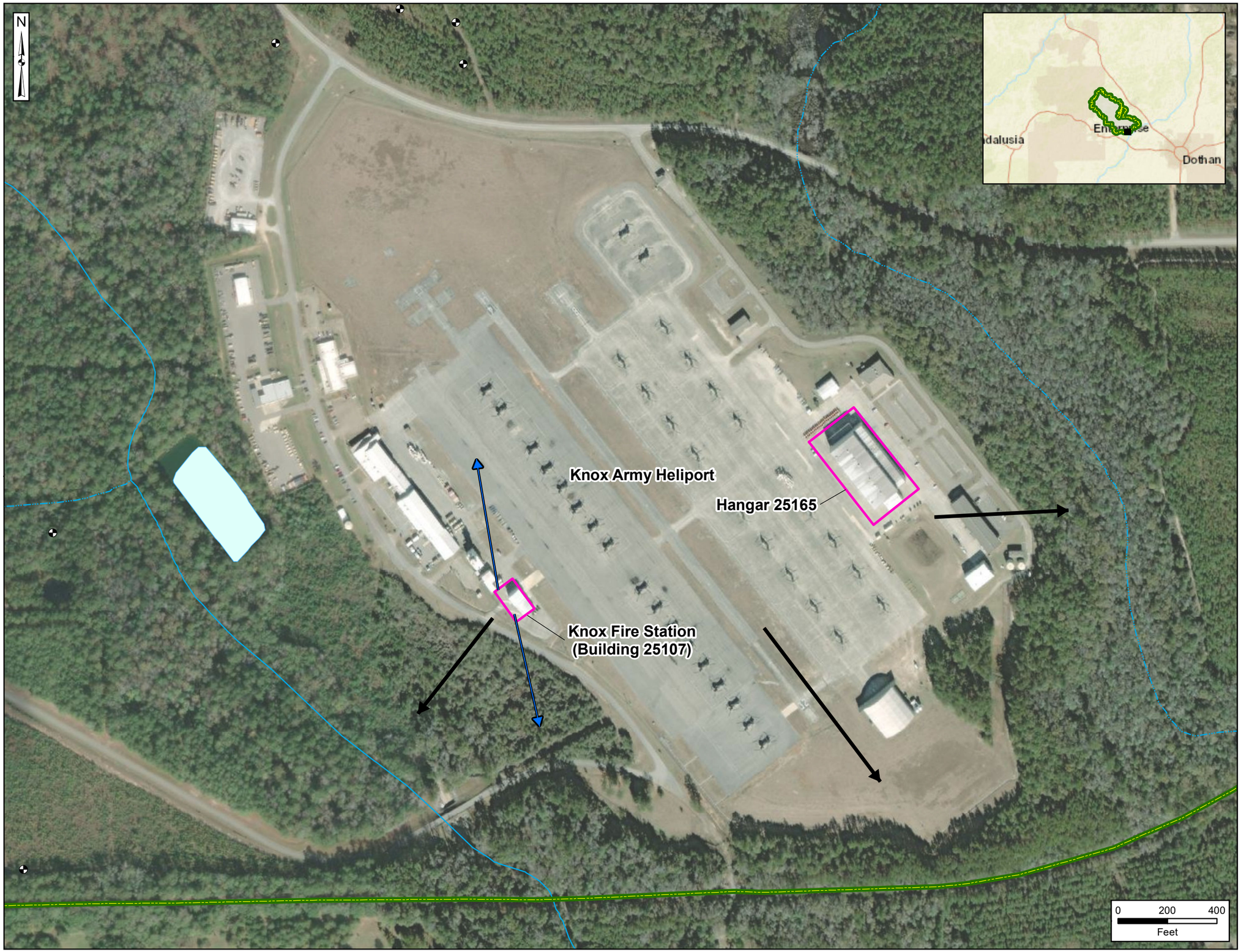


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Figure 5-17
Aerial Photo of
Knox Army Heliport

Legend

- AOPI
- Main Post
- Monitoring Well
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Fort Rucker, AL

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Figure 5-18
Aerial Photo of Louisville Stage Field

Legend

- AOPI / Army Property Boundary
- Main Post
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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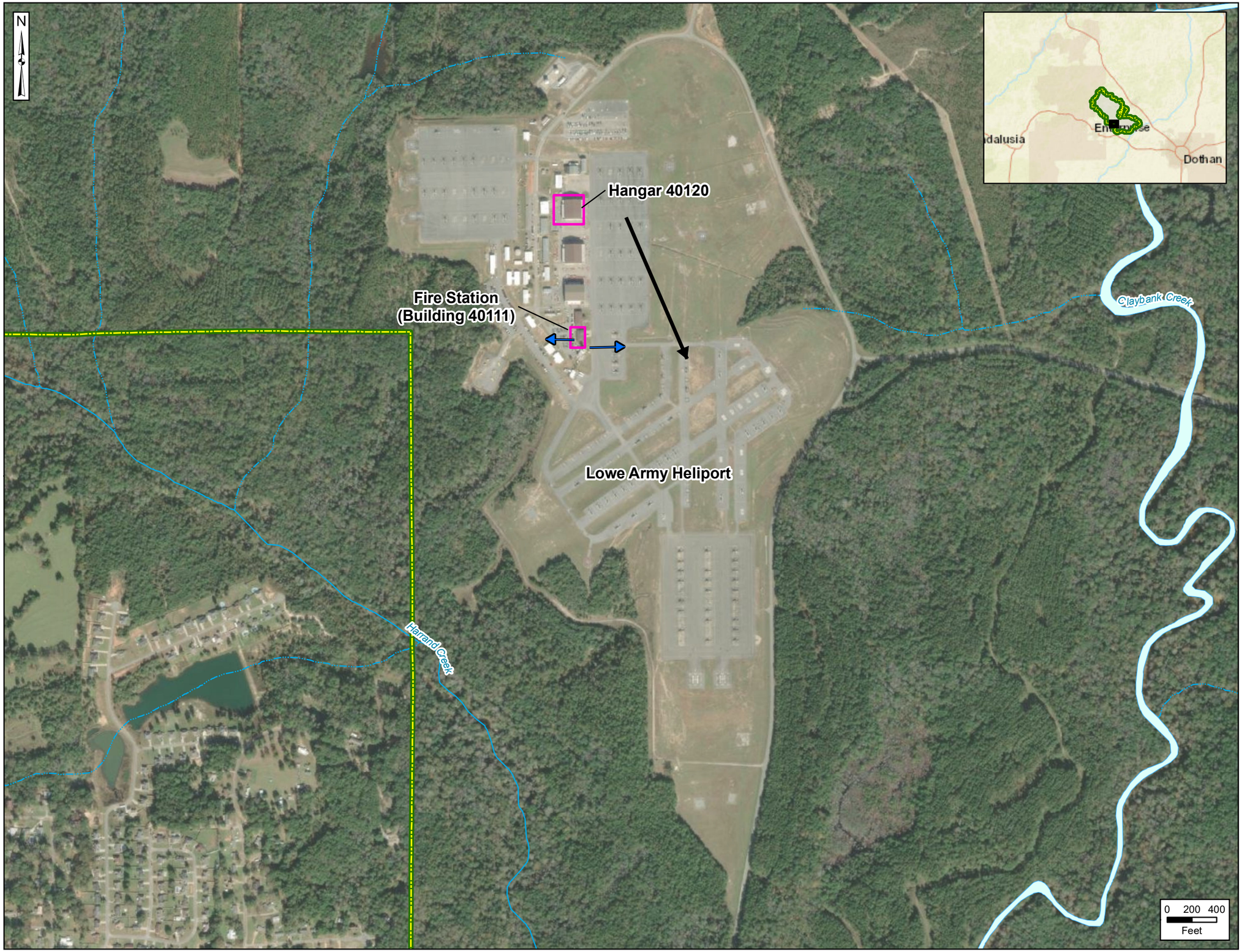
Figure 5-19 Aerial Photo of Lowe Army Heliport



Legend

- Main Post
- AOPI
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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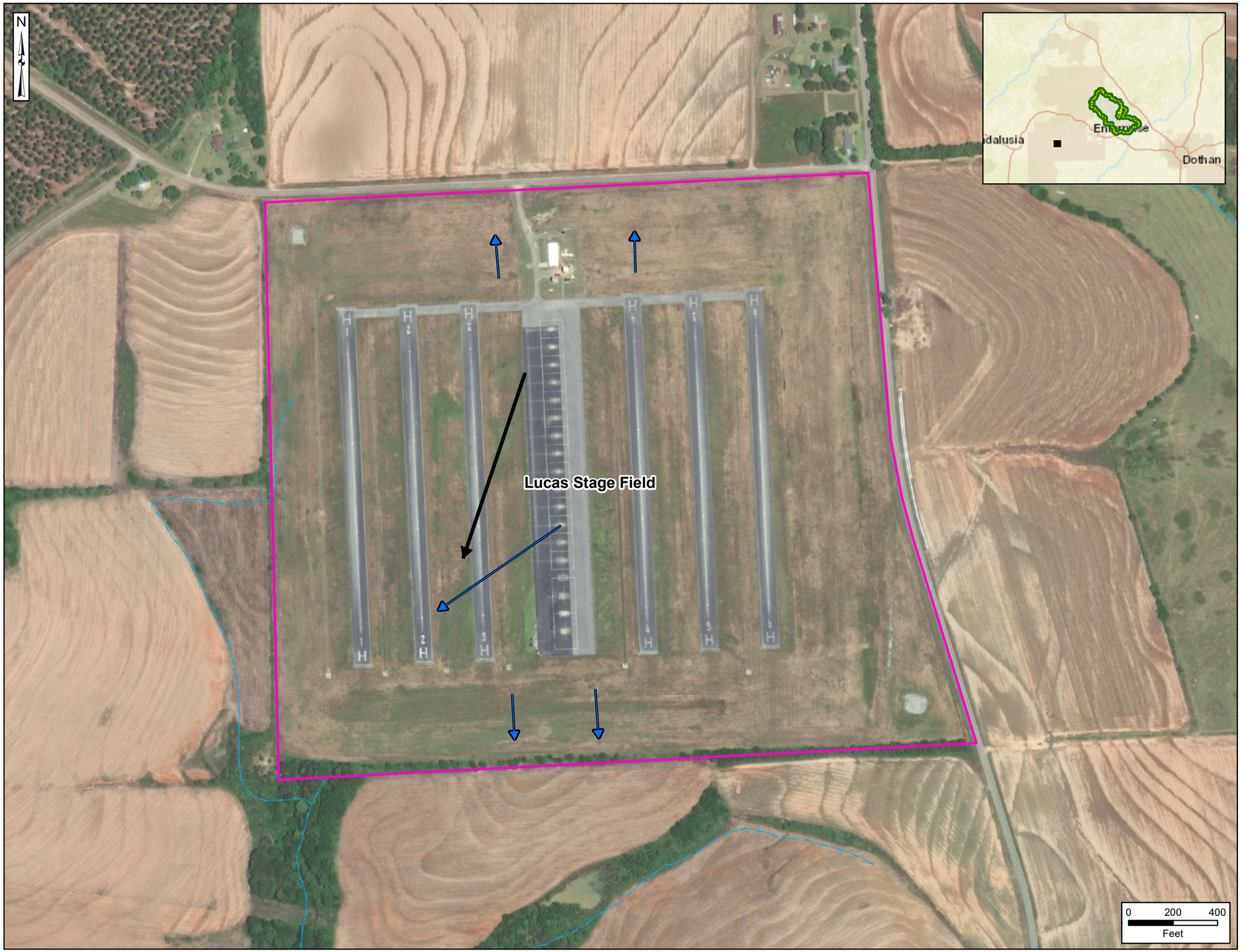

Figure 5-20
Aerial Photo of
Lucas Stage Field

Legend

- AOPI / Army Property Boundary
- Main Post
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

N

Building 25609

Molinelli FARP

dalusia

Dothan

0 200 400
Feet

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Fort Rucker, AL

ARCADIS

Figure 5-21
Aerial Photo of Molinelli Forward Area Refueling Point

Legend

- Main Post
- AOPI
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest
FARP = Forward Area Refueling Point

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Figure 5-22
Aerial Photo of Rucker Fire Station

Legend

- AOPI
- Main Post

AOPI = area of potential interest

Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

N

Runkle Stage Field

Pea River

Buck's Mill Creek

Dothan

0 200 400
Feet

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Fort Rucker, AL

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Figure 5-23
Aerial Photo of Runkle Stage Field

Legend

- AOPI
- Main Post
- Army Property Boundary
- Stream/Creek (Perennial)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Water Body

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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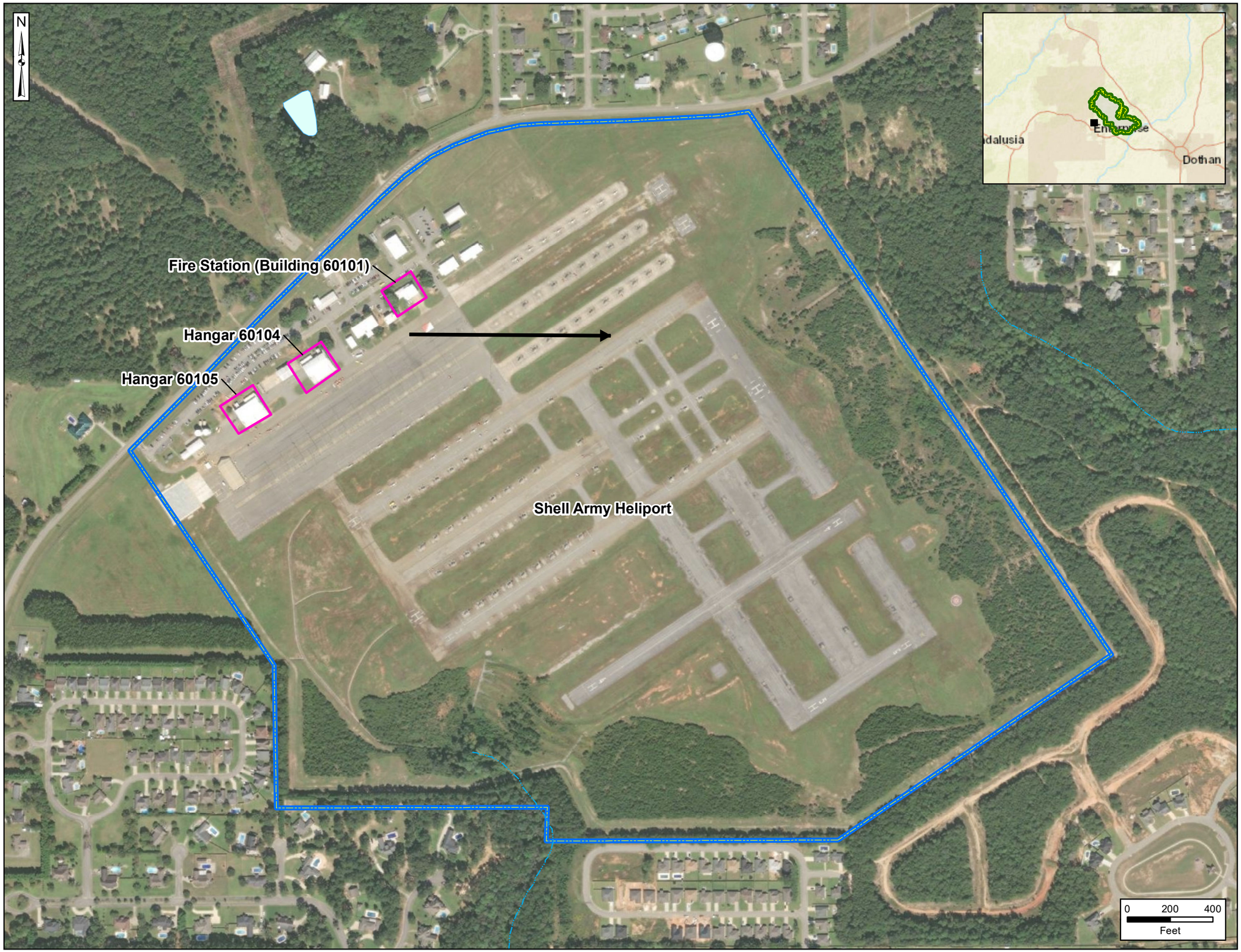
ARCADIS

Figure 5-24 Aerial Photo of Shell Army Heliport



Legend

- Main Post
- AOPI
- Army Property Boundary
- Stream (Intermittent)
- Water Body
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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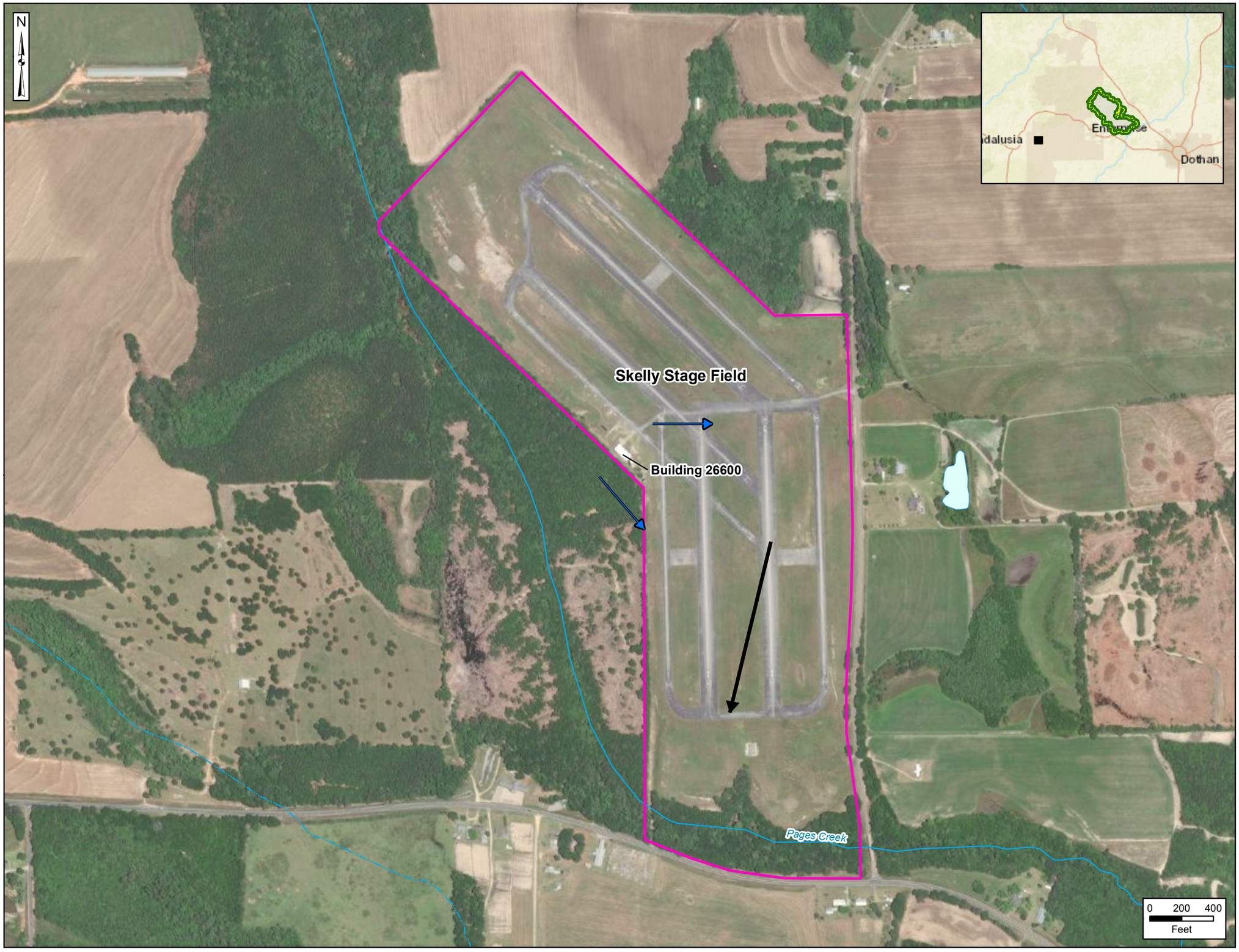
ARCADIS

Figure 5-25 Aerial Photo of Skelly Stage Field



Legend

- AOPI / Army Property Boundary
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Figure 5-26 Aerial Photo of Stinson Stage Field

Legend

- AOPI
- Army Property Boundary
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Preliminary Assessment / Site Inspection
Fort Rucker, AL

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Figure 5-27
Aerial Photo of
Tabernacle Stage Field

Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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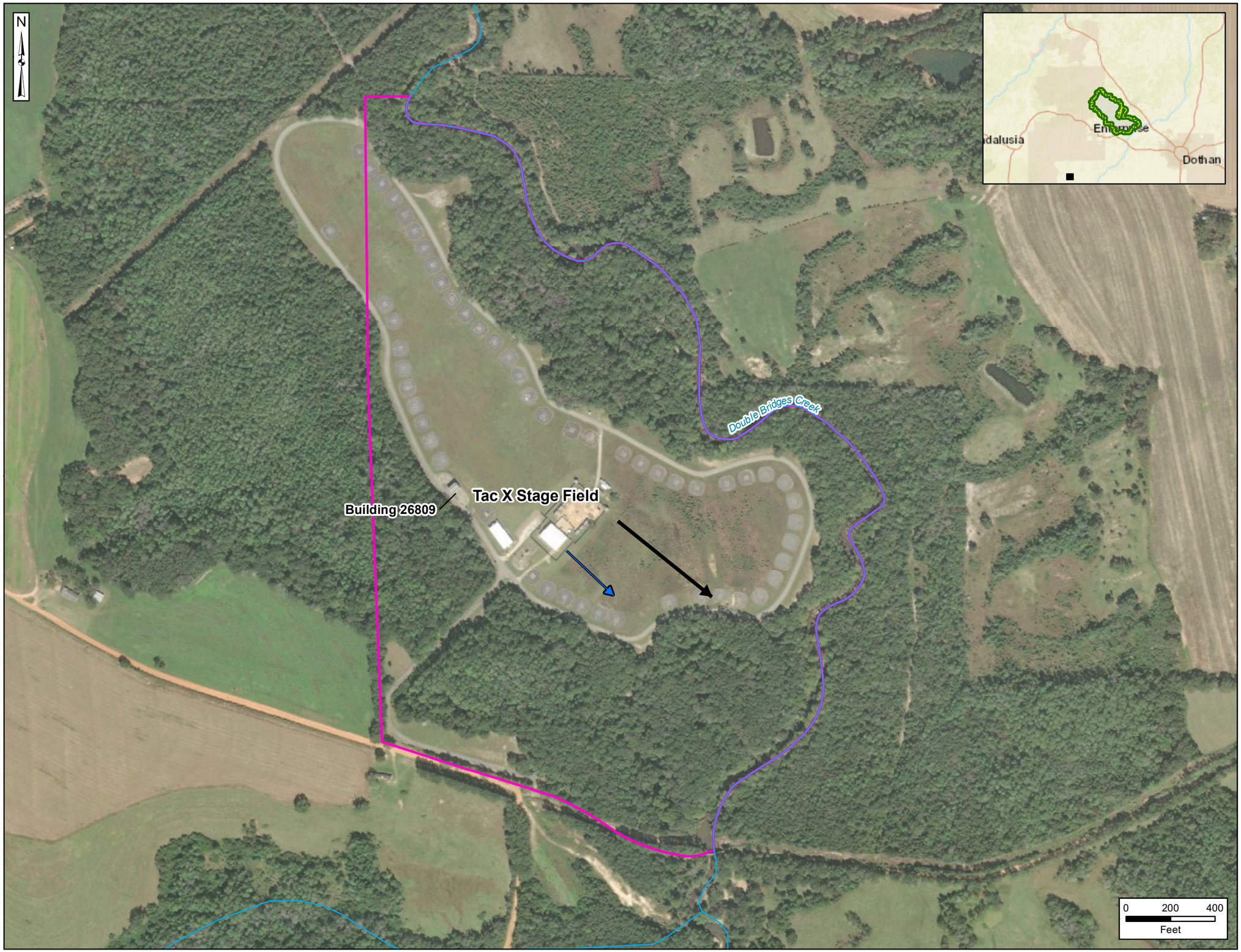
ARCADIS

Figure 5-28 Aerial Photo of Tac X



Legend

- AOPI / Army Property Boundary
- Main Post
- Stream/Creek (Perennial)
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Preliminary Assessment / Site Inspection
Fort Rucker, AL

Figure 5-29
Aerial Photo of
Toth Stage Field

Legend

- AOPI / Army Property Boundary
- Main Post
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Figure 5-30
Aerial Photo of Rucker Wastewater Treatment Plant

Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Surface Runoff Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Figure 7-1
AOPI Locations and OSD Risk Screening Level Exceedances

Legend

- Main Post
- Outlying Range
- AOPI Location
- AOPI with OSD Risk Screening Level Exceedance

AAF = Army Airfield
AHP = Army Heliport
FARP = Forward Area Refueling Point
FTA = Fire Training Area
FFTA = Former Fire Training Area
OSD = Office of the Secretary of Defense
SF = Stage Field

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

Coordinate System:
WGS 1984, UTM Zone 16 North

Louisville SF
Molinelli FARP
Tabernacle SF
Hooper SF
Ech SF
Brown SF
Stinson SF
Shell AHP
Lowe AHP
Runkle SF
Hunt SF
Hatch SF
Wastewater Treatment Plant
Current FTA
Hanchey AHP
Knox AHP
Fire Truck Staging Area
Former FTA (SWMU 15)
Rucker Fire Station
Former Metal Plating Shop
Cairns AAF
Skelly SF
Lucas SF
Allen SF
Toth SF
Highbluff SF
Tac X SF
Goldberg SF

Alabama

0 2 4 Miles

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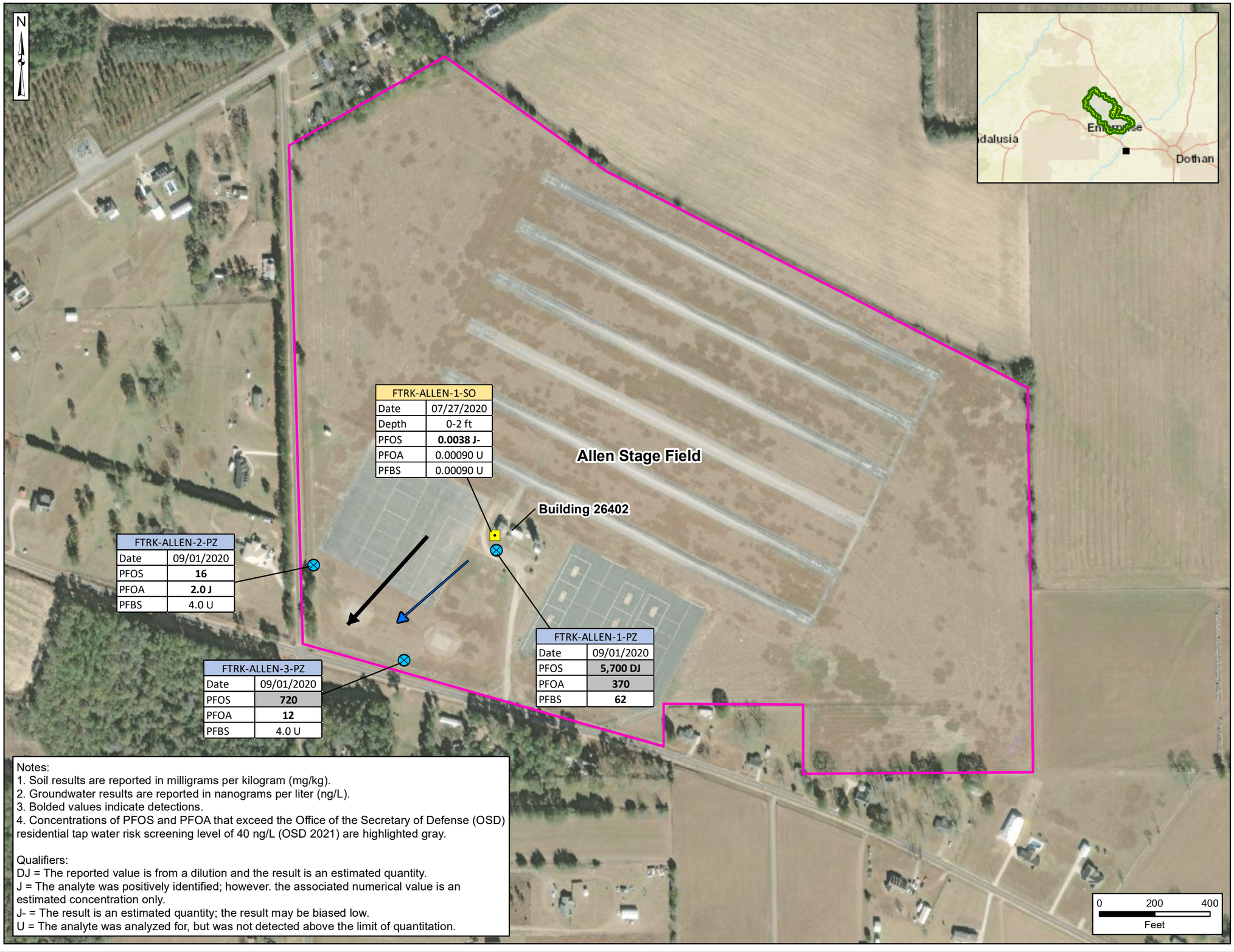
Figure 7-2
Allen Stage Field
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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 low.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

Legend

- AOPI / Army Property Boundary
- Main Post
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (Piezometer)

AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

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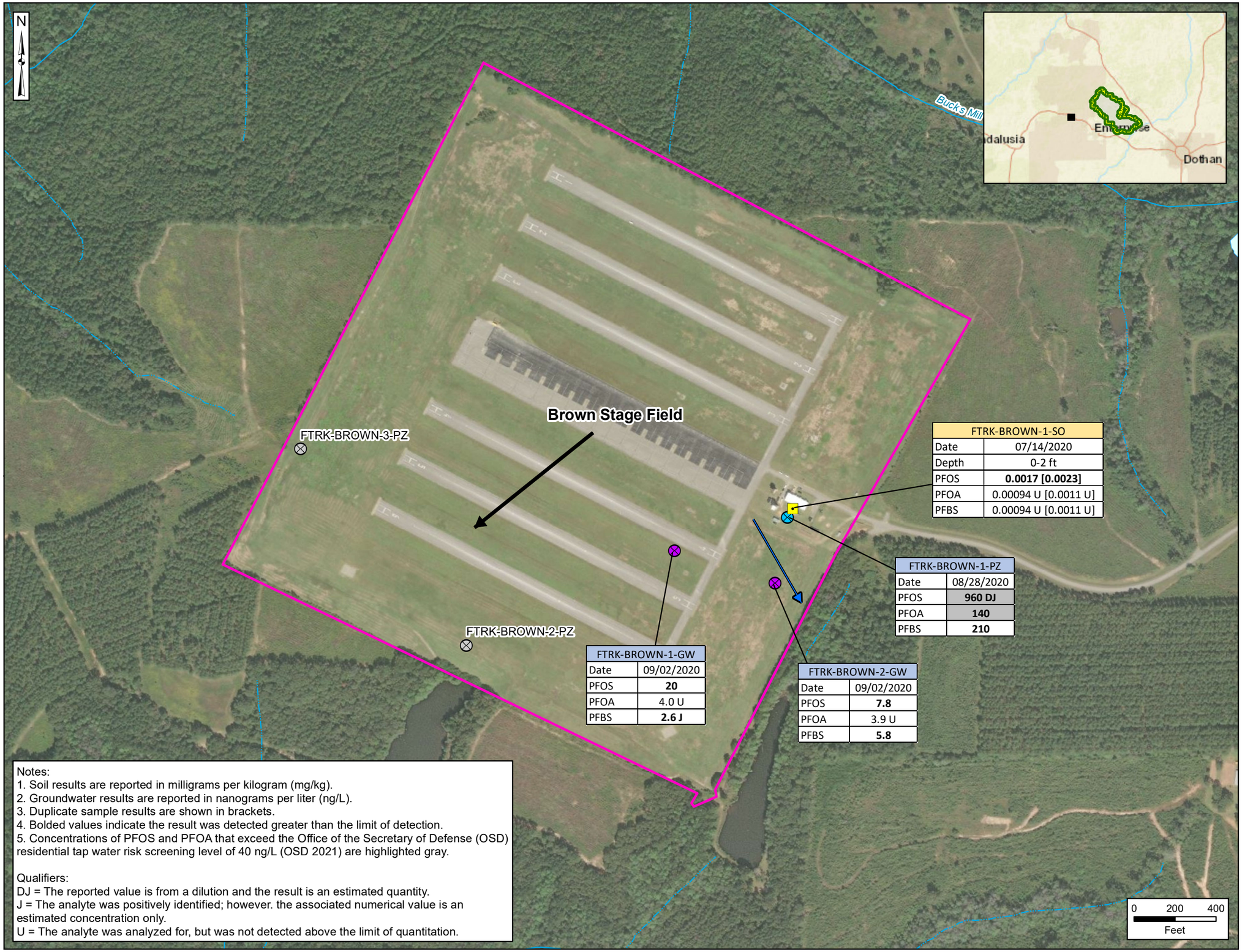
Figure 7-3
Brown Stage Field
PFOS, PFOA, and PFBS Analytical Results



Legend

- AOPI / Army Property Boundary
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate the result was detected greater than the limit of detection.
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:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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.

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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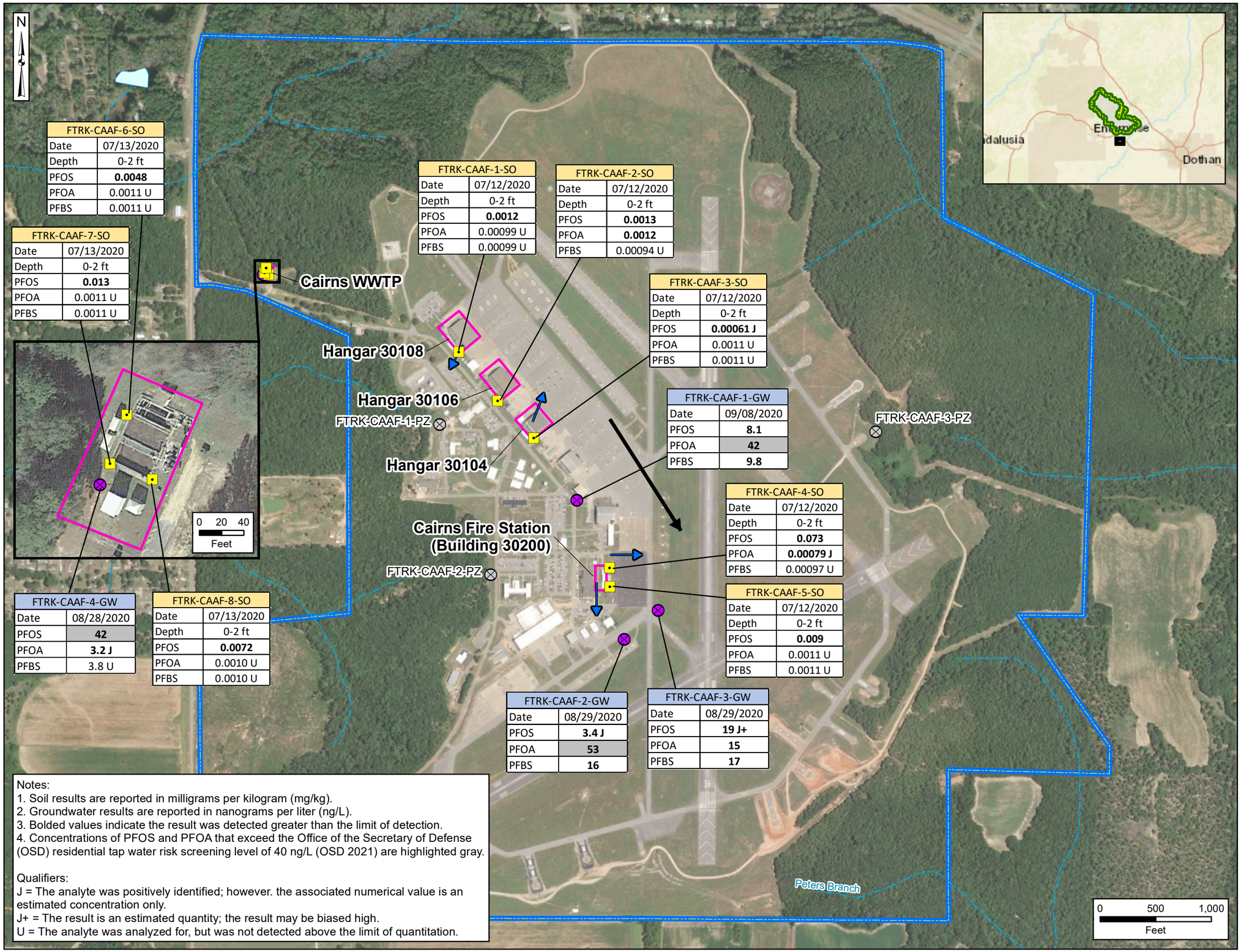
Figure 7-4
Cairns AAF and WWTP PFOS, PFOA, and PFBS Analytical Results



FTRK-CAAF-6-SO	
Date	07/13/2020
Depth	0-2 ft
PFOS	**0.0048**
PFOA	0.0011 U
PFBS	0.0011 U

FTRK-CAAF-7-SO	
Date	07/13/2020
Depth	0-2 ft
PFOS	**0.013**
PFOA	0.0011 U
PFBS	0.0011 U

FTRK-CAAF-1-SO	
Date	07/12/2020
Depth	0-2 ft
PFOS	**0.0012**
PFOA	0.00099 U
PFBS	0.00099 U

FTRK-CAAF-2-SO	
Date	07/12/2020
Depth	0-2 ft
PFOS	**0.0013**
PFOA	**0.0012**
PFBS	0.00094 U

FTRK-CAAF-3-SO	
Date	07/12/2020
Depth	0-2 ft
PFOS	**0.00061 J**
PFOA	0.0011 U
PFBS	0.0011 U

FTRK-CAAF-1-GW	
Date	09/08/2020
PFOS	**8.1**
PFOA	**42**
PFBS	**9.8**

FTRK-CAAF-4-SO	
Date	07/12/2020
Depth	0-2 ft
PFOS	**0.073**
PFOA	**0.00079 J**
PFBS	0.00097 U

FTRK-CAAF-5-SO	
Date	07/12/2020
Depth	0-2 ft
PFOS	**0.009**
PFOA	0.0011 U
PFBS	0.0011 U

FTRK-CAAF-4-GW	
Date	08/28/2020
PFOS	**42**
PFOA	**3.2 J**
PFBS	3.8 U

FTRK-CAAF-8-SO	
Date	07/13/2020
Depth	0-2 ft
PFOS	**0.0072**
PFOA	0.0010 U
PFBS	0.0010 U

FTRK-CAAF-2-GW	
Date	08/29/2020
PFOS	**3.4 J**
PFOA	**53**
PFBS	**16**

FTRK-CAAF-3-GW	
Date	08/29/2020
PFOS	**19 J+**
PFOA	**15**
PFBS	**17**

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate the result was detected greater than the limit of detection.
4. 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.
J+ = The result is an estimated quantity; the result may be biased high.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

Legend

- Main Post
- Army Property Boundary
- AOPI
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Installed Piezometer - Not Sampled

AAF = Army Airfield
AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
WWTP = Wastewater Treatment Plant

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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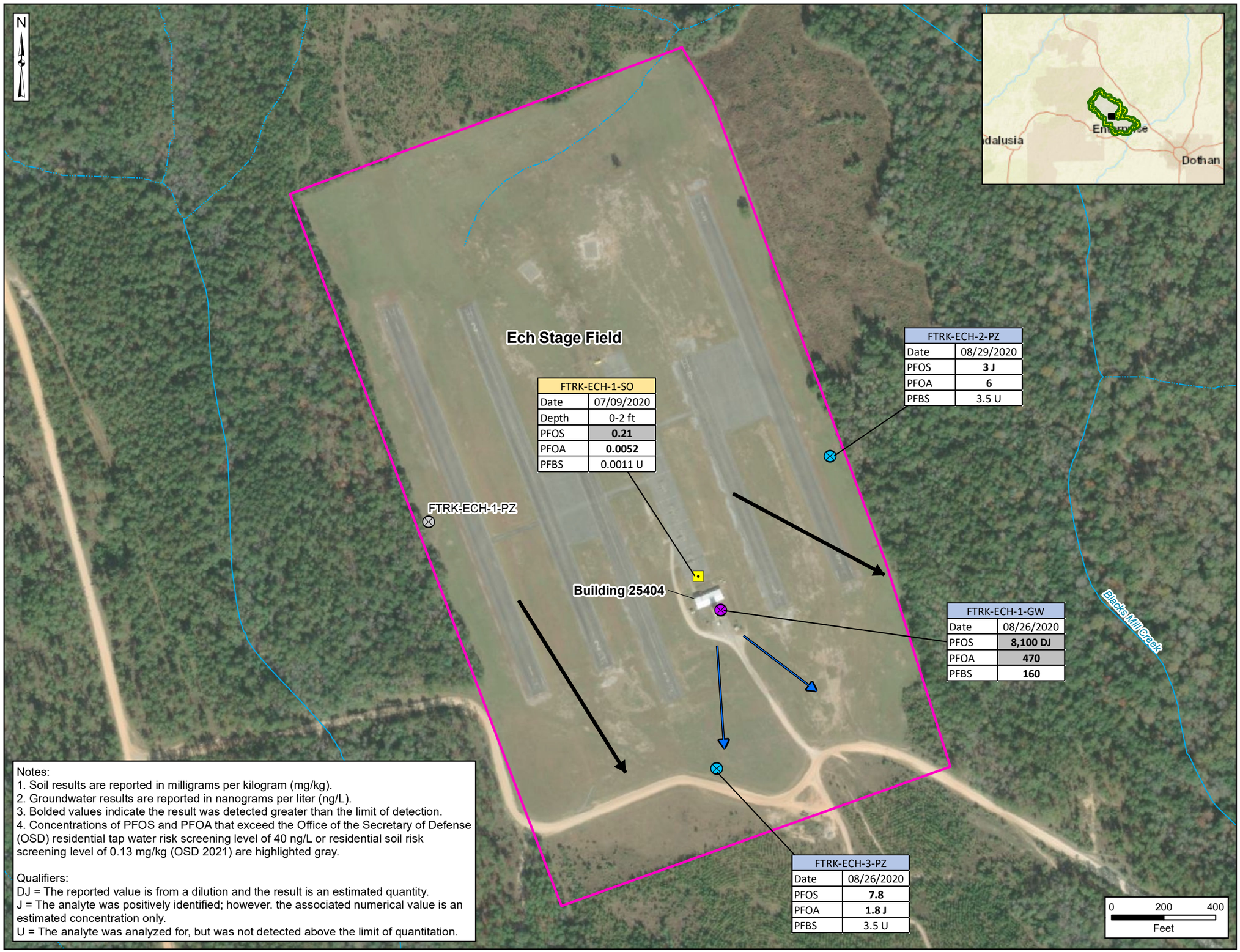
Figure 7-5
Ech Stage Field
PFOS, PFOA, and PFBS Analytical Results



Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

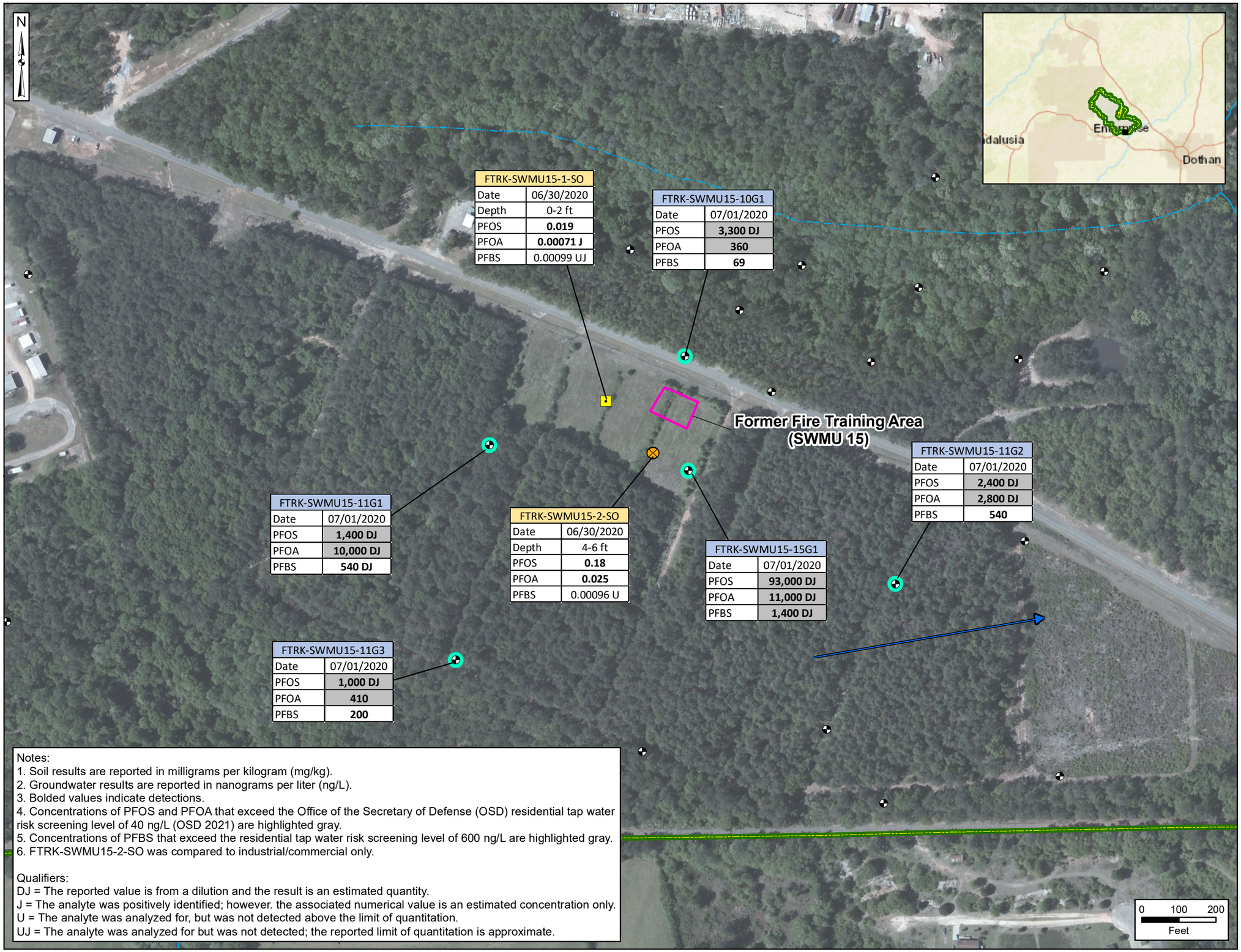
AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate the result was detected greater than the limit of detection.
4. 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 or residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.

Qualifiers:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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.

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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.
5. Concentrations of PFBS that exceed the residential tap water risk screening level of 600 ng/L are highlighted gray.
6. FTRK-SWMU15-2-SO was compared to industrial/commercial only.

Qualifiers:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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.
UJ = The analyte was analyzed for but was not detected; the reported limit of quantitation is approximate.

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Figure 7-6
Former Fire Training Area (SWMU 15)
PFOS, PFOA, and PFBS Analytical Results

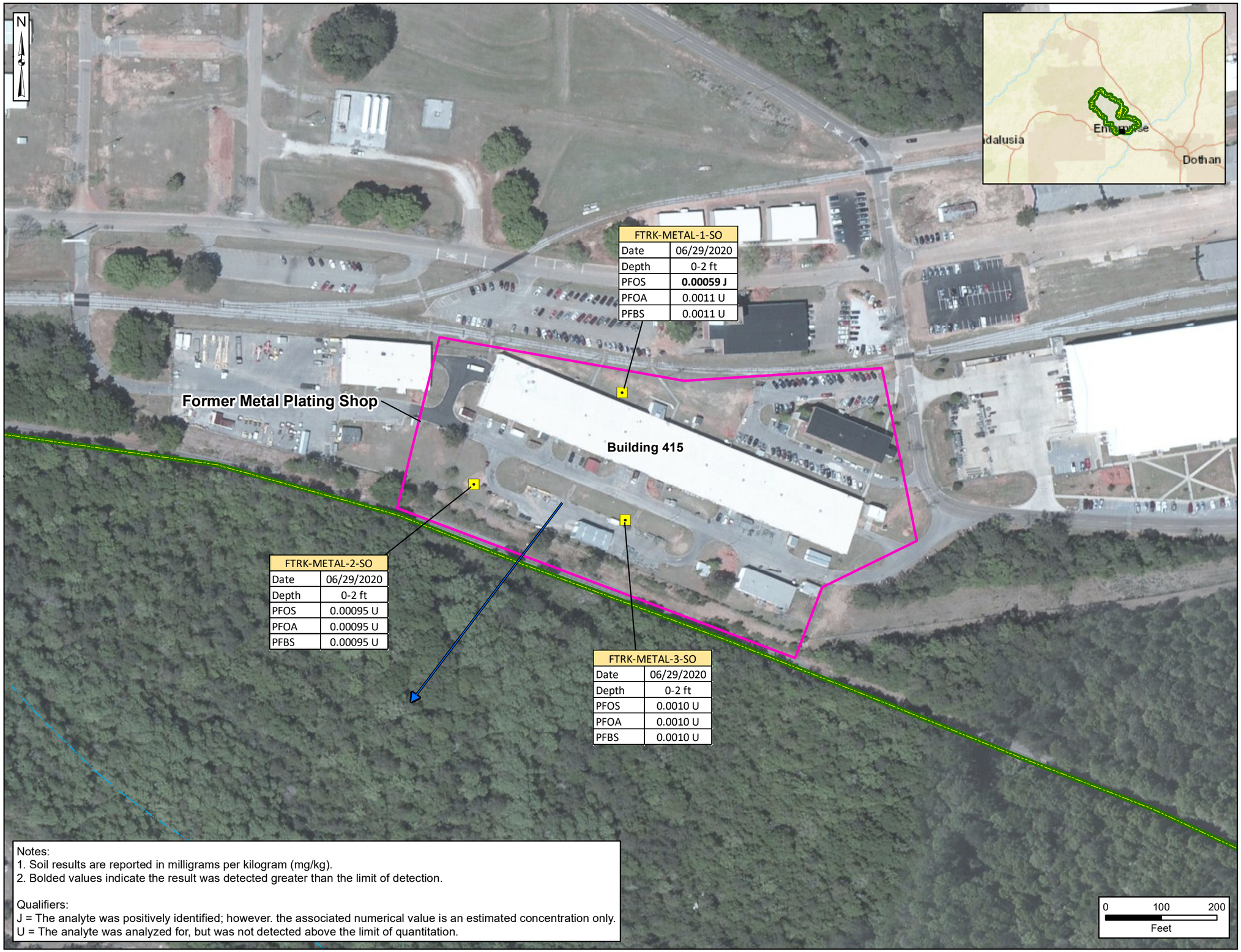
Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Monitoring Well
- Surface Soil Sampling Location
- Subsurface Soil Sampling Location
- Groundwater Sampling Location (Existing Well)

AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SWMU = solid waste management unit

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Bolded values indicate the result was detected greater than the limit of detection.

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.

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Figure 7-7
Former Metal Plating Shop PFOS, PFOA, and PFBS Analytical Results

Legend

- AOPI
- Main Post
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Surface Soil Sampling Location

AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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Figure 7-8
Fire Truck Staging Area PFOS, PFOA, and PFBS Analytical Results

Legend

- AOPI
- Main Post
- Surface Soil Sampling Location

AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Bolded values indicate the result was detected greater than the limit of detection.

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.

Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

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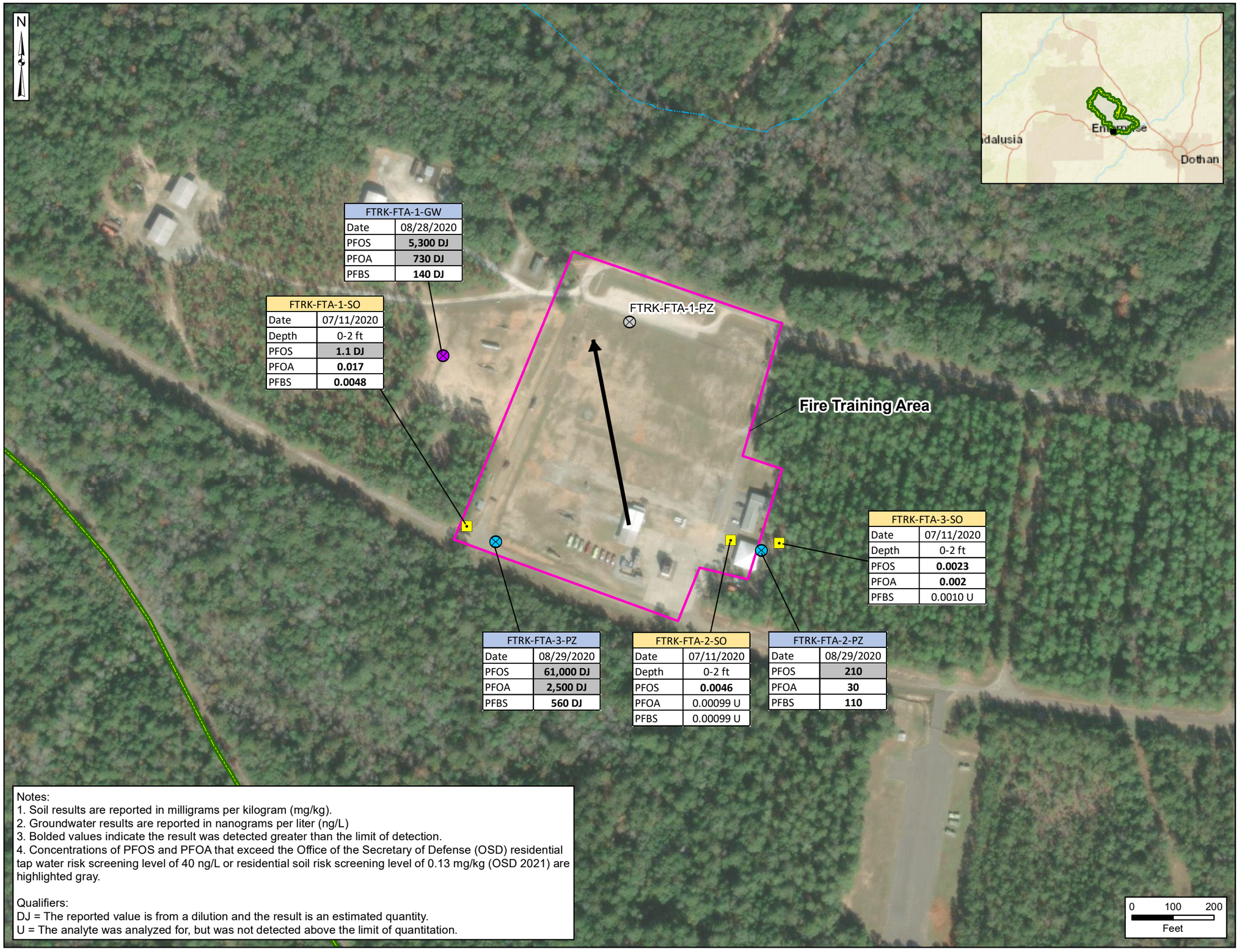
Figure 7-9
Fire Training Area
PFOS, PFOA, and PFBS Analytical Results



Legend

- Main Post
- AOPI
- Stream (Intermittent)
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L)
3. Bolded values indicate the result was detected greater than the limit of detection.
4. 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 or residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.

Qualifiers:
DJ = The reported value is from a dilution and the result is an estimated quantity.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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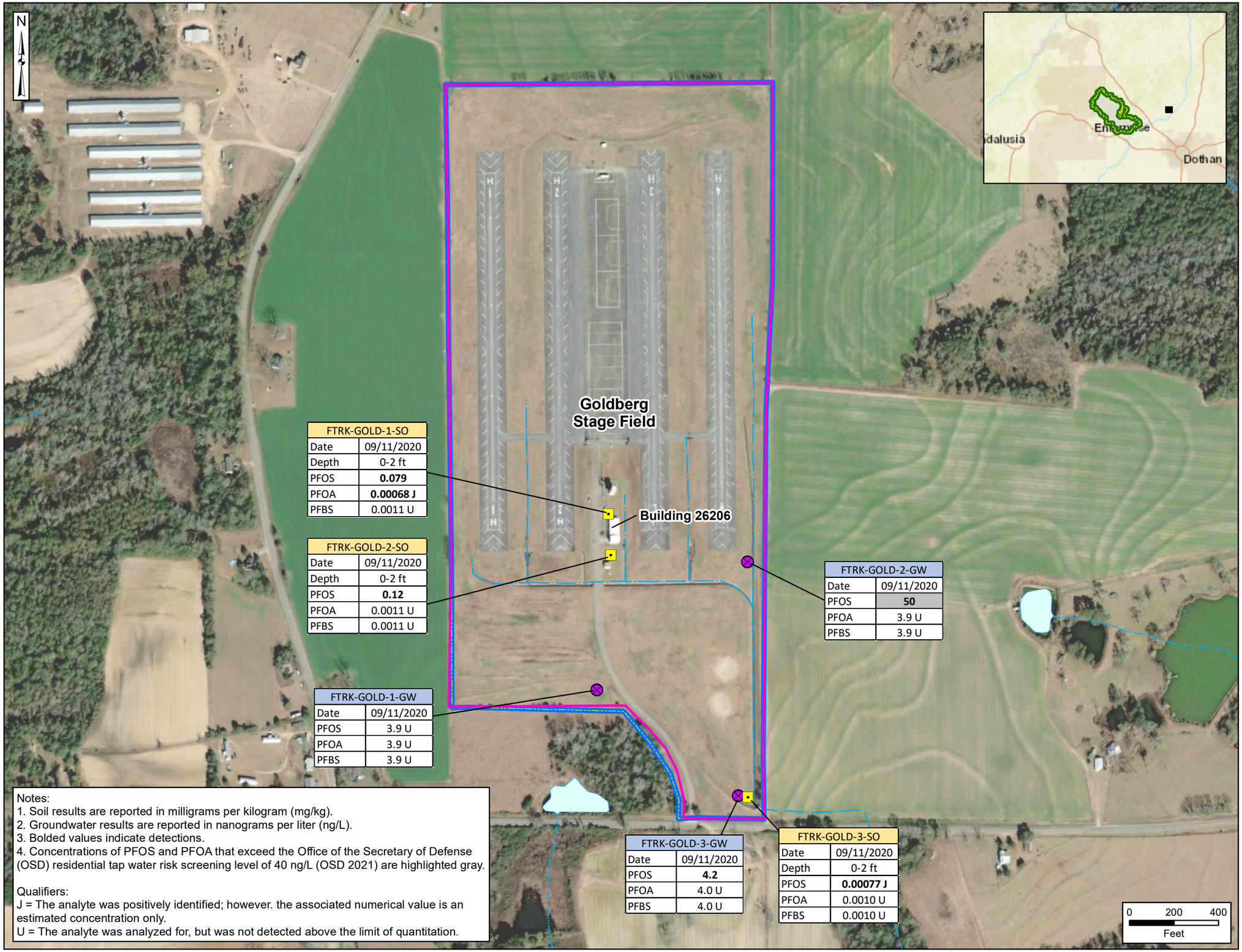
Figure 7-10
Goldberg Stage Field
PFOS, PFOA, and PFBS Analytical Results



FTRK-GOLD-1-SO	
Date	09/11/2020
Depth	0-2 ft
PFOS	**0.079**
PFOA	**0.00068 J**
PFBS	0.0011 U

FTRK-GOLD-2-SO	
Date	09/11/2020
Depth	0-2 ft
PFOS	**0.12**
PFOA	0.0011 U
PFBS	0.0011 U

FTRK-GOLD-1-GW	
Date	09/11/2020
PFOS	3.9 U
PFOA	3.9 U
PFBS	3.9 U

FTRK-GOLD-2-GW	
Date	09/11/2020
PFOS	**50**
PFOA	3.9 U
PFBS	3.9 U

FTRK-GOLD-3-GW	
Date	09/11/2020
PFOS	**4.2**
PFOA	4.0 U
PFBS	4.0 U

FTRK-GOLD-3-SO	
Date	09/11/2020
Depth	0-2 ft
PFOS	**0.00077 J**
PFOA	0.0010 U
PFBS	0.0010 U

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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.

Legend

- Main Post
- AOPI / Army Property Boundary
- Stream (Intermittent)
- Canal/Ditch
- Water Body
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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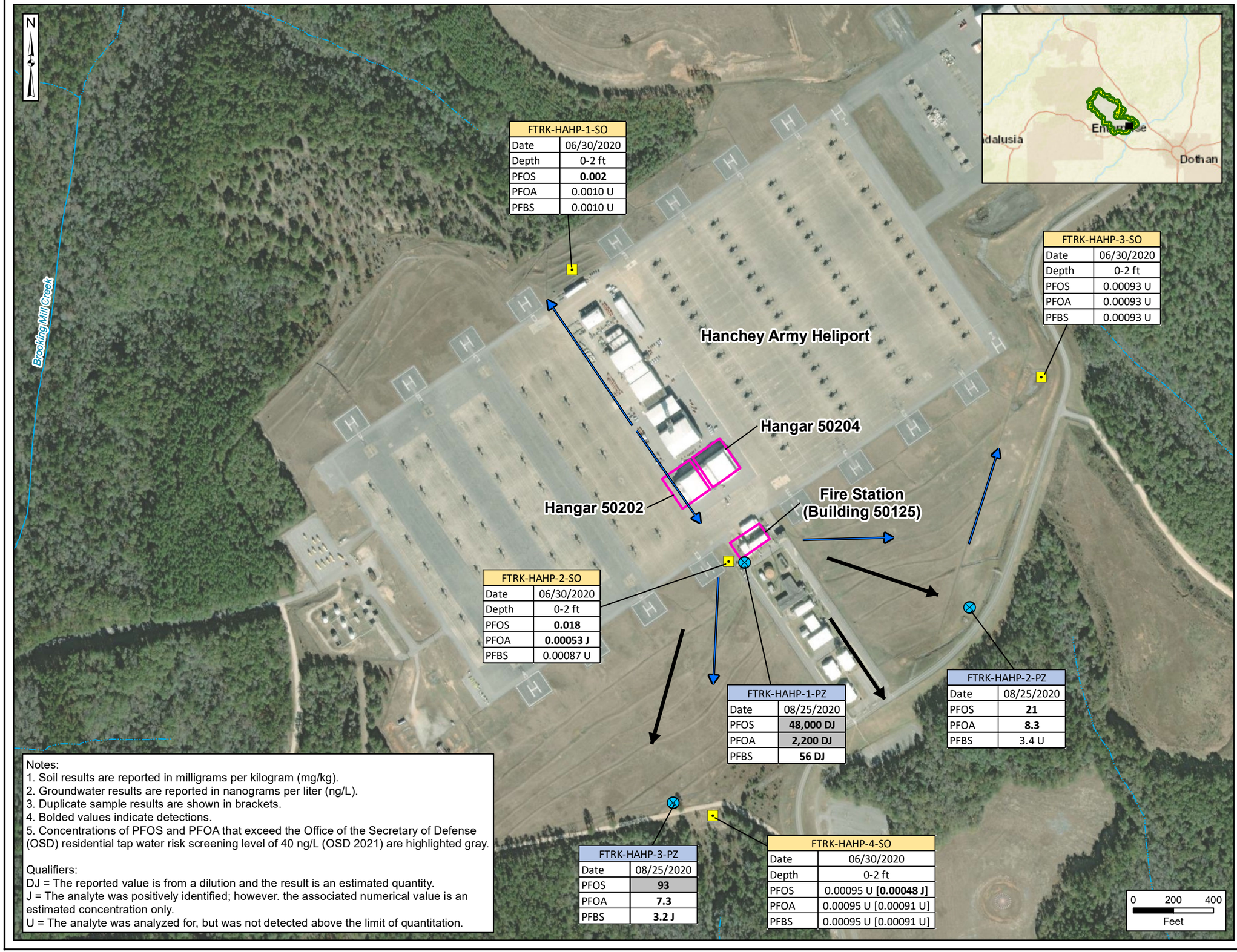
Figure 7-11
Hanchey Army Heliport
PFOS, PFOA, and PFBS
Analytical Results



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
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:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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.

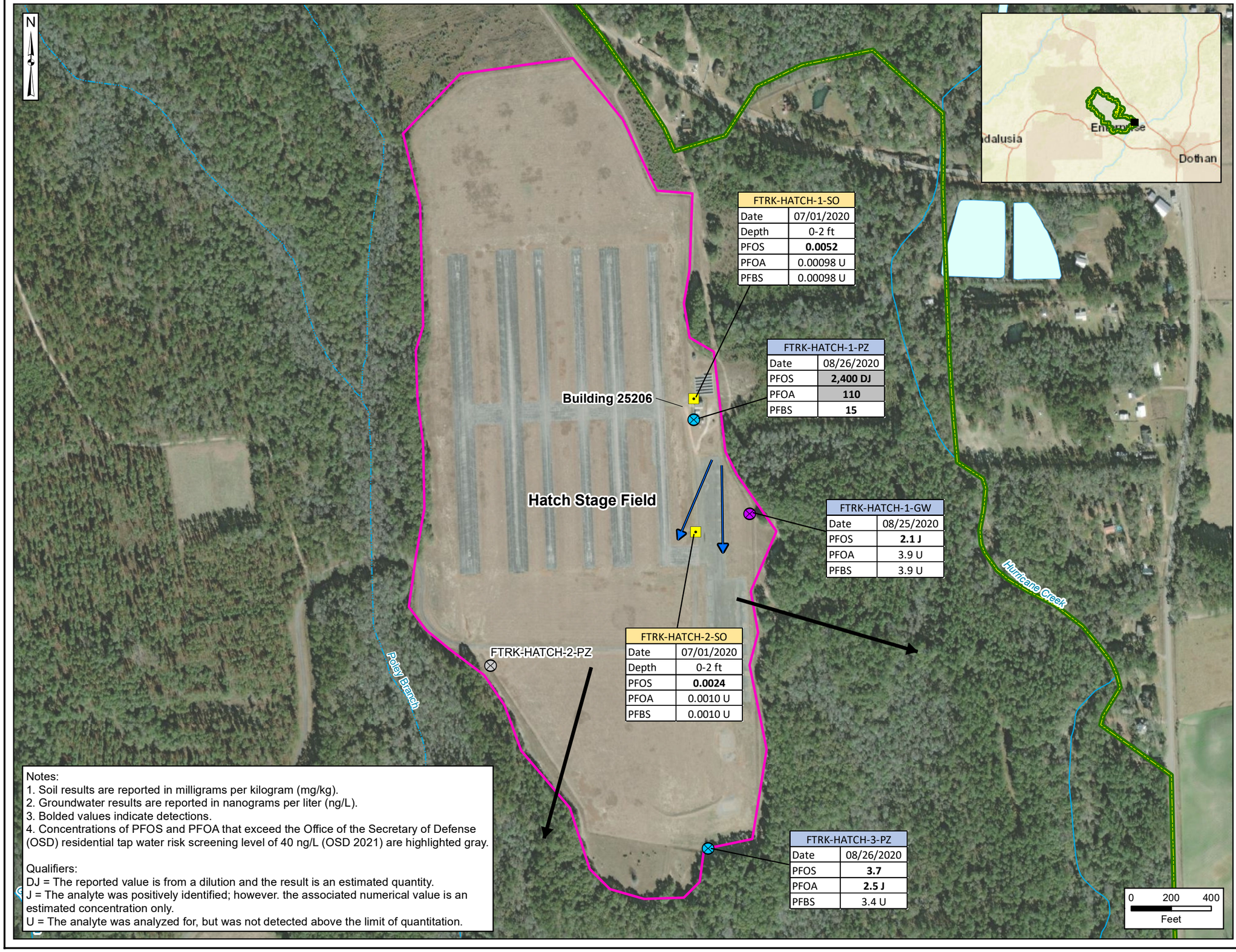
Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (Piezometer)

AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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.

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Figure 7-12
Hatch Stage Field PFOS, PFOA, and PFBS Analytical Results

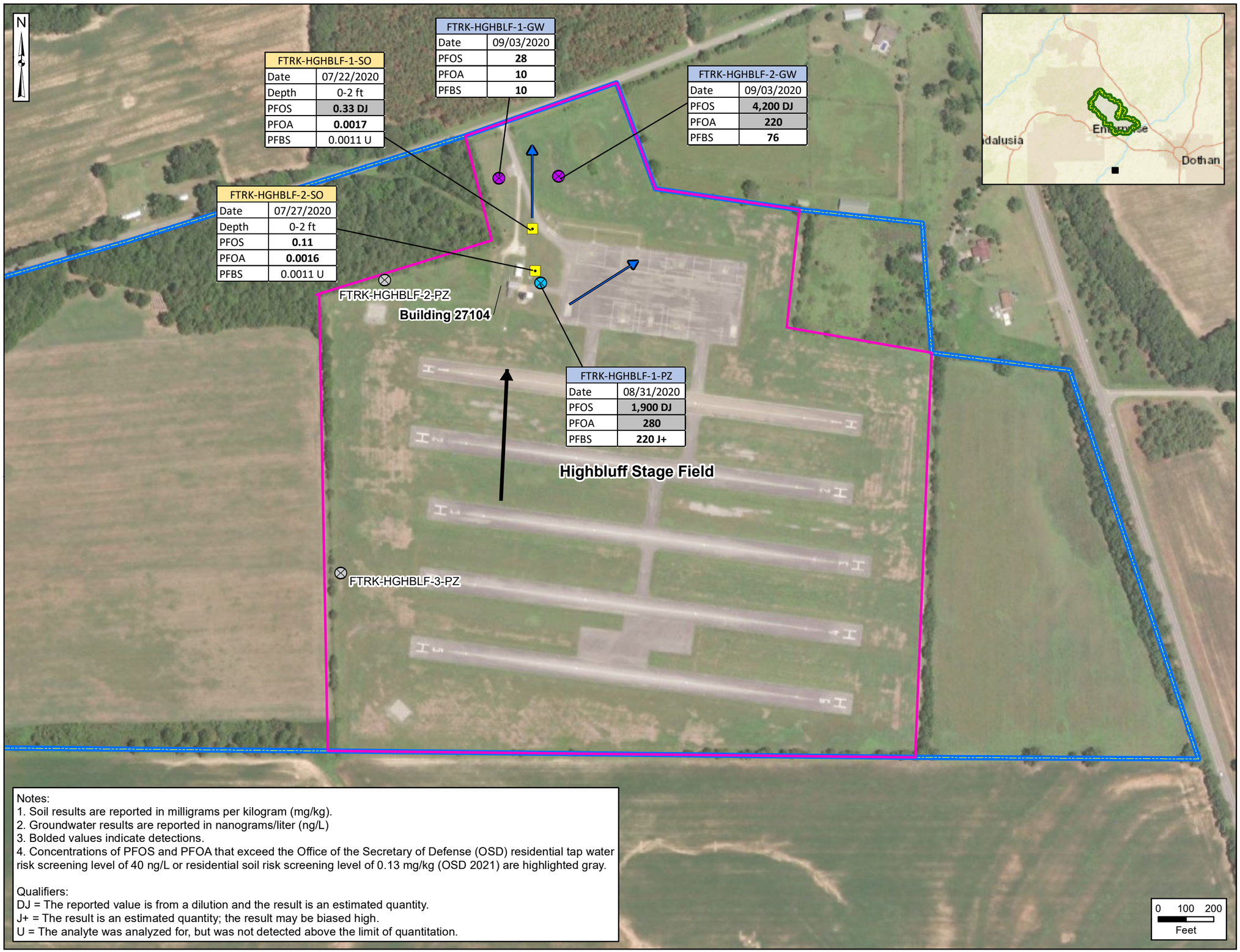
Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms/liter (ng/L)
3. Bolded values indicate detections.
4. 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 or residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.

Qualifiers:
DJ = The reported value is from a dilution and the result is an estimated quantity.
J+ = The result is an estimated quantity; the result may be biased high.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

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Figure 7-13 Highbluff Stage Field PFOS, PFOA, and PFBS Analytical Results

Legend

- AOPI
- Main Post
- Army Property Boundary
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

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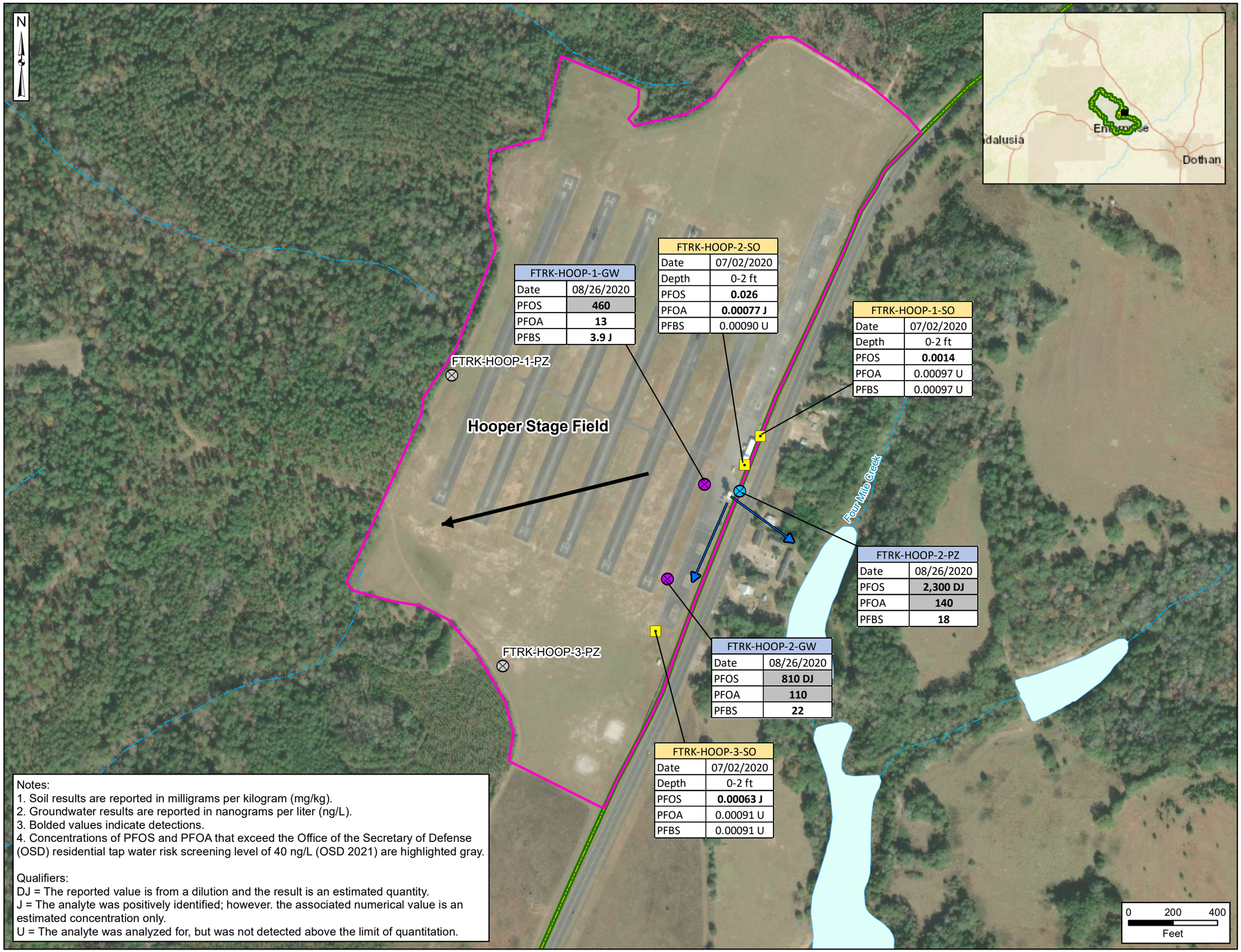
Figure 7-14
Hooper Stage Field
PFOS, PFOA, and PFBS Analytical Results



FTRK-HOOP-1-GW	
Date	08/26/2020
PFOS	**460**
PFOA	**13**
PFBS	**3.9 J**

FTRK-HOOP-2-SO	
Date	07/02/2020
Depth	0-2 ft
PFOS	**0.026**
PFOA	**0.00077 J**
PFBS	0.00090 U

FTRK-HOOP-1-SO	
Date	07/02/2020
Depth	0-2 ft
PFOS	**0.0014**
PFOA	0.00097 U
PFBS	0.00097 U

FTRK-HOOP-2-PZ	
Date	08/26/2020
PFOS	**2,300 DJ**
PFOA	**140**
PFBS	**18**

FTRK-HOOP-2-GW	
Date	08/26/2020
PFOS	**810 DJ**
PFOA	**110**
PFBS	**22**

FTRK-HOOP-3-SO	
Date	07/02/2020
Depth	0-2 ft
PFOS	**0.00063 J**
PFOA	0.00091 U
PFBS	0.00091 U

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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.

Legend

- Main Post
- AOPI
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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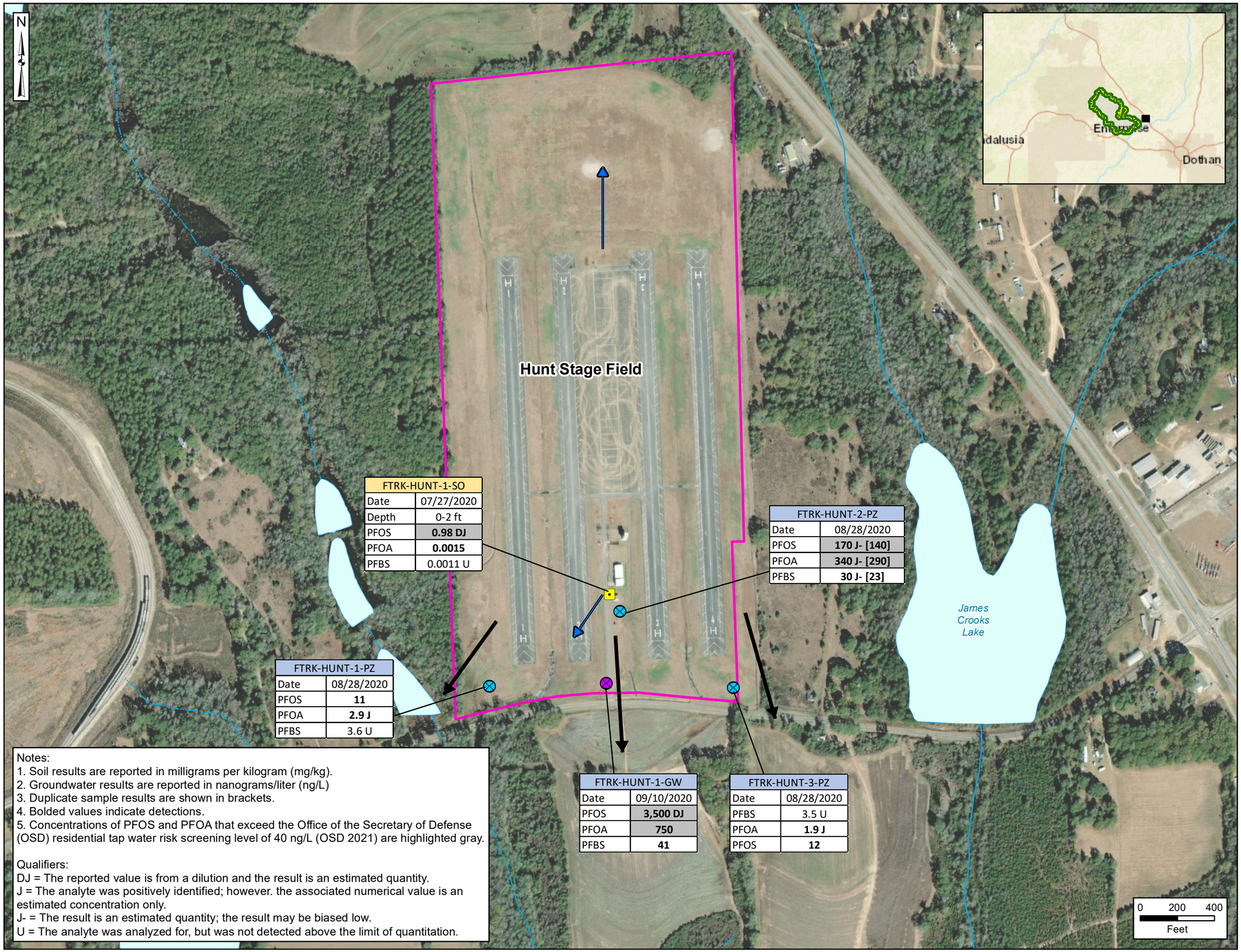
Figure 7-15 Hunt Stage Field PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms/liter (ng/L)
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
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:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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 low.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

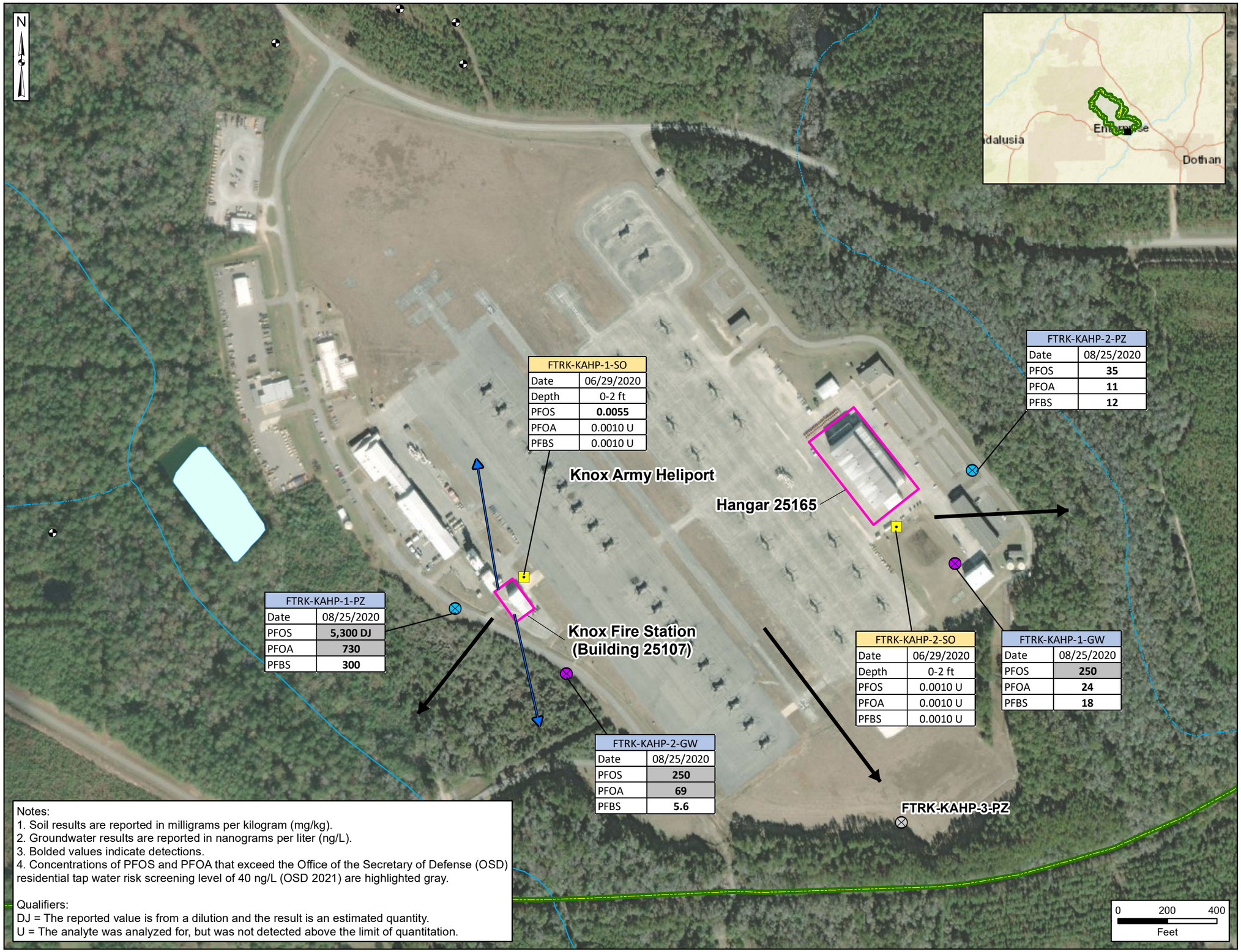
Legend

- Main Post
- AOPI / Army Property Boundary
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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:
DJ = The reported value is from a dilution and the result is an estimated quantity.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

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Figure 7-16
Knox Army Heliport
PFOS, PFOA, and PFBS Analytical Results

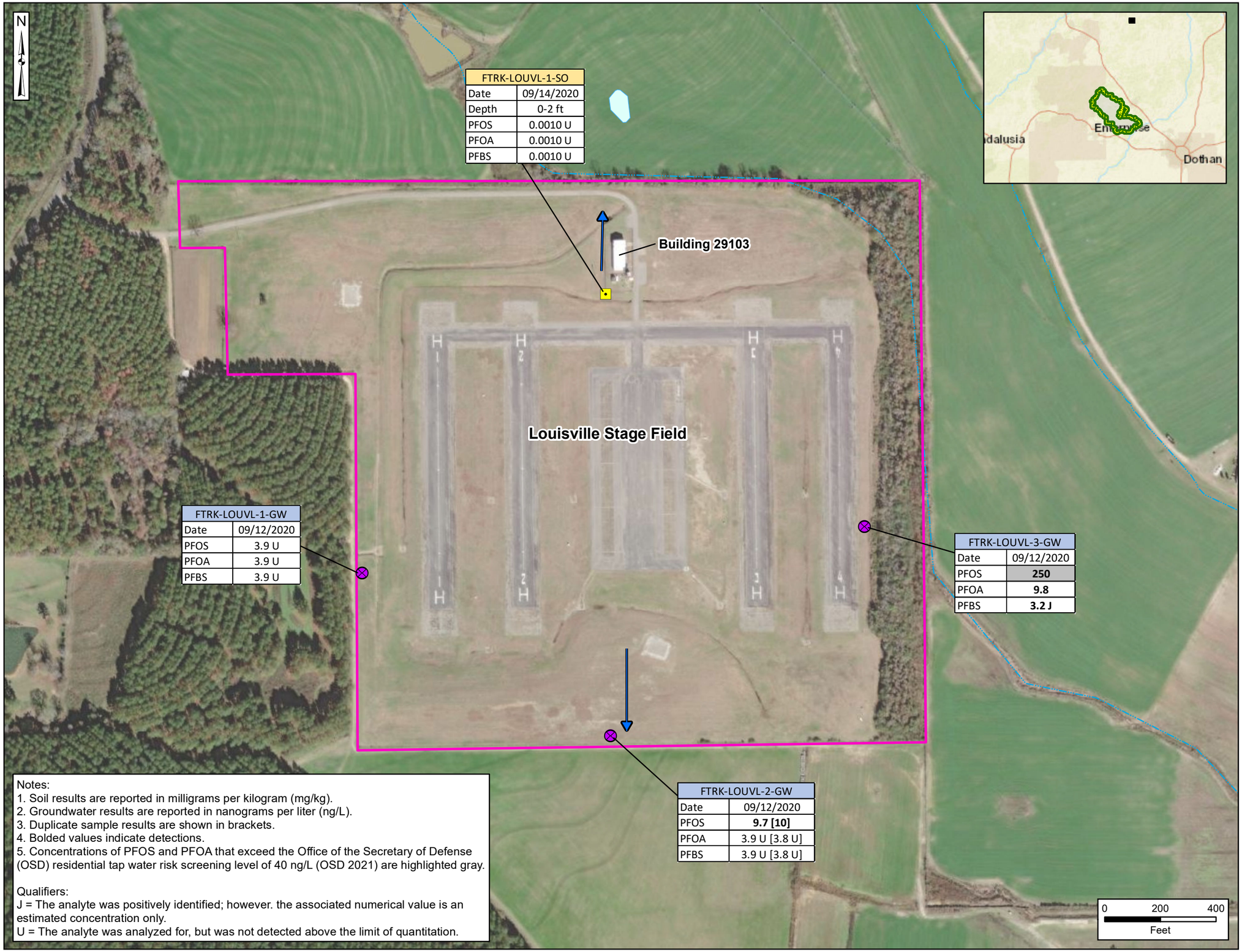
Legend

- AOPI
- Main Post
- Monitoring Well
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
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.

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Figure 7-17
Louisville Stage Field
PFOS, PFOA, and PFBS Analytical Results

Legend

- AOPI / Army Property Boundary
- Main Post
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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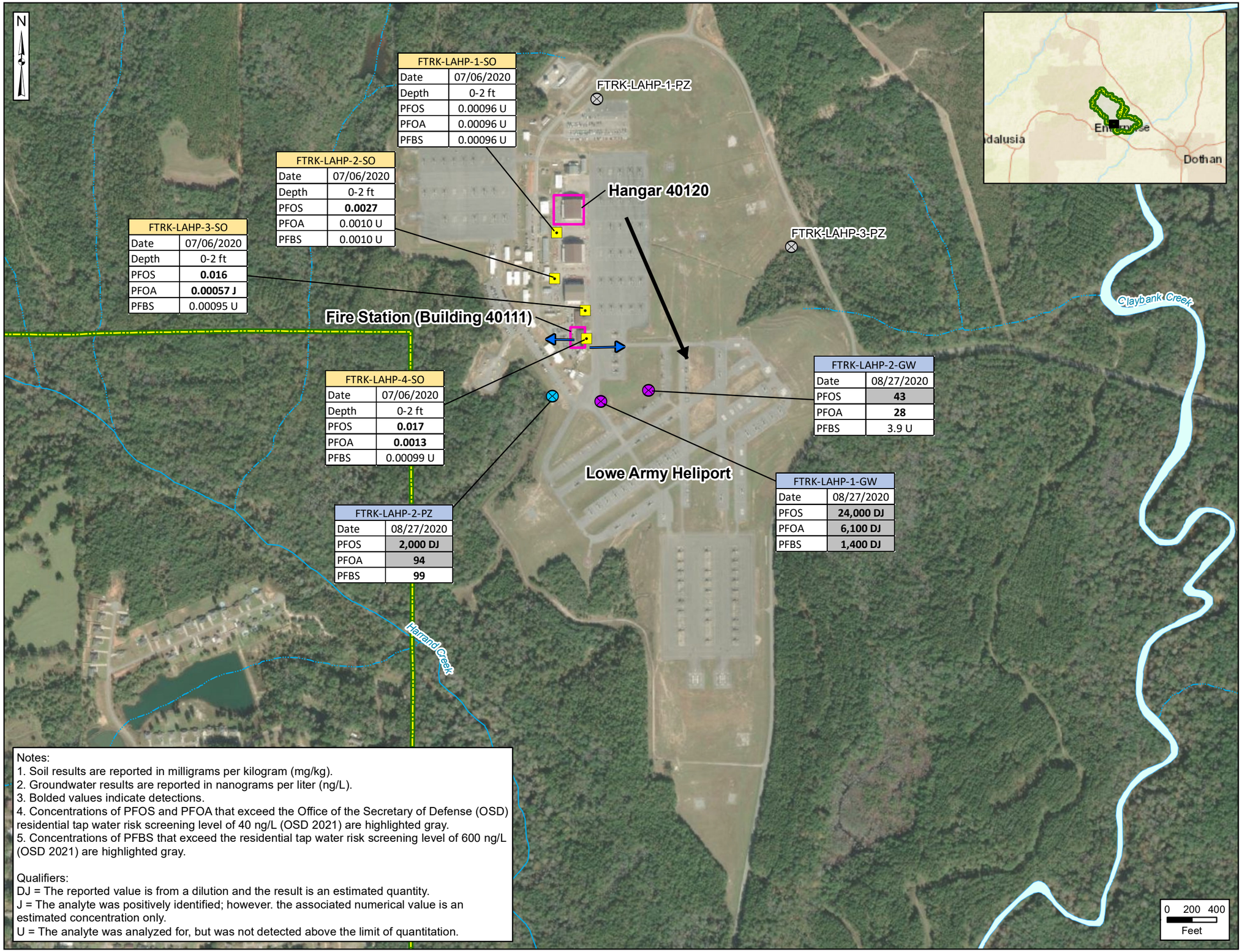
Figure 7-18 Lowe Army Heliport PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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.
5. Concentrations of PFBS that exceed the residential tap water risk screening level of 600 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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.

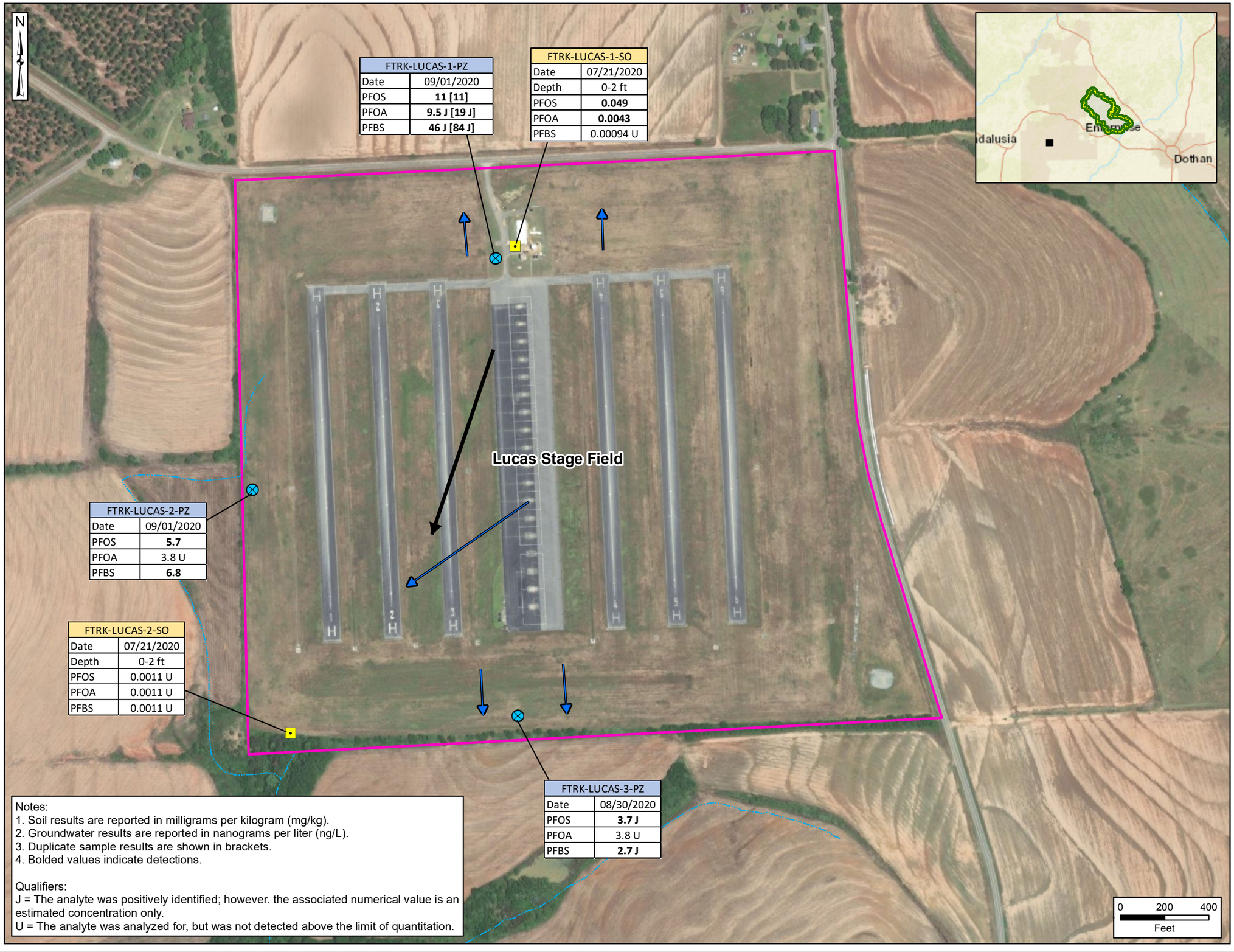
Legend

- Main Post
- AOPI
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.

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.

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Figure 7-19
Lucas Stage Field
PFOS, PFOA, and PFBS Analytical Results

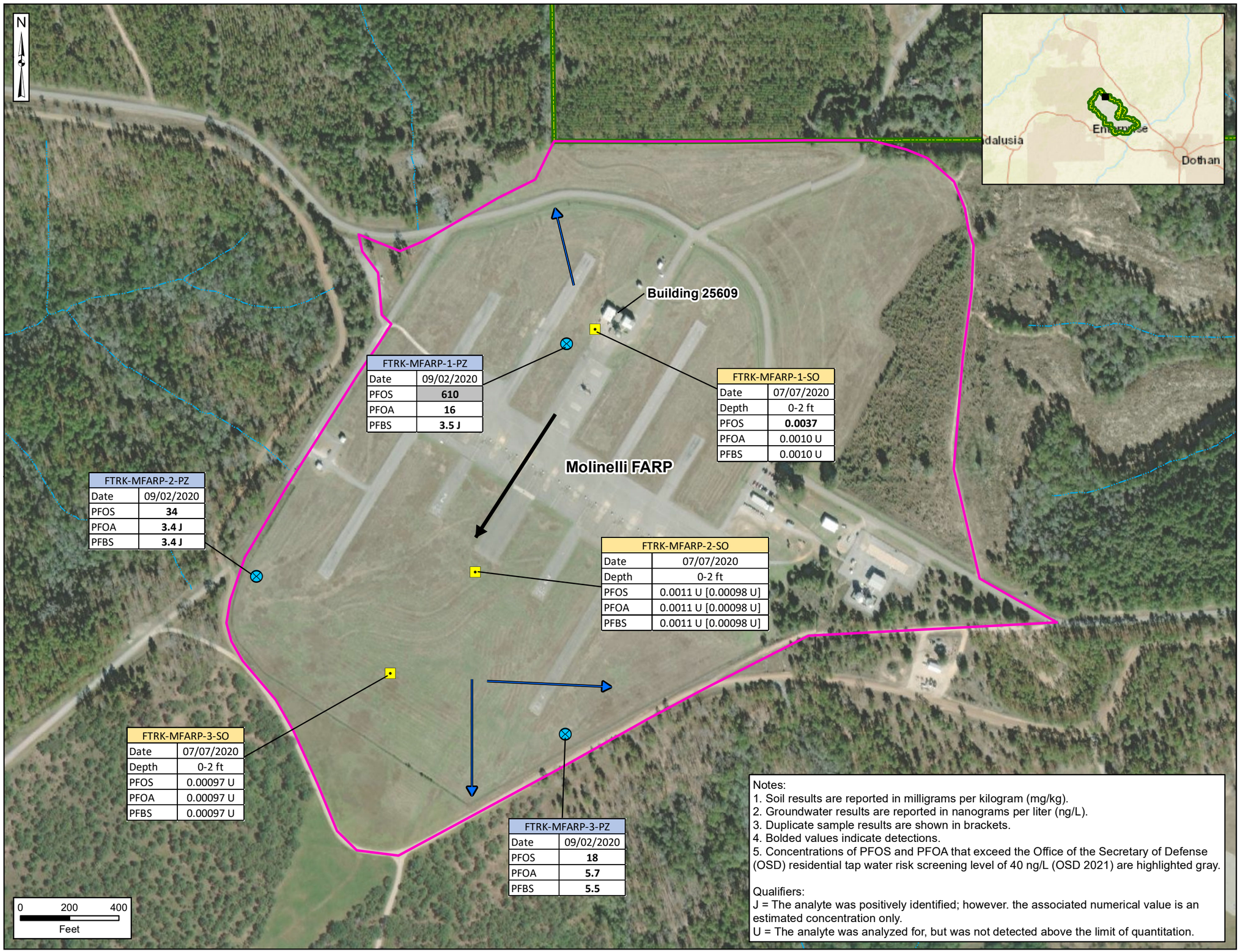
Legend

- AOPI / Army Property Boundary
- Main Post
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (Piezometer)

AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
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.

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Fort Rucker, AL

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Figure 7-20
Molinelli Forward Area Refueling Point PFOS, PFOA, and PFBS Analytical Results

Legend

- Main Post
- AOPI
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (Piezometer)

AOPI = area of potential interest
FARP = Forward Area Refueling Point
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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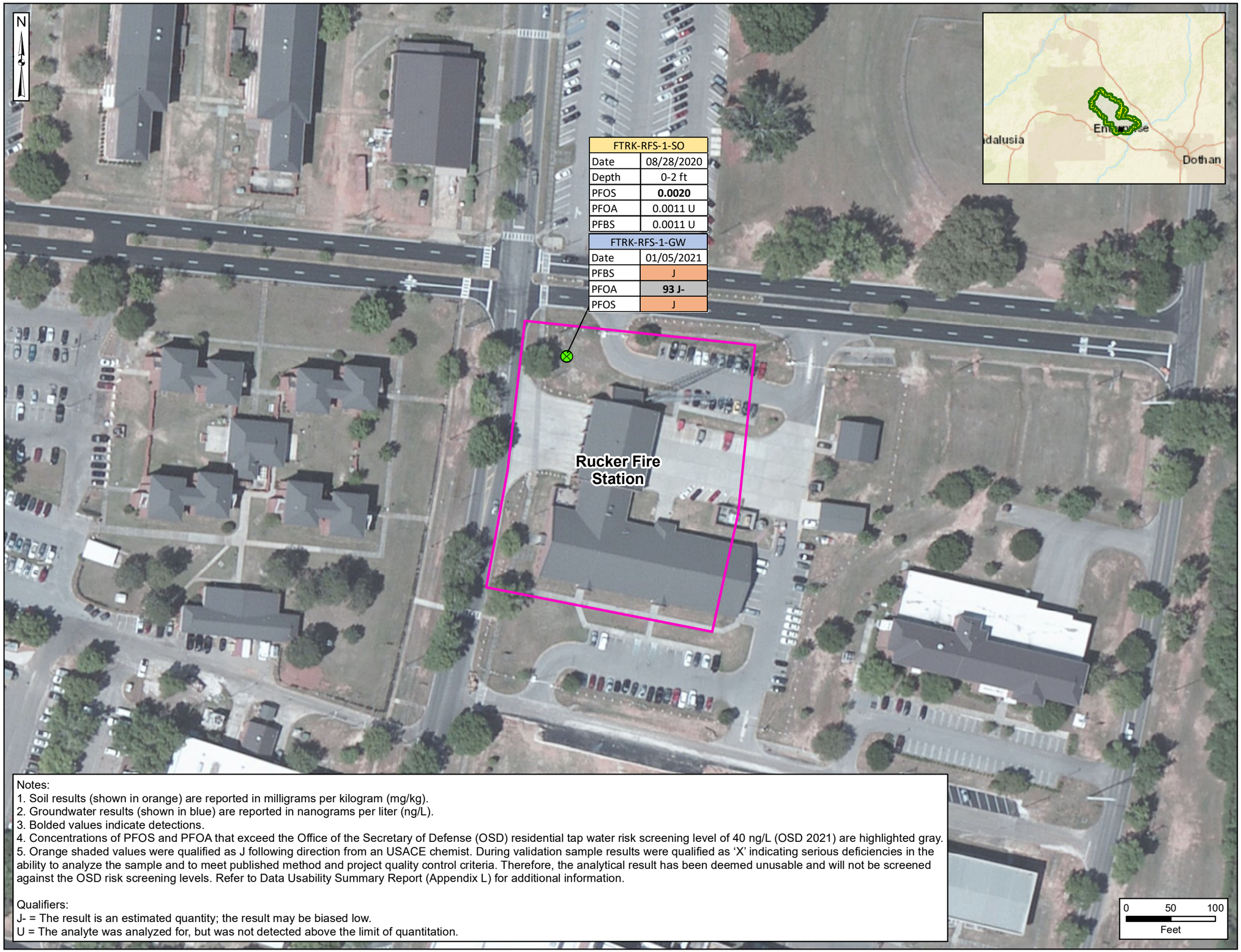
Figure 7-21 Rucker Fire Station PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Soil results (shown in orange) are reported in milligrams per kilogram (mg/kg).
2. Groundwater results (shown in blue) are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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.
5. Orange shaded values were qualified as J following direction from an USACE chemist. During validation sample results were qualified as 'X' indicating serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. Therefore, the analytical result has been deemed unusable and will not be screened against the OSD risk screening levels. Refer to Data Usability Summary Report (Appendix L) for additional information.

Qualifiers:
J- = The result is an estimated quantity; the result may be biased low.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

Legend

- AOPI
- Main Post
- Soil/Groundwater Sampling Location (Sonic Rig)

AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Rucker, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

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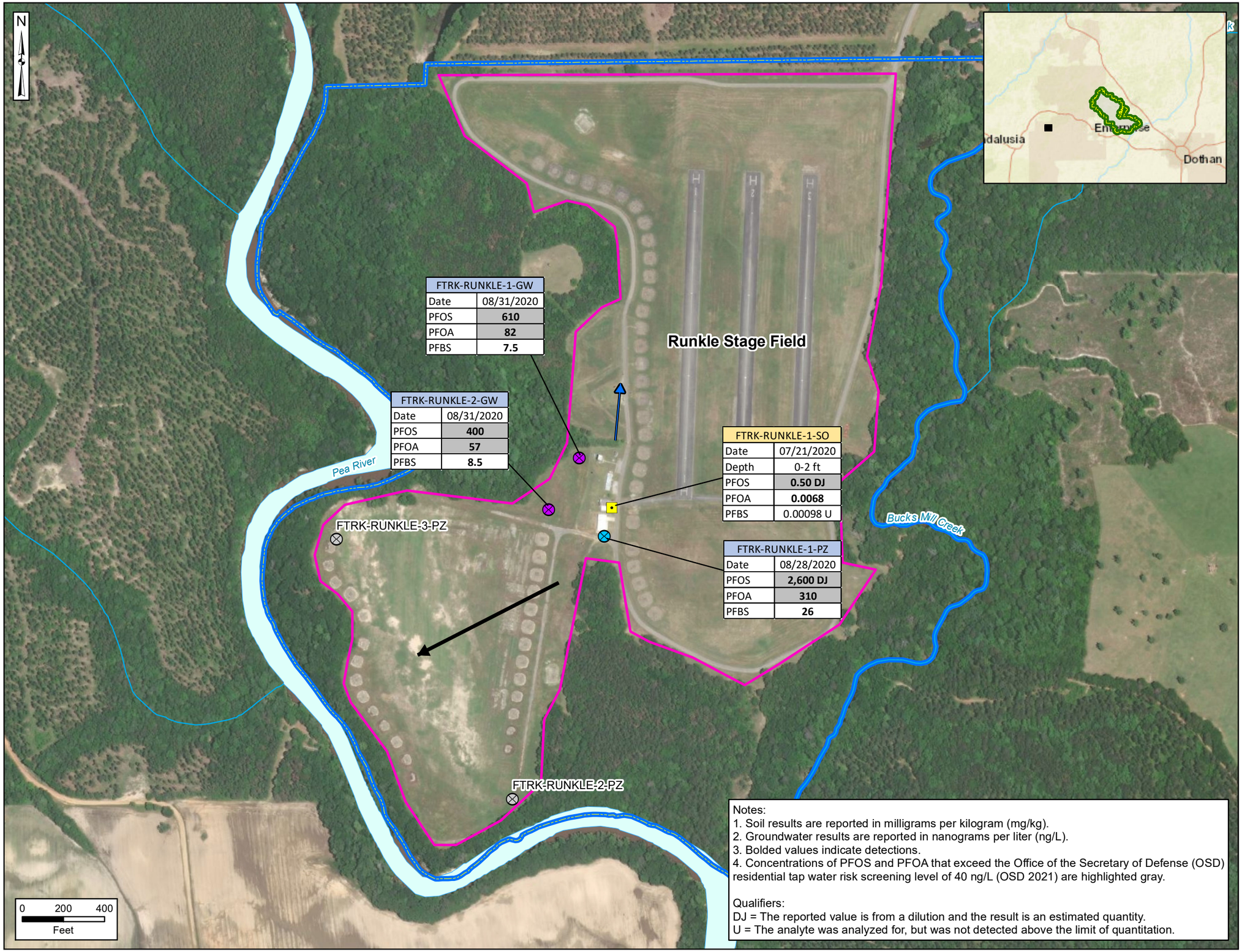
Figure 7-22
Runkle Stage Field
PFOS, PFOA, and PFBS Analytical Results



FTRK-RUNKLE-1-GW	
Date	08/31/2020
PFOS	**610**
PFOA	**82**
PFBS	**7.5**

FTRK-RUNKLE-2-GW	
Date	08/31/2020
PFOS	**400**
PFOA	**57**
PFBS	**8.5**

FTRK-RUNKLE-1-SO	
Date	07/21/2020
Depth	0-2 ft
PFOS	**0.50 DJ**
PFOA	**0.0068**
PFBS	0.00098 U

FTRK-RUNKLE-1-PZ	
Date	08/28/2020
PFOS	**2,600 DJ**
PFOA	**310**
PFBS	**26**

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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:
DJ = The reported value is from a dilution and the result is an estimated quantity.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

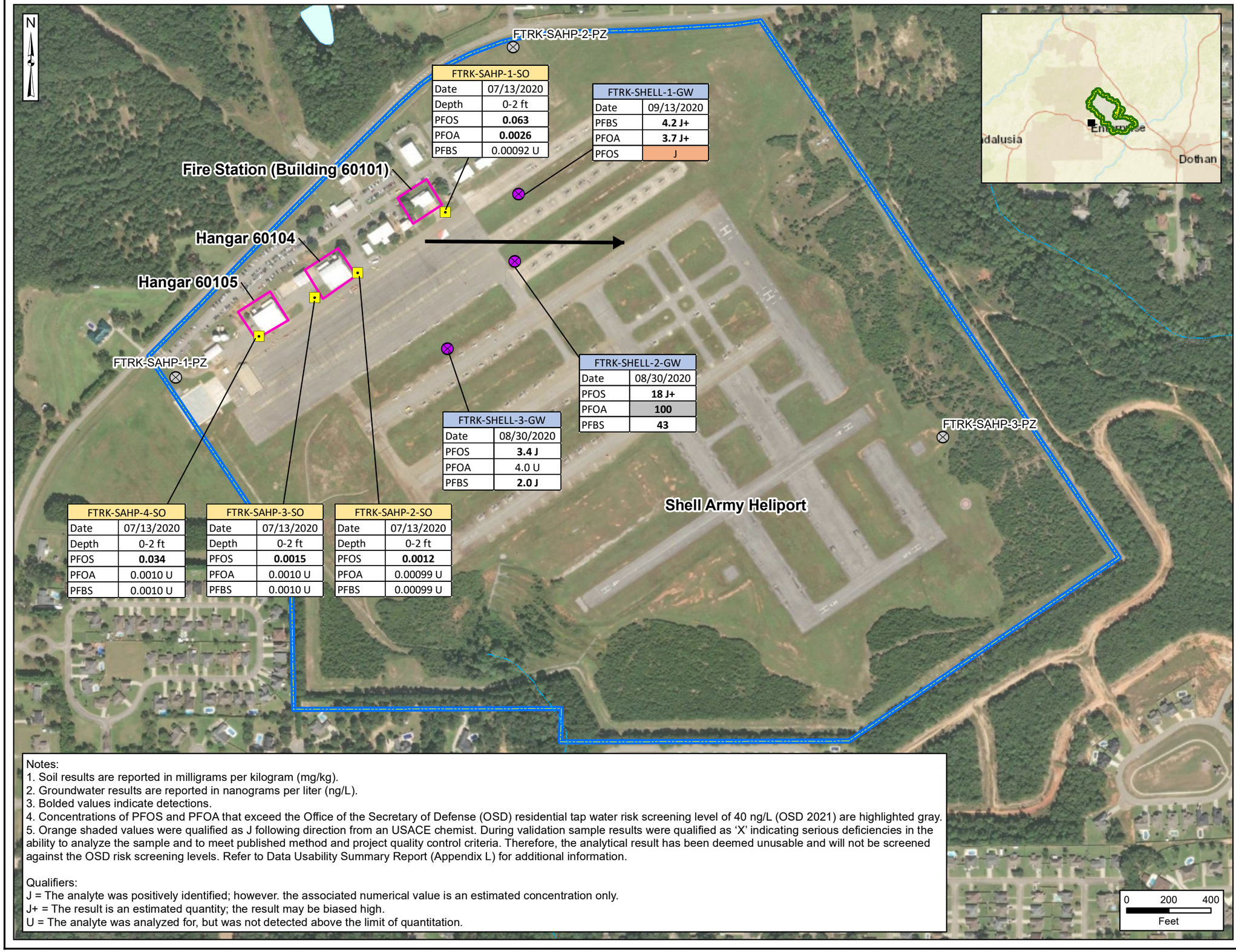
Legend

- AOPI
- Main Post
- Army Property Boundary
- Stream/Creek (Perennial)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Water Body
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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.
5. Orange shaded values were qualified as J following direction from an USACE chemist. During validation sample results were qualified as 'X' indicating serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. Therefore, the analytical result has been deemed unusable and will not be screened against the OSD risk screening levels. Refer to Data Usability Summary Report (Appendix L) for additional information.

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

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Figure 7-23
Shell Army Heliport
PFOS, PFOA, and PFBS Analytical Results

Legend

- Main Post
- AOPI
- Army Property Boundary
- Stream (Intermittent)
- Water Body
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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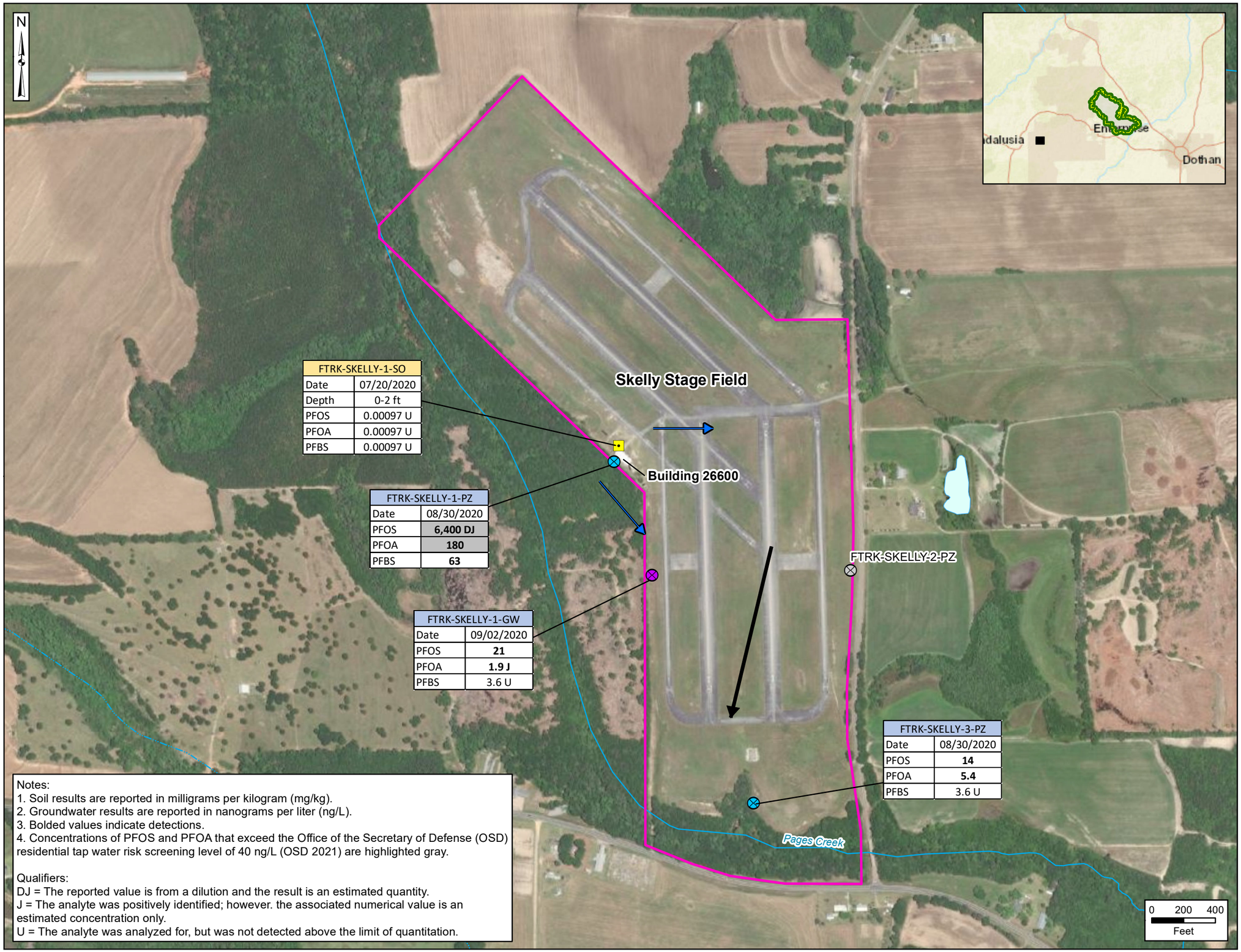
Figure 7-24
Skelly Stage Field
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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:
DJ = The reported value is from a dilution and the result is an estimated quantity.
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.

Legend

- AOPI / Army Property Boundary
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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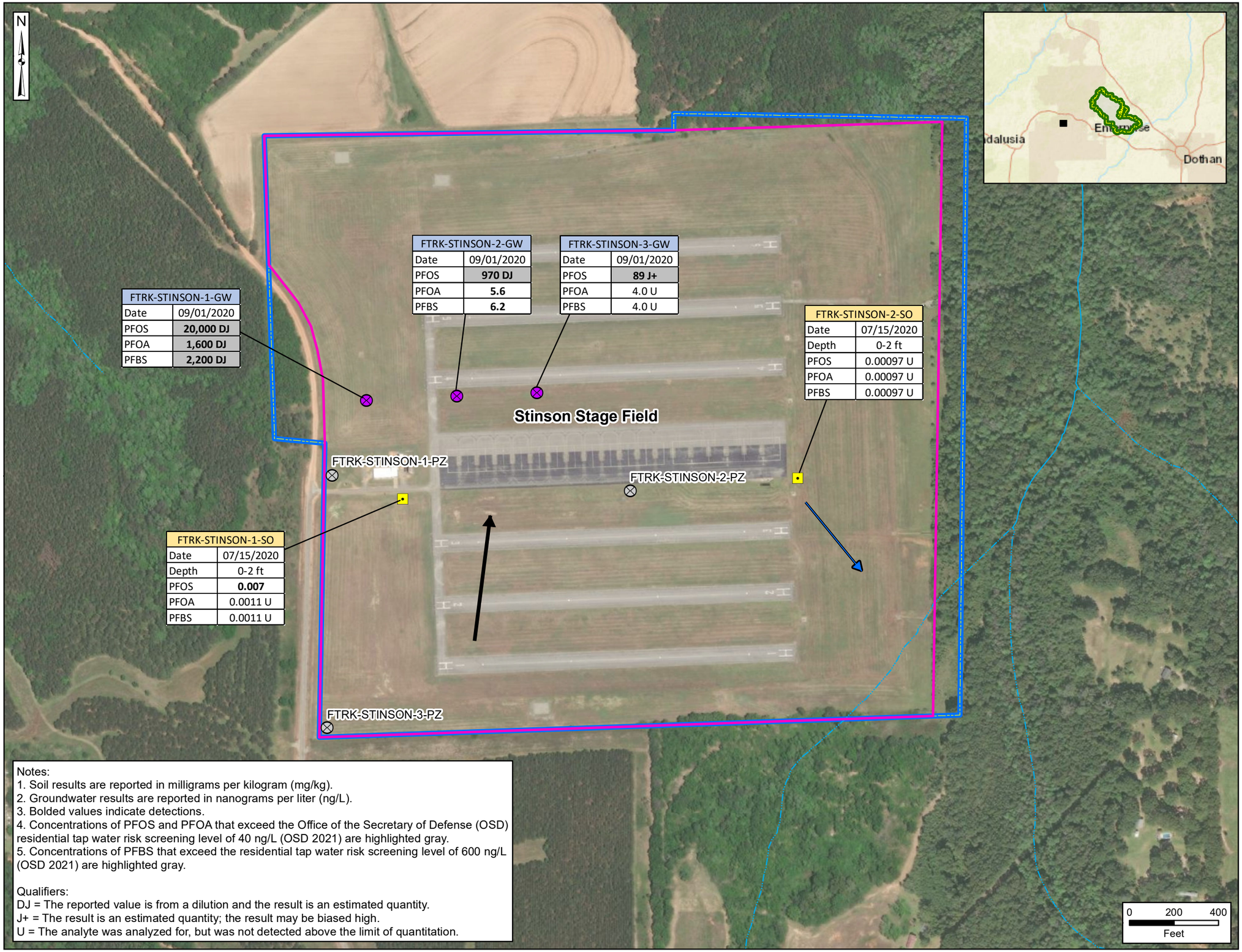
Figure 7-25
Stinson Stage Field
PFOS, PFOA, and PFBS Analytical Results



Legend

- AOPI
- Army Property Boundary
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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.
5. Concentrations of PFBS that exceed the residential tap water risk screening level of 600 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
DJ = The reported value is from a dilution and the result is an estimated quantity.
J+ = The result is an estimated quantity; the result may be biased high.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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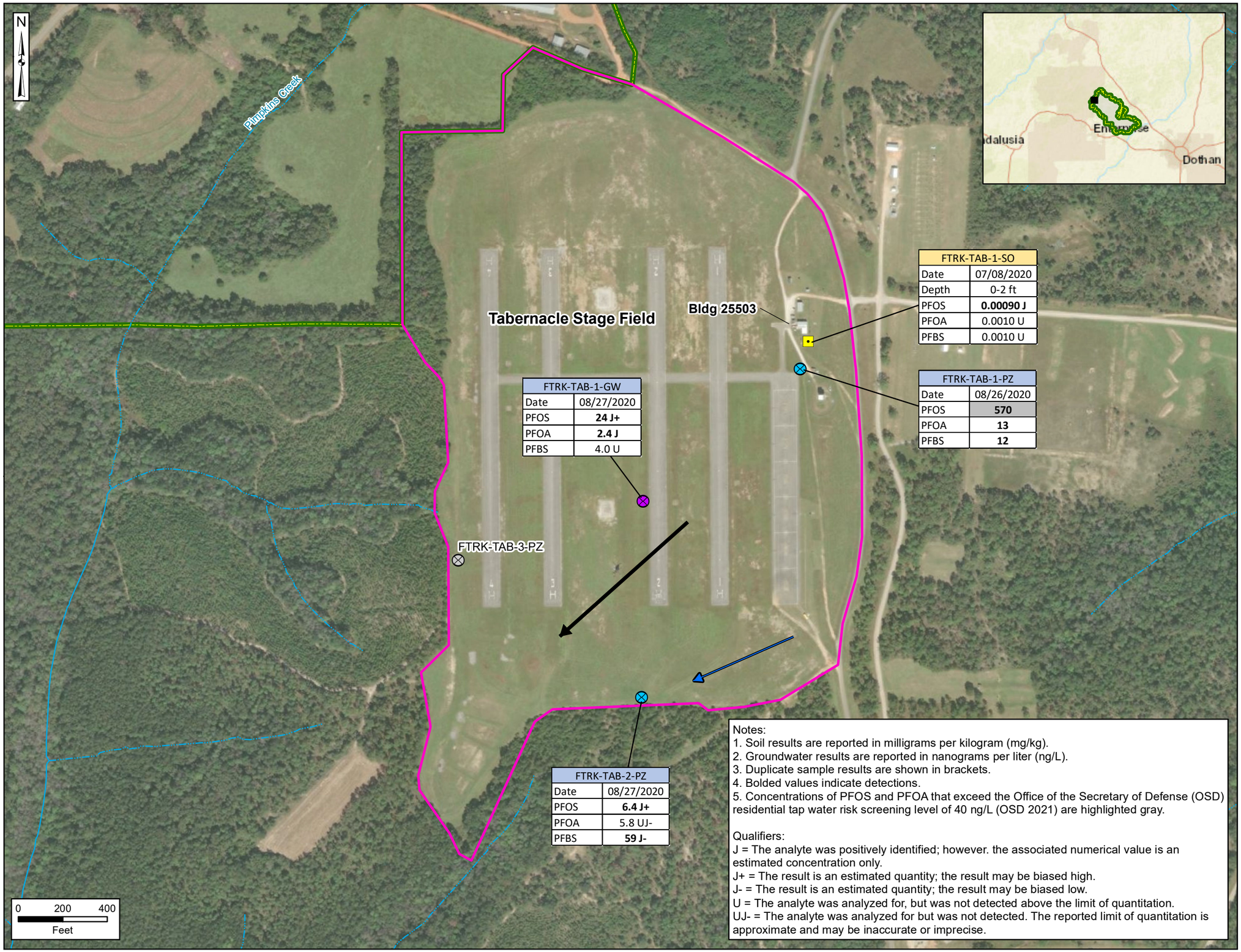

Figure 7-26
Tabernacle Stage Field
PFOS, PFOA, and PFBS
Analytical Results

Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
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.
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 was not detected above the limit of quantitation.
UJ- = The analyte was analyzed for but was not detected. The reported limit of quantitation is approximate and may be inaccurate or imprecise.

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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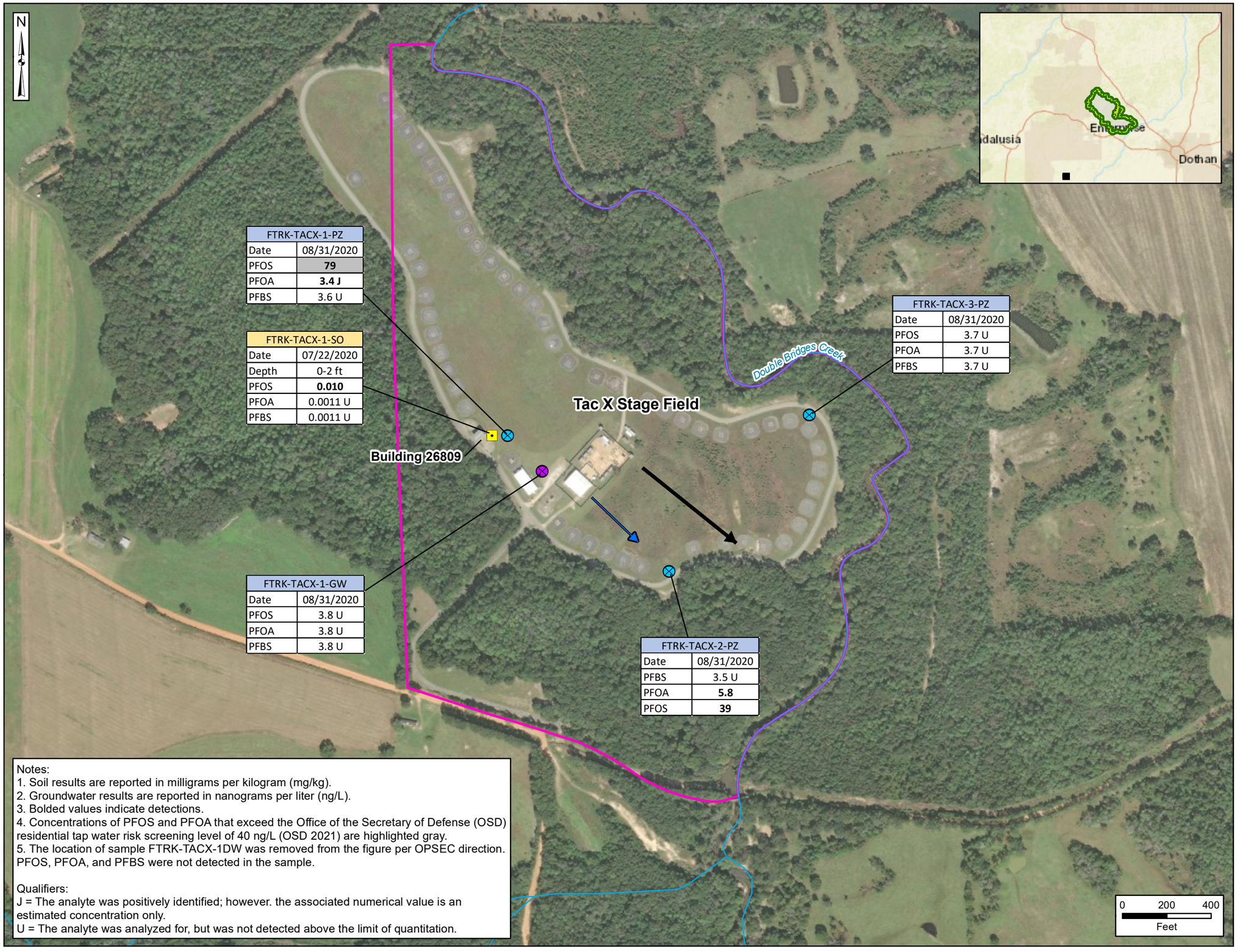
Figure 7-27
Tac X
PFOS, PFOA, and PFBS Analytical Results



Legend

- AOPI / Army Property Boundary
- Main Post
- Stream/Creek (Perennial)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)
- Groundwater Sampling Location (Piezometer)

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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.
5. The location of sample FTRK-TACX-1DW was removed from the figure per OPSEC direction. PFOS, PFOA, and PFBS were not detected in the sample.

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.

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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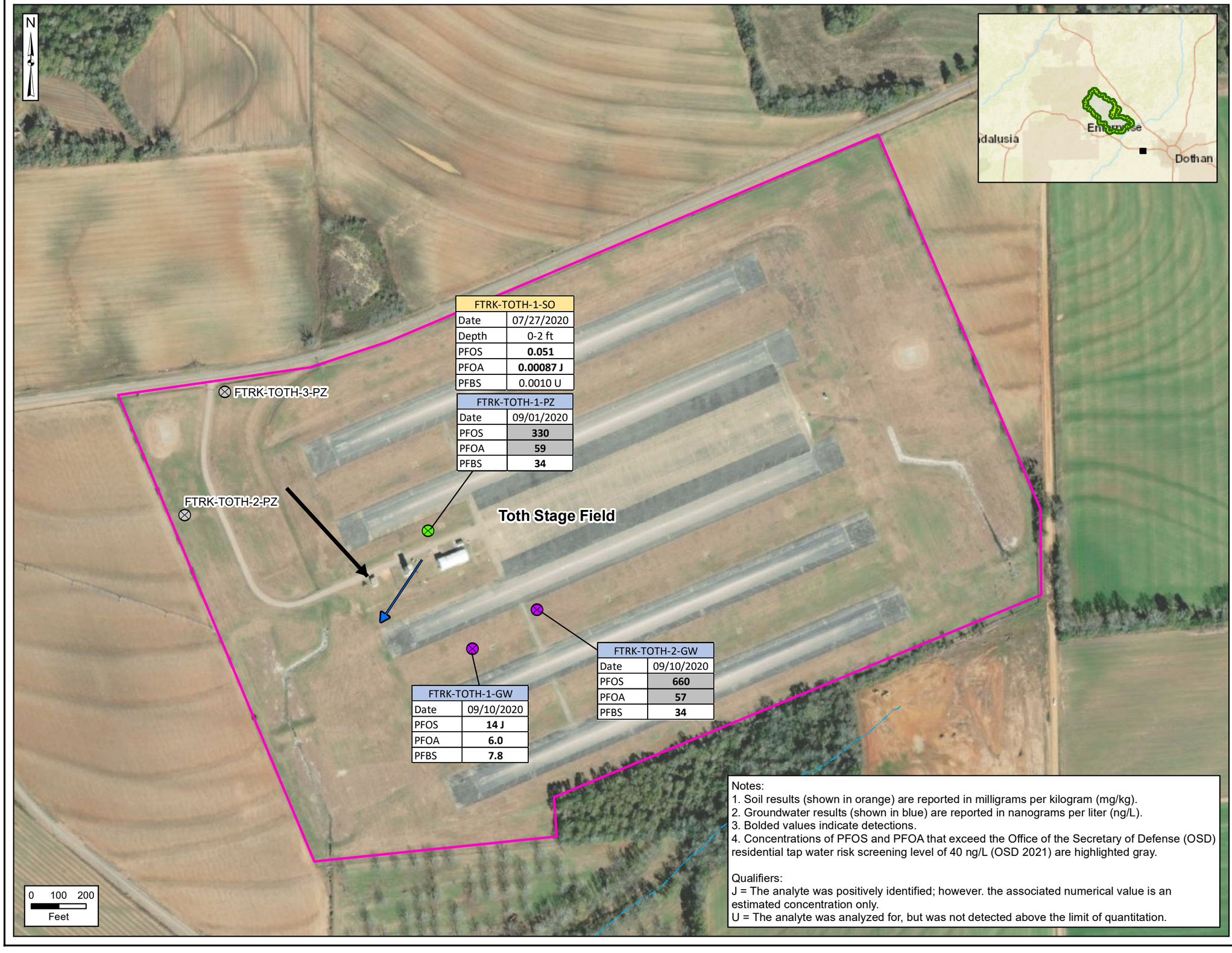
Figure 7-28 Toth Stage Field PFOS, PFOA, and PFBS Analytical Results



Legend

- AOPI / Army Property Boundary
- Main Post
- Stream (Intermittent)
- Surface Runoff Flow Direction
- Groundwater Flow Direction
- Soil/Groundwater Sampling Location (Piezometer)
- Groundwater Sampling Location (DPT)
- Installed Piezometer - Not Sampled

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Notes:
1. Soil results (shown in orange) are reported in milligrams per kilogram (mg/kg).
2. Groundwater results (shown in blue) are reported in nanograms per liter (ng/L).
3. Bolded values indicate detections.
4. 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.

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

Coordinate System:
WGS 1984, UTM Zone 16 North

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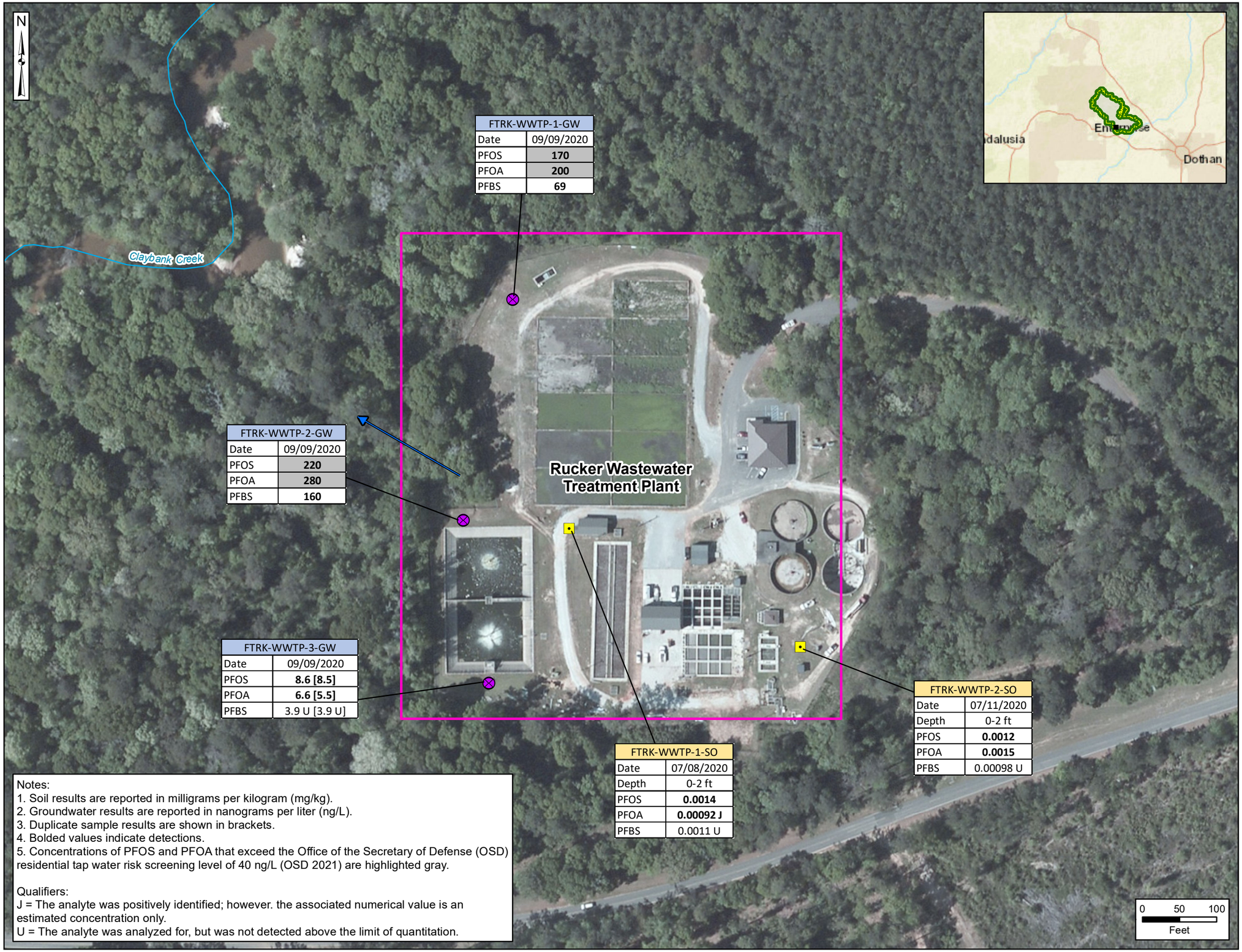
Figure 7-29 Rucker Wastewater Treatment Plant PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Groundwater results are reported in nanograms per liter (ng/L).
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
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.

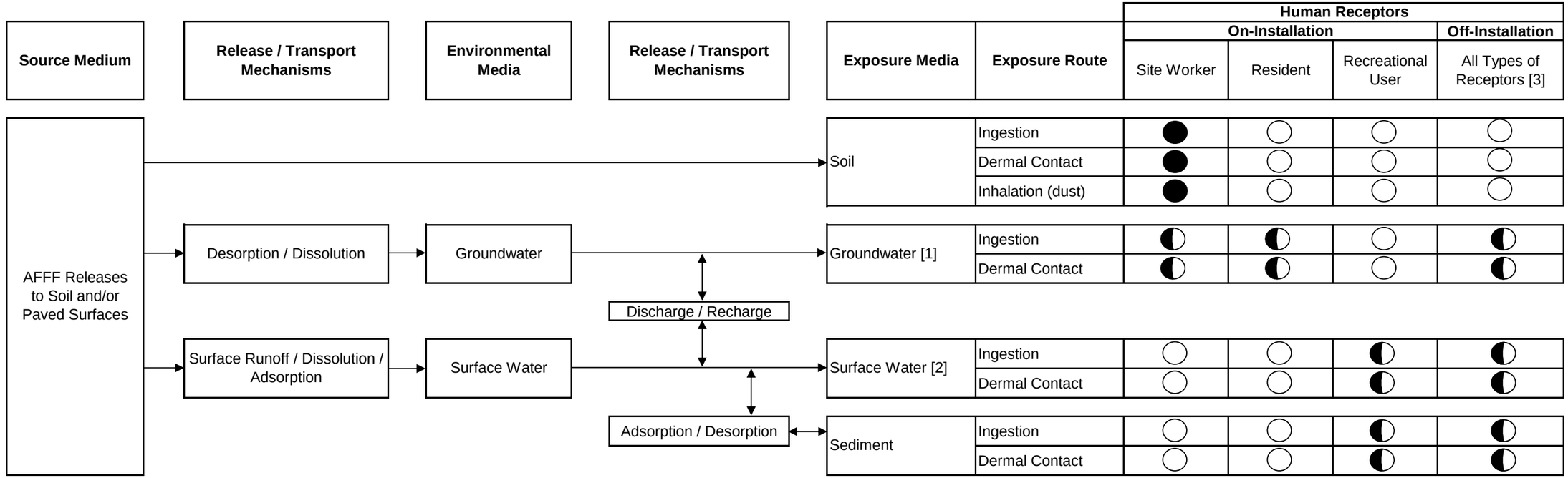
Legend

- AOPI
- Main Post
- Stream/Creek (Perennial)
- Surface Runoff Flow Direction
- Surface Soil Sampling Location
- Groundwater Sampling Location (DPT)

AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Coordinate System:
WGS 1984, UTM Zone 16 North



Legend:

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

Notes:
[1] The groundwater pathway for off-installation drinking water receptors is potentially complete for all AOPIs except Ech Stage Field, which is more than 5 miles from the installation boundary.
[2] Surface water and sediment exposure pathways for Site Workers and Recreational Users describe incidental ingestion and dermal contact during outdoor work activities and outdoor recreational activities.
[3] All types of off-installation human receptors include drinking water receptors and recreational users.

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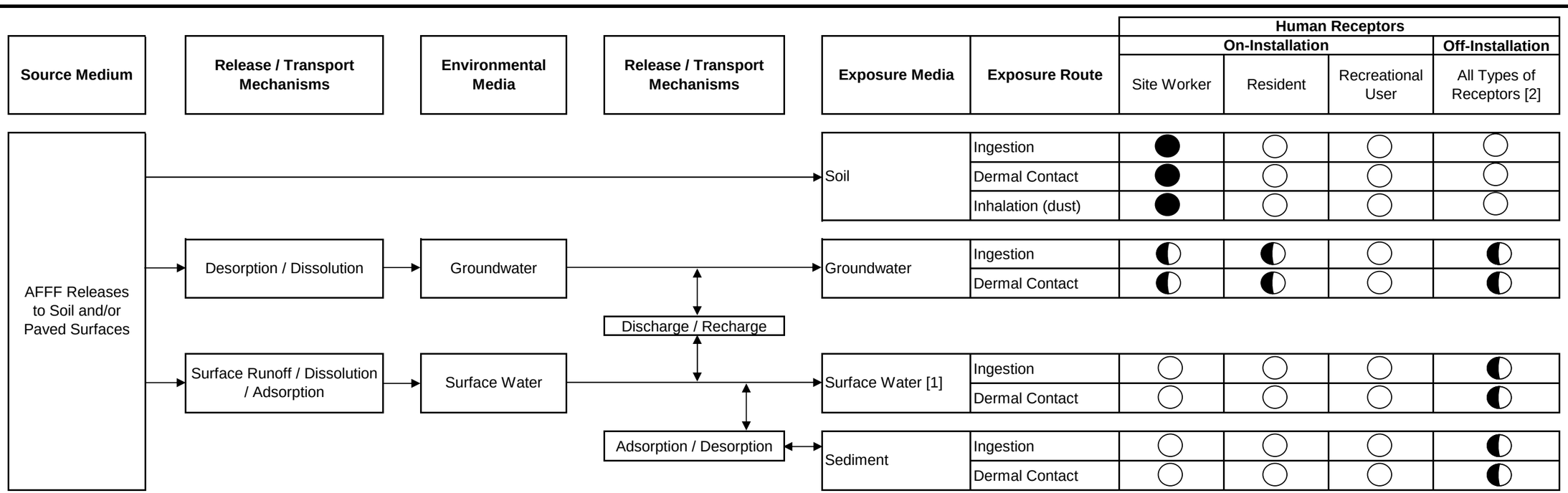
Conceptual Site Model - Ech Stage Field, Hooper Stage Field, Lowe Stage Field, Fire Training Area, Hanchey Army Heliport, Fire Truck Staging Area, Knox Army Heliport, Former Fire Training Area, Cairns Army Airfield, Rucker Fire Station, Molinelli Forward Area Refuling Point, and Hatch Stage Field

Figure 7-30



Legend:

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

Notes:
[1] Surface water and sediment exposure pathways for Site Workers and Recreational Users describe incidental ingestion and dermal contact during outdoor work activities and outdoor recreational activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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Conceptual Site Model - Goldberg Stage Field, Hunt Stage Field, Stinson Stage Field, Brown Stage Field, and Runkle Stage Field

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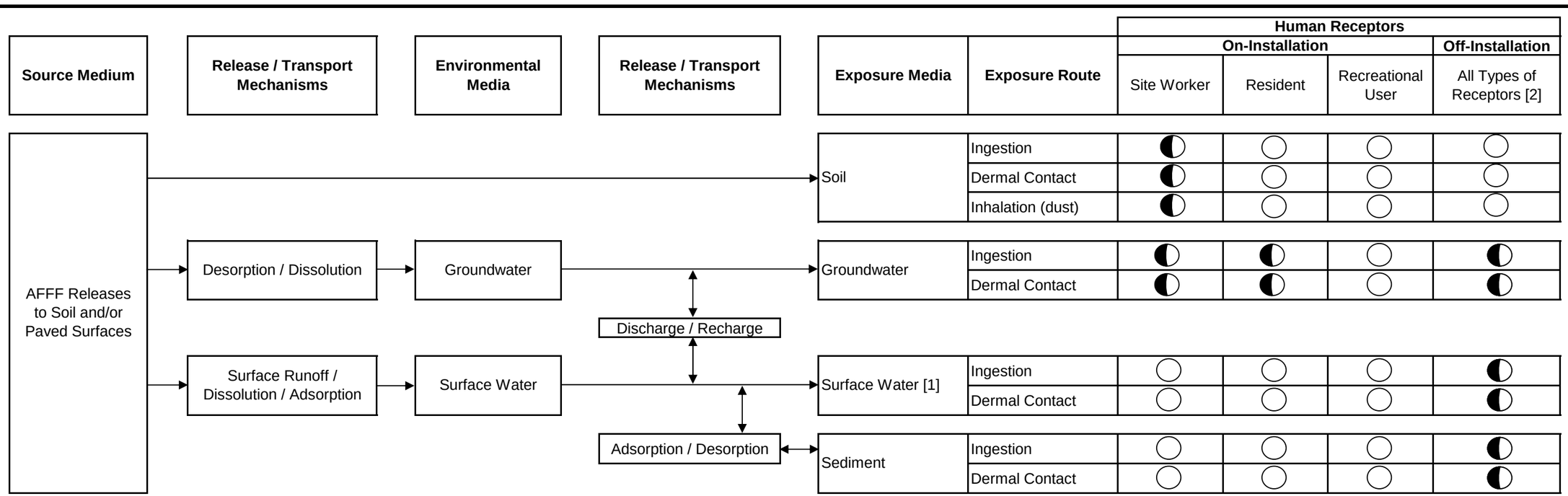
Figure 7-31



Legend:

- ● = Complete Exposure Pathway
- ◐ = Potentially Complete Exposure Pathway
- ○ = Incomplete Exposure Pathway

Notes:
[1] Surface water and sediment exposure pathways for Site Workers and Recreational Users describe incidental ingestion and dermal contact during outdoor work activities and outdoor recreational activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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Conceptual Site Model - Skelly Stage Field
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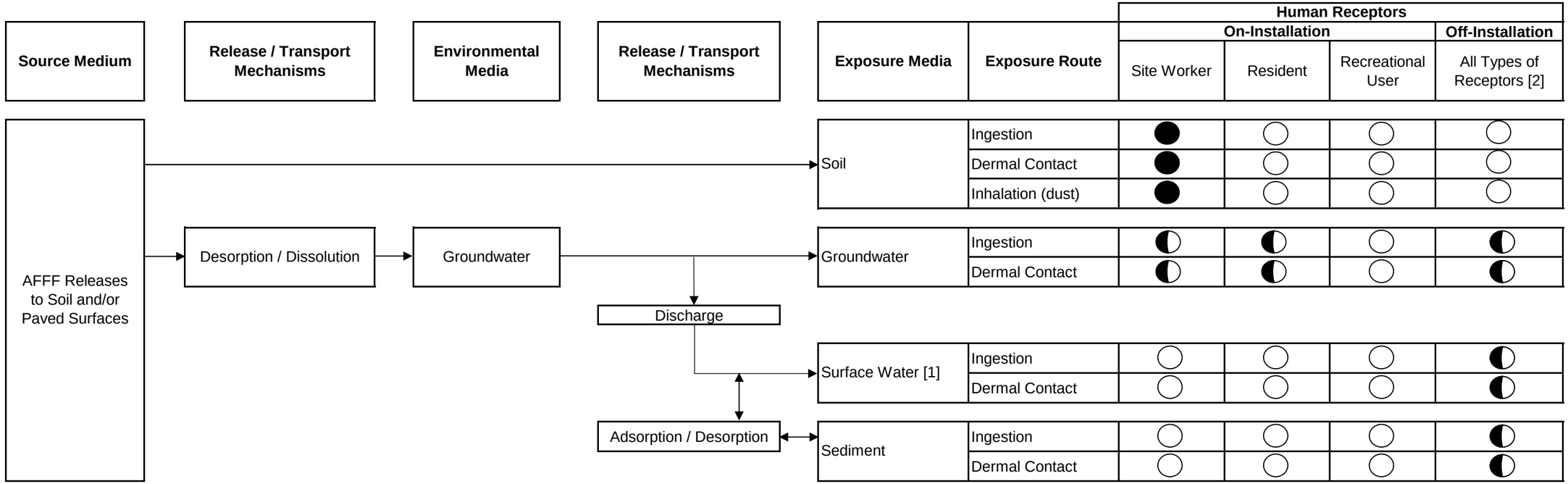
Figure 7-32



Legend:

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

Notes:
[1] Surface water and sediment exposure pathways for Site Workers and Recreational Users describe incidental ingestion and dermal contact during outdoor work activities and outdoor recreational activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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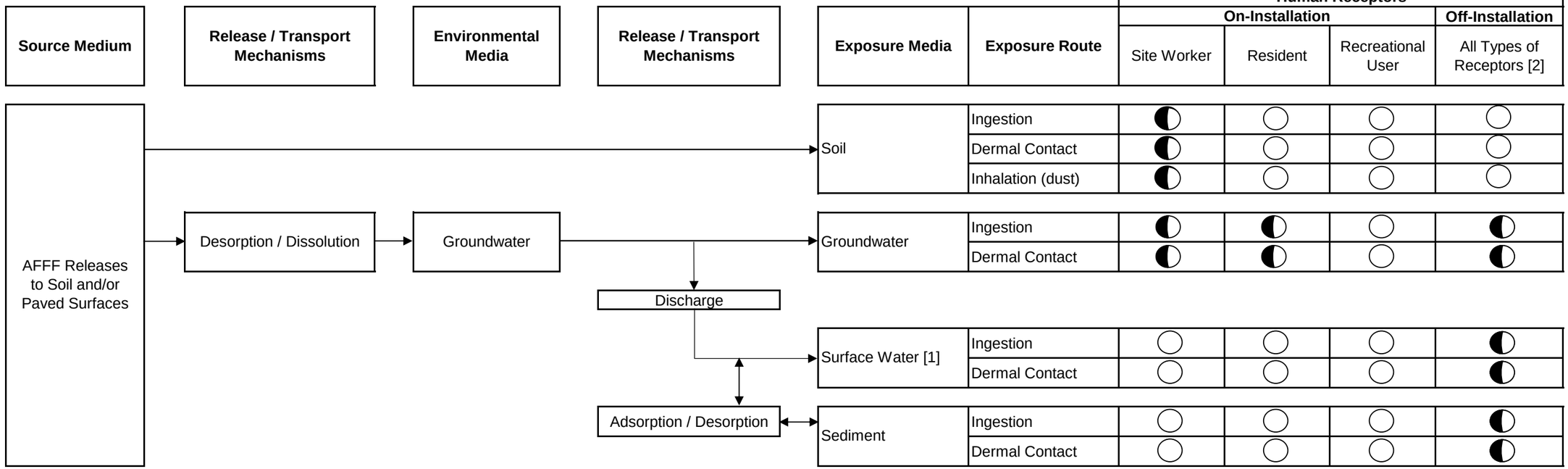
Conceptual Site Model - Shell Army Heliport, Tac X Stage Field, Lucas Stage Field, Highbluff Stage Field, Tabernacle Stage Field, Allen Stage Field, and Toth Stage Field

USAEC PFAS Preliminary Assessment / Site Inspection

Figure 7-33



Legend:

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

Notes:
[1] Surface water and sediment exposure pathways for Site Workers and Recreational Users describe incidental ingestion and dermal contact during outdoor work activities and outdoor recreational activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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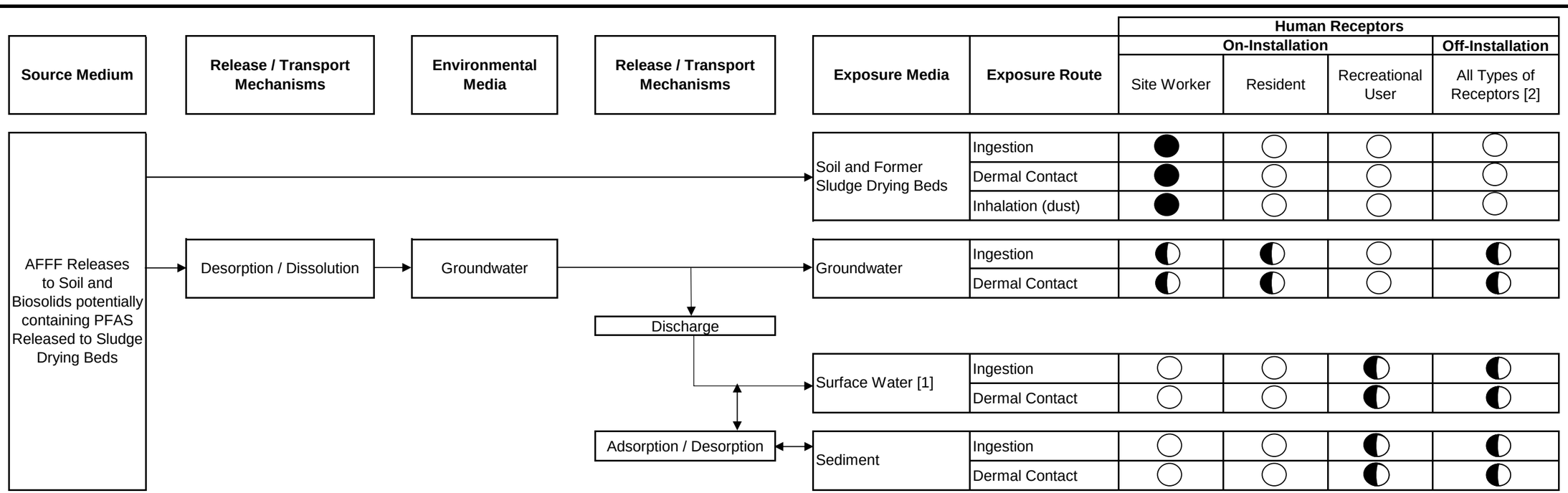
Conceptual Site Model - Louisville Stage Field
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Rucker, Alabama

Figure 7-34



Legend:

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

Notes:
[1] Surface water and sediment exposure pathways for Site Workers and Recreational Users describe incidental ingestion and dermal contact during outdoor work activities and outdoor recreational activities..
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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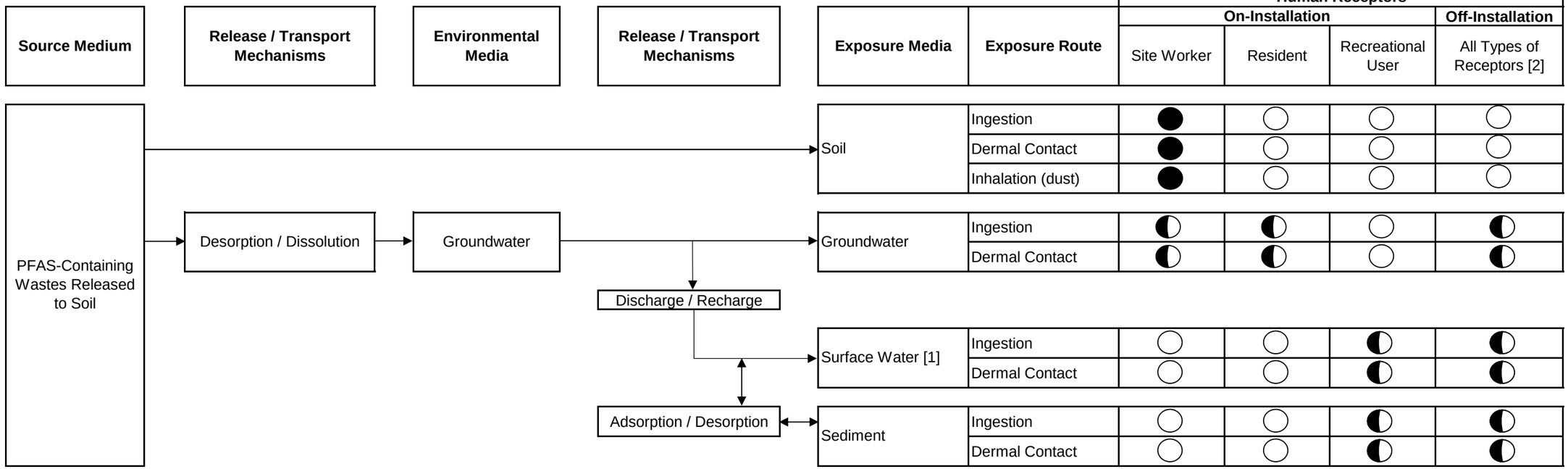
Conceptual Site Model - AOPIs Rucker Wastewater Treatment Plane and Cairns Wastewater Treatment Plant
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Rucker, Alabama

Figure 7-35



Legend:

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

Notes:
[1] Surface water and sediment exposure pathways for Site Workers and Recreational Users describe incidental ingestion and dermal contact during outdoor work activities and outdoor recreational activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

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Conceptual Site Model - Former Metal Plating Shop
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Rucker, Alabama

Figure 7-36

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