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

Fort Gordon, Georgia

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

The Fort Gordon Military Reservation is located approximately 9 miles southwest of the city of Augusta in east-central Georgia. The cantonment area occupies approximately 6,500 acres that includes living quarters and primary operation facilities. The training area occupies the remaining 49,500 acres of Fort Gordon and includes small-arms and artillery ranges.

The Fort Gordon PA identified eight AOPIs for investigation during the SI phase. SI sampling results from the eight 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, groundwater and/or sediment at all eight AOPIs; however, only five of the eight AOPIs had PFOS, PFOA, and/or PFBS present at concentrations greater than the risk-based screening levels. The Fort Gordon 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 or no action at this time at each AOPI.

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

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)			Recommendation
	Groundwater	Soil	Sediment	
Fire Station 2	No	No	NS	No action at this time
Former Fire Station	Yes	No	NS	Further study in a remedial investigation
Former Fire Training Area	Yes	NS	NS	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)			Recommendation
	Groundwater	Soil	Sediment	
Solid Waste Management Unit (SWMU) 009 (Building 955)	Yes	NS	NS	Further study in a remedial investigation
SWMU 020 (Building 961)/SMWU 031 (Building 984)	No	NS	NS	No action at this time
Soil Erosion Lake	No	NS	No	No action at this time
Fort Gordon (FTGD)-030 Wastewater Treatment Plan	Yes	No	NS	Further study in a remedial investigation
FTGD-029 Gibson Road Landfill	Yes	NS	NS	Further study in a remedial investigation

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

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 Gordon 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 Gordon 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 (and also used to evaluate groundwater or surface water used as drinking water sources) 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 Gordon, PA/SI development followed a similar process as described in **Sections 1.3.1** through **1.3.5** below. **Section 3** provides a summary of the PA activities completed, and **Section 6** provides a summary of the SI activities completed for Fort Gordon. The PA and SI processes are documented in the PA/SI Quality Control Checklist included as **Appendix B**.

1.3.1 Pre-Site Visit

First, an installation kickoff teleconference was held between applicable points of contact (POCs) from United States Army Environmental Command (USAEC), United States Army Corps of Engineers (USACE), Fort Gordon, and Arcadis U.S., Inc. (Arcadis). The kickoff call occurred on 04 March 2019 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 review is to identify any area on the installation that may have been a location where PFAS-containing materials were used, stored, and/or disposed, of as well as gather information on the physical setting and site history at Fort Gordon.

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, 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 01 April through 03 April 2019. 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 Gordon. The interviews focused on confirming information discussed in historical documents, collecting information that may have not been in historical documents, and 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. An exit briefing was conducted on 03 April 2019 with the installation, USAEC, and USACE to discuss preliminary findings of the PA site visit.

1.3.3 Post-Site Visit

Information collected before, during, and after the site visit was reviewed and corroborated by cross-referencing records and reviewing interview details and observations noted during site visit reconnaissance. A site visit trip report was completed and provided to the installation POC, applicable USAEC POCs, and USACE regional POCs following the site visit. The information collected during the pre-site visit and site visit activities was compiled to develop the installation-specific PA portion of the PA/SI report. 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/ scoping teleconference was held between the Army PA team and Fort Gordon.

The objectives of the SI kickoff/scoping teleconference were to:

- discuss the AOPIs selected for sampling and the proposed sampling plan for each AOPI
- gauge regulatory involvement requirements or preferences
- confirm the plan for investigation derived waste (IDW) handling and disposal
- identify specific installation access requirements
- discuss general SI deliverable and field work schedule information and logistics

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 Gordon (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 were completed. Once the schedule was determined, field teams mobilized to the installation to complete the scope of work defined in the QAPP Addendum.

1.3.5 Data Analysis, Validation, and Reporting

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

2 INSTALLATION OVERVIEW

The following subsections provide general information about Fort Gordon, 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 Gordon is located approximately 9 miles southwest of the City of Augusta in east-central Georgia. The installation occupies approximately 56,000 acres in Richmond, Jefferson, Columbia, and McDuffie counties, with the majority of the post located in Richmond County (**Figure 2-1**). Fort Gordon is divided into cantonment and training areas (**Figure 2-2**). The cantonment area occupies approximately 6,500 acres that include living quarters and primary operation facilities. The training area encompasses the remaining 49,500 acres of Fort Gordon and includes small arms and artillery ranges (PIKA-Arcadis JV 2018).

2.2 Mission and Brief Site History

On 2 December 1941 Fort Gordon was first activated as Camp Gordon and was used to train infantry and armor units, used as a disciplinary barracks, and as a prisoner of war camp during World War II. Following the war, Camp Gordon hosted a variety of operations (e.g., the Signal Corps Training Center, a criminal investigations laboratory, a rehabilitation center and a U.S. disciplinary barracks, the Basic Replacement Training Center and Advanced Leader's School). These facilities ceased operations in 1955 and in March 1956 Camp Gordon was re-designated Fort Gordon and became a permanent Army installation (Fort Gordon 2016).

Following the official designation as a permanent Army installation, Fort Gordon hosted a variety of operations (e.g., the U.S. Army Training Center [basic, infantry, and advanced individual training], combat operations, the Signal Corps Training Center, the Signal Training Brigade). The primary mission of Fort Gordon is to train military personnel in the installation, operation, and maintenance of communications and electronic equipment. Fort Gordon is an active U.S. Army facility under the jurisdiction of the IMCOM and is the location of the U.S. Army Cyber Center of Excellence (Fort Gordon 2016).

2.3 Current and Projected Land Use

Approximately 49,500 acres of Fort Gordon is used for training missions. The installation is subdivided into 49 training areas, two restricted impact areas (small arms and artillery), and two cantonment areas (main and industrial) (**Figure 2-2**). The cantonment areas include military housing, administrative offices, community facilities, medical facilities, industrial facilities, maintenance facilities, supply/storage facilities, lakes and ponds, recreational areas, and forested areas (Gulf South Research Corporation 2008).

The installation operates 14 live fire ranges, one dud impact area, one demolition pit, one indoor shoot house, one convoy live fire familiarization course, two military operations on urban terrain site/building clearings, and one nuclear, biological, and chemical chamber. Training primarily consists of advanced individual signal training and unit employment of tactical communications/electronics operations.

Additionally, artillery demolition, aerial gunnery load master drop zone, and airborne troop training are conducted on Fort Gordon (Gulf South Research Corporation 2008).

2.4 Climate

The climate at Fort Gordon consists of warm, humid summers and short mild winters. The average daily temperature for the month of January is 45 degrees Fahrenheit, and 80 degrees Fahrenheit for the month of July. Measurable snow is rare and remains on the ground only a short time when it does occur. Freezing of the ground is rare, and then to only 0.5 to 3 inches in depth, and normally not for more than 48 hours. Average annual rainfall is approximately 44 inches, and is fairly evenly distributed throughout the year, with July normally recording the greatest amount, usually in the form of heavy thunderstorms. Winds are predominantly from the southeast during the spring and summer months and westerly or northwesterly during the winter. Severe weather, such as tornadoes and hurricanes, most often occurs during the spring; however, hurricanes occurring in late summer to early fall can potentially affect the installation (Fort Gordon 2019).

2.5 Topography

The topography within Fort Gordon is generally classified as small, rolling hills with surface water and groundwater drainage areas formed around small ditches and intermittent creeks in the low areas between hills (**Figure 2-3**). Elevations generally range from 500 feet above mean sea level on the hilltops within the cantonment area to as low as 350 feet above mean sea level in the drainage divides within the valleys (United States Geological Survey 1980).

2.6 Geology

Fort Gordon is located on the northwestern edge of Georgia's Upper Coastal Plain Physiographic Province – directly southeast of the Eastern Piedmont Province. This area is characterized by a flat to gently undulating topography underlain by a sequence of unconsolidated Cretaceous through Tertiary-age continental shelf deposits that thicken to the south and southeast (LeGrande and Furcron 1956). The most important structural feature in the vicinity of Fort Gordon is the Belair Fault Zone, which trends northeast to southwest, and runs beneath the eastern portion of the cantonment area. The fault zone is a series of en echelon, reverse strike-slip faults (Arcadis 2011b).

The underlying basement complex is comprised of pre-Mesozoic metamorphosed sedimentary bedrock including gneisses, phyllites, slates, and schists (Gorday 1985). The basement rock is overlain by the Upper Cretaceous to Lower Tertiary-age Oconee Group. The Oconee Group is composed of the Upper Cretaceous-age Gaillard Formation and the Paleocene- to Eocene-age Huber Formation. The Oconee Group ranges in thickness from 100 feet near the Fall Line to 600 feet near an exposure at McBean Creek south of Fort Gordon. The Gaillard and Huber Formations have similar lithology and are generally composed of white and pink sands and gravels that are typically interbedded with sandy clays (Arcadis 2011a).

The Oconee Group is overlain by the Eocene-age Barnwell Group. The Barnwell Group consists of three formations, from top to bottom as follows: Tobacco Road Sand, Dry Branch, and Clinchfield. The Tobacco Road Sand is generally a medium-grained, very poorly sorted sand that contains discontinuous clay

lenses. The Dry Branch Formation consists of the Twiggs Clay (green to dark-gray silty clay), the Irwinton Sand (well-sorted, fine- to medium- grained quartz sand interspersed with silt), and the Griffins Landing members (calcareous sand with clay lenses). The various members of the Clinchfield Formation appear only locally in the Fort Gordon area, most notably the Utley Limestone and Albion members (Arcadis 2011a).

2.7 Hydrogeology

The primary sources of groundwater in the Richmond County area are two aquifers, both present within the Gaillard Formation: Basal Cretaceous and Upper Cretaceous Aquifers. In most locations, the Basal Cretaceous Aquifer is bounded on the bottom by saprolite that overlies basement rocks and is confined at the top by red sandy clay. The Upper Cretaceous aquifer is present throughout Fort Gordon. A unit characterized as purple and/or red clay, which generally marks the upper boundary of the Gaillard Formation, and/or a relatively thick kaolin bed were identified from Fort Gordon cantonment area monitoring well boring logs as the upper confining boundary of the Upper Cretaceous Aquifer. A few, minor, isolated perched groundwater zones within the Barnwell Group exist throughout Fort Gordon. The depth, thickness, and permeability of the upper confining boundary of the Upper Cretaceous Aquifer influence the formation of these perched zones (Arcadis 2011b).

Groundwater occurs under both unconfined and semi-confined conditions in the Fort Gordon area. A shallow unconfined aquifer exists at some locations under Fort Gordon. The water table of this aquifer is generally 10 to 25 feet below ground surface (bgs) and mimics the land surface topography. Shallow ground water discharge occurs where streams intersect the water table. Recharge to the shallow aquifer is from precipitation (U.S. Army Center for Health Promotion and Preventive Medicine 2008).

A deeper, locally confined to semi-confined regional Cretaceous aquifer system also exists in the Fort Gordon area. The Cretaceous aquifer system is a complexly interconnected group of aquifer subsystems developed in the Late Cretaceous sands of the Coastal Plain. It is about 50 to 200 feet bgs. Major water withdrawals from the Cretaceous aquifer system come from the Upper Cretaceous and Basal Cretaceous aquifers. The aquitards that separate the aquifers are leaky. Thus, some of the recharge to the deeper aquifers is from the aquifer above. Regional groundwater flow for the Cretaceous aquifers is southeast toward the Savannah River (U.S. Army Center for Health Promotion and Preventive Medicine 2008).

2.8 Surface Water Hydrology

Fort Gordon is drained by three major tributaries of the Savannah River: Butler, Spirit, and Briar Creeks (**Figures 2-2**). The major tributaries to these streams are the South Prong, Sandy Run Creek, and Boggy Gut Creek. The streams are perennial, with base flow provided by groundwater and springs. Butler and Spirit creeks originate outside the northern and western boundaries of the cantonment area, respectively, and discharge directly to the Savannah River, which is southeast of the installation. Briar Creek originates northwest of the installation and receives drainage from a large portion of the training areas via Headstall Creek and other tributaries. Boggy Gut and Sandy Run Creeks drain to Briar Creek south of Fort Gordon. The north-central and eastern portions of the cantonment area drain to Butler Creek. The western and southern areas drain to Spirit Creek and its tributaries, Marcum Branch and McCoys Creek. No natural lakes or ponds are present at Fort Gordon. All lakes result from impounding streams with earth dams, although some have concrete spillways (Arcadis 2011b).

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 Gordon.

2.9.1 Stormwater Management System Description

The Fort Gordon stormwater collection system is separate from the sanitary wastewater collection system. Stormwater at Fort Gordon is collected via a variety of infrastructure (e.g., manholes, pipes, ditches, swales, catch basins, ponds) and eventually is conveyed off-post via numerous Waters of the State (creeks and streams). Fort Gordon's stormwater discharges are authorized by the various National Pollutant Discharge Elimination System (NPDES) General Permits including Industrial, Municipal Separate Storm Sewer System, and Construction Stormwater.

2.9.2 Sewer System Description

The former wastewater treatment plant (WWTP; Fort Gordon [FTGD] -030) in the cantonment area was constructed in the 1940s and consisted of preliminary (bar screen, comminutor, and grit chamber), primary, and secondary (biological trickling filters) treatment, with gaseous chlorine disinfection. Effluent wastewater was discharged to Spirit Creek in accordance with a Georgia Department of Natural Resources NPDES permit. Sludge waste facilities included anaerobic digesters and fifty sludge drying beds. Sludges were disposed of at the Gibson Road (GR) Landfill and sporadically land applied at various undesignated locations in the 1980s. The WWTP received X-ray processing fluids from the new hospital on-post between 1975 and approximately 2000. The WWTP operations were ceased around 2007, when Fort Gordon connected to Augusta-Richmond County wastewater system for wastewater conveyance and treatment.

2.10 Potable Water Supply and Drinking Water Receptors

Fort Gordon has purchased potable water from the Augusta-Richmond County Water System since 2007, which supplies the majority of the cantonment area. Previously, potable water had been obtained from Butler Reservoir on-post. In remote areas that are not serviced by the Augusta-Richmond County Water System, potable water is supplied from six permitted and three non-permitted wells. Two of the permitted wells, Gordon Lakes Golf Course LT1 and Gordon Lakes Golf Course LT2, are located within the cantonment area of Fort Gordon. The remaining four permitted wells, Fort Gordon Range 14 well, two Range Control Complex wells, and the Fort Gordon Regimental Noncommissioned Officers Academy Tactical Training well, are all located in the training area portion of Fort Gordon (**Figure 2-2**). Additionally, there are three non-permitted drinking water wells located within the training area at Fort Gordon: Forestry 460 (Fish & Wildlife), Forestry 463, and Game Warden Office 526 (**Figure 2-2**).

An Environmental Data Resources, Inc. (EDR) report includes search results from a variety of environmental, state, city, and other publicly available databases for a referenced property. As identified from the EDR report for Fort Gordon, there are numerous off-post potable wells within a 5-mile radius of Fort Gordon (**Figure 2-4**). Groundwater at Fort Gordon generally flows off-post to the southeast towards multiple off-post potable wells. The EDR report well search results are provided as **Appendix E**. Surface

water at Fort Gordon also flows off-post towards the southeast towards the Savannah River and no potable-use surface water bodies are located downgradient of Fort Gordon within a 5-mile radius.

2.11 Ecological Receptors

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

Fort Gordon is inhabited by a wide variety of wildlife species. Approximately 136 species of birds have been identified on the installation. It is estimated that approximately 31 species of mammals and approximately 67 species of reptiles and amphibians inhabit Fort Gordon. These species are dispersed throughout the various habitats on the installation. Common mammal species found on the installation include, but are not limited to, gray fox, striped skunk, and coyote. Common bird species found on Fort Gordon include, but are not limited to, northern bobwhite quail, turkey vulture, pileated woodpecker, northern mockingbird, red-eyed vireo, tufted titmouse, and Carolina chickadee. Common reptile and amphibian species found include the eastern mud turtle, eastern box turtle, southern fence lizard, brown water snake, and eastern kingsnake. White-tailed deer, red fox, eastern gray squirrel, racoon, eastern cottontail rabbit, wood duck, eastern wild turkey, northern bobwhite quail, and mourning dove are actively managed for sport hunting on Fort Gordon. The Fort Gordon DPW stocks designated fishing lakes with channel catfish, largemouth bass, and redear sunfish. In addition to stocked species, there are approximately 56 species of fish are known to occur on Fort Gordon. Common fish species on the installation include, but are not limited to, yellow bullhead, flat bullhead, bowfin, carp, and gizzard shad (Fort Gordon 2019).

A total of 16 animals (five birds, two mammals, five reptiles and amphibians, and four fishes) and 11 plant species listed as either threatened, endangered, or species of concern by the U.S. Fish and Wildlife Services or the State of Georgia are known to occur on Fort Gordon (Gulf South Research Corporation 2008).

Approximately 4,395 acres of wetlands occur on Fort Gordon and consist of both alluvial and nonalluvial wetlands. Thirty reservoirs and ponds are maintained on Fort Gordon, for a total of approximately 436 acres. These reservoirs and ponds are considered deep water habitat for aquatic species. Of these 30 lakes, 27 are managed for recreational fishing (Gulf South Research Corporation 2008). Fort Gordon exhibits a large variety of native vegetation characteristic of both the Upper Coastal Plain and Lower Piedmont Plateau physiographic provinces. Nearly 78% of Fort Gordon is in forest cover. Forest types at Fort Gordon include pine forest, mixed pine/hardwood forest, bottomland hardwood forest, and upland hardwood forest (Fort Gordon 2019).

2.12 Previous PFAS Investigations

Previous (i.e., pre-PA) PFAS investigations relative to Fort Gordon, including both those conducted and not conducted by the Army, are summarized to provide full context of available PFAS data for Fort Gordon. However, only data collected by the Army will be used to make recommendations for further investigation. The USEPA conducted the third Unregulated Contaminant Monitoring Rule (UCMR3) related monitoring between 2013 and 2015. UCMR3 is a national program that collects data for

contaminants that are suspected to be present in drinking water and do not have health-based standards set under the Safe Drinking Water Act. The UCMR3 included the analysis of PFOS, PFOA, and PFBS in public water systems serving more than 10,000 people between 2013 and 2015. The majority of Fort Gordon obtains potable water from the Augusta-Richmond County Water System. The Augusta-Richmond County Water System was sampled during the UCMR3 and results indicated that PFOS, PFOA, and PFBS were not detected in any of the facilities sampled: Augusta-Richmond County Plant, Max Hicks Filter Plant, Peachtree Orchard Plant. The detection limit at the time of UCMR3 sampling was 40 ng/L for PFOS, 20 ng/L for PFOA, and 90 ng/L for PFBS, all equal to or less than the respective OSD tap water risk screening levels (**Appendix A**). Of those public water systems sampled during UCMR3 and within a 5-mile radius of Fort Gordon, none had detections of PFOS, PFOA, or PFBS.

In response to IMCOM Operations Order 16-088, issued in 2016, Fort Gordon sampled their drinking water supply for PFAS, including PFOS, PFOA, and PFBS, from six different water systems in February 2017. One of the water systems, referred to as “Fort Gordon Lakes Golf Course 539 Water System” in the 2017 sampling report, was sampled again in January, May, September, and November 2018. Fort Gordon personnel clarified that the samples from “Fort Gordon Lakes Golf Course 539 Water System” were actually obtained from a nearby building at the golf club that is supplied by the Augusta-Richmond County Water Supply, not the Gordon Lakes Golf Course water supply wells. Four of the six water systems sampled did not have detections of PFOS, PFOA, or PFBS (**Table 2-1**). These systems were Gordon Lakes Golf Course LT2 (referred to as Fort Gordon Lakes Golf Course 540 Water System in the 2017 sampling report), Fort Gordon Natural Resources Water System, Fort Gordon Ranges 14 Water System, and Fort Gordon Range Control Water System. The Gordon Lakes Golf Course (collected from water supplied by the Augusta-Richmond County Water Supply) and Fort Gordon Point Water System samples had detections of PFOS and/or PFOA, but below the OSD risk screening levels (**Table 2-1**). In June 2020, Fort Gordon collected PFAS samples from all 10 of their drinking water systems. Two of the 10 water systems, Fort Gordon Forestry 463 and Fort Gordon Point Water, had detections of PFOS and/or PFOA in the water, but below the OSD risk screening levels (**Table 2-1**).

During the PA site visit, Fort Gordon personnel clarified that the Fort Gordon Pointes West Water System is supplied by the Columbia County Water System, not from a potable source located on Fort Gordon property. Fort Gordon leases the Fort Gordon Recreation Area and a portion of J. Strom Thurmond Lake for camping and general training purposes, which is located approximately 28 miles from the main Fort Gordon post. The PA team did not find information to indicate that the Columbia County Water Supply is influenced by Fort Gordon operations. The Columbia County water supply obtains potable water from the Savannah River and the Clarks Hill Reservoir.

3 SUMMARY OF PA ACTIVITIES

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

- Records review
- Personnel interviews
- Site reconnaissance.

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

3.1 Records Review

The records reviewed for this PA included, but were not limited to, various Installation Restoration Program (IRP) administrative record documents, compliance documents, Fort Gordon fire department documents, Fort Gordon directorate of public works documents, and GIS files. Internet searches were also conducted to identify publicly available and other relevant information. A list of the specific documents reviewed for Fort Gordon 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 Gordon (affiliation is with Fort Gordon unless otherwise noted) is presented below.

- IRP Support Contractor
- IRP Manager
- Environmental Chief
- National Environmental Policy Act Coordinator
- Natural Resources Personnel
- Current Fire Chief
- Current Assistant Fire Chiefs (multiple)
- Environmental Support Manager for Fort Gordon (USAEC)

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

3.3 Site Reconnaissance

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

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.

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

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

Fort Gordon 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.

At Fort Gordon, AFFF is currently stored in relation to the Fort Gordon Fire Department emergency preparedness (i.e., no current AFFF equipment testing/personnel training, no AFFF suppression systems or AFFF fire responses documented at Fort Gordon). During initial documents review, the PA team reviewed Army provided records regarding AFFF storage but did not find AFFF storage results for Fort Gordon.

During the PA site visit, members of the Fort Gordon Fire Department were interviewed, obtaining data back to 1998. The Fort Gordon Fire Department stated currently, 495 gallons of AR-AFFF is stored in 250-gallon totes on a portable trailer inside of Fire Station 2 (FS2). In 2016, the Fort Gordon Fire Department purchased the AR-AFFF in case of an emergency at the newly constructed fuel farm on-post but has not used or dispensed the AR-AFFF since the purchase. A safety data sheet was collected for the 3% Chemguard AR-AFFF concentrate currently stored at Fort Gordon (**Appendix J**). The Fort Gordon Fire Department noted FS2 is the only area of AR-AFFF storage and there has been no AFFF storage since they have been present (1998). Retired members of the Fort Gordon Fire Department were not available for interviews, therefore AFFF use and storage at Fort Gordon prior to 1998 is unknown.

Fire Station 1 was built in 2002. Therefore, the PA team was able to confirm there has been no AFFF storage or use at Fire Station 1 from interviews conducted with the Fort Gordon Fire Department. The Former Fire Station (FFS) was demolished in 2003 or 2004 but was historically used by the Fort Gordon Fire Department. The exact time period of use is unknown, however historical aerials show the FFS present in 1993. Therefore, AFFF use and storage at the FFS prior to 1998 is unknown.

Fort Gordon Natural Resources personnel were interviewed regarding AFFF use or storage related to prescribed burning activities. Fort Gordon Natural Resources members, who have been present at Fort Gordon since 1974, indicated that the Fort Gordon Natural Resources group has only utilized Class A foams for suppression of wildfires and controlled burns. Class A foams are currently stored on brush trucks and slip-on pumpers for trucks. There has not been any AFFF use or storage related to the Fort Gordon Natural Resources operations at Fort Gordon.

Currently, there are two active fire stations (Fire Station 1 and FS2) and one historical fire station (FFS) at Fort Gordon. As mentioned in **Section 4.1**, Fire Station 1 was built in 2002 and is the newest fire station at Fort Gordon. Fort Gordon Fire Department staff were interviewed, whose presence dates back to 1998. The Fort Gordon Fire Department members stated Fire Station 1 has not stored any AFFF or AFFF-containing trucks since its construction. FS2 was built between 1993 and 2000 but was not used as a fire station until 2001 or 2002. FS2 is the only documented place of current and historical AR-AFFF storage at Fort Gordon. The AR-AFFF is stored within two, 250-gallon totes on a trailer, not within any fire truck tanks. As described in **Section 4.1**, there are data gaps regarding AFFF use and/or storage (e.g., within fire truck tanks, AFFF filling of trucks, AFFF equipment testing or personnel training) at the FFS.

A current fire training area was identified during document research and the Fort Gordon Fire Department identified the Former Fire Training Area (FFTA) during the site visit interviews. Interviews with the Fort Gordon Fire Department noted the FFTA had been used until 2002. The exact start date of use is unknown, however structures within the area are present in the 1993 historical aerial. The Fort Gordon Fire Department members stated the FFTA was seldomly used and AFFF was not used there. According to site personnel interviewed, Class A foam was used at least once here, which made the training area non-operational since it was not designed for burn training. Only water was used during pump testing for the remainder of the operation. However, the PA team was unable to collect information regarding potential AFFF use at the FFTA prior to 1998. The current fire training area has been present since the mid-2000s and is used by the Fort Gordon Fire Department for training with Class A foam, hazmat training, and confined space training. The Fort Gordon Fire Department stated only water and occasionally Class A foams are used here during fire department training operations.

Following document research and interviews with the Fort Gordon Fire Department, the PA team could not identify any AFFF fire response events at Fort Gordon. The Fort Gordon Fire Department stated all fire responses since 1998 have been with water and there have not been any events when off-post departments have responded on-post with AFFF. However, there is a data gap regarding AFFF fire responses at Fort Gordon prior to 1998.

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

Following document research, personnel interviews, and site reconnaissance at Fort Gordon, metal plating operations, photo processing operations, wastewater treatment plants, landfills, pesticide storage areas, car washes, plastics shops, and laundry areas 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**, discussion regarding areas retained as AOPIs is presented in **Section 5.2**.

Solid Waste Management Unit (SWMU) 009 (Building 955) is the only area identified as a historical chromium plating operation at Fort Gordon. Operations at Building 955 started in 1958; however, it is unknown when use of the sump and leach field started. Activities performed at Building 955 included small arms repairs (including solvent degreasing), parkerizing, and electroplating. Electroplating operations included chromium plating with chromic acid, and parkerizing using zinc or manganese phosphates (Advanced Sciences, Inc. 1992). Rinse water from these operations was discharged to a drain connected to a concrete block sump, which discharged to the clay tile leach field. Since electroplating operations included plating using chromic acid and there were plating baths used in building operations, it is possible that PFAS-containing mist suppressants were used. However, the PA team could not find documentation or interview personnel familiar with building operations to confirm the use of PFAS-mist suppressants. The repair of small arms at Building 955 was discontinued in the 1971. Building 955 was demolished in 1998, and in 2005, the sump, sediments, and approximately 50 cubic yards of soil were excavated from the area.

The following areas were identified related to photo-processing facilities and associated wastes: SWMU 020 (Building 961)/SWMU 031 (Building 984), Soil Erosion Lake (SEL), FTGD-030 WWTP, and FTGD-029 GR Landfill. Historical photo processing operations from SWMU 020 (Building 961)/SWMU 031 (Building 984) and the former/current hospital X-rays could have potentially utilized PFAS-containing materials. X-ray wastes from the former hospital were discharged to SEL until 1975, which had historically been dredged to recover silver from X-ray wastes. Following 1975, X-ray wastes from the current hospital were diverted to the FTGD-030 WWTP. Following treatment, sludges were held in sludge drying beds at FTGD-030 WWTP to dry and were landfilled at the FTGD-029 GR Landfill or sporadically land applied at various undesignated locations.

Pesticides were mixed and stored in multiple areas at Fort Gordon, including Building 2030 (FTGD-035). Safety data sheets for the pesticides used on-installation between 2011 and 2018 were reviewed and did not include PFAS-containing materials. Additionally, it was noted during a discussion with a USAEC Pest Management Consultant that the majority of pesticides generally do not contain PFAS-containing materials. Pesticides containing Sulfluramid (i.e., associated with insecticides) that may have contained PFAS-containing chemicals were phased out in 1996. The USAEC Pest Management Consultant has records of pesticides used and stored at IMCOM installations, including Fort Gordon, and did not identify Fort Gordon as an installation having used or stored PFAS-containing pesticides/insecticides.

A current and former car wash and a current and former plastics shop were identified at Fort Gordon. The PA team reviewed safety data sheets for chemicals stored at each of the current facilities and did not identify PFAS-containing materials. Lastly, a laundry facility was identified at Fort Gordon. However, activities at the laundry facility do not include waterproofing/application of chemicals to laundered materials.

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 Gordon) 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 Gordon Fire Department did not identify any known off-post AFFF fire responses within a 5-mile radius of Fort Gordon. However, four of the Augusta Fire Department Stations and the Augusta Fire

Department Headquarters are within 5 miles of Fort Gordon, but the current and historical AFFF use by the Augusta Fire Department is unknown.

5 SUMMARY OF AREAS RESEARCHED AND AOPIs

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

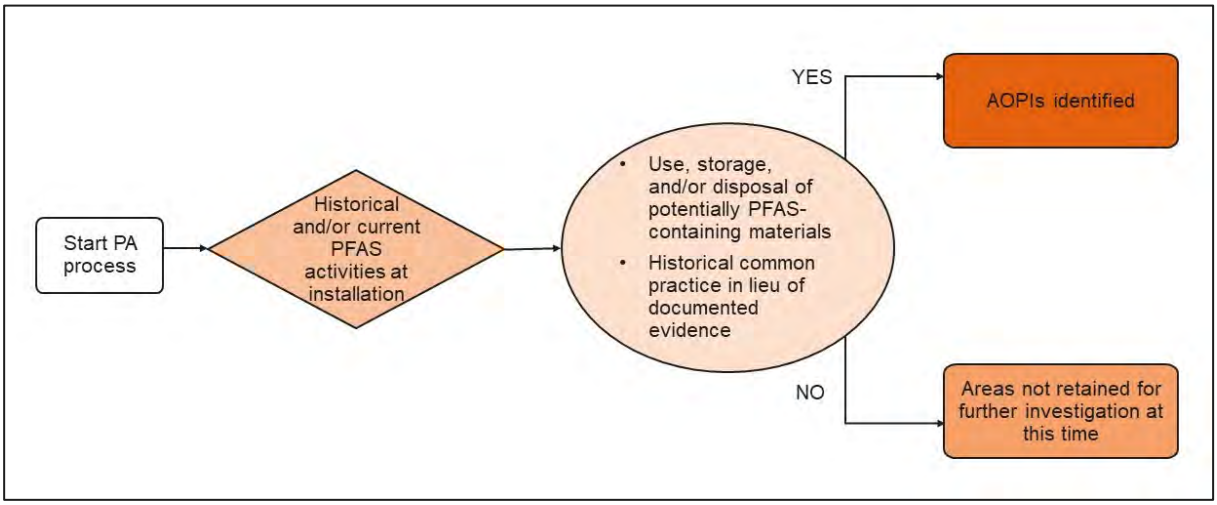

Figure 5-1: AOPI Decision Flowchart

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 Gordon are presented in **Section 8**.

5.1 Areas Not Retained for Further Investigation

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

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

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

Area Description	Dates of Operation	Relevant Site History	Reason Eliminated
Gordon Lakes Golf Course 539 Water System	Unknown to present	IMCOM sampling results listed the Gordon Lakes Golf Course 539 Water System as a repeated PFAS sampling location, with detections of PFOS and PFOA below the OSD risk screening levels.	Additional information was provided following the PA site visit that indicted that PFAS detections in samples associated with the Gordon Lakes Golf Course 539 Water System were actually sourced from water supplied by the Augusta-Richmond County Water System, not Fort Gordon.
Biosolid Application Areas	1980s	For a short period in the 1980s, (exact dates unknown), biosolids from the FTGD-030 WWTP were land-applied in multiple on-installation locations. The exact application locations/extents and frequency are unknown. Fort Gordon personnel marked-up a figure during the PA site visit showing potential locations and historical aerials were reviewed to evaluate extents.	Unconfirmed locations, extents, frequency, and duration of biosolid application areas. No confirmed use, storage, and disposal of PFAS-containing materials.
Fire Engine Maintenance Facility	Unknown to present	Building 14602. Fire engines are maintained at this location. No known AFFF storage on or within the current fire engines at Fort Gordon.	No PFAS-containing materials were identified for use, storage, and/or disposal at this location.
Current Fire Training Area	Approximately 2002 to present	No current or historical AFFF training in this area (historical knowledge goes back to 1998). Area includes a building that is used for training with Class A foam only.	No documented use, storage, and/or disposal of AFFF at this fire training area. Only Class A foam use here (i.e., non-PFAS-containing material).
Fire Station 1	2002 to present	No current or historical AFFF or fire engine storage in this station (knowledge back to 1998). Floor drains within the interior of Fire Station 1 discharge directly (i.e., no oil water separator) to Augusta-Richmond County wastewater system.	No AFFF or fire engine storage at this fire station, therefore no suspected use, storage, or disposal of PFAS-containing materials. The PA team was able to confirm this for the entire timeline of this fire station.
Former Car Wash and MWR Car Wash	Former Car Wash: unknown to approximately 2000 MWR Car Wash: approximately 2000 to present	The former car wash only utilized soap and water. The MWR car wash utilized several products with proprietary items noted in the safety data sheets. Drainage is directed to an oil water separator through the floor drain, then eventually discharged to either FTGD-030 WWTP (until closure in 2007) or off-post to	No confirmed use of PFAS-containing materials in either car washing operation.

Area Description	Dates of Operation	Relevant Site History	Reason Eliminated
		the Augusta-Richmond County wastewater system.	
Fort Gordon Pointes West Water System	14 February 2017	Water is supplied to this area by Columbia County. In 2017 samples were collected from a potable water spigot and results indicated PFOS/PFOA detections of 2.9 / 3.9 ng/L. Fort Gordon leases the Fort Gordon Recreation Area and a portion of J. Strom Thurmond Lake for camping and general training purposes; current permit term from 2013 to 2023 and previous permit term from 2001 to 2013. Information collected as part of the PA did not indicate that the county's water supplies are influenced by operations related to Fort Gordon. Columbia County obtains water from the Savannah River and the Clarks Hill Reservoir. This water system is located approximately 30 miles from the main post at Fort Gordon.	Columbia County supplies the water to this spigot. This area is leased by Fort Gordon and is only used for camping and general training purposes. The PA team did not find information to indicate that operations at Fort Gordon have an impact on the water supplies for Columbia County.
Pesticide Storage and Application Areas	Unknown to present	Pesticides were mixed and stored in multiple areas at Fort Gordon, including Building 2030 (FTGD-035). Safety data sheets for the pesticides used on-installation between 2011 and 2018 were provided – no PFAS-containing materials were listed in the pesticide safety data sheets.	No use of PFAS-containing pesticides between 2011 and 2018 and no suspected use of PFAS-containing pesticides prior to 2011.
Laundry Facility	Unknown to present	No current or historical waterproofing activities at the laundry facility.	No known use of PFAS-containing materials.
Hangar	Unknown to present	Hangar fire suppression systems have only contained water. Hangar used for communications van storage and electrical work pertaining to helicopters; however, no current/historical storage of helicopters.	No AFFF used in the fire suppression system.
Natural Resources Field Area	Approximately 1974 to present	The Natural Resources Group has utilized Class A foam for suppression of wildfires and controlled burns since approximately 1974. The natural resources field area includes two brush trucks (approximately 5 gallons and approximately 7 gallons of Class A foam) and two "slip-ons" (approximately 3 gallons Class A foam each). Brush trucks are maintained in the forestry building or the General Services Administration building;	Class A foam used (i.e., not PFAS-containing materials)

Area Description	Dates of Operation	Relevant Site History	Reason Eliminated
		foam was collected in buckets and reused as much as possible.	
Plastics Shop	Old: unknown to approximately 2006. New (Building 15303): approximately 2006 to present.	Building 15303 at the Training Support Center. Plastic resins (produced off-post) used to manufacture training aids; current operations similar to historical operations. No PFAS-containing materials listed in provided safety data sheet.	No known use of PFAS-containing materials.

5.2 AOPIs

Overviews for each AOPI identified during the PA process are presented in this section. Four of the AOPIs overlap with Fort Gordon IRP sites and/or Headquarters Army Environmental System (HQAES) sites. 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 Gordon IRP sites had historically been investigated for the presence of PFAS.

The areas retained as AOPIs are shown on **Figure 5-2**. Aerial photographs of each AOPI are presented on **Figures 5-3** through **5-15** and include active monitoring wells in the vicinity of each AOPI.

5.2.1 Fire Station 2 (CCSWMU015, 13055.1057)

The FS2 is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to documented AFFF storage. FS2 was built between 1993 and 2000 and was originally used for vehicle maintenance. In the early 2000s (2001 or 2002) it was converted to a fire house for the industrial portion of the base and is used to store fire trucks and 495 gallons of AR-AFFF. AR-AFFF is stored in 250-gallon totes on a portable trailer inside the station. The AR-AFFF was purchased in 2016 in preparation for potential emergency response associated with a newly constructed fuel farm; however, it has never been used. Floor drains inside the station discharge to an oil water separator that eventually discharges to the Augusta-Richmond County wastewater system.

The AOPI is located in the industrial cantonment area and is an active fire station (industrial use). Features of the building include four bays for fire truck and firefighting materials storage as well as office and living space for Fort Gordon Fire Department personnel. There is a large, paved area that wraps around the southern end of the building where fire department vehicles park on occasion. Grassy areas are to the north in between the FS2 building and additional parking areas as well as to the south along the edge of the pavement. There is also a storage building and additional parking at the southern end of the paved portion of the AOPI (**Figure 5-3**). There are 17 monitoring wells located in the vicinity of FS2 that were installed in relation to an underground storage tank oil spill (URS 2019). The AOPI is surrounded by Chamberlain Avenue to the south, a large, paved parking area to the east, additional parking and grassy areas to the north, and 13th Street to the west. Surface drainage from the pavement surrounding FS2 likely

flows to the south towards stormwater inlets and/or the grassy edge for infiltration. Groundwater at FS2 flows to the south-southeast.

FS2 overlaps with Compliance Restoration Site 15: Former Underground Storage Tank Site. The Compliance Restoration site identifier is CCSWMU015 and the HQAES number is 13055.1057. The Compliance Restoration site history includes underground storage tank diesel and gasoline spills in 1992, unrelated and prior to the FS2 operations in this area. The corrective action plan included soil excavation and monitoring to achieve site closure (Fort Gordon 2016).

5.2.2 Former Fire Station

The FFS is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to data limitations for entire operational history. Fort Gordon Fire Department personnel (who have been present at Fort Gordon since 1998) were interviewed. The FFS had been used as a fire station since at least 1993 (start date unknown, however historical aerial photographs showed the FFS in 1993) until the early 2000s. Therefore, the PA team was unable to collect information regarding AFFF use and/or storage (e.g., within fire truck tanks, AFFF filling of trucks, AFFF equipment testing or personnel training) at the FFS prior to 1998. There are no groundwater monitoring wells associated with the AOPI; however, groundwater is estimated to flow to the south based on wells at nearby sites.

The FFS was a historical wooden structure fire station located in the industrial cantonment portion of Fort Gordon on the corner of 13th Street and 11th Avenue. The building was demolished in 2003 or 2004 and the area currently consists of overgrown vegetation (**Figure 5-4**). The AOPI is surrounded by wooded vegetation to the north and east, and roadways to the west and south. There is no defined current use of the AOPI.

5.2.3 Former Fire Training Area

The FFTA is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to data limitations for entire operational history (in relation to AFFF use). FFTA was used for firefighting training exercises until approximately 2002. According to site personnel interviewed, the FFTA was used for burn training with Class A foam at least once which made the training area non-operational since it was not designed for burn training. Since then, FFTA was only used for pump testing with water. The FFTA was abandoned upon construction of a new fire training area and is now a concrete operations facility. Data gaps exist relative to historical operations involving AFFF use, location of the former burn pits, and fire department training and equipment testing activities prior to 1998. There are no groundwater monitoring wells associated with the AOPI; however, groundwater is estimated to flow to the southwest based on wells at a nearby site.

The AOPI is located within the industrial cantonment portion of Fort Gordon and is currently used for concrete operations (industrial use). The AOPI is surrounded by wooded areas to the west, paved parking areas to the north, and roadways to the east and south (**Figure 5-5**).

5.2.4 SWMU 009 (Building 955) (FTGD-009, 13055.1010)

SWMU 009 (Building 955) is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to the possibility for use of PFAS-mist suppressants related to historical electroplating

operations involving chromic acid. Operations at Building 955 started in 1958; however, it is unknown when use of the sump and leach field started. Activities performed at Building 955 included small arms repairs (including solvent degreasing), parkerizing, and electroplating. Electroplating operations included chromium plating with chromic acid, and parkerizing using zinc or manganese phosphates (Advances Sciences, Inc. 1992). Rinse water from these operations was discharged to a drain connected to a concrete block sump, which discharged to the clay tile leach field. Electroplating operations included plating using chromic acid and possibly PFAS-containing mist suppressants. The repair of small arms at Building 955 was discontinued in 1971. Building 955 was demolished in 1998, and in 2005, the sump, sediments, and approximately 50 cubic yards of soil were excavated from the area. The aquifer beneath and downgradient of SWMU 009 has been classified and historically investigated in terms of three general zones: shallow, intermediate, and deep. Additionally, a few, minor, isolated perched groundwater zones exist throughout Fort Gordon. Groundwater from this AOPI flows to the west/southwest and discharges to an unnamed stream. SWMU 009 currently has a granular activated carbon treatment system that treats groundwater collected in extraction wells (no pumping due to artesian head conditions) prior to the unnamed stream in relation to trichloroethene impacts at the site from electroplating activities. There is a network of monitoring wells related to previous investigations at SWMU 009 (**Figure 5-6**). Data limitations exist relative to whether PFAS-containing mist suppressants were used during the historical operations and the quantity of wastewater generated.

The AOPI is located within the industrial cantonment portion of Fort Gordon and is currently an active IRP site (industrial use). The AOPI is surrounded by 10th Street to the east, 9th Street to the west, and other former industrial operations to the north and south (**Figure 5-6**). Shallow groundwater at the AOPI flows to the west, while intermediate groundwater flows to the southwest towards a nearby stream.

The IRP site identifier is FTGD-009, and the HQAES number is 13055.1010. The site has a groundwater capture and treatment system that is part of its Corrective Action Plan, and the site is currently in the corrective measures implementation operation phase (Fort Gordon 2016).

5.2.5 SWMU 020 (Building 961) (FTGD-020, 13055.1018)/SWMU 031 (Building 984) (FTGD-031, 13055.1032)

The SWMU 020 (Building 961)/SWMU 031 (Building 984) area is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to the possibility for use of PFAS-containing chemicals related to historical photographic operations. Photography operations occurred in two former buildings which were later designated as SWMU 020 (Building 961) and SWMU 031 (Building 984). Photo-processing wastewater from Building 984 was discharged to floor drains that discharged to the soil directly below the building. In 2003, Building 984 was demolished and the wastewater sump and underlying soils were excavated to approximately 7.5 ft bgs; approximately 53 tons were excavated and disposed. Confirmatory soil samples collected from the excavation confirmed that photo-processing constituents previously detected in the wastewater sump were not present in the remaining subsurface soils at concentrations above screening levels. Photo-processing water from Building 961 was discharged to a neutralization tank that was tied to a leach field via subsurface piping. The leach field consisted of a 4-inch diameter clay drain tile buried approximately 2 feet bgs and extended approximately 100 feet parallel to the western wall of Building 961 in a narrow grass area. In 2014 or 2015, Building 961 was demolished and based on historical investigations, there were no impacts to soils in the vicinity of the

leach field associated with photography operations. Therefore, the likelihood of potential PFAS impacts to the soil at this AOPI from photo-processing water is considered low. Data limitations include historical operations and material used in photography processing fluids.

The AOPI is located within the industrial cantonment portion of Fort Gordon (industrial use). The AOPI is surrounded by former industrial operations and is bounded by 10th Street to the east, 9th Street to the west, and Barnes Avenue is located between the two former buildings. There are no groundwater monitoring wells associated with the AOPI; however, shallow groundwater at the AOPI flows to the southwest based on wells at a nearby site (**Figure 5-7**).

The IRP site identifier for SWMU 020 is FTGD-020, and the HQAES number is 13055.1018. The site received no further action from the Georgia Environmental Protection Division in November 2004. The IRP site identifier for SWMU 031 is FTGD-031, and the HQAES number is 13055.1032. The site received no further action from Georgia Environmental Protection Division in October 2004 (Fort Gordon 2016).

5.2.6 Soil Erosion Lake

SEL is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to the release of potentially PFAS-containing chemicals related to historical X-ray operations at this AOPI. SEL received X-ray processing fluids from the former hospital between the 1940s and 1975. According to Fort Gordon personnel, SEL had historically been dredged to recover silver related to X-ray processing fluids and drained twice. The former hospital was closed, and the new hospital disposed of X-ray processing fluid to the FTGD-030 WWTP. Data limitations at SEL include the material composition used in X-ray processing fluid prior to the early 2000s and the quantity of fluid discharged.

The AOPI is located to the east of the cantonment area at Fort Gordon. The AOPI is surrounded by wooded vegetation to the north, east, and west, and residential properties to the south (**Figure 5-8**). The depth of the lake is estimated to be 20 feet deep, and a dam is located on the eastern side controlling flow of surface water to Boardman's Pond downstream. There are no groundwater monitoring wells associated with the AOPI; however, groundwater is estimated to flow to the east based on a review of topography maps.

5.2.7 FTGD-030 WWTP (FTGD-030, 13055.1031)

The FTGD-030 WWTP is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to the release of potentially PFAS-containing chemicals related to historical X-ray operations at the new hospital. FTGD-030 WWTP was constructed in the 1940s and operated until 2007, when Fort Gordon connected to Augusta-Richmond County wastewater system for wastewater conveyance and treatment. The FTGD-030 WWTP consisted of preliminary (bar screen, comminutor, and grit chamber), primary, and secondary (biological trickling filters) treatment, with gaseous chlorine disinfection. Effluent wastewater was discharged to Spirit Creek in accordance with a Georgia Department of Natural Resources NPDES permit. Sludge waste facilities included anaerobic digesters and 50 sludge drying beds. Sludge was landfilled at the FTGD-029 GR Landfill and sporadically land applied at various undesignated locations in the 1980s. The WWTP received X-ray processing fluids from the new hospital on-post between 1975 and the early 2000s when digital X-ray processing began. The FTGD-030 WWTP is no longer operational; however, some of the structures are still present. Data limitations at FTGD-030

WWTP include the material composition used in X-ray processing fluid prior to the early 2000s and the quantity of fluid discharged.

The AOPI is located south of the cantonment areas at Fort Gordon and is the site of a historical WWTP (industrial). The AOPI is surrounded by wooded vegetation to the east, west, and south, and North Range Road to the north. Spirit Creek runs to the southwest/south of the AOPI with flow going southeast and McCoys Creek runs to the west of the AOPI with flow going south/southeast. There are no groundwater monitoring wells associated with the AOPI; however, groundwater is estimated to flow towards the south/southeast based on a review of topography maps (**Figure 5-9**).

The IRP site identifier is FTGD-030, and the HQAES number is 13055.1031. In 1993, the site was grandfathered into the Restoration Management Information System program; however, because it was an active site at that time, no further investigation was proposed under the IRP (Fort Gordon 2016). Throughout the operational history, there were no documented releases at the WWTP. Soil samples were collected in the 1990s, but based on the results, the site was not investigated further.

5.2.8 Gibson Road Landfill (FTGD-029, 13055.1030)

The FTGD-029 GR Landfill is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to the release of potentially PFAS-containing chemicals related to historical X-ray operations at the new hospital. The GR Landfill closed in December 1996, but a portion of the landfill designated for construction debris is still active (Fort Gordon 2016). The contents of the older closed landfills are unknown but are believed to contain sanitary refuse and construction debris. The GR Landfill received most biosolids (i.e., sludges) from the FTGD-030 WWTP from 1985 to 2007. There is no liner for the landfill since the natural clay meets landfill requirements, however groundwater and surface water associated with the site are actively monitored. Data limitations at this AOPI include the material composition used in X-ray processing fluid prior to the early 2000s and the quantity of biosolids received.

The AOPI is located within the training area at Fort Gordon, and a portion of the AOPI is still an active landfill (industrial use). The AOPI is surrounded by wooded areas to the north, east, and southeast, Gibson Road to the northwest, and a cleared area to the southwest (**Figure 5-10**). Groundwater is estimated to flow towards the south.

The IRP site identifier is FTGD-029, and the HQAES number is 13055.1030. In 1993, the site was grandfathered into the Restoration Management Information System program; however, because it is an active site, no further investigation will occur under the IRP (Fort Gordon 2016).

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at Fort Gordon, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at Fort Gordon at eight AOPIs to evaluate presence or absence of PFOS, PFOA, and PFBS in comparison with the OSD risk screening levels. As such, an installation-specific QAPP Addendum (Arcadis 2020) was developed to supplement the general information provided in the PQAPP (Arcadis 2019) and to detail the site-specific proposed scope of work for the SI. A preliminary CSM was prepared for each of the installation's AOPIs in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 200-1-12 (USACE 2012). The preliminary CSMs identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses. The preliminary CSMs identified soil, groundwater, and/or sediment pathways as potentially complete which guided the SI sampling. The QAPP Addendum details the sampling design and rationale based on each AOPI's preliminary CSM. The SI scope of work was completed in April 2020 and May 2020 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 Gordon. Non-conformances to the prescribed procedures in the PQAPP and QAPP Addendum are described in **Section 6.3.3**. Analytical results obtained through SI field activities are summarized in **Section 7**.

6.1 Data Quality Objectives

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

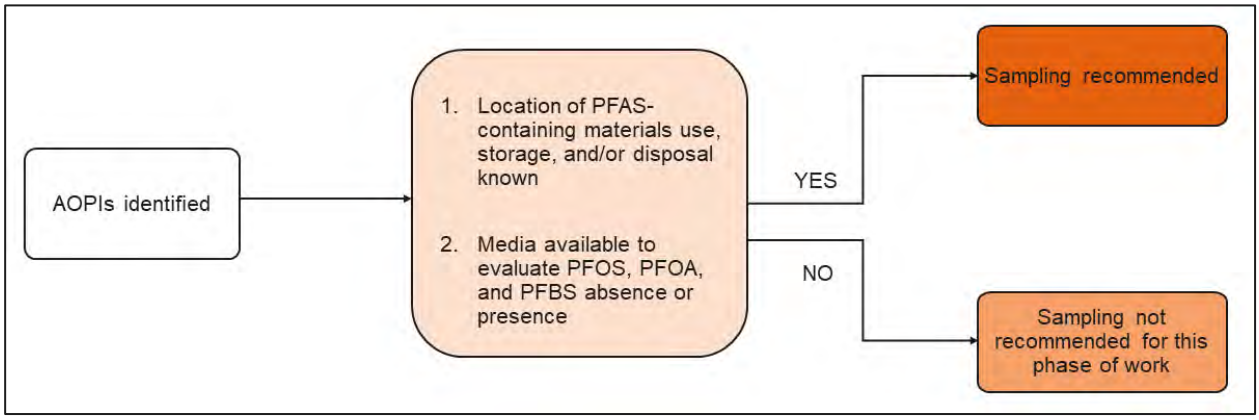

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI activities at Fort Gordon is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2020). Briefly, the areas of focus for this SI (i.e., sites within the identified AOPIs) were selected based on a review of historical documents and data and information obtained by conducting personal interviews during the PA; these information inputs were used to develop the preliminary CSMs provided in the QAPP Addendum. Soil, groundwater, and sediment samples were collected from Fort Gordon at areas closest to suspected releases and believed to have the potential for the greatest PFOS, PFOA, and PFBS concentrations based on AOPI histories.

Groundwater was sampled at all eight AOPIs from existing wells or temporary well points to assess PFOS, PFOA, and PFBS concentrations associated with or migrating from the AOPI. Soil samples were collected from three (FS2, FFS, and FTGD-030 WWTP) of the eight AOPIs in the area of suspected use, storage, and/or disposal or downgradient where run-off may have occurred. Soil samples were not collected from select AOPIs based on the AOPI history, where the suspected use, storage, and disposal at the AOPI was not to surface soils (SEL and FTGD-029 GR Landfill), where the surrounding soil has been disturbed since the AOPI use timeframe (e.g., excavation, building demolished) (SWMU 009 and SWMU 020/SWMU 031), and/or where the exact areas of use, storage, and disposal are unknown (FFTA). Sediment samples were only collected at one AOPI (SEL) which is a lake that received wastewater potentially with PFAS-containing chemicals. Surface water samples were not collected from this location because the lake was drained after receiving the wastewater.

Surface water and sediment samples were not collected from seven of the AOPIs where water bodies are not in close proximity of the AOPI (FS2, FFS, FFTA, SWMU 020/SWMU 031, and FTGD-029 GR Landfill), where it is unlikely that surface water would contain PFOS, PFOA, and PFBS from historical discharge (FTGD-030 WWTP) and/or where the AOPI site history did not involve direct use, storage, and disposal to water bodies (SWMU 009).

Approximate sampling depths and constituents analyzed for each sampling location and medium are included in **Table 6-1**. Sampling depths noted for existing monitoring wells represent approximately the center of the saturated screened interval.

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 (included as an attachment to the QAPP Addendum). 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, and sample collection logs) documenting the SI sampling activities are included in **Appendix K**.

6.3.1 Field Methods

Groundwater samples were collected from existing monitoring wells using low-flow purging methods from approximately the center of the saturated screened interval or as a grab sample via PFAS-free bailers if the well was artesian. For low-flow sampling, a portable bladder pump with PFAS free disposable high-density polyethylene tubing was used to purge and sample existing wells. Field parameters (temperature, pH, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential) were measured during purging and samples were collected following stabilization. Groundwater samples were placed into a laboratory supplied, PFAS free container, for the analysis of select PFAS.

At groundwater sampling locations where boreholes were advanced using rotosonic drilling methods, dual-tube drill casings were advanced using a top-down sampling method to minimize cross-contamination at depth. Once groundwater was encountered, the borehole was advanced 5 to 10 feet and the soil core and inner sonic core barrel were removed. A stainless-steel screen was inserted, and the outer casing was extracted exposing 5 feet of screen in accordance with P-12, TGI – PFAS-Specific Drilling and Monitoring Well Installation Technical Guidance Instruction (Arcadis 2019; Appendix A). Since rotosonic drilling requires the introduction of drilling water during boring advancement, a source blank sample was collected prior to the start of the work (**Section 6.3.2** presents QA/QC details). Based on the analytical results, trace concentrations of PFAS were detected in the drilling water; therefore, a nontoxic fluorescent tracer (fluorescein dye) was added to water used during drilling. Water in the boreholes was purged with a PFAS-free, stainless-steel Proactive Environmental Products® Hurricane pump until no dye was visible and field parameters were stabilized. Groundwater samples were placed into a laboratory supplied, PFAS free containers for submittal to the laboratory.

Soil samples were collected by hand auger as a composite sample of soil within a select interval, as specified in the QAPP Addendum (Arcadis 2020). Soil from the associated interval was homogenized in a

stainless-steel bowl and placed into a laboratory supplied, PFAS-free container for submittal to the laboratory. Additional sample volume was collected at one location from each AOPI where soil samples were collected for pH, total organic carbon (TOC), and grain size analysis. Soil lithology was recorded in associated field forms (**Appendix K**).

Sediment samples were collected from the upper 10 centimeters using a Ponar grab sampler. Sediment samples were decanted prior to placement into a laboratory supplied, PFAS-free container, for the analysis of select PFAS.

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

6.3.2 Quality Assurance/Quality Control

Worksheets #20 of the PQAPP and QAPP Addendum provide QA/QC requirements for field duplicates, matrix spike/matrix spike duplicates, equipment blanks (EBs), source blanks for water used in the initial decontamination step for drill tooling and water used during drilling activities, 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 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 the skinny dipper, water level meter, bladder pump, Ponar grab sampler, hand auger, and Proactive Environmental Products® Hurricane pump as applicable to the sampled media. Analytical results for blank samples are discussed in **Section 7.10.**

6.3.3 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 Gordon 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 included as **Appendix L** and are summarized below.

- At AOPI SWMU 009, existing monitoring wells MW-009-21 and MW-009-35 were not sampled due to insufficient water column. The scope of work was modified to sample existing monitoring wells MW-009-07 and MW-009-02. These wells were in the vicinity of the AOPI and screened at similar aquifer zones.
- A nontoxic fluorescent tracer (fluorescein dye) was added to water used during drilling to identify when formation water was reached during purging and sampling. Water in the boreholes was

purged with a PFAS-free, stainless-steel Proactive Environmental Products® Hurricane pump until no dye was visible and water quality parameters were stabilized.

6.3.4 Decontamination

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

6.3.5 Investigation-Derived Waste

IDW, including soil cuttings, excess sediment, groundwater, and decontamination fluids were collected and placed in Department of Transportation-approved 55-gallon drums or 5-gallon buckets, labeled as non-hazardous, segregated by medium: waters and soil/sediment, and transported to a staging area. IDW was disposed of offsite at American Bio-Mass in Walterboro, South Carolina (Permit # 152630-2001). A copy of the waste manifest is included in **Appendix K**. Equipment IDW including personal protective equipment and other disposable materials (e.g., gloves, plastic sheeting, Lexan tubes, and high-density polyethylene and silicon tubing) that came into contact with sampling media was disposed of in solid waste dumpster on site.

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 an Arcadis 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, soil, and sediment samples using an analytical method that is ELAP-accredited and compliant with QSM 5.3, Table B-15 (DoD and Department of Energy 2019).

Additionally, the following general chemistry and physical characteristic analyses were completed for select soil and sediment 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 M**).

6.4.2 Data Validation

All analytical data generated during the SI, except grain size, 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, per contractual obligations, 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 M**.

6.4.3 Data Usability Assessment and Summary

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

Based on the final data usability assessment, the environmental data collected at Fort Gordon 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 M**), and as indicated in the full analytical tables (**Appendix N**) provided for the SI results. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019) and Fort Gordon QAPP Addendum (Arcadis 2020). Data qualifiers applied to laboratory analytical results for samples collected during the SI at Fort Gordon 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 Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15 (**Appendix A**).
2. All soil data will be screened against both the residential scenario and industrial/commercial risk screening levels (if collected from less than 2 feet bgs), regardless of the current and projected land use of the AOPI. Soil samples collected from greater than two feet but less than 15 feet bgs will be compared to the industrial/commercial risk screening levels only, and soil samples collected from greater than 15 feet bgs will not be compared to either risk screening level.
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 Gordon are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, and PFBS will be used to evaluate detected soil concentrations. The data from the SI sampling event are compared to the OSD risk screening levels in **Section 7**. If concentrations of PFOS, PFOA, or PFBS are detected greater than the applicable OSD risk screening levels, further study in a remedial investigation is recommended in **Section 8.**

7 SUMMARY AND DISCUSSION OF SI RESULTS

This section describes analytical results of sampling conducted for the Fort Gordon SI. Field duplicate results are provided in the associated tables. Sampled media and QA/QC samples were analyzed for the constituents prescribed per Worksheet #18 of the QAPP Addendum (Arcadis 2020) and as noted in **Table 6-1**. 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 through **7-3** provide a summary of the groundwater, soil, and sediment analytical results for PFOS, PFOA, and PFBS. **Table 7-4** summarizes AOPIs and whether their SI results exceed the OSD risk screening levels. **Appendix N** includes the full suite of analytical results for these media, as well as for the QA/QC samples. An overview of AOPIs at Fort Gordon with OSD risk screening level exceedances is depicted on **Figure 7-1. Figures 7-2** through **7-9** show the PFOS, PFOA, and PFBS analytical results in groundwater, soil, and/or sediment 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 and sediment data are reported in mg/kg, or parts per million.

Field parameters measured for groundwater during purging and sample collection are provided on the field forms in **Appendix K**. Soil and sediment descriptions are provided on the field forms in **Appendix K**. The results of the SI are grouped by AOPI and discussed for each medium as applicable.

Table 7-4 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
FS2	No
FFS	Yes
FFTA	Yes
SWMU 009	Yes
SWMU 020/SMWU 031	No
SEL	No
FTGD-030 WWTP	Yes
FTGD-029 GR Landfill	Yes

7.1 AOPI FS2

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with AOPI FS2. PFOS, PFOA, and PFBS concentrations are less than the OSD risk screening levels.

7.1.1 Groundwater

Groundwater samples were collected from three existing monitoring wells at AOPI FS2 (**Figure 7-2**). Groundwater was encountered from approximately 7 to 43 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. PFOS and PFOA were detected at concentrations below the OSD risk screening level of 40 ng/L in groundwater samples at all monitoring wells: FTGD-FS2-MW08 (7.9/8.4 ng/L and 11/11 ng/L, respectively in the sample and field duplicate), FTGD-FS2-MW09 (estimated 18 ng/L and estimated 15 ng/L, respectively), and FTGD-FS2-MW10 (5.6 ng/L and 4.1 ng/L, respectively). PFBS was detected in all samples with concentrations varying from an estimated 2.0 ng/L (FTGD-FS2-MW10) to an estimated 7.7 ng/L (FTGD-FS2-MW09), but concentrations did not exceed the risk screening level of 600 ng/L.

7.1.2 Soil

Soil samples were collected from two locations at AOPI FS2 (**Figure 7-2**). Each boring included one surface soil sample from 0 to 2 feet bgs. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. PFOS, PFOA, and PFBS were not detected in any of the soil samples collected from FS2.

7.2 AOPI FFS

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with AOPI FFS. PFOS and PFOA concentrations in groundwater are greater than the OSD risk screening levels.

7.2.1 Groundwater

One grab groundwater sample was collected via rotosonic drilling and screenpoint sampling at AOPI FFS (**Figure 7-3**). The groundwater sample was collected at the first-encountered groundwater at approximately 25 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. PFOS and PFOA were detected at concentrations above the OSD risk screening level of 40 ng/L in sample FTGD-FFS-01 (6,000 ng/L and 200 ng/L, respectively). PFBS was detected in the sample collected from FTGD-FFS-01 at a concentration of 44 ng/L which is below the OSD risk screening level of 600 ng/L.

7.2.2 Soil

Two soil samples were collected from one location at AOPI FFS (**Figure 7-3**). The soil samples were collected from 0 to 2 feet bgs and 4 to 5 feet bgs. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. PFOA and PFBS were not detected in either sample. PFOS was detected

at 0.0095 mg/kg in the 0 to 2 feet bgs sample which is below both the residential and industrial/commercial OSD risk screening levels of 0.13 mg/kg and 1.6 mg/kg, respectively. PFOS was also detected in the 4 to 5 feet bgs soil sample at a concentration of 0.022 mg/kg which is below the industrial/commercial OSD risk screening level.

7.3 AOPI FFTA

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with AOPI FFTA. PFOS concentrations in groundwater are greater than the OSD risk screening level.

7.3.1 Groundwater

Groundwater samples were collected from two borings via rotosonic drilling and screenpoint sampling at AOPI FFTA (**Figure 7-4**). Grab groundwater samples were collected at first-encountered groundwater, which was from approximately 30 to 50 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. PFOS was detected at concentrations above the OSD risk screening level of 40 ng/L at both sampling locations: FTGD-FFTA-01 (47 ng/L) and FTGD-FFTA-02 (73 ng/L). PFOA was detected at concentrations below the OSD risk screening level of 40 ng/L in both groundwater samples: FTGD-FFTA-01 (2.5 ng/L) and FTGD-FFTA-02 (6.8 ng/L). PFBS was not detected in either sample.

7.4 AOPI SWMU 009

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with AOPI SWMU 009. PFOS and PFOA concentrations in one groundwater sample are greater than the OSD risk screening levels.

7.4.1 Groundwater

Groundwater samples were collected from five existing monitoring wells at AOPI SWMU 009 (**Figure 7-5**). One monitoring well is located adjacent to the stream and is artesian. The remaining groundwater wells were located at higher elevations and groundwater was encountered from approximately 40 to 60 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected in samples collected from three (FTGD-009-EW00907, FTGD-009-MW00901, and FTGD-009-MW00902) of the five monitoring wells. PFOS and PFOA were detected at concentrations greater than the OSD risk screening level of 40 ng/L in the groundwater sample collected from one monitoring well: FTGD-009-MW00907 (130 ng/L PFOS and 64 ng/L PFOA). PFBS was detected below the OSD risk screening level of 600 ng/L at monitoring well FTGD-009-MW00907 (7.3 ng/L). Additional detections of PFOS and PFOA were identified at monitoring well FTGD-009-MW00942 (5.6 ng/L PFOS and an estimated 3.1 ng/L PFOA), however results were below the OSD risk screening level of 40 ng/L.

7.5 AOPI SWMU 020/SWMU 031

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with AOPI SWMU 020/SWMU 031. PFOS, PFOA, and PFBS concentrations in groundwater are less than the OSD risk screening level.

7.5.1 Groundwater

Groundwater samples were collected from two borings via rotosonic drilling and screenpoint sampling at AOPI SWMU 020/SWMU 031 (**Figure 7-6**). Grab groundwater samples were collected at first-encountered groundwater, which was at approximately 20 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. PFOS and PFOA were detected below the OSD risk screening level of 40 ng/L at both sample locations: FTGD-020-1 (4.6 ng/L and 3.8 ng/L, respectively) and FTGD-031-1 (5.2 and 6.4 ng/L, respectively). PFBS was not detected in either sample.

7.6 AOPI SEL

The subsections below summarize the groundwater and sediment PFOS, PFOA, and PFBS analytical results associated with AOPI SEL. PFOS, PFOA, and PFBS concentrations are less than the OSD risk screening levels. The source medium at this AOPI is wastewater that was discharged to the SEL.

7.6.1 Groundwater

A groundwater sample was collected from one boring via rotosonic drilling and screenpoint sampling at AOPI SEL (**Figure 7-7**). The grab groundwater sample was collected at first-encountered groundwater, which was at approximately 22 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. PFOS was detected below the OSD risk screening level of 40 ng/L at location FTGD-SEL-01 (4.3 ng/L). PFOA and PFBS were not detected in the sample.

7.6.2 Sediment

Grab sediment samples were collected from three locations at AOPI SEL (**Figure 7-7**). A summary of PFOS, PFOA, and PFBS sediment analytical results is provided in **Table 7-3**. PFOS was detected below the OSD risk screening levels for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg) at location FTGD-SEL-03 (estimated 0.0014 mg/kg). PFOS at the remaining two sample locations and PFOA and PFBS at all locations were not detected.

7.7 AOPI FTGD-030 WWTP

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with AOPI FTGD-030 WWTP. PFOS and PFOA concentrations in groundwater are greater than the OSD risk screening levels.

7.7.1 Groundwater

Groundwater samples were collected from two borings via rotosonic drilling and screenpoint sampling at AOPI FTGD-030 WWTP (**Figure 7-8**). Grab groundwater samples were collected at first-encountered groundwater, which was at approximately 10 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. PFOS and PFOA were detected above the OSD risk screening level of 40 ng/L at both sample locations: FTGD-030-1 (570 ng/L and 510 ng/L, respectively) and FTGD-030-2 (830 and 300 ng/L, respectively). PFBS was also detected below the OSD risk screening level of 600 ng/L at both sample locations: FTGD-030-1 (140 ng/L) and FTGD-030-2 (60 ng/L).

7.7.2 Soil

Soil samples were collected from two locations at AOPI FTGD-030 WWTP (**Figure 7-8**). Two soil samples were collected at each boring at depths of 0 to 2 feet bgs and 4 to 5 feet bgs. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. PFOS was detected below the OSD risk screening levels for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg) in both soil samples collected from 0 to 2 feet bgs with a maximum concentration of 0.0085 mg/kg (FTGD-030-02 from 0 to 2 feet bgs). PFOS was also detected below the OSD risk screening level for industrial/commercial in both soil samples collected from 4 to 5 feet bgs with a maximum concentration of 0.0073 mg/kg (FTGD-030-02 from 4 to 5 feet bgs). PFOA was detected below the OSD risk screening level(s) in both samples at location FTGD-030-02 (0.0017 mg/kg at 0 to 2 feet bgs and 0.0024 mg/kg at 4 to 5 feet bgs). PFBS was not detected in any sample.

7.8 AOPI FTGD-029 GR Landfill

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with AOPI FTGD-029 GR Landfill. PFOA concentrations in groundwater are greater than the OSD risk screening level.

7.8.1 Groundwater

Groundwater samples were collected from three existing monitoring wells at AOPI FTGD-029 GR Landfill (**Figure 7-9**). Groundwater was encountered from approximately 30 to 75 feet bgs. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. PFOA was detected at concentrations greater than the OSD risk screening level of 40 ng/L in groundwater samples collected from two of the three monitoring wells: FTGD-029-GWC6 (68 ng/L) and FTGD-029-GWCIA (210 ng/L). PFOS was detected below the OSD risk screening level of 40 ng/L at all three wells with concentrations varying from 3.8 ng/L (FTGD-029-GWC6) to 12 ng/L (FTGD-029-GWC5). PFBS was detected below the OSD risk screening level of 600 ng/L at all three wells with concentrations varying from 4.9 ng/L (FTGD-029-GWC5) to 21 ng/L (FTGD-029-GWCIA).

7.9 Total Organic Carbon, 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 3,720 to 4,200 mg/kg. The TOC at this installation was slightly lower than typical organic content in topsoil (5,000 – 30,000 mg/kg). The combined percentage of fines (i.e., silt and clay) in soils at Fort Gordon ranged from 8.5 to 17.7% with an average of 12.4%. PFAS constituents tend to be more mobile in soils with less than 20% fines and lower TOC. The percent moisture of the soil [4.6 to 17.4%] was slightly higher, but typical for sandy soil (0-10%). The pH of the soil was slightly acidic (4-6). Based on these geochemical and physical soil characteristics observed underlying the installation during the SI, PFAS constituents are expected to be relatively more mobile at Fort Gordon than in soils with greater percentage of fines and TOC.

7.10 Blank Samples

Detections of PFOS, PFOA, and/or PFBS are summarized below for blank samples.

PFOA (estimated 3.0 ng/L) and PFBS (estimated 1.8 ng/L) were detected in the drilling source water blank collected on 13 April 2020. Source blank water was used during rotosonic drilling activities to collect grab groundwater samples at AOPIs FFS, FFTA, SWMU 020/SWMU 031, SEL, and FTGD-030 WWTP. During rotosonic drilling activities, a nontoxic fluorescent dye was added to the source water that was used to identify the presence/absence of source water during sample purging activities. Details are included in the Field Change Reports (**Appendix L**).

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

7.11 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 7-10** through **7-18** and in this section therefore represent the current understanding of the potential for human exposure. For some AOPIs, the CSM is the same and thus shown on the same figure.

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

Based on the use, storage, and/or disposal of PFAS-containing materials at the AOPIs, affected media may consist of soil, groundwater, surface water, and/or sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater; transport via sediment carried in and dissolution to stormwater and surface water; discharge/recharge between groundwater and surface water; and adsorption/desorption between surface water and sediment. Generic categories of potential human

receptors and their associated exposure scenarios that are typically evaluated in a CERCLA human health risk assessment were considered and include on-installation site workers (e.g., industrial/commercial workers, utility workers, or future construction workers who could be exposed to chemicals in soil at an AOPI or to chemicals in tap water in an industrial/commercial building), on-installation residents (e.g., adults and children who could be exposed to chemicals in tap water in a residence), and on-installation recreational users (e.g., hikers or hunters who could be exposed to chemicals in waterways at an installation). Off-installation receptor types could include drinking water receptors (i.e., commercial/industrial workers or residents) and recreational users.

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

Figure 7-10 presents the CSM for SEL, to which X-ray processing fluids from the hospital were historically released. Groundwater flow direction for this AOPI is assumed east-southeast. A dam is located on the east side of SEL. General conveyance of surface water is to the east toward Boardmans Pond before flowing into Butler Creek. Butler Creek flows into the Savannah River approximately 10 miles southeast of the AOPI.

- The source medium at this AOPI is wastewater that was released to SEL. No historical impacts to soil are anticipated. Therefore, soil samples were not collected, and soil is not included as a potential exposure medium in this CSM figure.
- PFOS was detected in groundwater. The majority of the drinking water in the cantonment area and at the Gordon Lakes Golf Shop is supplied by the City of Augusta; however, there are nine drinking water wells (6 permitted and 3 non-permitted) on Fort Gordon that supply water to facility personnel in areas not capable of being supplied water from the City. The existing on-post drinking water wells are located side gradient of SEL and are unlikely to be affected by historical releases at this AOPI. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to account for potential future use of the on-post groundwater downgradient of SEL. Recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-installation recreational users is incomplete.
- PFOS was detected in groundwater at this AOPI which flows off-post toward the installation’s eastern boundary. Off-post potable wells are located downgradient of this AOPI. Due to the absence of land use controls preventing potable use of groundwater in this area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- PFOS was detected in sediment at SEL. SEL and other surface water bodies 5 miles downstream of the AOPI are not used for drinking water. Therefore, the surface water exposure pathways via drinking water ingestion and dermal contact for on-installation and off-installation receptors are incomplete.

However, on-installation and off-installation recreational users could contact constituents in surface water and sediment via incidental ingestion and dermal contact. As such, these exposure pathways are potentially complete for surface water and complete for sediment for on-installation recreational users and potentially complete for surface water and sediment for off-installation recreational users. On-installation site workers and residents are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete.

Figure 7-11 through **Figure 7-15** present the CSMs for FS2, FFS, FTGD-030 WWTP, FFTA, SWMU 009, and SWMU 020/SWMU031, respectively. Groundwater flow direction for these AOPIs is generally to the southwest, south, or southeast. General conveyance of surface water runoff is toward tributaries of Spirit Creek or McCoys Creek. Spirit Creek and McCoys Creek flow into Gordon Lake which is located at the southeast boundary of the installation before continuing to flow southeast for approximately 10 miles into the Savannah River. The following exposure pathway determinations apply to these CSMs:

- PFOS, PFOA, and PFBS were not detected in soil at AOPI FS2, therefore the soil exposure pathways for all receptors are incomplete**.**
- PFOS and/or PFOA were detected in soil at AOPI FFS and FTGD-030 WWTP and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete. The AOPIs are not likely to be regularly accessed by on-installation residents and recreational users, or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- Soil samples were not collected from AOPI FFTA. On-installation site workers could contact constituents in soil via incidental ingestion, dermal contact and inhalation of dust; as such, the soil exposure pathways for on-installation site workers are potentially complete.
- At AOPIs SWMU 009 and SWMU 020/SWMU 031, wastewater potentially containing PFAS was historically released to sumps or floor drains, and the residual source may be present in subsurface soil. It is assumed constituents are not available for human contact at the soil surface, therefore, soil samples were not collected and the soil exposure pathway for on-installation site workers is incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at AOPIs FS2, FFS, FTGD-030 WWTP, FFTA, SWMU 009, and SWMU 020/SWMU 031. Two of the on-site permitted groundwater wells used to supply water at Fort Gordon are located near the Gordon Lakes Golf Course and are downgradient of these AOPIs. The wells currently only supply water to bathrooms on the golf course and were non-detect for PFAS. The groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation recreational users (i.e., golfers) is therefore incomplete under the current scenario, however, to account for potential future exposure, the groundwater exposure pathway is potentially complete. Additionally, 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 potable use of the on-post groundwater downgradient of these AOPIs.
- PFOS, PFOA, and/or PFBS were detected in groundwater at AOPIs FS2, FFS, FTGD-030 WWTP, FFTA, SWMU 009, and SWMU 020/SWMU 031. Groundwater originating at these AOPIs flows off-post through the installation's southern boundary. Due to the absence of land use controls preventing

potable use of groundwater in this area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.

- Surface water bodies within 5 miles downstream of these AOPIs are not used for drinking water. Therefore, the surface water exposure pathways via drinking water ingestion and dermal contact for on-installation and off-installation residential receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at AOPIs FS2, FFS, FTGD-030 WWTP, FFTA, SWMU 009, and SWMU 020/SWMU 031. Groundwater containing PFAS may discharge to surface water and PFAS may adsorb to sediments from surface water. On-installation and off-installation recreational users could contact constituents in surface water and sediment via incidental ingestion and dermal contact; as such, these exposure pathways are potentially complete. Additionally, Gordon Lake is located downgradient of these AOPIs and site workers at the Gordon Lakes Golf Course could contact constituents in surface water and sediment via incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on-installation site workers are potentially complete.
- On-installation residents are not likely to contact surface water and sediment in the on-post surface water bodies through incidental ingestion and dermal contact, therefore, the surface water and sediment exposure pathways for these receptors are incomplete.

Figure 7-16 presents the CSM for FTGD-029 GR Landfill. Biosolids potentially containing PFOS, PFOA, and PFBS were historically disposed of at this landfill. Groundwater flow direction for this AOPI is generally to the south or southeast. General conveyance of surface water runoff is toward tributaries of Sandy Run Creek, and Sandy Run Creek flows into various ponds before continuing to flow south toward Brier Creek.

- Based on what is known about typical landfill operations, it is assumed that any potential PFAS-containing waste is present in the subsurface soil and is not available at the soil surface for human exposure. Therefore, soil samples were not collected, and the soil exposure pathways are incomplete.
- PFOS, PFOA, and PFBS were detected in groundwater. Two of the non-permitted and one permitted groundwater well used to supply water to the training areas at Fort Gordon are located downgradient of the AOPI. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete. Recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-installation recreational users is incomplete.
- PFOS, PFOA, and PFBS were detected in groundwater and groundwater originating at these AOPIs flows off-post through the installation's southern boundary. The groundwater exposure pathway for off-installation receptors is potentially complete in the absence of land use controls preventing potable use of off-post groundwater.
- Surface water bodies within 5 miles downstream of this AOPI are not used for drinking water. Therefore, the surface water exposure pathways via drinking water ingestion and dermal contact for on-installation and off-installation receptors are incomplete. However, on-installation and off-installation recreational users could contact constituents in surface water and sediment via incidental ingestion and dermal contact; as such, these exposure pathways are potentially

complete. On-installation site workers and residents are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete.

Following the SI sampling, all eight 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 CONCLUSIONS AND RECOMMENDATIONS

The PFAS PA/SI included two distinct efforts. The PA identified AOPIs at Fort Gordon 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 PFOA, PFOS, and PFBS to the environment occurred.

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

In response to IMCOM Operations Order 16-088, issued in 2016, Fort Gordon sampled six of their drinking water supplies for PFOS, PFOA, and PFBS in 2017 and all 10 drinking water supplies in 2020. In 2017, two of the six water systems, one referred to as “Fort Gordon Lakes Golf Course 539 Water System” in the 2017 sampling report and Fort Gordon Pointes West Water System, had PFOS, PFOA, and/or PFBS detections below the OSD risk screening levels. Fort Gordon personnel clarified that the samples from “Fort Gordon Lakes Golf Course 539 Water System” were actually obtained from a nearby building at the golf club that is supplied by the Augusta-Richmond County Water Supply, not the Gordon Lakes Golf Course water supply wells. In 2020, two of the 10 water systems, Fort Gordon Forestry 463 and Fort Gordon Point Water, had detections of PFOS and/or PFOA below the OSD risk screening levels. Fort Gordon Pointes West Water System is located approximately 28 miles from Fort Gordon on land leased for camping and general training purposes. The water to this area is supplied by the Columbia County Water System, not from a potable source located on Fort Gordon property. The Columbia County water supply obtains potable water from the Savannah River and the Clarks Hill Reservoir.

Eight AOPIs were sampled during the SI at Fort Gordon to evaluate whether PFOS, PFOA, and PFBS were present at concentrations that exceed OSD risk screening levels. The SI scope of work was completed in accordance with the Final PQAPP (Arcadis 2019) and the Fort Gordon QAPP Addendum (Arcadis 2020).

PFOS, PFOA, and PFBS were detected in groundwater at all eight AOPIs and above the OSD risk screening levels at five AOPIs. Results are summarized below:

- PFOS exceeded the OSD risk screening level in six of the 19 groundwater samples with a maximum concentration of 6,000 ng/L at AOPI FFS. OSD risk screening level exceedances occurred at four AOPIs: FFS, FFTA, SWMU 009, and FTGD-030 WWTP.
- PFOA exceeded the OSD risk screening level in six of the 19 groundwater samples with a maximum concentration of 510 ng/L at AOPI FTGD-030 WWTP. OSD risk screening level exceedances occurred at four AOPIs: FFS, SWMU 009, FTGD-030 WWTP, and FTGD-029 GR Landfill.
- PFBS concentrations were below the OSD risk screening level in all 19 samples. The maximum PFBS concentration of 140 ng/L was detected at AOPI FTGD-030 WWTP.

Following the SI sampling, all eight AOPIs with confirmed PFOS, PFOA, and/or PFBS presence were considered to have complete or potentially complete exposure pathways. The groundwater exposure pathways (via drinking water ingestion and dermal contact) for all AOPIs for on-installation receptors are potentially complete. There are nine on-site wells on Fort Gordon and the potential to install additional wells in the future. Due to a lack of land use controls off-installation and downgradient of Fort Gordon, the groundwater exposure pathways for off-installation receptors are also potentially complete for all AOPIs.

All soil detections were below the OSD risk screening levels; however, PFOS and PFOA were detected in soil at two of the three AOPIs sampled. Results are summarized below:

- PFOS was detected in six of the eight soil samples with a maximum concentration of 0.022 mg/kg at 4 to 5 feet bgs at AOPI FFS.
- PFOA was detected in two of the eight soil samples with a maximum concentration of 0.0024 mg/kg at 4 to 5 feet bgs at AOPI FTGD-030 WWTP.
- PFBS was not detected in any sample.

Soil exposure pathways for on-installation site workers are complete at two AOPIs (FFS and FTGD-030 WWTP) and potentially complete at one AOPI (FFTA).

Sediment samples were only collected at one AOPI (SEL) and PFOS was detected below the OSD risk screening levels. Results are summarized below.

- PFOS was detected in one of the three sediment samples with an estimated concentration of 0.0014 mg/kg.
- PFOA and PFBS were not detected in any sediment sample.

Surface water is not used for drinking water at Fort Gordon, however on- and off-installation recreational users could contact constituents in surface water and sediment via incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways are potentially complete at all AOPIs, except for the complete sediment exposure pathway for on-installation recreational users at AOPI SEL.

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

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

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)			Recommendation
	Groundwater	Soil	Sediment	
Fire Station 2	No	No	NS	No action at this time
Former Fire Station	Yes	No	NS	Further study in a remedial investigation
Former Fire Training Area	Yes	NS	NS	Further study in a remedial investigation
Solid Waste Management Unit (SWMU) 009 (Building 955)	Yes	NS	NS	Further study in a remedial investigation
SWMU 020 (Building 961)/SMWU 031 (Building 984)	No	NS	NS	No action at this time
Soil Erosion Lake	No	NS	No	No action at this time
Fort Gordon (FTGD)-030 Wastewater Treatment Plan	Yes	No	NS	Further study in a remedial investigation
FTGD-029 Gibson Road Landfill	Yes	NS	NS	Further study in a remedial investigation

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

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 in **Section 8**. The data limitations relevant to the development of this PA/SI for PFOS, PFOA, and PFBS at Fort Gordon 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. Interviews with Fort Gordon Fire Department personnel covered activities back to 1998.

Additionally, records reviewed during the PA did not indicate whether or not the chemicals used in the historical electroplating and photo processing/X-ray operations contained PFAS-containing materials and the associated quantity of wastewaters generated.

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

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

Finally, the available PFOS, PFOA, and PFBS analytical data are limited to results from groundwater samples at eight AOPIs, soil samples from three AOPIs, and sediment samples at one AOPI. Surface water and drinking water wells (on-post and/or off-post) were not sampled as part of the SI. Available data, including PFOS, PFOA, and PFBS, is listed in **Appendix N**, which were analyzed per the selected analytical method.

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

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ACRONYMS

%	percent
6:2 FTSA	6:2 fluorotelomer sulfonate
8:2 FTSA	8:2 fluorotelomer sulfonate
AFFF	aqueous film-forming foam
AOPI	area of potential interest
AR-AFFF	alcohol-resistant aqueous film-forming foam
Arcadis	Arcadis U.S., Inc.
Army	United States Army
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	conceptual site model
DoD	Department of Defense
DQO	data quality objective
DUSR	Data Usability Summary Report
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
FFS	Former Fire Station
FFTA	Former Fire Training Area
FS2	Fire Station 2
FTGD	Fort Gordon
GIS	geographic information system
GR	Gibson Road
GW	groundwater
HQAES	Headquarters Army Environmental System
IDW	investigation-derived waste
IMCOM	Installation Management Command
installation	United States Army and Reserve installation
IRP	Installation Restoration Program

LOD	limit of detection
LOQ	limit of quantitation
mg/kg	milligrams per kilogram (parts per million)
MWR	Morale, Welfare, and Recreation
ng/L	nanogram per liter (parts per trillion)
NPDES	National Pollutant Discharge Elimination System
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
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RSL	regional screening level
SE	sediment
SEL	Soil Erosion Lake
SI	site inspection
SO	soil
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
SW	surface water
SWMU	Solid Waste Management Unit
TGI	technical guidance instruction

TOC	total organic carbon
TSC	Training Support Center
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
WWTP	wastewater treatment plant

TABLES

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

Source Water		Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
Water System Name		FG Gordon Lakes Golf Course 539 Water System[1]	FG Gordon Lakes Golf Course 539 Water System[1]	FG Gordon Lakes Golf Course 539 Water System[1]	FG Gordon Lakes Golf Course 539 Water System[1]	FG Gordon Lakes Golf Course 539 Water System[1]	FG Gordon Lakes Golf Course LT1 (539) Water System	FG Gordon Lakes Golf Course 540 Water System	FG Gordon Lakes Golf Course LT2 (540) Water System	FG Natural Resources Water System	FG Forestry 463 Water System	FG Forestry 460 Water System
Sample Date		2/14/2017	1/24/2018	5/29/2018	9/12/2018	11/14/2018	6/1/2020	2/14/2017	6/1/2020	2/14/2017	6/1/2020	6/1/2020
	OSD Risk Screening Level* in ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Perfluorooctanoic acid (PFOA)	40	< 2.0	< 2.0	< 2.0	**2.1**	**5.5**	< 1.8	< 2.0	< 1.8	< 2.0	**1.8**	< 1.8
Perfluorobutanesulfonic acid (PFBS)	600	< 2.0	< 2.0	< 2.0	< 2.0	**2.8**	< 1.8	< 2.0	< 1.8	< 2.0	< 1.7	< 1.8
Perfluorooctane sulfonate (PFOS)	40	**2.0**	< 2.0	< 2.0	< 2.0	**2.9**	< 1.8	< 2.0	< 1.8	< 2.0	< 1.7	< 1.8

Notes and Acronyms:

The Office of Secretary of Defense (OSD) Risk Screening Levels for Tapwater will be used to compare all groundwater for this Army PFAS PA/SI program (OSD 2021).

[1] - Samples were actually obtained from a nearby building at the golf club that is supplied by Augusta-Richmond County Water Supply, not the Gordon Lakes Golf Course water supply wells.

Bolded values indicate the result was detected greater than the limit of detection.

Data provided by Installatoin Management Command PFOS/PFOA spreadsheet, provided by USAEC

FG = Fort Gordon

ng/L - nanograms per liter

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

	Source Water	Groundwater	Groundwater	Groundwater	Groundwater	Groundwater
	Water System Name	FG Range 14 Water System	FG Range 14 Water System	FG Pointes West Water System	FG Pointes West Water System	FG Range Control Water System
	Sample Date	2/14/2017	6/1/2020	2/14/2017	6/1/2020	2/14/2017
	OSD Risk Screening Level* in ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Perfluorooctanoic acid (PFOA)	40	< 2.0	< 1.8	**3.9**	**3.0**	< 2.0
Perfluorobutanesulfonic acid (PFBS)	600	< 2.0	< 1.8	< 2.0	< 1.8	< 2.0
Perfluorooctane sulfonate (PFOS)	40	< 2.0	< 1.8	**2.9**	**2.0**	< 2.0

Notes and Acronyms:

The Office of Secretary of Defense (OSD) Risk Screening Levels for Tapwater will be used to compare all groundwater for this Army PFAS PA/SI program (OSD 2021).

[1] - Samples were actually obtained from a nearby building at the golf club that is supplied by Augusta-Richmond County Water Supply, not the Gordon Lakes Golf Course water supply wells.

Bolded values indicate the result was detected greater than the limit of detection.

Data provided by Installatoin Management Command PFOS/PFOA spreadsheet, provided by USAEC

FG = Fort Gordon

ng/L - nanograms per liter

Table 6-1 - Site Inspection Sampling Location Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Gordon, Georgia

AOPI	Matrix	Sample Identification	Depth Interval (ft bgs)[1]	Sample Method	Analytes[2,3]
Fire Station 2	GW	FTGD-FS2-MW8-GW	30	Grab	PFAS, field parameters
	GW	FTGD-FS2-MW9-GW	15	Grab	PFAS, field parameters
	GW	FTGD-FS2-MW10-GW	46	Grab	PFAS, field parameters
	SO	FTGD-FS2-01	0-2	Composite	PFAS
	SO	FTGD-FS2-02	0-2	Composite	PFAS, TOC, pH, grain size
Former Fire Station	GW	FTGD-FFS-01-GW	27.5	Grab - Monsoon Pump	PFAS, field parameters
	SO	FTGD-FFS-01	0-2	Composite	PFAS, TOC, pH, grain size
	SO		4-5	Composite	PFAS
Former Fire Training Area	GW	FTGD-FFTA-01-GW	31.5	Grab - Monsoon Pump	PFAS, field parameters
	GW	FTGD-FFTA-02-GW	50.5	Grab - Monsoon Pump	PFAS, field parameters
SWMU 009	GW	FTGD-009-MW00901-GW	70	Grab - Bladder Pump	PFAS, field parameters
	GW	FTGD-009-MW00942-GW	54	Grab - Bailer	PFAS, field parameters
	GW	FTGD-009-EW00907-GW	Artesian	Grab - Bailer	PFAS, field parameters
	GW	FTGD-009-MW00907-GW	82	Grab - Bladder Pump	PFAS, field parameters
	GW	FTGD-009-MW00902-GW	45	Grab - Bladder Pump	PFAS, field parameters
SWMU 020/ SWMU 031	GW	FTGD-020-1-GW	32.5	Grab - Monsoon Pump	PFAS, field parameters
	GW	FTGD-031-1-GW	22	Grab - Monsoon Pump	PFAS, field parameters
Soil Erosion Lake	GW	FTGD-SEL-01-GW	24.5	Grab - Monsoon Pump	PFAS, field parameters
	SE	FTGD-SEL-01-SE	0-10 (cm)	Composite	PFAS
	SE	FTGD-SEL-02-SE	0-10 (cm)	Composite	PFAS
	SE	FTGD-SEL-03-SE	0-10 (cm)	Composite	PFAS
FTGD-030 WWTP	GW	FTGD-030-1-GW	10.5	Grab - Monsoon Pump	PFAS, field parameters
	GW	FTGD-030-2-GW	11.5	Grab - Monsoon Pump	PFAS, field parameters
	SO	FTGD-030-1	0-2	Composite	PFAS, TOC, pH, grain size
	SO		4-5	Composite	PFAS
	SO	FTGD-030-2	0-2	Composite	PFAS
	SO		4-5	Composite	PFAS
FTGD-029 Gibson Road Landfill	GW	FTGD-LF-GWC1A-GW	77	Grab - Bladder Pump	PFAS, field parameters
	GW	FTGD-LF-GWC5-GW	32	Grab - Bladder Pump	PFAS, field parameters
	GW	FTGD-LF-GWC6-GW	54.2	Grab - Bladder Pump	PFAS, field parameters

Notes:

1. Depth units are reported in ft bgs unless otherwise noted. Sampling depth noted for existing monitoring wells indicates the depth at approximately the center of the saturated screened interval.

2. In addition to laboratory analytes, field parameters were measured for groundwater samples and include temperature, pH, conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential. Lithologic descriptions were logged continuously at soil boring locations and for sediment sampling locations. Field parameters and lithological descriptions are shown on field sampling forms included in **Appendix K**.

3. The PFAS analyte group includes PFOS, PFOA, PFBS and 15 other PFAS constituents.

AOPI = Area of Potential Interest
ft bgs = feet below ground surface
FTGD = Fort Gordon
GW = groundwater
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SE = sediment
SO = soil
SWMU = Soild Waste Management Unit
TOC = total organic carbon
WWTP = wastewater treatment plant

Table 7-1 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USACE PFAS Preliminary Assessment/Site Inspection
Fort Gordon, Georgia

AOPI	Location	Sample/ Parent Identification	Sample Date	Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
				OSD Risk Screening Level - Tapwater	40		40		600	
				Sample Type	Result	Qual	Result	Qual	Result	Qual
Fire Station 2	FTGD-FS2-MW08	FTGD-FS2-MW8-GW-042020	04/20/2020	N	**7.9**		**11**		**2.2**	J
		FTGD-FD-01-GW-042020 / FTGD-FS2-MW8-GW-042020	04/20/2020	FD	**8.4**		**11**		**2.2**	J
	FTGD-FS2-MW09	FTGD-FS2-MW9-GW-042120	04/21/2020	N	**18**	J-	**15**	J-	**7.7**	J-
	FTGD-FS2-MW10	FTGD-FS2-MW10-GW-042020	04/20/2020	N	**5.6**		**4.1**		**2.0**	J
Former Fire Station	FTGD-FFS-01	FTGD-FFS-01-GW(050120)	05/01/2020	N	**6,000**	DJ	**200**		**44**	
Former Fire Training Area	FTGD-FFTA-01	FTGD-FFTA-01-GW(043020)	04/30/2020	N	**47**		**2.5**	J	3.6	U
	FTGD-FFTA-02	FTGD-FFTA-02-GW(042920)	04/29/2020	N	**73**		**6.8**		3.8	U
SWMU 009	FTGD-009-EW00907	FTGD-009-EW00907-GW-042220	04/22/2020	N	3.8	U	3.8	U	3.8	U
	FTGD-009-MW00901	FTGD-009-MW00901-GW-042820	04/28/2020	N	3.4	U	3.4	U	3.4	U
	FTGD-009-MW00902	FTGD-009-MW00902-GW-042920	04/29/2020	N	3.4	U	3.4	U	3.4	U
	FTGD-009-MW00907	FTGD-009-MW00907-GW-042320	04/23/2020	N	**130**		**64**		**7.3**	
	FTGD-009-MW00942	FTGD-009-MW00942-GW	04/21/2020	N	**5.6**		**3.1**	J	3.8	U
SWMU 020/ SWMU 031	FTGD-020-1	FTGD-020-01-GW-042820	04/28/2020	N	**4.6**		**3.8**		3.6	U
	FTGD-031-1	FTGD-031-01-GW-042820	04/28/2020	N	**5.2**		**6.4**		3.5	U
Soil Erosion Lake	FTGD-SEL-01	FTGD-SEL-01-GW(050520)	05/05/2020	N	**4.3**		3.7	U	3.7	U
FTGD-030 WWTP	FTGD-030-1	FTGD-030-01-GW(050420)	05/04/2020	N	**570**		**510**		**140**	
	FTGD-030-2	FTGD-030-02-GW(050520)	05/05/2020	N	**830**		**300**		**60**	
FTGD-029 Gibson Road Landfill	FTGD-029-GWC1A	FTGD-029-GWC1A-GW-042120	04/21/2020	N	**5.6**		**210**		**21**	
	FTGD-029-GWC5	FTGD-029-GWC5-GW-042220	04/22/2020	N	**12**		**32**		**4.9**	
	FTGD-029-GWC6	FTGD-029-GWC6-GW-042220	04/22/2020	N	**3.8**		**68**		**15**	

Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Grey shaded values indicate the result was detected greater than the Office of the Secretary of Defense (OSD) risk screening levels (OSD 2021).

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
FD = field duplicate sample
FTGD = Fort Gordon
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFBS = perfluorobutane sulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonic acid
Qual = qualifier
SWMU = Solid Waste Management Unit
WWTP = Wastewater Treatment Plant

Qualifiers:

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.

Table 7-2 - Soil PFOS, PFOA, and PFBS Analytical Results
USACE PFAS Preliminary Assessment/Site Inspection
Fort Gordon, Georgia

AOPI	Location	Sample/Parent Identification	Sample Date	Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
				OSD Risk Screening Level - Industrial/ Commercial	1.6		1.6		25	
				OSD Risk Screening Level - Residential	0.13		0.13		1.9	
				Sample Type	Result	Qual	Result	Qual	Result	Qual
FTGD-030 WWTP	FTGD-030-1	FTGD-030-01-SO(0-2)042720	04/27/2020	N	**0.0066**		0.001	U	0.001	U
		FTGD-030-01-SO(4-5)042720	04/27/2020	N	**0.00067**	J	0.00088	U	0.00088	U
	FTGD-030-2	FTGD-030-02-SO(0-2)042720	04/27/2020	N	**0.0085**		**0.0017**		0.0011	U
		FTGD-030-02-SO(4-5)042720	04/27/2020	N	**0.0073**		**0.0024**		0.0012	U
Former Fire Station	FTGD-FFS-01	FTGD-FFS-01-SO(0-2)042720	04/27/2020	N	**0.0095**		0.0011	U	0.0011	U
		FTGD-FFS-01-SO(4-5)042720	04/27/2020	N	**0.022**		0.0011	U	0.0011	U
Fire Station 2	FTGD-FS2-01	FTGD-FS2-01-SO(0-2)042720	04/27/2020	N	0.001	U	0.001	U	0.001	U
	FTGD-FS2-02	FTGD-FD-01-SO(042720) / FTGD-FS2-02-SO(0-2)042720	04/27/2020	FD	0.0012	U	0.0012	U	0.0012	U
		FTGD-FS2-02-SO(0-2)042720	04/27/2020	N	0.00098	U	0.00098	U	0.00098	U

Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Soil data collected from less than 2 feet bgs are compared to the Office of the Secretary of Defense (OSD) risk screening levels for both residential and industrial/commercial scenario and samples collected from greater than 2 feet are compared to the industrial/commercial risk screening levels only (OSD 2021). No concentrations of PFBS, PFOS, or PFOA exceeded the OSD risk screening levels.

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
FD = field duplicate sample
FTGD = Fort Gordon
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFBS = perfluorobutane sulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonic acid
Qual = qualifier
WWTP = Wastewater Treatment Plant

Qualifiers:

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

Table 7-3 - Sediment PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Gordon, Georgia

AOPI	Location	Sample/Parent Identification	Sample Date	Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
				Sample Type	Result	Qual	Result	Qual	Result	Qual
Soil Erosion Lake	FTGD-SEL-01	FTGD-FD-01-SE-042220 / FTGD-SEL-01-SE-042220	04/22/2020	FD	0.0030	U	0.0030	U	0.0030	U
		FTGD-SEL-01-SE-042220	04/22/2020	N	0.0039	U	0.0039	U	0.0039	U
	FTGD-SEL-02	FTGD-SEL-02-SE-042220	04/22/2020	N	0.0037	U	0.0037	U	0.0037	U
	FTGD-SEL-03	FTGD-SEL-03-SE-042220	04/22/2020	N	**0.0014**	J	0.0028	U	0.0028	U

Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
FD = field duplicate sample
FTGD = Fort Gordon
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFBS = perfluorobutane sulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonic acid
Qual = qualifier

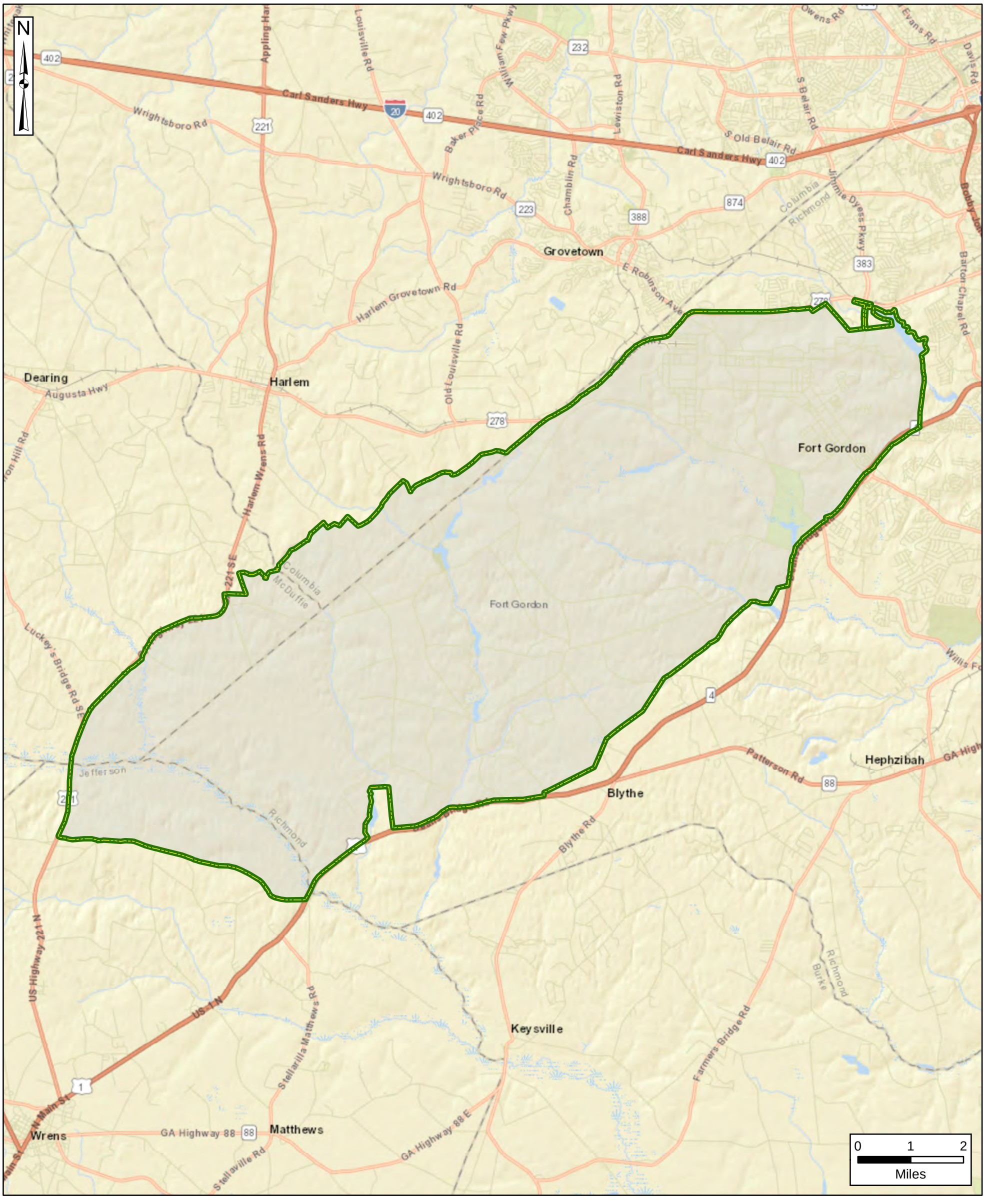
Qualifiers:

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

FIGURES

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 2-1
Site Location



Installation Boundary

Data Sources:
USACE, GIS Data, 2002
ESRI, ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 2-2
Site Layout

- Installation Boundary
- Training Area
- Cantonment Area
- Other Non-Operational Area
- Surface Water Flow Direction
- Assumed Groundwater Flow Direction
- River/Stream (Perennial)
- River/Stream (Intermittent)
- Water Body
- Installation Drinking Water Well (Permitted)
- Installation Drinking Water Well (Non-Permitted)

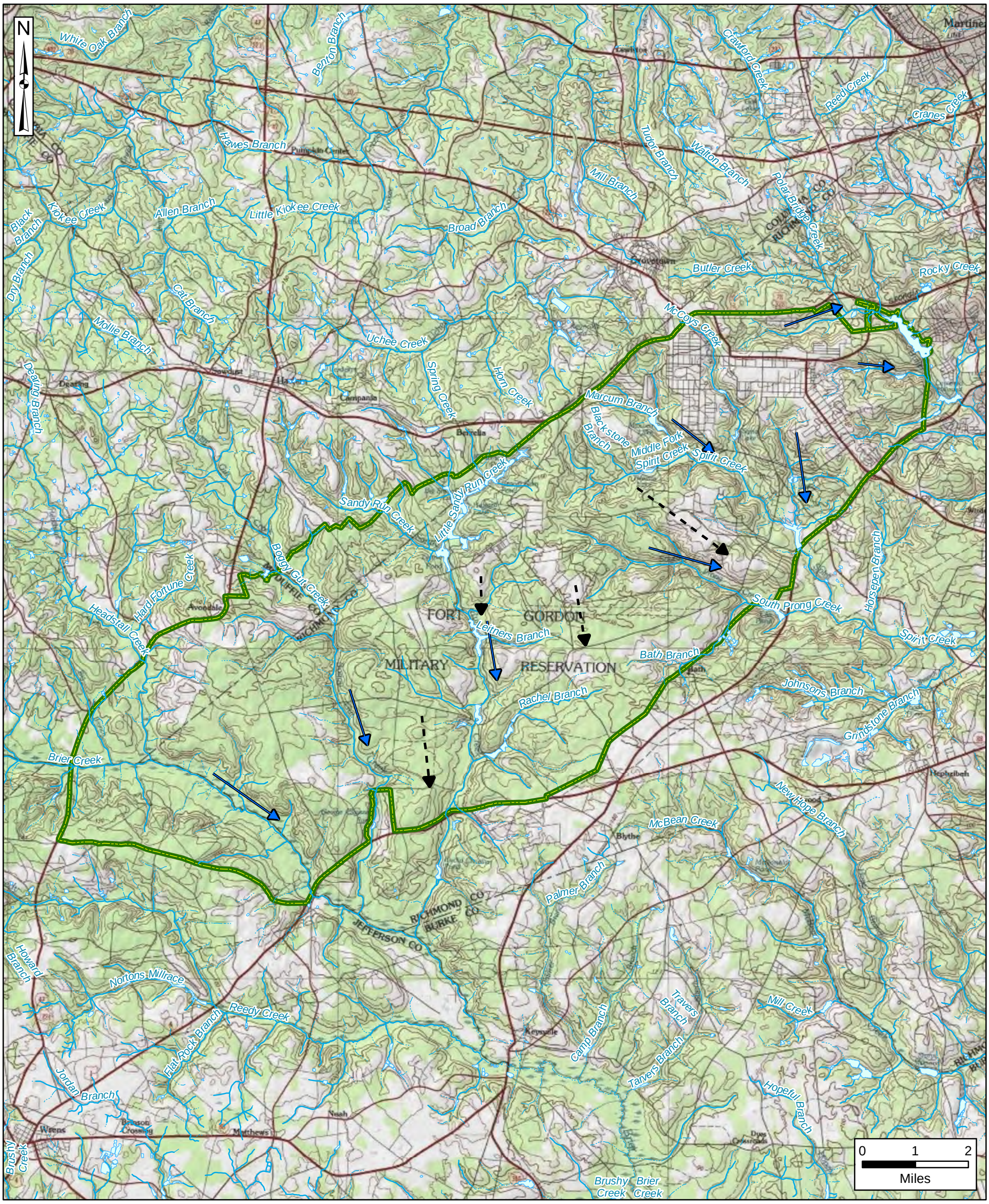
RNCOA = Regimental Noncommissioned Officers Academy

Data Sources:
USACE, GIS Data, 2002
USGS, NHD Data, 2019
Fort Gordon, Well Data, 2020
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 2-3
Topographic Map

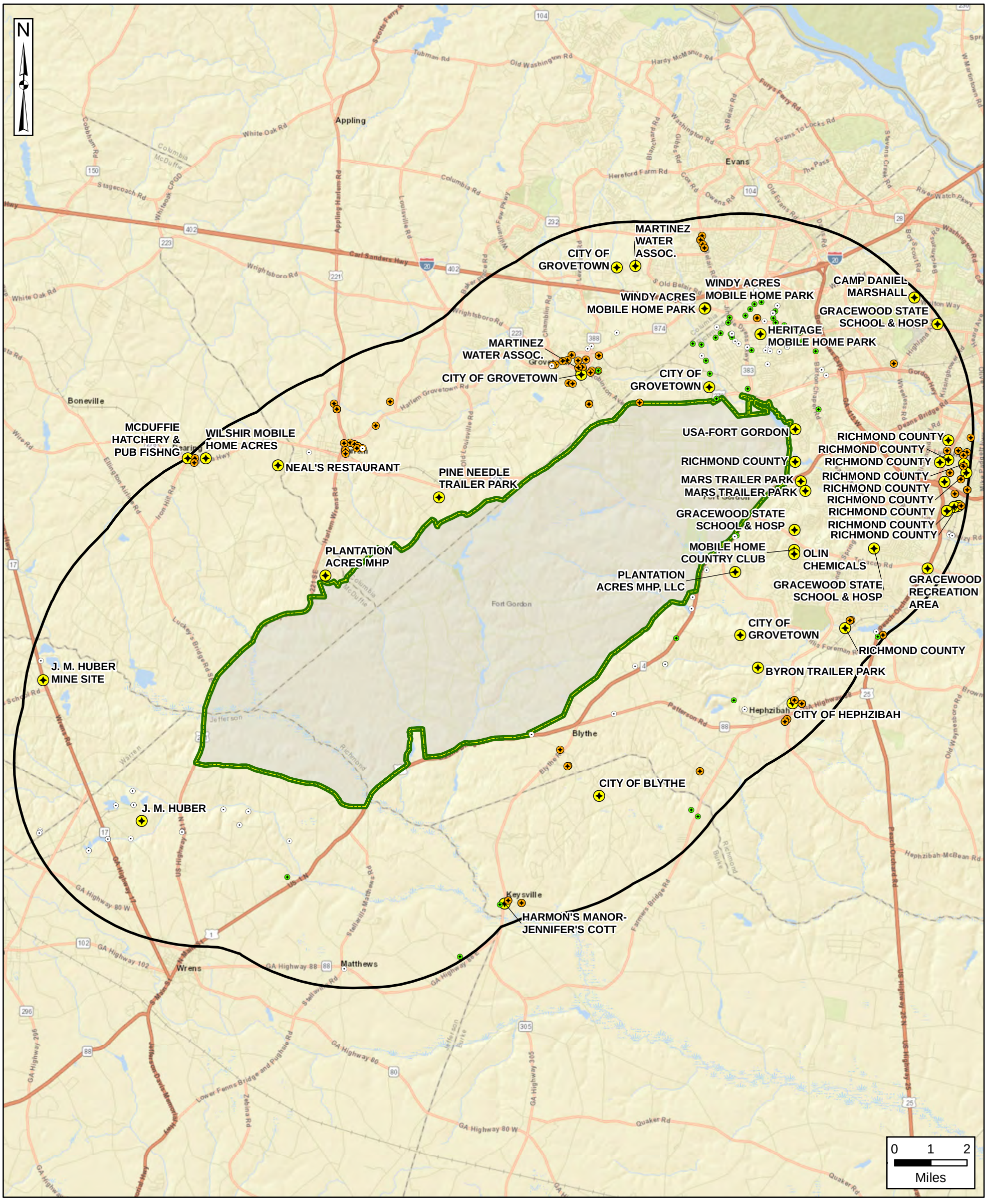


Data Sources:
USACE, GIS Data, 2002
USGS, NHD Data, 2019
ESRI, ArcGIS Online, Topo Map

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 2-4
Off-Post Potable Wells



Installation Boundary

5-Mile Radius

Public Water Supply System Well

Other Public Supply Well

Domestic Well

Other Designated Use Well

Notes:

Public Water Supply System Well data from the Federal Reporting Data System and includes water systems which provides water to at least 25 people for at least 60 days annually.

Other public supply wells include institutional, municipal, and public supply wells identified in state databases.

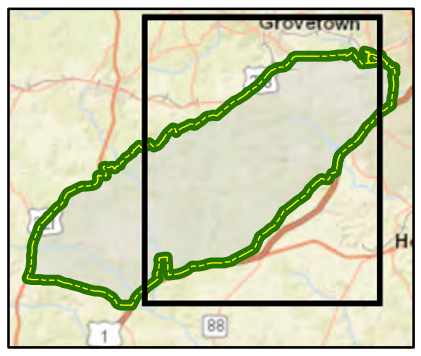
Other designated use wells include commercial, industrial, and irrigation wells, as well as wells with unknown use.

Data Sources:
EDR, Well Data, 2018
ESRI, ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 5-2
AOPI Locations



Installation Boundary
AOPI
River/Stream (Perennial)
River/Stream (Intermittent)
Water Body
Surface Water Flow Direction
Assumed Groundwater Flow Direction
Installation Drinking Water Well (Permitted)
Installation Drinking Water Well (Non-Permitted)

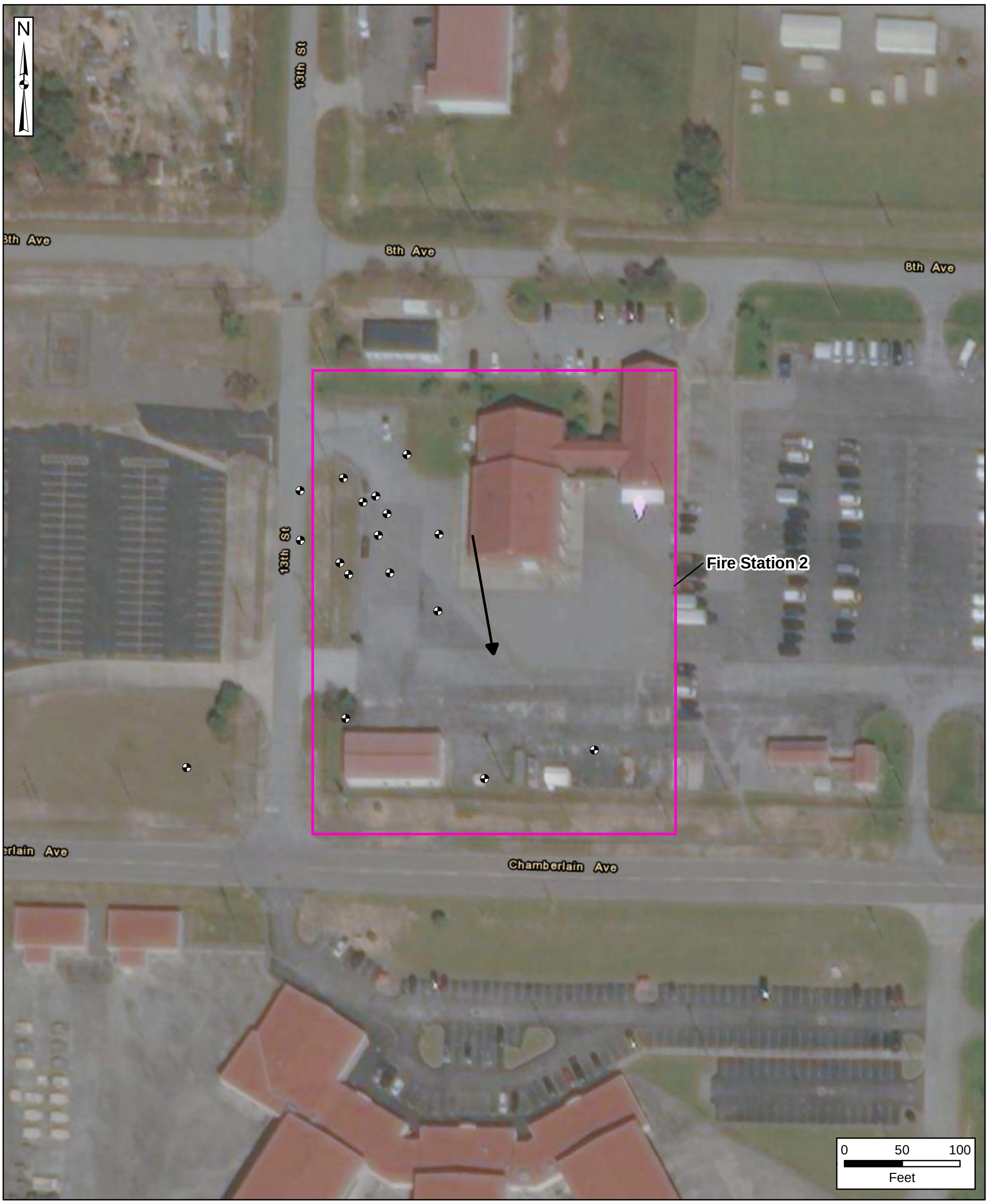
AOPI = area of potential interest
RNCOA = Regimental Noncommissioned Officers Academy
SWMU = Solid Waste Management Unit

Data Sources:
USACE, GIS Data, 2002
EDR, Well Data, 2018
USGS, NHD Data, 2019
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 5-3
Aerial Photo of Fire Station 2



Installation Boundary

AOPI

Monitoring Well

Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
URS, *Corrective Action Plan Part B, Sixth Monitoring Only Report, Site 15: Former UST*, Well Locations, 2019;
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 5-4
Aerial Photo of Former Fire Station

Installation Boundary
AOPI
Historical Building
Assumed Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

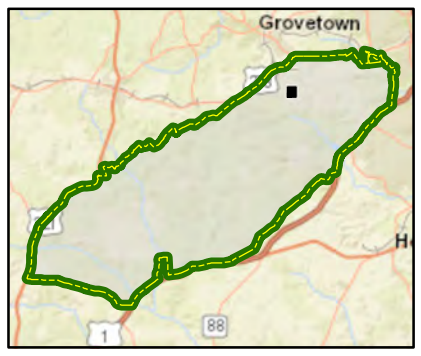


Figure 5-5
Aerial Photo of Former Fire Training Area

Installation Boundary

AOPI

Assumed Groundwater Flow Direction

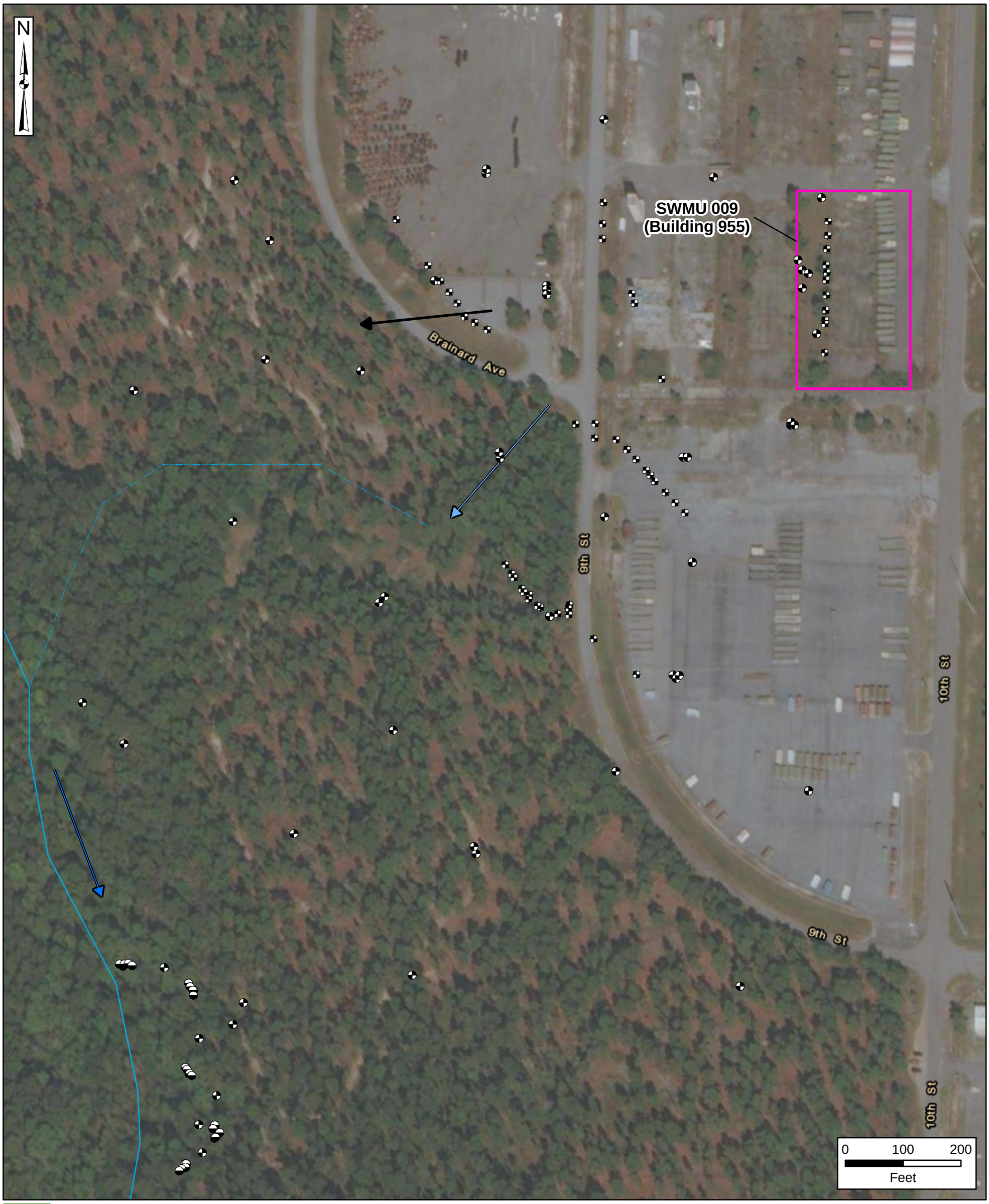
AOPI = area of potential interest

Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 5-6
Aerial Photo of SWMU 009 (Building 955)



Installation Boundary
AOPI
River/Stream (Perennial)
River/Stream (Intermittent)
Shallow Groundwater Flow Direction
Intermediate Groundwater Flow Direction
Surface Water Flow Direction
Monitoring Well
Extraction Well
Injection Well

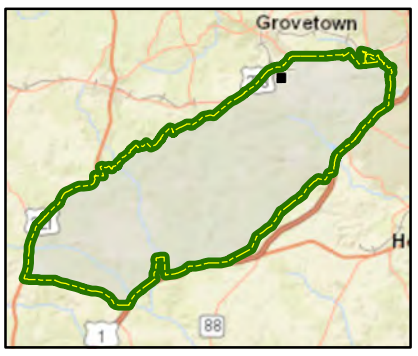
AOPI = area of potential interest
SWMU = solid waste management unit

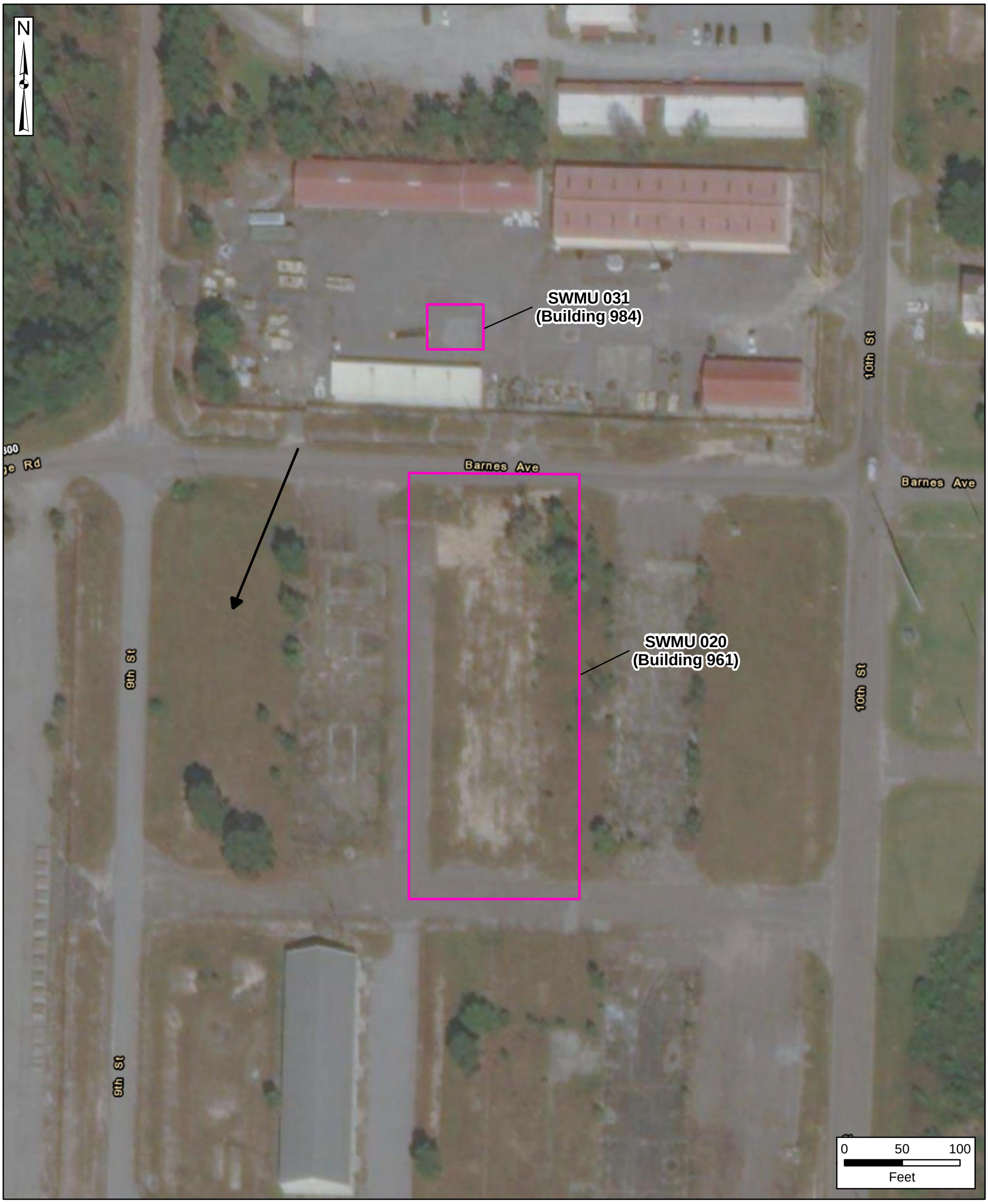
Data Sources:
Arcadis, *Corrective Action Plan Progress Report #10 for the Building 955 Leach Field (SWMU 009)*, Well Locations, 2019;
USGS, NHD Data, 2019;
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 5-7
Aerial Photo of SWMU 020 (Building 961)
and SWMU 031 (Building 984)





Installation Boundary

AOPI

Groundwater Flow Direction

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

Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

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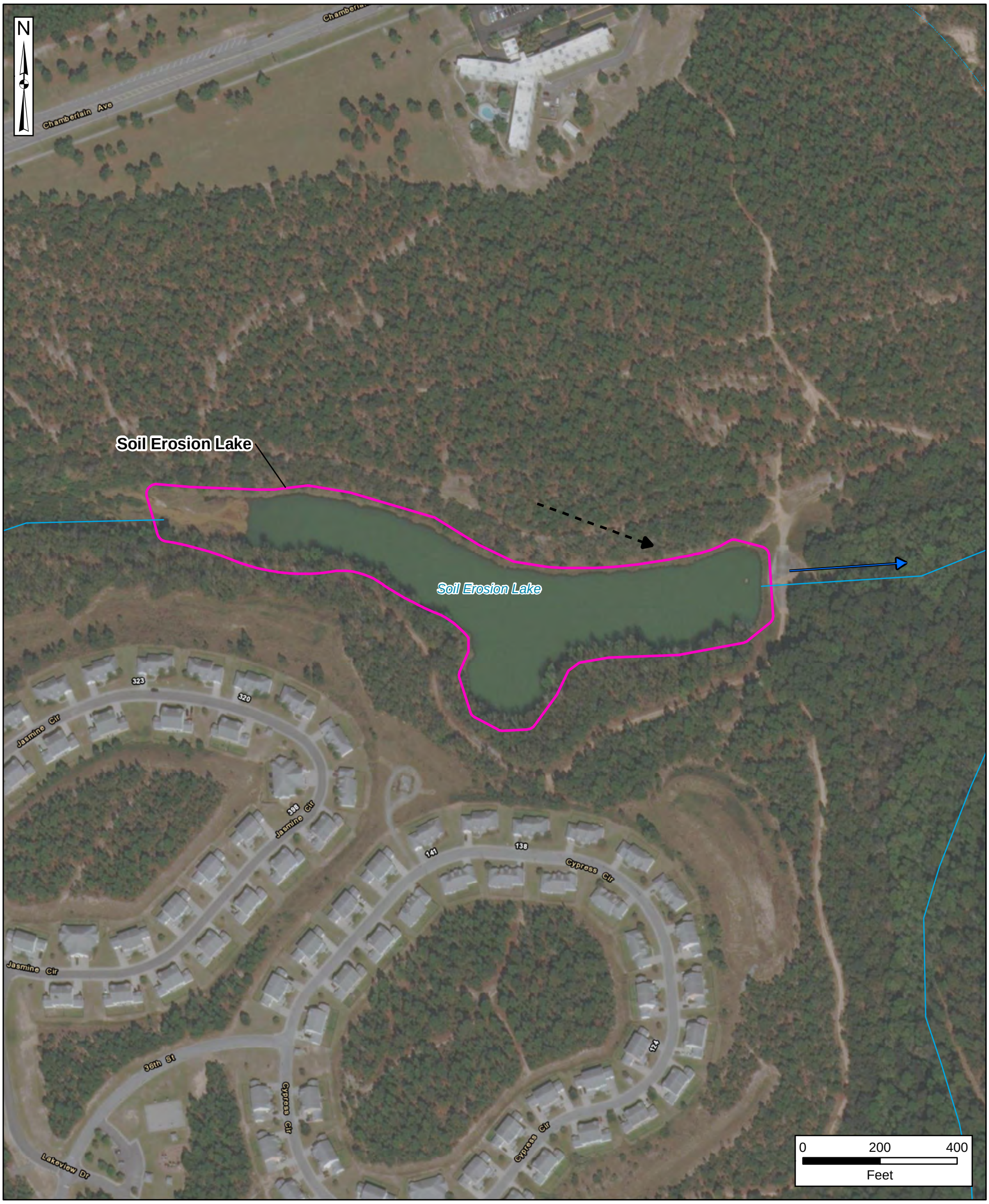
Fort Gordon, GA

Figure 5-8
Aerial Photo of Soil Erosion Lake



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

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 17 North

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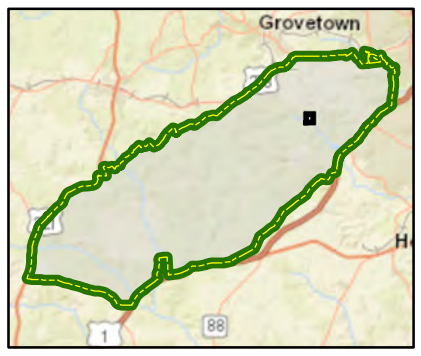
Fort Gordon, GA

Figure 5-9
Aerial Photo of FTGD-030
Wastewater Treatment Plant



Installation Boundary
AOPI
River/Stream (Perennial)
Surface Water Flow Direction
Assumed Groundwater Flow Direction

AOPI = area of potential interest

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

Coordinate System:
WGS 1984, UTM Zone 17 North

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Fort Gordon, GA

Figure 5-10
Aerial Photo of FTGD-029 Gibson Road Landfill

Installation Boundary
AOPI
River/Stream (Perennial)
Water Body
Groundwater Flow Direction
Monitoring Well

AOPI = area of potential interest

Data Sources:
EMA, Gibson Road Landfill Potentiometric Surface Map, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

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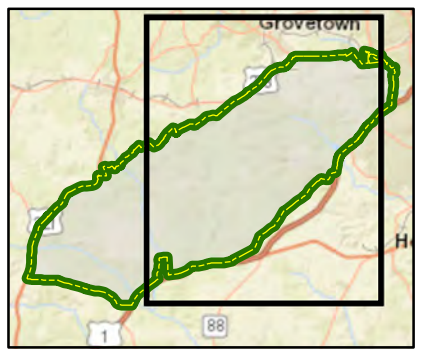
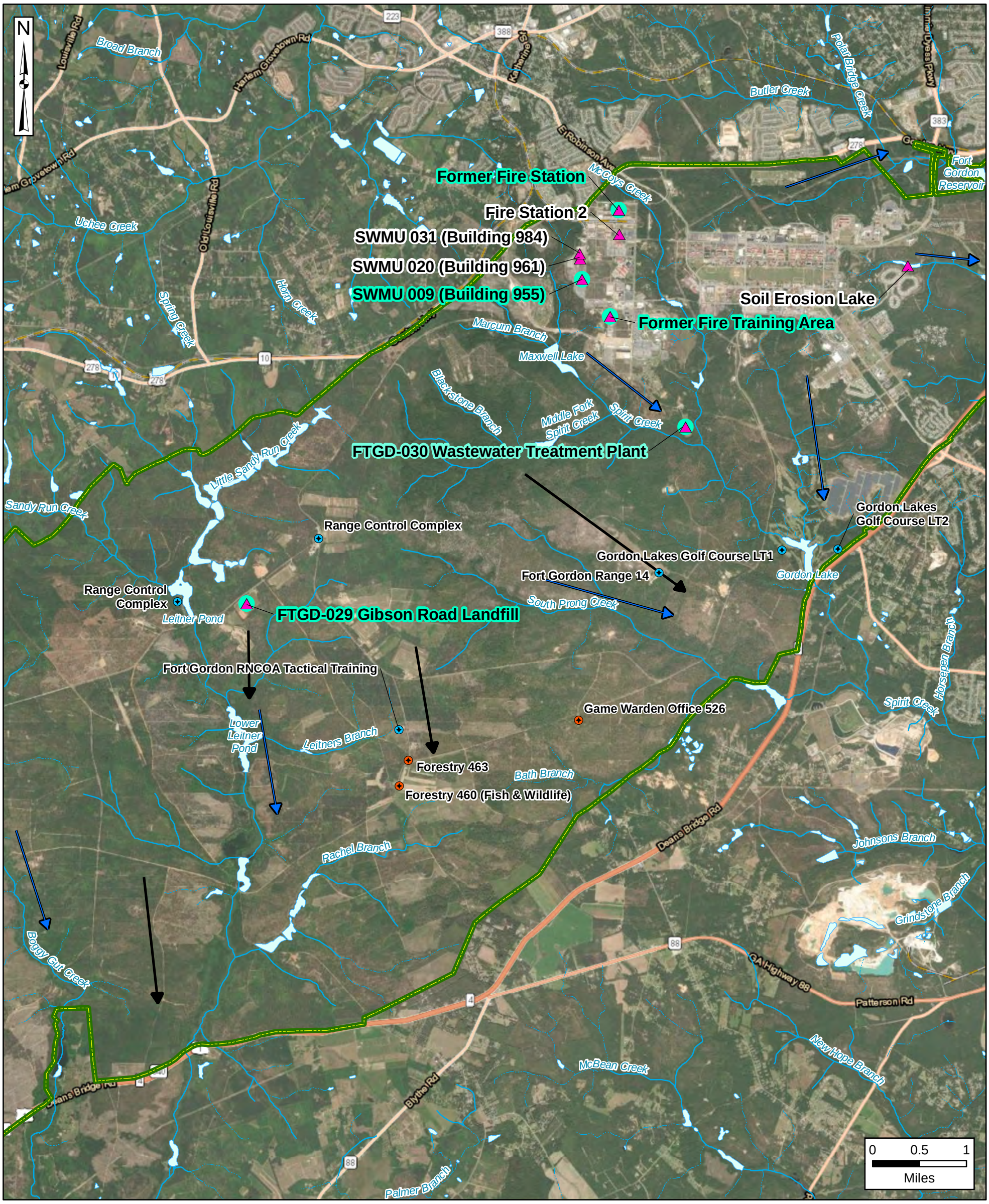
Fort Gordon, GA

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





Installation Boundary
AOPI Location
AOPI with OSD Risk Screening Level Exceedance
River/Stream (Perennial)
River/Stream (Intermittent)
Water Body
Surface Water Flow Direction
Groundwater Flow Direction
Installation Drinking Water Well (Permitted)
Installation Drinking Water Well (Non-Permitted)

AOPI = area of potential interest
OSD = Office of the Secretary of Defense
RNCOA = Regimental Noncommissioned Officers Academy
SWMU = Solid Waste Management Unit

Data Sources:
USACE, GIS Data, 2002
EDR, Well Data, 2018
USGS, NHD Data, 2019
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

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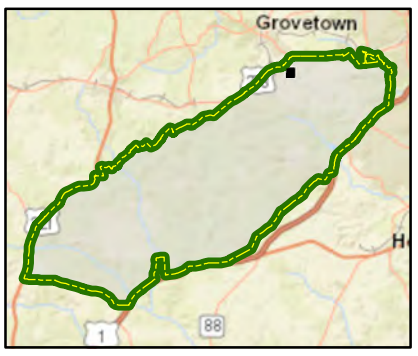
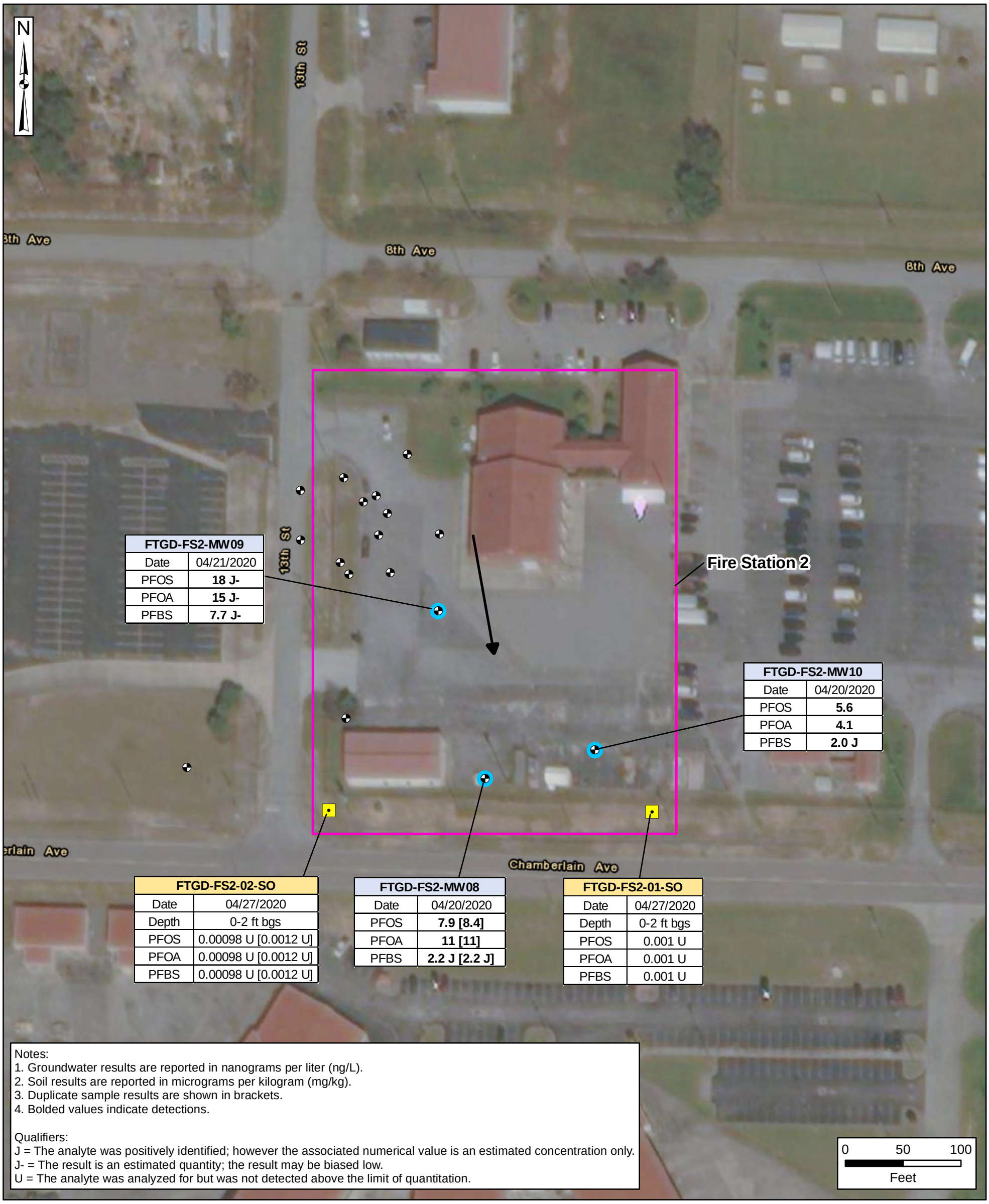
Fort Gordon, GA

Figure 7-2
Fire Station 2
PFOS, PFOA, and PFBS Analytical Results





FTGD-FS2-MW09	
Date	04/21/2020
PFOS	**18 J-**
PFOA	**15 J-**
PFBS	**7.7 J-**

FTGD-FS2-MW10	
Date	04/20/2020
PFOS	**5.6**
PFOA	**4.1**
PFBS	**2.0 J**

FTGD-FS2-02-SO	
Date	04/27/2020
Depth	0-2 ft bgs
PFOS	0.00098 U [0.0012 U]
PFOA	0.00098 U [0.0012 U]
PFBS	0.00098 U [0.0012 U]

FTGD-FS2-MW08	
Date	04/20/2020
PFOS	**7.9 [8.4]**
PFOA	**11 [11]**
PFBS	**2.2 J [2.2 J]**

FTGD-FS2-01-SO	
Date	04/27/2020
Depth	0-2 ft bgs
PFOS	0.001 U
PFOA	0.001 U
PFBS	0.001 U

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in micrograms per kilogram (mg/kg).
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.
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.

Installation Boundary
AOPI
Monitoring Well
Groundwater Flow Direction
Surface Soil Sampling Location
Groundwater Sampling Location (Existing Monitoring Well)

AOPI = area of potential interest
ft bgs = feet below ground surface
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
URS, *Corrective Action Plan Part B, Sixth Monitoring Only Report, Site 15: Former UST*, Well Locations, 2019;
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 7-3
Former Fire Station
PFOS, PFOA, and PFBS Analytical Results

N

13th St

Former Fire Station

11th Ave

1300

11th Ave

11th

FTGD-FFS-01-SO		
Date	04/27/2020	
Depth	0-2 ft bgs	4-5 ft bgs
PFOS	**0.0095**	**0.022**
PFOA	0.0011 U	0.0011 U
PFBS	0.0011 U	0.0011 U

FTGD-FFS-01-GW	
Date	05/01/2020
PFOS	**6,000 DJ**
PFOA	**200**
PFBS	**44**

13th St

1300

10th

0 50 100
Feet

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in micrograms per kilogram (mg/kg).
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 analyte was analyzed at dilution and the result is an estimated quantity.
U = The analyte was analyzed for but the result was not detected above the limit of quantitation.

Installation Boundary

AOPI

Historical Building

Assumed Groundwater Flow Direction

Rotosonic Soil Boring and Grab Groundwater Sample Location

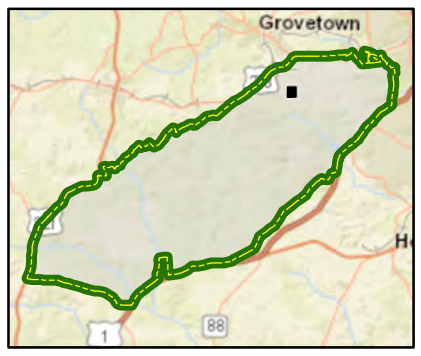
AOPI = area of potential interest
ft bgs = feet below ground surface
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

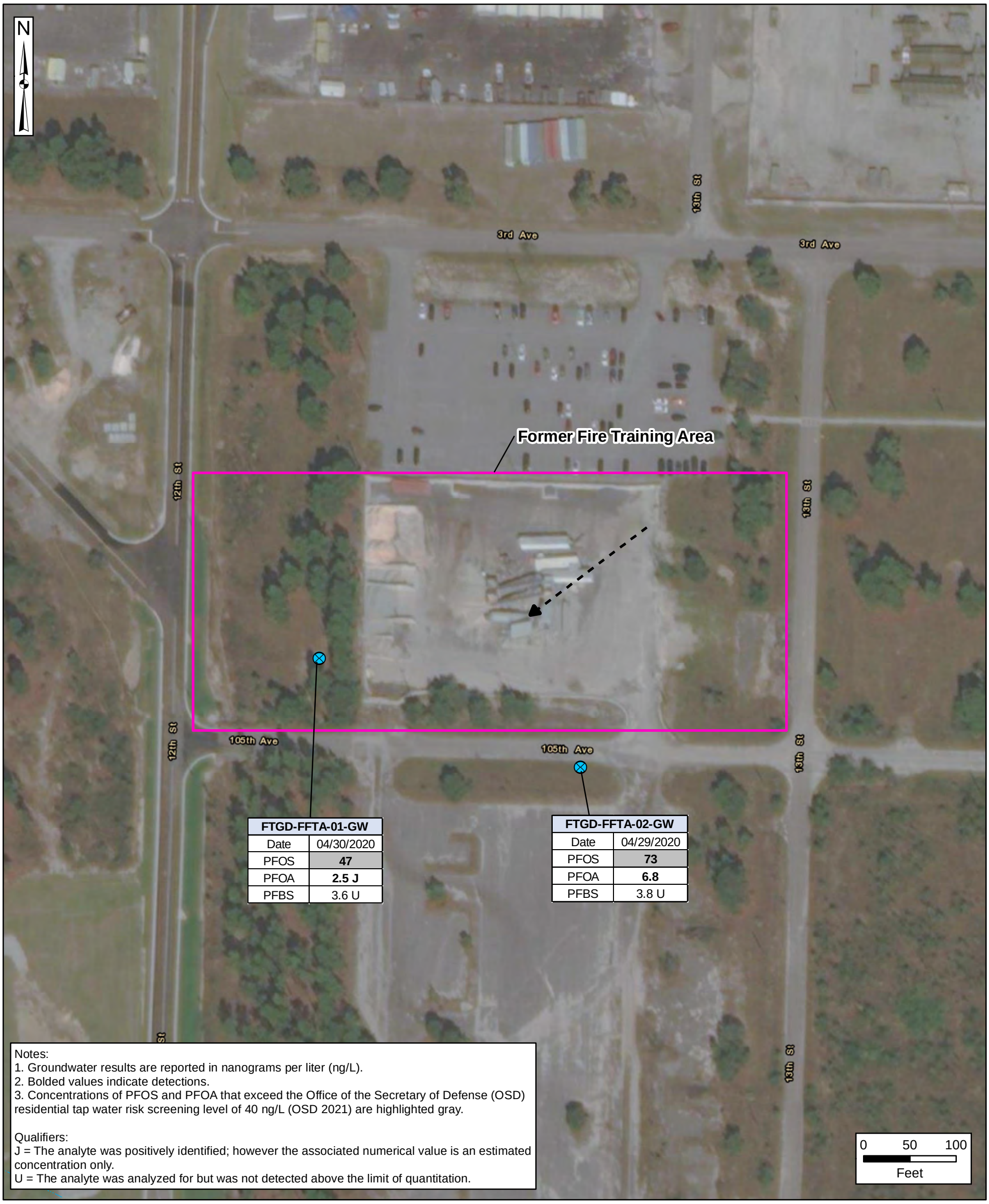
Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

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





FTGD-FFTA-01-GW	
Date	04/30/2020
PFOS	**47**
PFOA	**2.5 J**
PFBS	3.6 U

FTGD-FFTA-02-GW	
Date	04/29/2020
PFOS	**73**
PFOA	**6.8**
PFBS	3.8 U

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Bolded values indicate detections.
3. 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.

Installation Boundary

AOPI

Assumed Groundwater Flow Direction

Rotosonic Grab Groundwater Sample Location

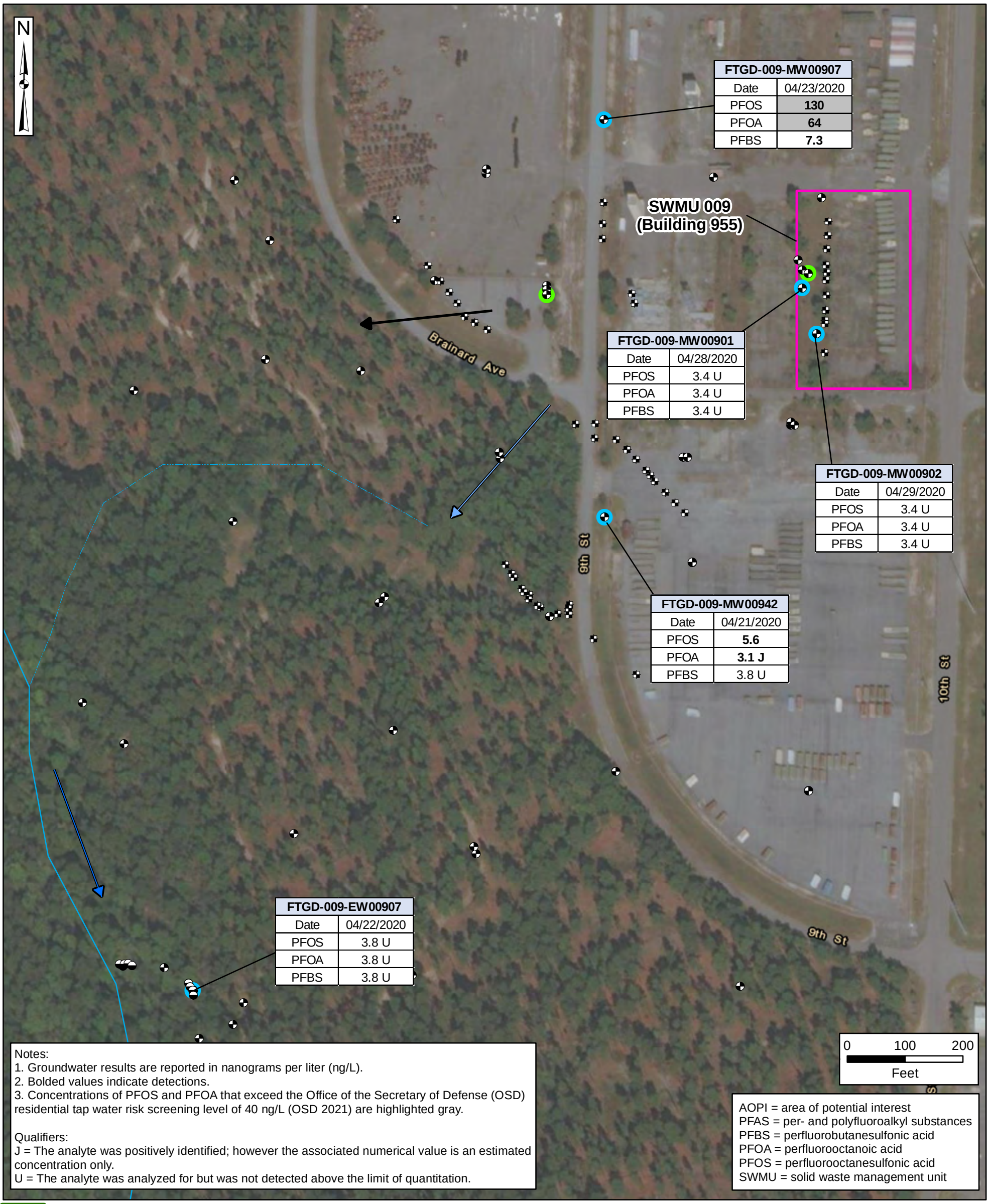
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 7-5
SWMU 009 (Building 955)
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Bolded values indicate detections.
3. 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.

AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SWMU = solid waste management unit

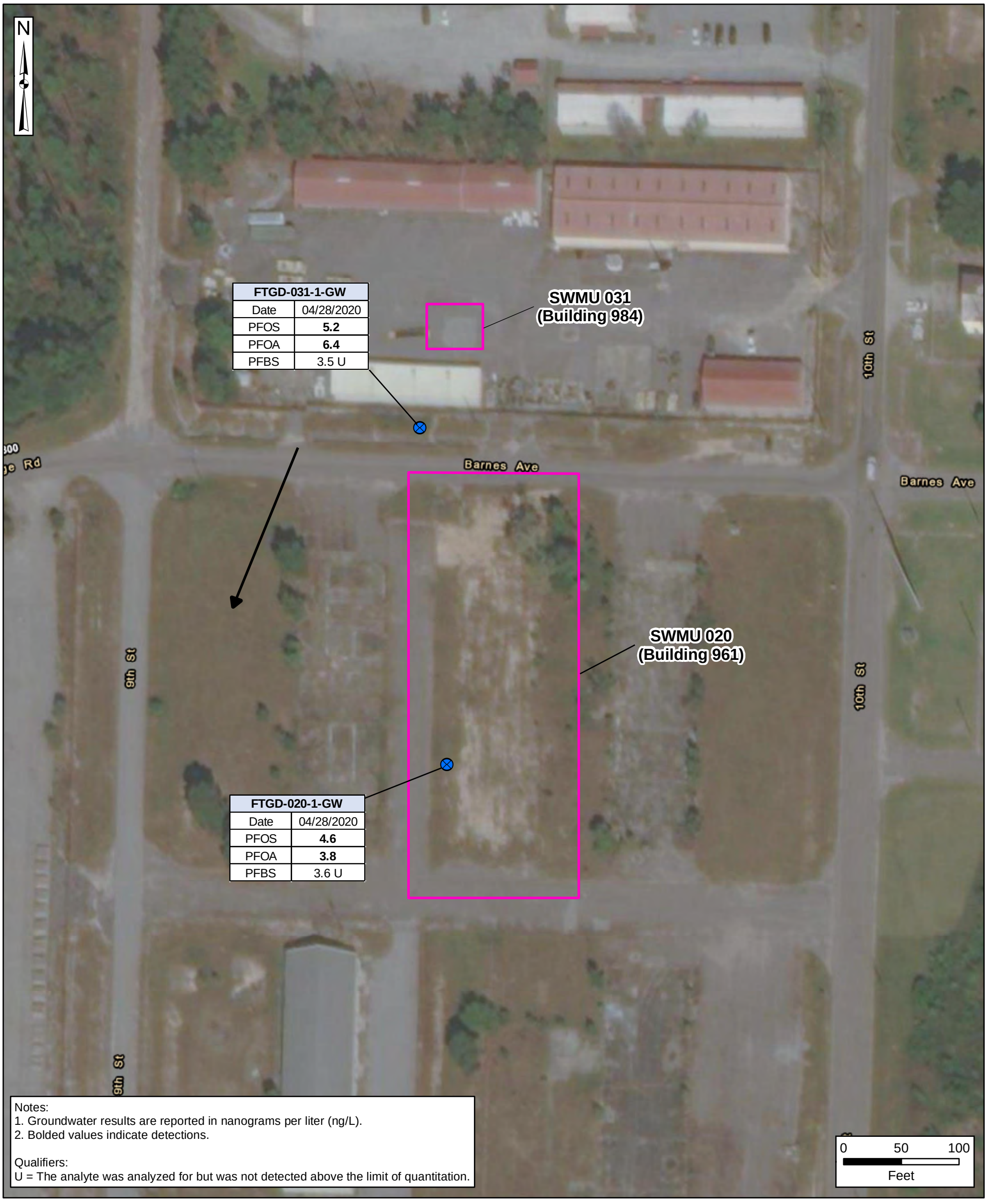
- Installation Boundary
- AOPI
- River/Stream (Perennial)
- River/Stream (Intermittent)
- Shallow Groundwater Flow Direction
- Intermediate Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well
- Extraction Well
- Injection Well
- Groundwater Sampling Location (Existing Well)
- Proposed Groundwater Sampling Location (Existing Well - Insufficient water for sampling)

Data Sources:
Arcadis, *Corrective Action Plan Progress Report #10 for the Building 955 Leach Field (SWMU 009)*, Well Locations, 2019;
USGS, NHD Data, 2019;
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 7-6
SWMU 020 (Building 961) and SWMU 031 (Building 984)
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Bolded values indicate detections.

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

Installation Boundary

AOPI

Groundwater Flow Direction

Rotosonic Grab Groundwater Sample Location

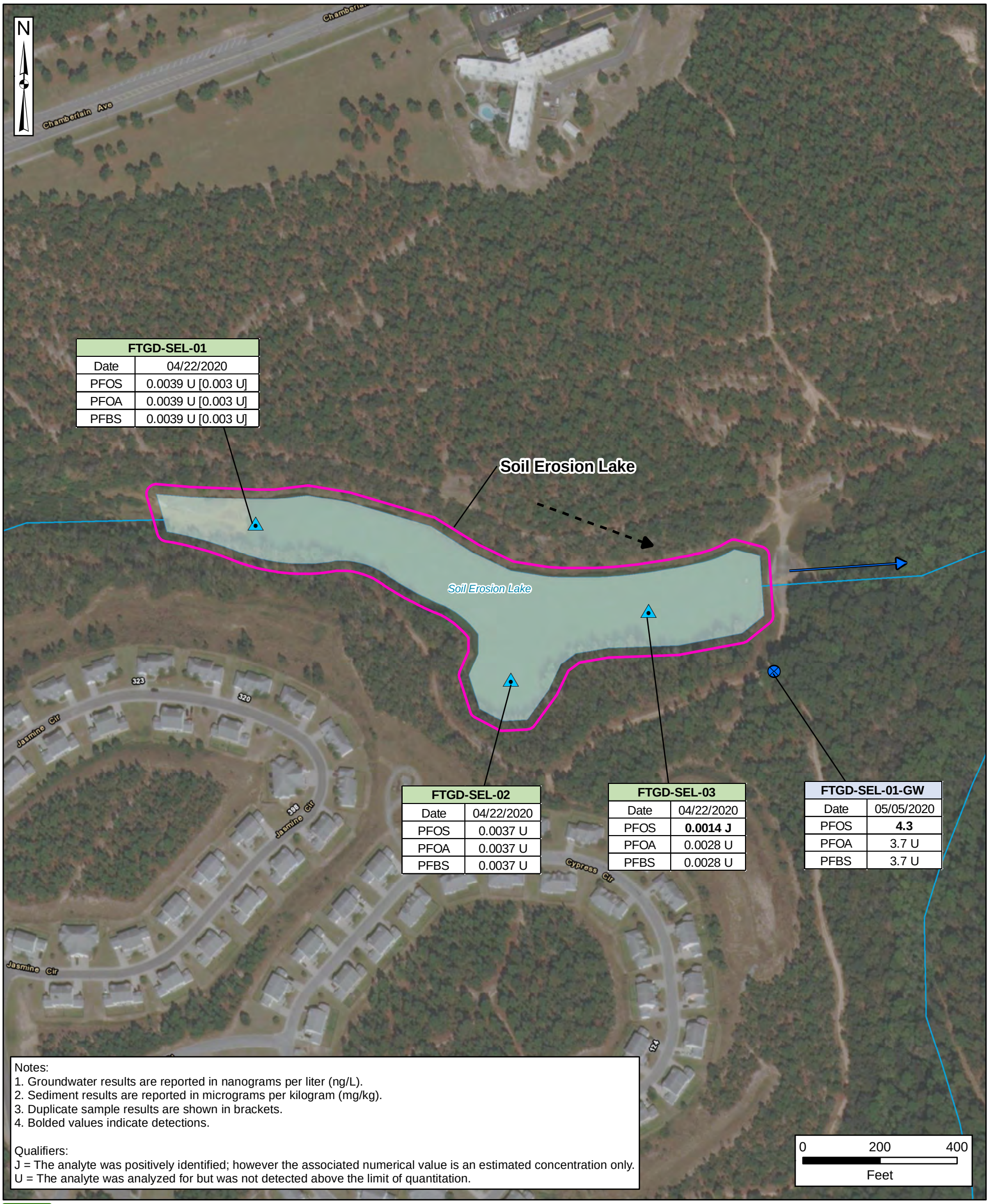
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SWMU = solid waste management unit

Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 7-7
Soil Erosion Lake
PFOS, PFOA, and PFBS Analytical Results



FTGD-SEL-01	
Date	04/22/2020
PFOS	0.0039 U [0.003 U]
PFOA	0.0039 U [0.003 U]
PFBS	0.0039 U [0.003 U]

FTGD-SEL-02	
Date	04/22/2020
PFOS	0.0037 U
PFOA	0.0037 U
PFBS	0.0037 U

FTGD-SEL-03	
Date	04/22/2020
PFOS	**0.0014 J**
PFOA	0.0028 U
PFBS	0.0028 U

FTGD-SEL-01-GW	
Date	05/05/2020
PFOS	**4.3**
PFOA	3.7 U
PFBS	3.7 U

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Sediment results are reported in micrograms per kilogram (mg/kg).
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.

- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Water Body
- Surface Water Flow Direction
- Assumed Groundwater Flow Direction
- Rotosonic Grab Groundwater Sample Location
- Sediment Sample Location

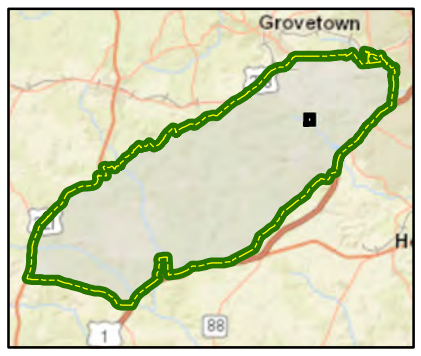
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

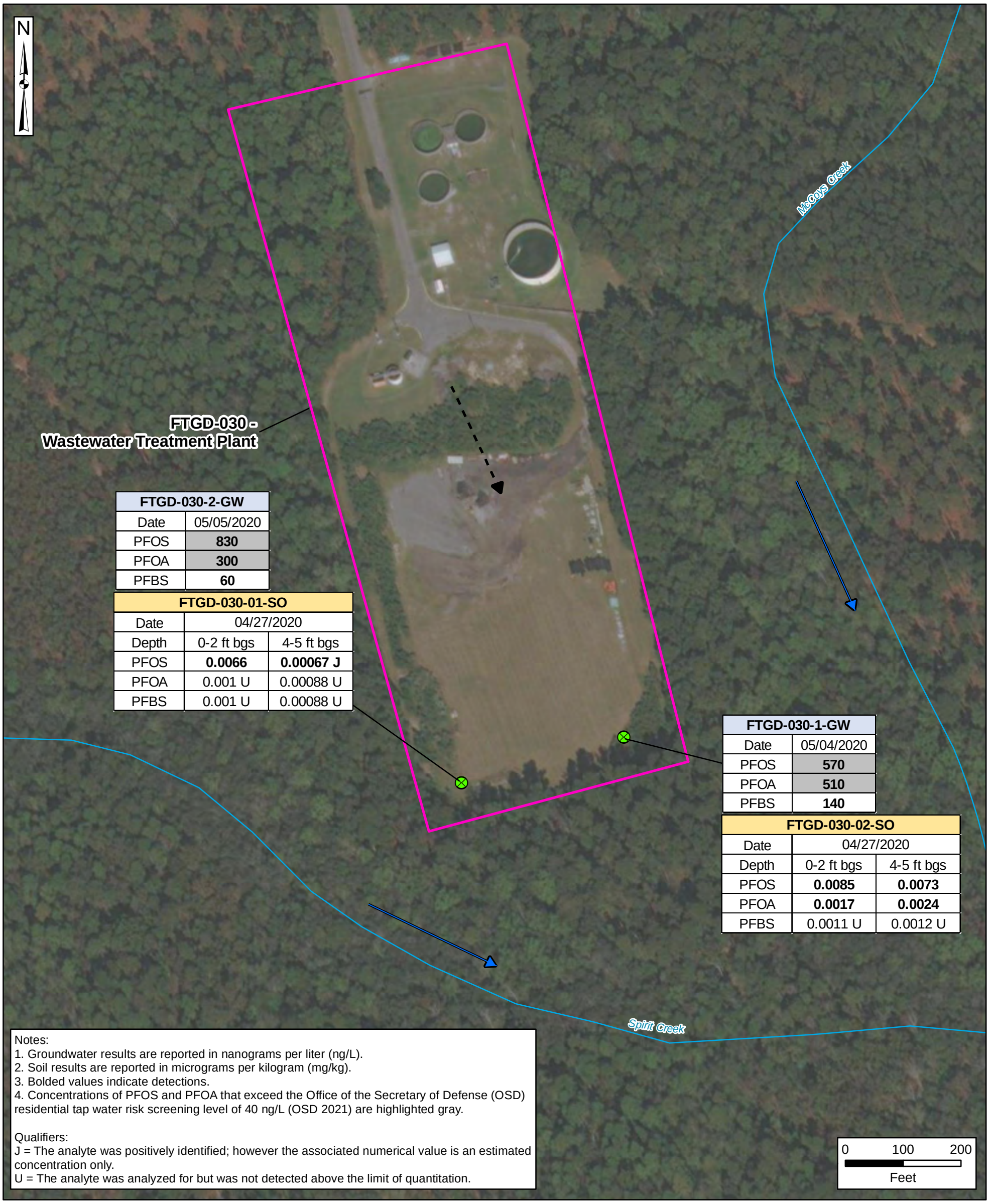
Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 7-8
FTGD-030 Wastewater Treatment Plant
PFOS, PFOA, and PFBS Analytical Results





FTGD-030-2-GW	
Date	05/05/2020
PFOS	**830**
PFOA	**300**
PFBS	**60**

FTGD-030-01-SO		
Date	04/27/2020	
Depth	0-2 ft bgs	4-5 ft bgs
PFOS	**0.0066**	**0.00067 J**
PFOA	0.001 U	0.00088 U
PFBS	0.001 U	0.00088 U

FTGD-030-1-GW	
Date	05/04/2020
PFOS	**570**
PFOA	**510**
PFBS	**140**

FTGD-030-02-SO		
Date	04/27/2020	
Depth	0-2 ft bgs	4-5 ft bgs
PFOS	**0.0085**	**0.0073**
PFOA	**0.0017**	**0.0024**
PFBS	0.0011 U	0.0012 U

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in micrograms per kilogram (mg/kg).
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.

Installation Boundary
AOPI
River/Stream (Perennial)
Surface Water Flow Direction
Assumed Groundwater Flow Direction
Rotosonic Soil Boring and Grab Groundwater Sample Location

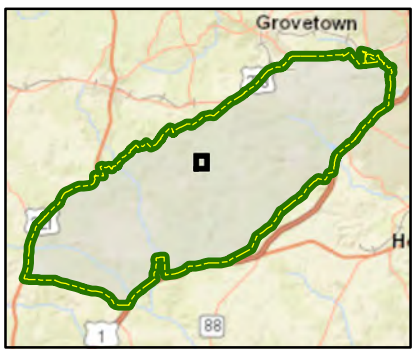
AOPI = area of potential interest
ft bgs = feet below ground surface
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

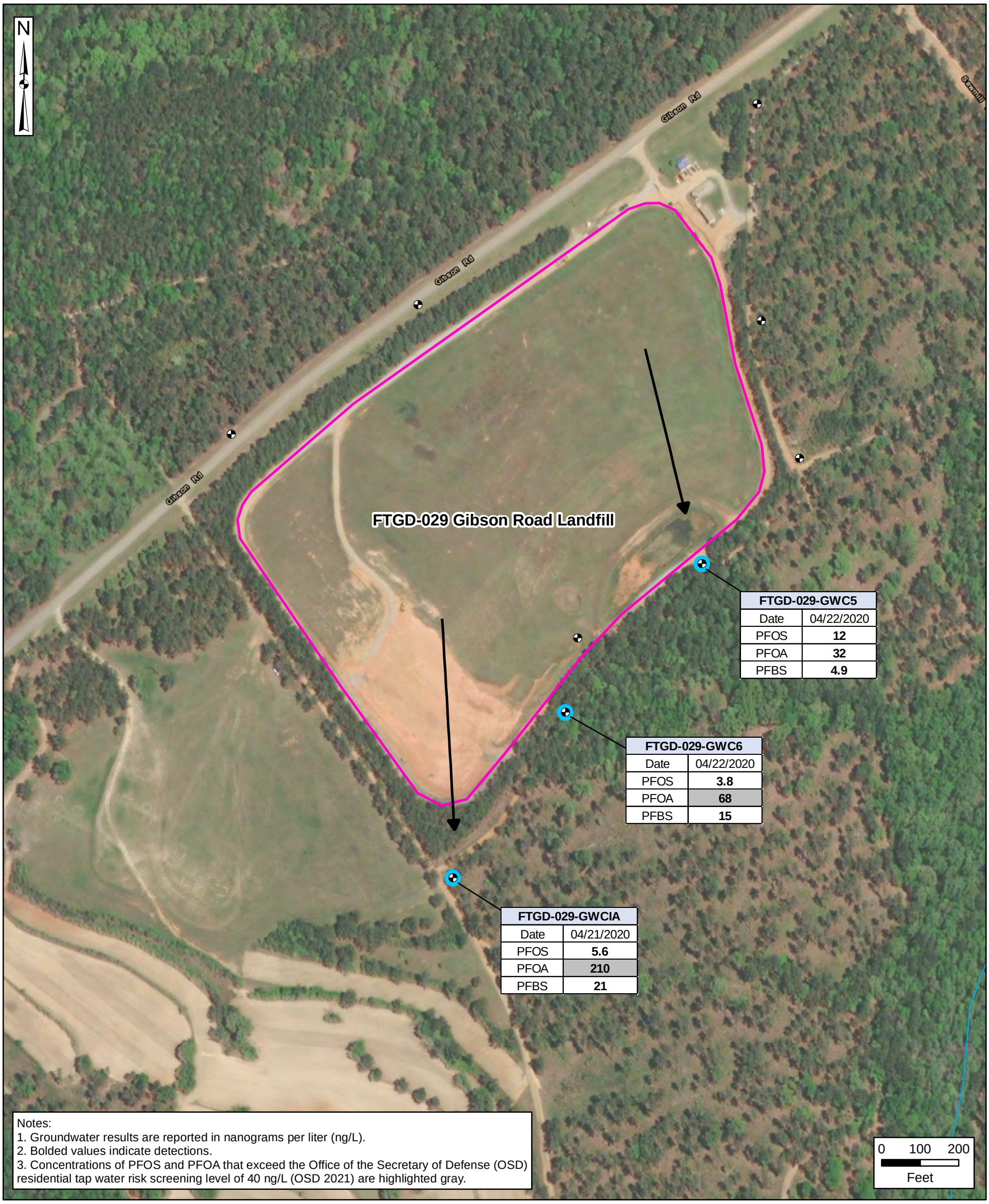
Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, GA

Figure 7-9
FTGD-029 Gibson Road Landfill
PFOS, PFOA, and PFBS Analytical Results





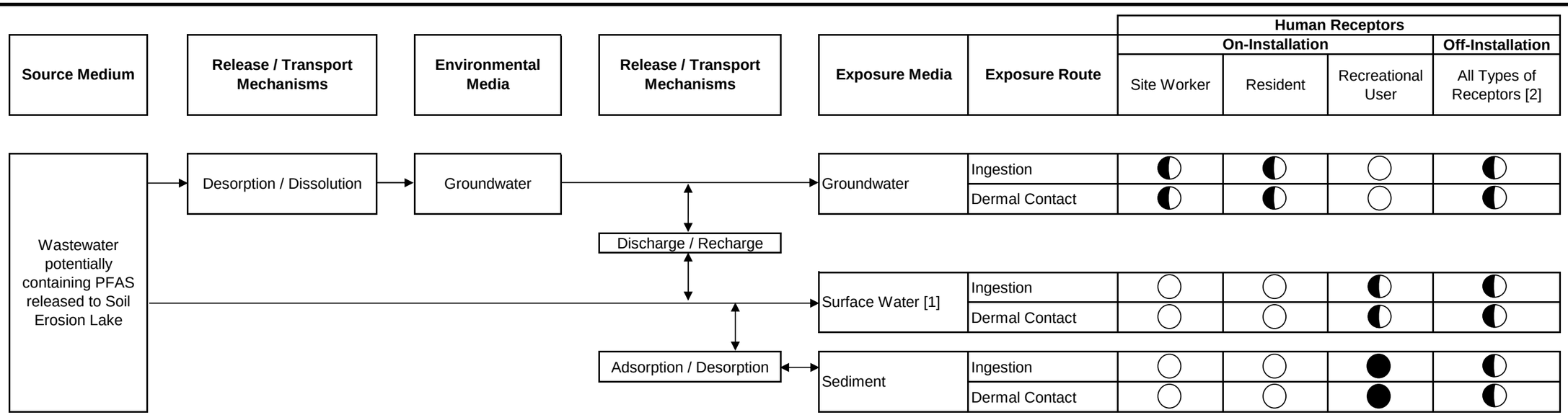
Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Bolded values indicate detections.
3. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Installation Boundary
AOPI
Groundwater Flow Direction
River/Stream (Perennial)
Monitoring Well
Groundwater Sampling Location (Existing Well)

AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
EMA, Gibson Road Landfill Potentiometric Surface Map, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 17 North



Legend:

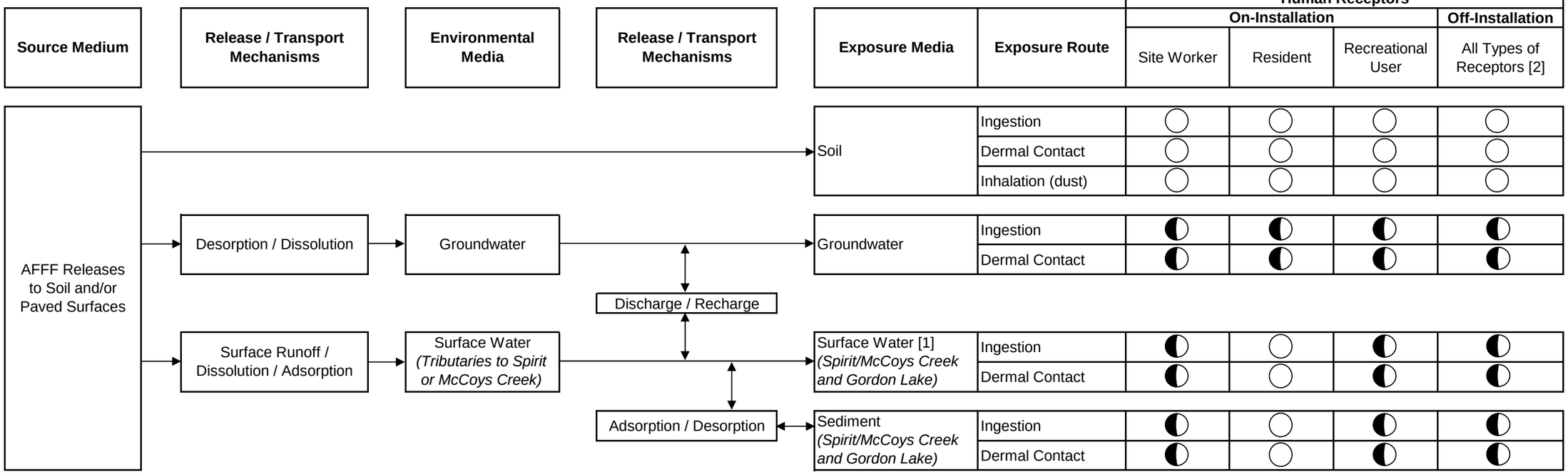
- ● = Complete Exposure Pathway
- ◐ = Potentially Complete Exposure Pathway
- ○ = Incomplete Exposure Pathway

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

ARCADIS

Conceptual Site Model - Fort Gordon AOPI Soil Erosion Lake
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, Georgia

Figure 7-10



Legend:

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

Notes:
[1] Surface water exposure pathway for Residents describes a drinking water scenario, and for Site Workers and Recreational Users describes incidental ingestion and dermal contact with constituents in surface water bodies, outdoors (e.g., site workers at Gordon Lakes Golf Course).
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AFFF - aqueous film-forming foam
AOPI = areas of potential interest

ARCADIS

Conceptual Site Model - Fort Gordon AOPI Fire Station 2
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, Georgia

Figure 7-11

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

Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

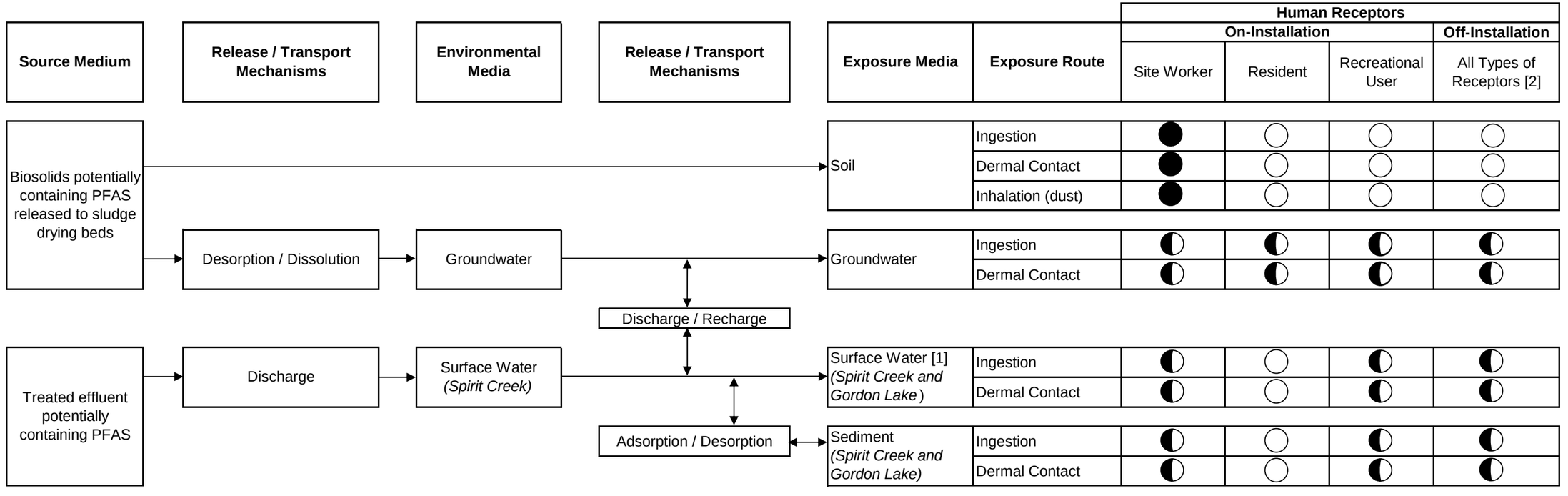
○ = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Residents describes a drinking water scenario, and for Site Workers and Recreational Users describes incidental ingestion and dermal contact with constituents in surface water bodies, outdoors (e.g., site workers at Gordon Lakes Golf Course).
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AFFF = aqueous film-forming foam
AOPI = area of potential interest

ARCADIS

Conceptual Site Model - Fort Gordon AOPI Former Fire Station
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, Georgia

Figure 7-12



Legend:

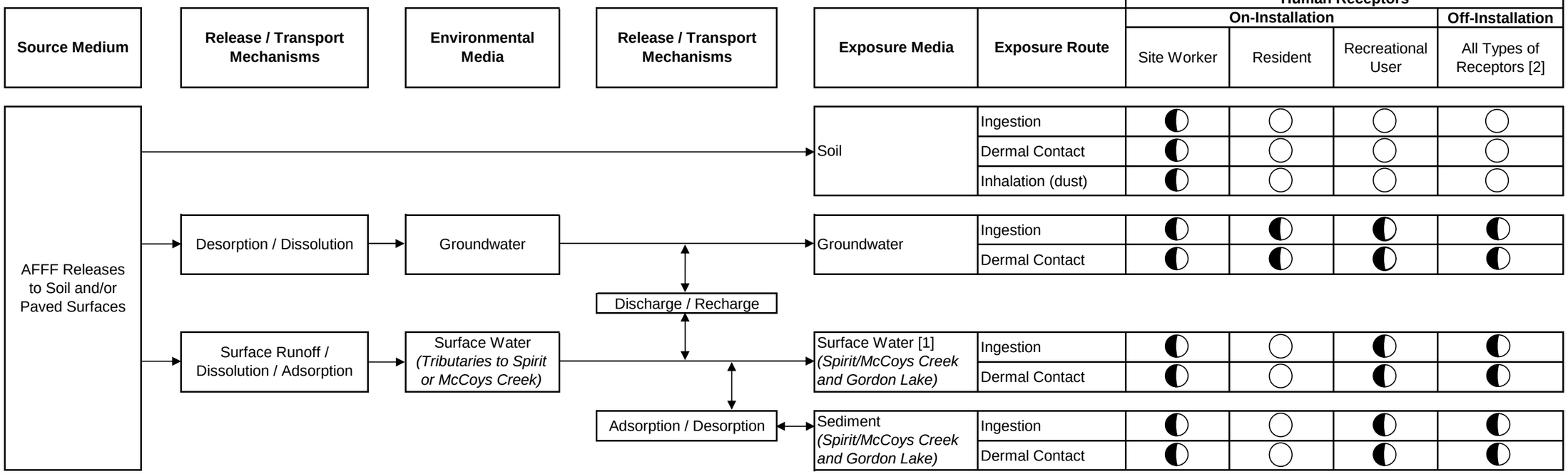
- ● = Complete Exposure Pathway
- ◐ = Potentially Complete Exposure Pathway
- ○ = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Residents describes a drinking water scenario, and for Site Workers and Recreational Users describes incidental ingestion and dermal contact with constituents in surface water bodies, outdoors (e.g., site workers at Gordon Lakes Golf Course).
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AOPI = area of potential interest
WWTP = wastewater treatment plant

ARCADIS

Conceptual Site Model - Fort Gordon AOPI FTGD-030 WWTP
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, Georgia

Figure 7-13



Legend:

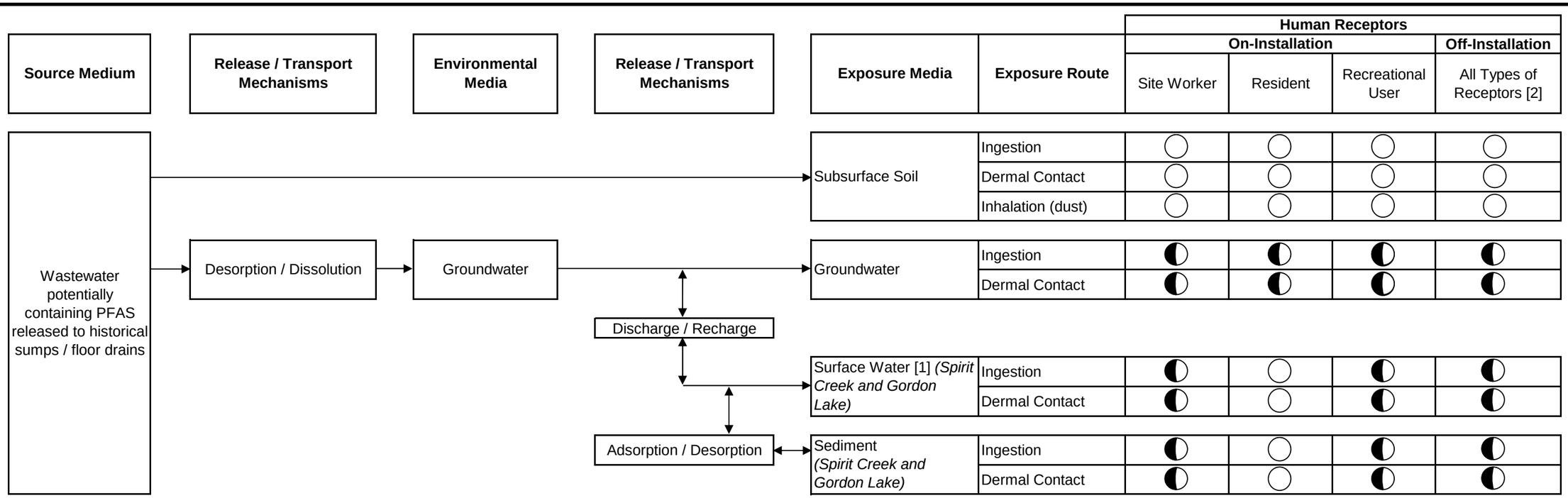
- = Complete Exposure Pathway
- = Potentially Complete Exposure Pathway
- = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Residents describes a drinking water scenario, and for Site Workers and Recreational Users describes incidental ingestion and dermal contact with constituents in surface water bodies, outdoors (e.g., site workers at Gordon Lakes Golf Course).
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AFFF = aqueous film-forming foam
AOPI = area of potential interest

ARCADIS

Conceptual Site Model - Fort Gordon AOPI Former Fire Training Area
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, Georgia

Figure 7-14



Legend:

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

Notes:
[1] Surface water exposure pathway for Residents describes a drinking water scenario, and for Site Workers and Recreational Users describes incidental ingestion and dermal contact with constituents in surface water bodies, outdoors (e.g., site workers at Gordon Lakes Golf Course).
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AOPI = area of potential interest
SWMU = Solid Waste Management Unit

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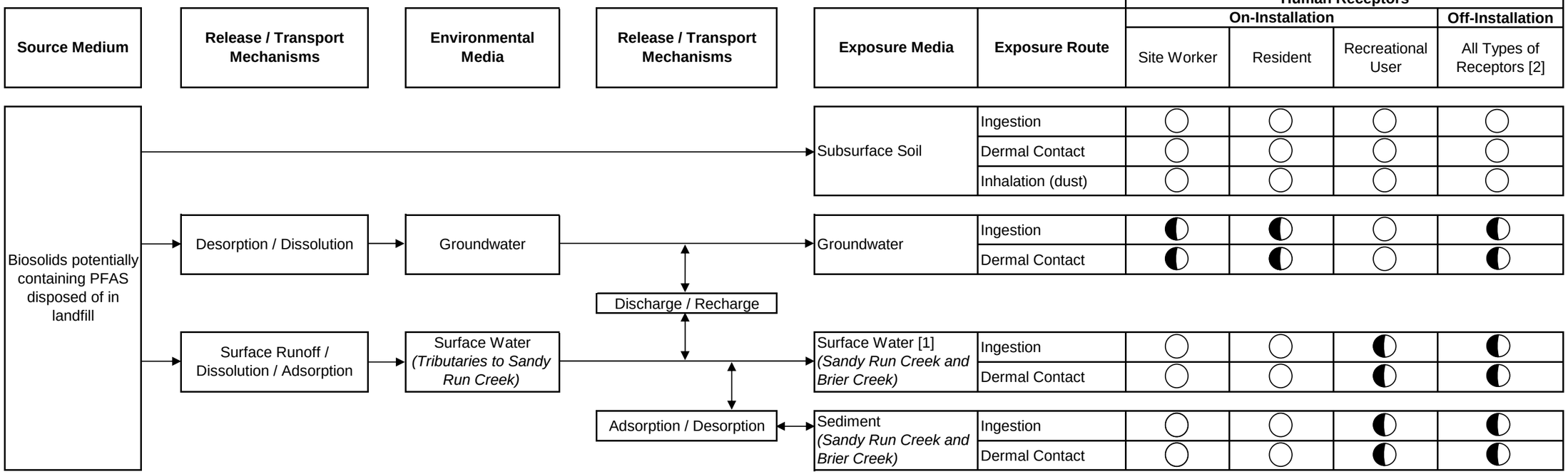
Conceptual Site Model - Fort Gordon AOPI SWMU 009 and SWMU 020/SWMU 031
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, Georgia

Figure 7-15



Legend:

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

Notes:
[1] Surface water exposure pathway for Residents describes a drinking water scenario, and for Site Workers and Recreational Users describes incidental ingestion and dermal contact with constituents in surface water bodies, outdoors (e.g., site workers at Gordon Lakes Golf Course).
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AOPI = area of potential interest

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Conceptual Site Model - Fort Gordon AOPI FTGD-029 Gibson Road Landfill
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Gordon, Georgia

Figure 7-16

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