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

Gillem Enclave, Forest Park, Georgia

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Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

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EXECUTIVE SUMMARY

The United States Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations 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 Gillem Enclave 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.

Gillem Enclave is located in Forest Park, Clayton County, Georgia approximately ten miles south of Atlanta, Georgia. Gillem Enclave was formerly part of the larger Fort Gillem until closure in 2011. The Army retained 260 acres now known as Gillem Enclave which extends approximately 0.9 miles from east to west and 0.7 miles from north to south. Gillem Enclave is bounded by the Fort Gillem Base Realignment and Closure property to the east, Georgia Highway 54 (Jonesboro Road) to the west, Georgia State Route 331 to the south, and residential properties to the north.

The Gillem Enclave PA identified two AOPIs for investigation during the SI phase. SI sampling results from the two AOPIs were compared to risk-based screening levels calculated by the Office of the Secretary of Defense (OSD) for PFOS, PFOA, and PFBS. PFOS, PFOA, and/or PFBS were detected in soil and/or groundwater at both AOPIs; however, only one of the two AOPIs had PFOS, PFOA, and/or PFBS present at concentrations greater than the risk-based screening levels. The Gillem Enclave 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 Gillem Enclave, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)		Recommendation
	Groundwater	Soil	
FTG-03 Former Industrial Wastewater Treatment Plant	No	NS	No action at this time
FTG-13 Former Western Sewage Treatment Plant	Yes	No	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 Gillem Enclave 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 Gillem Enclave 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 Gillem Enclave, 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 Gillem Enclave. The PA and SI processes are documented in the PA/SI Quality Control Checklist included as **Appendix B**.

1.3.1 Pre-Site Visit

The Army undertook a PA for the Gillem Enclave based on knowledge of historical activities at Gillem Enclave that were discussed during a PA site visit to nearby Fort Gordon. Due to the proximity of the Gillem Enclave to Fort Gordon, the Army PA team conducted the Gillem Enclave PA site visit immediately following the Fort Gordon site visit. Therefore, unlike for other PA site visits, an installation kickoff teleconference was not conducted, and a read-ahead package was not prepared for the Gillem Enclave prior to the site visit. However, prior to the Gillem Enclave site visit, the Army PA team reviewed available records from both the USAEC Environmental Support Manager and Fort Gordon IRP staff to identify areas on the installation that may have been a location where PFAS-containing materials were used,

stored, and/or disposed as well as to gather information on the physical setting and site history at the Gillem Enclave.

1.3.2 Preliminary Assessment Site Visit

The PA site visit was conducted on 05 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 Gillem Enclave. 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, or unpaved, visual staining), surface water bodies and surface flow, potential receptors, and the distance to the installation boundary. Access to existing groundwater monitoring wells, if present, were also noted during the site reconnaissance in case the monitoring wells could be proposed for SI sampling. Photo documentation of the preliminary locations was collected, and access limitations or advantages related to potential future sampling activities were noted.

An exit briefing was offered to installation personnel at the conclusion of the site visit to raise any items identified during the site visit, discuss any follow-up items, and review the schedule for submitting deliverables. The exit briefing was conducted on 05 April 2019 with the installation and USAEC 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 points of contact (POC), applicable USAEC POCs, and U.S. Army Corps of Engineers (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 teleconference was held between the Army PA team and the Gillem Enclave.

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 Gillem Enclave (Arcadis 2020) in **Sections 6.1** through **6.3**.

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

1.3.5 Data Analysis, Validation, and Reporting

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

2 INSTALLATION OVERVIEW

The following subsections provide general information about Gillem Enclave, 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

Gillem Enclave is located in Forest Park in Clayton County, Georgia, approximately ten miles south of the central business district of Atlanta. Gillem Enclave was formerly part of the larger Fort Gillem until its closure in 2011. The Army retained 260 acres now known as Gillem Enclave and extends approximately 0.9 miles from east to west and 0.7 miles from north to south. Gillem Enclave is bounded by the Fort Gillem Base Realignment and Closure (BRAC) property to the east, Georgia Highway 54 (Jonesboro Road) to the west, Georgia State Route 331 to the south, and residential properties to the north (**Figure 2-1**). The West Fork of Conley Creek cuts through the northwestern portion of Gillem Enclave and the East Fork of Conley Creek originate within Gillem Enclave. Both branches flow off-post prior to flowing into Conley Creek (**Figure 2-2**).

2.2 Mission and Brief Site History

Fort Gillem was founded in 1941, as a satellite installation of nearby Fort McPherson and housed different supply and support units. The installation was active through World War II, the Korean War, the Berlin Crisis, the Vietnam War, and Operation Desert Shield/Desert Storm during the Persian Gulf conflict. The installation shared responsibility for providing the Army with weapons and equipment needs, research and development, procurement, production, storage, distribution, inventory management, maintenance, and disposal of surplus and waste materials during both peacetime and wartime (Gillem Enclave 2013).

On 13 May 2005, the BRAC Commission recommended that Fort Gillem and Fort McPherson be closed. Fort Gillem continued to provide warehouse storage facilities for the Army and Air Force Exchange Service until February 2011 and the Federal Emergency Management Agency until July 2010. An exit ceremony was held at Fort Gillem on 3 June 2011. The Army retained 260 acres of Fort Gillem, now known as the Gillem Enclave.

2.3 Current and Projected Land Use

Gillem Enclave currently hosts the Defense Forensics Science Center, a military entrance processing station, and elements of the 81st Regional Support Command, and is under the command of Fort Gordon, Augusta, Georgia.

The western property line of Gillem Enclave is bounded by Georgia Highway 54 (Jonesboro Road), which is lined with commercial properties. The northern boundary of the installation is adjacent to residential neighborhoods. The eastern boundary is bounded by Fort Gillem BRAC property. This area and the area south of the installation are partially wooded and used for industrial/commercial purposes.

2.4 Climate

Gillem Enclave is near a humid, subtropical belt and experiences relatively mild winters with warm, moderate summers. The annual mean temperature is 62 degrees Fahrenheit and annual precipitation averages 48 inches. Although brief dry periods are common, precipitation is well distributed throughout the year. Heavy thunderstorms, frequently accompanied by high winds, occur most often during the summer months. Snow occurs rarely in measurable amounts and is of little importance as a climatic factor. Ice storms can occur during the winter (Rust Environment & Infrastructure 1994).

2.5 Topography

Gillem Enclave is located in the southern or inner Piedmont physiographic province. The topography at Gillem Enclave varies from gently rolling land in the central part to some relatively hilly terrain along the northern and northwestern parts of the installation. Elevations range from a low of approximately 886 feet above mean sea level (amsl) along some streams to as much as 984 feet amsl (**Figure 2-3**). Generally, the highest elevations are in the central part of the installation and range between 950 and 960 feet amsl (Rust Environment & Infrastructure 1994).

2.6 Geology

The Gillem Enclave is located within the Piedmont physiographic province, which is generally characterized by a relatively thick regolith overlying fractured and metamorphosed igneous and sedimentary bedrock. The land surface in the Piedmont is underlain by a thick layer of saprolite derived from in-situ weathering of the underlying bedrock. Beneath the saprolite the soils grade to competent bedrock through a transition zone between the saprolite and partially weathered rock. Bedrock in the Piedmont is highly variable, ranging from Precambrian to Paleozoic age (Heath 1984). Bedrock of the Piedmont generally is highly fractured near the partially weathered rock bedrock interface and becomes more competent with depth.

2.7 Hydrogeology

The complexity of the geology observed in the Piedmont physiographic province has led to an equally complex groundwater flow system. The most notable conceptualization of the groundwater flow scheme for the Piedmont physiographic province is the LeGrand Model (LeGrand 2004), which demonstrates that topographic highs act as the principal areas of groundwater recharge, and perennial streams represent discharge boundaries where groundwater flows to the surface as diffuse seepage or from springs. Additionally, the LeGrand Model established that the path of natural groundwater flow is relatively short and, in most cases, is restricted to the saprolite and shallow bedrock underlying the slope (LeGrand 2004). On this basis, the generalized flow path of groundwater can be determined using topographic relief. Local topography at Gillem Enclave generally drains to the north, toward Conley Creek. The depth to groundwater in the northwestern portion of the installation varies from several feet to about 26 feet below land surface. Within the Piedmont, seasonal fluctuations of the depth to the water table may range up to ten feet. The fluctuation occurs in response to changes in rainfall and rates of evapotranspiration. Groundwater elevations are generally higher in the winter and spring (Rust Environment & Infrastructure 1994).

2.8 Surface Water Hydrology

A southwest to northeast trending ridge, which crosses the entire width of the installation, separates two watersheds. Surface water runoff is essentially in two general directions, one to the north and northwest and the other to the south and southeast. Storm drains and drainage ditches flow into the streams of the two watersheds. Surface water runoff ultimately discharges through eight culverts or streams from the northern half of the installation into Conley Creek and its tributaries. Conley Creek eventually joins the South River, which is located approximately ten miles northeast of Gillem Enclave. Drainage into Conley Creek includes surface runoff from the area of the former industrial wastewater treatment plant (IWTP), the western sewage treatment plant (WSTP), and warehouses. A series of springs are located in the upland areas of the two major stream valleys which drain the northern half of Gillem Enclave (Rust Environment & Infrastructure 1994).

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 Gillem Enclave.

2.9.1 Stormwater Management System Description

Stormwater at Gillem Enclave is collected via a variety of infrastructure (e.g., inlets, manholes, pipes, swales, catch basins, ponds) and eventually is conveyed off-post via four outfalls: SDO-1, SDO-2, SDO-3, and SDO-4. Outfall SDO-2 is located at the northwestern boundary of Gillem Enclave and discharges to the West Fork of Conley Creek. Outfalls SDO-3 and SDO-4 are located at the northern boundary of Gillem Enclave and also discharge to the West Fork of Conley Creek. Outfall SDO-1 is located at the northern boundary of Gillem Enclave and discharges to the East Fork of Conley Creek.

2.9.2 Sewer System Description

Since 1978, all sanitary wastes generated at Gillem Enclave have been conveyed off-post to the Forest Park sanitary system (Rust Environment & Infrastructure 1994).

Historically, sanitary wastes were sent to the Fort Gillem (FTG)-13 WSTP on-post. The WSTP was in operation from 1951 to 1978 and received mostly sanitary waste from post operations. The operation consisted of a single stage trickling filter plant, followed by secondary clarification. Approximately twice a year, sludges from the digesters were removed and spread in drying beds. Dried sludges were subsequently landfilled at the North Landfill Area, located on the Fort Gillem BRAC property. Effluent from the FTG-13 Former WSTP was directed to the East Fork of Conley Creek (Rust Environment & Infrastructure 1994).

During the 1970s, the WSTP intermittently received industrial waste diverted from the FTG-03 Former IWTP, also located on Gillem Enclave. The FTG-03 Former IWTP operated between 1972 and 1978 and received wastewater from industrial operations performed in both the 900 and 400 Areas, which included maintenance and rebuilding of heavy equipment, engines, medical equipment, and aircraft. Sludges generated at the FTG-03 Former IWTP were placed in sludge drying beds. Dried sludges were removed

and disposed of at the North Landfill Area located on the Fort Gillem BRAC property. Effluent from the FTG-03 Former IWTP was discharged to an earthen holding pond prior to discharging to the West Fork of Conley Creek (Rust Environment & Infrastructure 1995).

2.10 Potable Water Supply and Drinking Water Receptors

Drinking water at Gillem Enclave is supplied by the Clayton County Water Authority, which also provides potable water to residents off post. Clayton County Water Authority sources water from surface water collected in five reservoirs located south-southeast (upgradient) of Gillem Enclave. There are no potable wells at Gillem Enclave.

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 Gillem Enclave, there are off-post potable wells within a 5-mile radius of Gillem Enclave (**Figure 2-4**). Regional groundwater flow is assumed to flow off post to the north toward a few off-post potable wells. The EDR report well search results are provided as **Appendix E**.

No additional information on drinking water receptors was collected during the site visit that was not already obtained during document research.

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.

The Enclave lies within the Piedmont ecoregion which comprises a transitional area between the mostly mountainous ecoregions of the Appalachians to the northwest and the relatively flat coastal plain to the southeast. It is a complex mosaic of Precambrian and Paleozoic metamorphic and igneous rocks with moderately dissected irregular plains and some hills (Griffith et al. 2001). The soils tend to be finer-textured than in Coastal Plain regions. Loblolly pine and hardwoods (gum, oak, and yellow poplar) are the main tree species along with common understory trees including flowering dogwood, black cherry, sassafras, and sourwood. There are no perennial surface water bodies in close proximity to the site, but intermittent tributaries drain surface runoff from the northern portion of Gillem Enclave to the West and East Fork of Conley Creek (PIKA-Pirnie JV 2020).

Wildlife expected to utilize the habitat include species associated with forest edges and urban areas. Expected species include birds such as northern cardinal, blue jay, woodpecker, screech owl, Carolina chickadee, white-breasted nuthatch, eastern bluebird, American robin, and mammals such as white-tailed deer, eastern cottontail, striped skunk, opossum, raccoon, and gray squirrels and various snakes and other reptiles. No threatened or endangered species were identified in the northwestern wooded portion of Gillem Enclave, and the habitat is not suitable to support threatened or endangered species (PIKA-Pirnie JV 2020).

2.12 Previous PFAS Investigations

Previous (i.e., pre-PA) PFAS investigations relative to Gillem Enclave, including both those conducted and not conducted by the Army, are summarized to provide full context of available PFAS data for Gillem

Enclave. 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. Gillem Enclave receives potable water from the Clayton County Water Authority where water is sourced from five reservoirs, the closest of which is located over 9 miles from Gillem Enclave. The Clayton County Water Authority was sampled during the UCMR3 where results indicated that PFOS, PFOA, and PFBS were not detected. The reporting limit at the time of UCMR3 sampling was 40 ng/L for PFOS, 20 ng/L for PFOA, and 90 ng/L for PFBS. These concentrations are 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 Gillem Enclave, none had detections of PFOS, PFOA, or PFBS.

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 Gillem Enclave, data was collected from three principal sources of information:

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

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

3.1 Records Review

The records reviewed for this PA included, but were not limited to, various IRP administrative record documents, and compliance documents. Internet searches were also conducted to identify publicly available and other relevant information. A list of the specific documents reviewed for Gillem Enclave 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 Gillem Enclave is presented below (affiliation is with Gillem Enclave unless otherwise noted).

- IRP Manager
- USAEC, Environmental Support Manager for Gillem Enclave
- BRAC, Environmental Coordinator
- Forest Park Fire Department, Member of the Forest Park Fire Department

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

3.3 Site Reconnaissance

Site reconnaissance and visual surveys were conducted at preliminary locations identified at Gillem Enclave during the records review process, the installation in-brief meeting, and/or during the installation personnel interviews. These areas were classified as an area not retained for further investigation or an AOPI based on a combination of other information collected (e.g., records reviewed, personnel interviews, internet searches). 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 Gillem Enclave 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

Gillem Enclave 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.

Following the analysis of data collected from site reconnaissance, installation personnel interviews, and records review, current or historical AFFF use or storage at Gillem Enclave was not able to be confirmed. Reference could not be found to any AFFF-suppression system that would have been historically used at Gillem Enclave. The former hangar (Building 935) and a portion of the runway exists in the northeast portion of Gillem Enclave. The hangar was built in 1960 and was later converted to a gymnasium in the 1980s after the last flight operation in 1974. The building was initially used as an aircraft hangar with supporting shops, offices, restrooms, and mechanical rooms (U.S. Army Engineer Division Laboratory 1997). There was no evidence of an AFFF- suppression system at this former hangar in documents reviewed or in personnel interviews conducted.

It was confirmed with Gillem Enclave personnel following the site visit that there are no current AFFF suppression systems on post. The Criminal Investigation Division (CID) building was specifically investigated due to the potential for having an AFFF suppression system; however, it was confirmed that systems in the CID building consist of water and ABC suppression (i.e., not PFAS-containing chemicals) systems.

AFFF storage related to fire department activities would have been stored at the historical Fort Gillem Fire Department building, located off post of Gillem Enclave on the current Fort Gillem BRAC property. The Forest Park Fire Department currently occupies the historical Fort Gillem Fire Department building. The interviews with Forest Park Fire Department personnel are described below in **Section 4.3**.

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

Following records review, personnel interviews, and site reconnaissance at Gillem Enclave, two former wastewater treatment plants were identified as preliminary locations of use, storage, and/or disposal of PFAS-containing materials.

The Former IWTP historically received wastewater from industrial operations performed in both the 900 and 400 Areas of the installation, which included maintenance and rebuilding of heavy equipment, engines, medical equipment, and aircraft. Wastewaters received at the Former IWTP included oils and greases, paint chips, phosphates, phenols, chromates, solvents, alkaline cleaning solutions, stripping compounds, and rinse water. Wastewater conveyed to the Former IWTP could have contained PFAS-containing materials from the various industrial operations which discharged to it.

The Former WSTP intermittently received industrial waste diverted from the Former IWTP mentioned above, therefore containing wastes from various industrial operations at Gillem Enclave and the Fort Gillem BRAC property. Specific discussion regarding areas not retained for further investigation and AOPIs is included in **Section 5.1** and **Section 5.2**, respectively.

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 Gillem Enclave) 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.

An interview was conducted with the Sergeant from the Forest Park Fire Department who currently occupies the historical Fort Gillem fire station located off-post of Gillem Enclave. The Sergeant noted that when the Forest Park Fire Department initially occupied the historical Fort Gillem fire station building in 2005, there were small amounts of Class A foam left within the building. Although a member of the former Fort Gillem Fire Department was not available for interview, the leftover Class A foam could indicate that there had previously been Class B foams, including AFFF, stored at some point during historical operations which is consistent with general Army Fire Department practices. Currently, the Forest Park Fire Department does store Class A (Chemguard) and Class A and B mix foams (F-500) within their trucks and storage areas. The historical Fort Gillem Fire Department is located approximately 1.2 miles from the current Gillem Enclave installation boundary.

Additionally, the Sergeant noted that the Forest Park Fire Department has historically responded to fire response emergencies with AFFF and/or a mix of Class A and B foams; however, none of them were at Gillem Enclave. The Sergeant noted the following off-post fire responses where AFFF was used:

- Kroger fire: In June or July 2018, approximately five gallons of AFFF concentrate were used during a fire response at the Kroger facility caused by a truck trailer catching fire. The fire response location is less than half of a mile east of the current Gillem Enclave installation boundary.
- Clorox fire: On 27 August 2010, an unknown amount of AFFF was used during a joint fire response at the Clorox facility in Forest Park, Georgia, which was caused when a truck at the plant caught fire which then resulted in an explosion. The Forest Park Sergeant stated that this event was the largest foam incident that he can recall. It was noted that the Hartsfield Airport also

assisted with the fire response. The fire response location is approximately 4 miles northwest of the current Gillem Enclave installation boundary.

Lastly, the Hartsfield-Jackson Atlanta International Airport and associated fire stations and training areas are located approximately 4 miles northwest of the current Gillem Enclave installation boundary. These facilities have the potential to be off-post locations of use, storage, and/or disposal of PFAS-containing materials due to their characteristics of AFFF storage as well as AFFF usage during responses and training operations.

5 SUMMARY AND DISCUSSION OF PA RESULTS

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

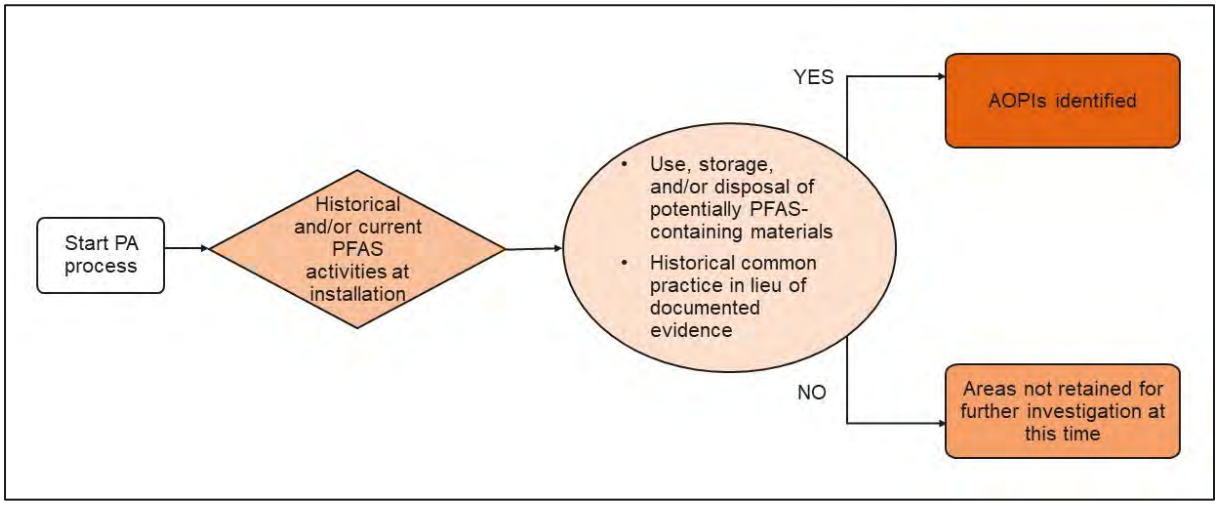

Figure 5-1: AOPI Decision Flowchart

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 Gillem Enclave 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
Former Aircraft Maintenance Facility (Building 935)	Approximately 1960 to approximately 1999	Building 935 was initially used as an aircraft hangar but was converted to a gymnasium in the 1980s; the building was demolished between 1999 and 2002. No flights have occurred at Gillem Enclave since 1974, and there is no knowledge of an AFFF fire suppression system. Drainage from the building interior likely would have discharged to the IWTP or WSTP until 1978. Exterior drainage likely flowed as surface water runoff to adjacent stormwater drains.	No documented use, storage, and/or disposal of PFAS-containing materials.
Former Aircraft Runway	Approximately 1960 to approximately 1999	Although this area is no longer used as a runway, it was historically utilized for aircraft traffic. Currently, the area consists of an asphalt-paved runway strip. A large soil pile/mound separates the portion of the runway that exists on the Fort Gillem BRAC property.	No documented use, storage, and/or disposal of PFAS-containing materials.
CID Laboratory	Early 2000s to present	The CID laboratory includes a wet pipe (i.e., water) fire suppression system in the archive storage area and ABC (Class A, B, or C) fire extinguishers. No known AFFF use in this building or its fire suppression system.	No documented use, storage, and/or disposal of PFAS-containing materials.

5.2 AOPIs

Overviews for each AOPI identified during the PA process are presented in this section. The two sites retained as AOPIs overlap with Gillem Enclave 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 Gillem Enclave IRP sites have historically been investigated for the possible presence of PFAS constituents.

The areas retained as AOPIs are shown on **Figure 5-2**. Aerial photographs of each AOPI are presented on **Figures 5-3** and **5-4** and include active monitoring wells in the vicinity of each AOPI.

5.2.1 FTG-03 Former IWTP (FTG-03,13055.1071)

The FTG-03 Former IWTP is identified as an AOPI following records review and personnel interviews due to the potential for FTG-03 Former IWTP to have received PFAS-containing wastes from various industrial operations at Gillem Enclave and the Fort Gillem BRAC property. FTG-03 Former IWTP received wastewater from industrial operations performed in both the 900 and 400 Areas, which included maintenance and rebuilding of heavy equipment, engines, medical equipment, and aircraft. Specific types of wastewaters received included oils and greases, paint chips, phosphates, phenols, chromates, solvents, alkaline cleaning solutions, stripping compounds, and rinse water. From 1972 to 1978, treated wastewater from FTG-03 Former IWTP was discharged to a 43,000-gallon earthen holding pond which discharged to a nearby tributary of Conley Creek, West Fork Conley Creek. Sludge from FTG-03 Former

IWTP was dewatered in sludge drying beds prior to being disposed of at the North Landfill Area, currently on the Fort Gillem BRAC property. The sludge beds were decommissioned and removed in 1991. The remaining structures associated with the FTG-03 Former IWTP were filled in or removed by 2004 and the site was re-graded. Historical records regarding the exact location and dimensions of the former structures as well as the filling and re-grading process were not available.

The AOPI currently consists of a wooded area with overgrown vegetation and the approximate location of the former IWTP structures are presented on **Figure 5-3**. There is a narrow driving path for accessibility to the site; however, there are no current activities at the AOPI. The AOPI is an active IRP site (industrial use) with monitoring wells present. Groundwater at the AOPI flows to the northwest across the northern installation boundary. The West Fork of Conley Creek flows west to east across the AOPI prior to flowing off-post to the north/northwest and joining Conley Creek. (**Figure 5-3**).

As mentioned above, FTG-03 Former IWTP is part of the Gillem Enclave IRP. The IRP identifier is FTG-03 and the HQAES number is 13055.1071. Several investigative activities have taken place at or in the vicinity of the FTG-03 Former IWTP since 1980. Studies included hydrogeologic investigations, SIs, a groundwater investigation, and a Remedial Investigation. These investigations included the collection of soil, sediment, surface water, and/or groundwater samples. The Draft Final Remedial Investigation Report recommended a feasibility study for FTG-03 Former IWTP since waste disposal units (i.e., effluent pond) were closed in place, and for the 900 Area to address constituents of concern (trichloroethylene, dieldrin, cobalt, hexavalent chromium, and manganese) identified in groundwater (ECC 2018).

5.2.2 FTG-13 Former WSTP (FTG-13, 13055.1075)

The FTG-13 Former WSTP is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to the potential for FTG-13 Former WSTP to have received PFAS-containing wastes from FTG-03 Former IWTP. During the 1970s, FTG-13 Former WSTP intermittently received industrial waste diverted from FTG-03 Former IWTP containing wastes from various industrial operations at Gillem Enclave and the Fort Gillem BRAC property as specified in **Section 5.2.1**. Approximately twice a year, biosolids from FTG-13 Former WSTP were removed and spread in two drying beds, then disposed of in the North Landfill Area located on the Fort Gillem BRAC property. Treated effluent from FTG-13 Former WSTP was discharged to a tributary of Conley Creek, East Fork Conley Creek, that flows across the northern installation boundary. Effluent discharge to the stream ceased with plant operation in September 1978 when connections between the Fort Gillem sanitary sewer system and the city of Forest Park Sanitation System were completed. Surface water runoff in the FTG-13 Former WSTP area is conveyed via an underground culvert that eventually drains to the East Fork of Conley Creek.

FTG-13 Former WSTP is located in a northern corner of Gillem Enclave. Currently, the AOPI consists of a wooded area with some overgrown vegetation. The AOPI is no longer used as a wastewater treatment facility; however, there are still some historical structures present. There is a driving path along the northern Gillem Enclave boundary and a walking path to the AOPI for accessibility to the site. The AOPI is an active IRP site (industrial use) with monitoring wells present. Groundwater at the AOPI flows to the north across the northern installation boundary. The East Fork of Conley Creek flows south to north along the east side of the AOPI prior to flowing off post and joining Conley Creek (**Figure 5-4**).

As mentioned above, FTG-13 Former WSTP is part of the Gillem Enclave IRP. The IRP identifier is FTG-13 and the HQAES number is 13055.1075. Several investigative activities have taken place at or in the

vicinity of the FTG-13 Former WSTP since 1980. Studies included hydrogeologic investigations, soil vapor surveys, groundwater and surface water investigations, and a Remedial Investigation. These investigations included the collection of soil, sediment, surface water and/or groundwater samples. Based on the data collected in the initial studies, the primary risk driver at the site to date is trichloroethene in groundwater. The Draft Final Remedial Investigation Report recommended no further action for FTG-13 Former WSTP attributing groundwater impacts to an upgradient source (ECC 2018).

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at Gillem Enclave, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at Gillem Enclave at both 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 and groundwater 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 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 Gillem Enclave. 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 and/or soil 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.

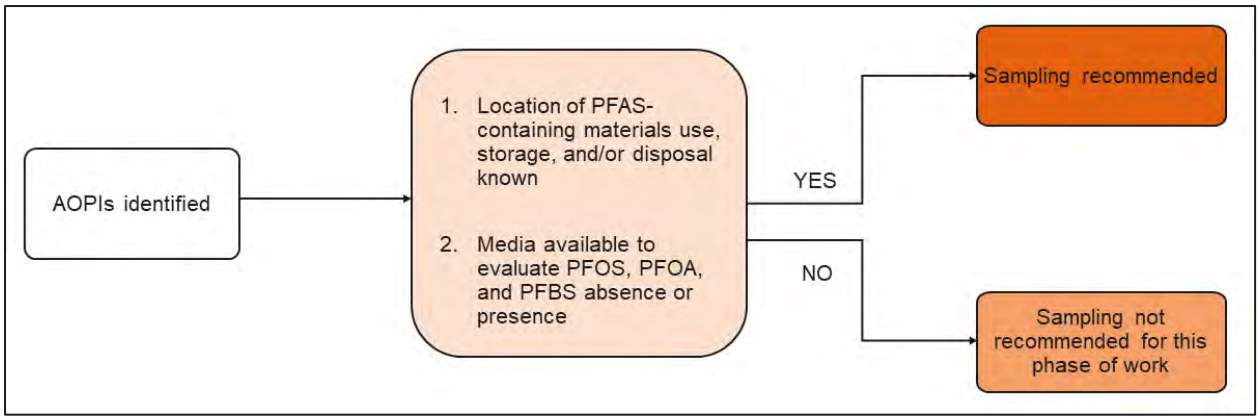

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI sampling activities at Gillem Enclave is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2020). Briefly, the areas of focus for this SI (i.e., both 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 and groundwater samples were collected from Gillem Enclave at areas closest to suspected releases and believed to have the potential for the greatest PFOS, PFOA, and PFBS concentrations.

Groundwater was sampled at both AOPIs from existing monitoring wells located within and/or downgradient of each AOPI to assess PFOS, PFOA, and PFBS concentrations associated with or migrating from the AOPI. The monitoring wells are used to monitor other constituents (i.e., not PFOS, PFOA, PFBS) associated with the site and are therefore located and screened at appropriate depths to achieve the goals of the SI. Soil was sampled at one AOPI (FTG-13 Former WSTP) within and near the former sludge drying beds, where the PFAS-containing materials were placed historically and/or run-off may have occurred. Soil samples were not collected at FTG-03 Former IWTP due to the lack of historical records regarding the dimensions of the former IWTP structures as well as filling and re-grading procedures that have occurred since the structures received wastes. Surface water and sediment were not sampled as part of the SI as it Is unlikely that existing surface water/sediment would contain PFOS, PFOA, and PFBS from wastewater discharged over 40 years ago.

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 forms (i.e., soil boring logs, groundwater purging logs, and sample collection logs) documenting the SI sampling activities are included in **Appendix J.**

6.3.1 Field Methods

Groundwater samples were collected from existing monitoring wells at AOPIs FTG-03 Former IWTP and FTG-13 Former WSTP via low-flow purging methods from approximately the center of the saturated screened interval. 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 containers for submittal to the laboratory.

Soil samples were collected at two locations within AOPI FTG-13 Former WSTP. The samples were collected by hand auger as a composite sample of soil from the top 2 feet. 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 for pH, total organic carbon (TOC), and grain size analysis. Soil lithology was recorded in associated field forms (**Appendix J**).

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

6.3.2 Quality Assurance/Quality Control

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

QA/QC samples were collected at the frequencies specified in the QAPP Addendum (Arcadis 2020), typically at a rate of 1 per 20 parent samples. Field duplicates and matrix spike/matrix spike duplicate samples were collected for media sampled for PFOS, PFOA, and PFBS 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 included a hand auger, water-level meter, and bladder pump as applicable to the sampled media. Analytical results for blank samples are discussed in **Section 7.4**.

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 Gillem Enclave 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 K** and are summarized below:

At AOPI FTG-13 Former WSTP, two soil samples were to be collected at one location within the former sludge drying bed from 0 to 2 feet below ground surface (bgs) and 4 to 5 feet bgs. During site activities, fill material (i.e., uniform sand) was identified below 1-foot bgs preventing the collection of a subsurface sample. Therefore, a surface sample was collected from 0 to 1 foot bgs [FTG-13-01-SO(0-1)-040820] within the former sludge drying bed and a second surface soil sample [FTG-13-02-SO(0-2)-040820] was collected outside of the former sludge drying bed approximately 15 feet south-southeast from sample FTG-13-01.

6.3.4 Decontamination

Non-dedicated reusable sampling equipment (e.g., hand augers and 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 groundwater and decontamination fluids, were collected and placed in 5-gallon plastic buckets, secured with lids, and labeled as non-hazardous. The liquid waste was combined into a 55-gallon drum and transported off site to American Bio-Mass in Walterboro, South Carolina (Permit #152630-2001) for disposal. Excess soil cuttings were returned to the ground at the point of collection. A copy of the waste manifest is included in **Appendix J**.

Equipment IDW, including personal protective equipment and other disposable materials (e.g., gloves, plastic sheeting, and high-density polyethylene and silicon tubing) that contacted sampling media, was collected in bags and disposed of in municipal waste receptacles.

6.4 Data Analysis

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

6.4.1 Laboratory Analytical Methods

Analytical samples collected during the SI were submitted to Pace South Carolina (formerly Shealy Environmental Services, Inc.), an ELAP-accredited laboratory for PFAS analysis, including PFOS, PFOA, and PFBS, by liquid chromatography with tandem mass spectrometry. Laboratory analyses associated with the SI were completed in accordance with Worksheets #12.1 through #12.5 in the PQAPP (Arcadis 2019). Eighteen PFAS-related compounds, including PFOS, PFOA, and PFBS, were analyzed for in groundwater and soil samples using 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 samples in accordance with Worksheet #18 of the QAPP Addendum (Arcadis 2020) by the analytical method noted:

- TOC by Solid Waste Test Method 846 9060A.
- Grain size analysis by American Society for Testing and Materials D422-63.
- pH by Solid Waste Test Method 846 9045D.

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

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

6.4.2 Data Validation

All analytical data generated during the SI, except grain size, 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 L**.

6.4.3 Data Usability Assessment and Summary

A data usability assessment was completed for all analytical data associated with SI sampling at Gillem Enclave. Documentation generated during the data usability assessments, which were compiled into a DUSR (**Appendix L**), was prepared in accordance with the USACE Engineer Manual 200-1-10 (USACE 2005), the Final DoD General Data Validation Guidelines (DoD 2019) and the Final DoD 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 Gillem Enclave during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUSR and its associated data validation reports (**Appendix L**), and as indicated in the full analytical tables (**Appendix M)** provided for the SI results. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019) and Gillem Enclave QAPP Addendum (Arcadis 2020). Data qualifiers applied to laboratory analytical results for samples collected during the SI at Gillem Enclave 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 value. 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.
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 Gillem Enclave 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 Gillem Enclave 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 because they have OSD risk screening levels. The Army will make subsequent investigation decisions based on these constituents' concentrations relative to OSD risk screening levels.

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

Field parameters measured for groundwater during low-flow purging and sample collection are provided on the field forms in **Appendix J**. Soil descriptions are provided on the field forms in **Appendix J**. The results of the SI are grouped by AOPI and discussed for each medium as applicable. Groundwater was generally first encountered at depths of approximately 3 feet bgs at AOPI FTG-03 Former IWTP and approximately 9 feet bgs at AOPI FTG-13 Former WSTP.

Table 7-3 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances?
FTG-03 Former IWTP	No
FTG-13 Former WSTP	Yes

7.1 AOPI FTG-03 Former IWTP

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with AOPI FTG-03 Former IWTP. As described in **Section 6.2**, soil samples were not collected at FTG-03 Former IWTP as part of the SI due to the lack of historical records regarding the dimensions of the former IWTP structures as well as filling and re-grading procedures that have occurred since the structures received wastes.

7.1.1 Groundwater

Groundwater samples were collected from two existing monitoring wells at AOPI FTG-03 Former IWTP (**Figure 7-2**). A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**. PFOS and PFOA were detected at concentrations below the OSD risk screening levels of 40 ng/L in groundwater samples at both monitoring wells: FTG-03-900WELL14 (5.9 ng/L and 4.9 ng/L, respectively) and FTG-03-900WELL14A (5.6 ng/L and 4.3 ng/L, respectively). PFBS was detected in both samples at estimated concentrations of 2.0 ng/L (FTG-03-900WELL14) and 2.2 ng/L (FTG-03-900WELL14A), but concentrations did not exceed the OSD risk screening level of 600 ng/L.

7.2 AOPI FTG-13 Former WSTP

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with AOPI FTG-13 Former WSTP. PFOS and PFOA concentrations in one groundwater sample are greater than the applicable OSD risk screening level.

7.2.1 Groundwater

Groundwater samples were collected from three existing monitoring wells at AOPI FTG-13 Former WSTP (**Figure 7-3**). A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-1**. The full suite of analytical results is included in **Appendix M**. PFOS and PFOA were detected at concentrations greater than the OSD risk screening level of 40 ng/L in the groundwater sample collected from monitoring well FTG-13-MW14 (360 ng/L and 150 ng/L, respectively), which is located within the AOPI. Detected concentrations of PFOS and PFOA at the remaining monitoring wells (FTG-13-MW10 and FTG-13-MW06) were below the OSD risk screening levels. Monitoring well FTG-13-MW10 is located on the downgradient edge of the AOPI and FTG-13-MW-06 is downgradient of the AOPI near the installation boundary. PFBS was detected at all three monitoring wells, with varying concentrations from an estimated 2.0 ng/L to 4.8 ng/L, but concentrations were below the OSD risk screening level of 600 ng/L.

7.2.2 Soil

Soil samples were collected from two locations at AOPI FTG-13 Former WSTP (**Figure 7-2**). Each boring included a surface soil sample collected from 0 to 1 feet bgs or 0 to 2 feet bgs. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-2**. The full suite of analytical results is included in **Appendix M**. PFOS was detected in only one of the soil samples, FTG-13-01-SO (estimated 0.00096 mg/kg), but the concentration was below the OSD risk screening levels for residential (0.13 mg/kg) and industrial/commercial (1.6 mg/kg). PFOA and PFBS were not detected in either of the soil samples collected (**Table 7-2**).

7.3 Total Organic Carbon, pH, Grain Size

In addition to sampling soil for PFOS, PFOA, and PFBS, one soil sample 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 sample was 12,300 mg/kg. The TOC at this installation is within range of typical organic content in topsoil (5,000 to 30,000 mg/kg). The combined percentage of fines (i.e., silt and clay) in soils at Gillem Enclave was 4.8%. PFAS constituents tend to be more mobile in soils with less than 20% fines and lower TOC. The percent moisture of the soil varied from 6.5 to 24% and the pH was slightly acidic (4 to 6).

7.4 Blank Samples

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

7.5 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 7-4** and **7-5** and in this section therefore represent the current understanding of the potential for human exposure.

Many of the PFAS constituents 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 7-4 shows the CSM for AOPI FTG-13 Former WSTP. The source media at this AOPI was sludge/biosolids potentially containing PFOS, PFOA, and PFBS that was released to sludge drying beds and wastewater or treated effluent potentially containing PFOS, PFOA, and PFBS that was released directly to surface water.

- PFOS was detected in soil and site workers (i.e., installation personnel) 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. There are no residents on the Gillem Enclave, and the AOPIs are not likely to be accessed by on-installation recreational users (if present), or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- PFOS, PFOA, and PFBS were detected in groundwater. Drinking water at Gillem Enclave is supplied by the Clayton County Water Authority which sources raw water from five reservoirs located south-southeast (upgradient) of Gillem Enclave. There are no groundwater wells used to supply potable water at Gillem Enclave; however, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete to account for potential future use of the on-post groundwater downgradient of the AOPI. There are no residents on Gillem Enclave, and recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathways for these receptors are incomplete.
- Groundwater originating at this AOPI flows off-post through the installation's northern 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 (e.g., East Fork of Conley Creek) on-post are small, intermittent water courses that are not used for drinking water and are unlikely to be accessed by recreational users (if present). Therefore, the surface water and sediment exposure pathways for on-installation receptors are incomplete.
- Surface water bodies flow off-post to the north and join Conley Creek, which is not used for drinking water within 5 miles downstream of Gillem Enclave. However, recreational users off-post could contact constituents in surface water and sediment through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation receptors are potentially complete.

Figure 7-5 shows the CSM for AOPI FTG-03 Former IWTP. The source media at this AOPI was sludge/biosolids potentially containing PFOS, PFOS, and PFBS that was released to sludge drying beds and wastewater or treated effluent potentially containing PFOS, PFOA, and PFBS that was released directly to surface water.

- Since the FTG-03 Former IWTP structures were either filled in or removed and the site was regraded, soil samples were not collected. If PFOS, PFOA, and/or PFBS are present in soil, on-installation site workers could contact constituents via incidental ingestion, dermal contact, and inhalation of dust; therefore, the soil exposure pathway for on-installation site workers is potentially complete. There are no residents on the Gillem Enclave, and the AOPIs are not likely to be accessed by on-installation recreational users (if present), or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.

- PFOS, PFOA, and PFBS were detected in groundwater. Drinking water at Gillem Enclave is supplied by the Clayton County Water Authority, which sources raw water from five reservoirs located south-southeast (upgradient) of Gillem Enclave. There are no groundwater wells used to supply potable water at Gillem Enclave; however, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete to account for potential future use of the on-post groundwater downgradient of the AOPI. There are no residents on Gillem Enclave, and recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathways for these receptors are incomplete.
- Groundwater originating at this AOPI flows off-post through the installation's northern 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 (e.g., West Fork of Conley Creek) on-post are small, intermittent water courses that are not used for drinking water and are unlikely to be accessed by recreational users (if present). Therefore, the surface water and sediment exposure pathways for on-installation receptors are incomplete.
- Surface water bodies flow off-post to the north and join Conley Creek, which is not used for drinking water within 5 miles downstream of Gillem Enclave. However, recreational users off-post could contact constituents in surface water and sediment through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation receptors are potentially complete.

Following the SI sampling, both 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 Gillem Enclave 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/or disposal at Gillem Enclave. Following the evaluation, two AOPIs were identified.

Detections of PFOS, PFOA, and PFBS in groundwater were identified at both AOPIs; however, drinking water is supplied by the Clayton County Water Authority. Water sourced by the County is located upgradient of Gillem Enclave and there are no potable supply wells located on Gillem Enclave.

Two AOPIs were sampled during the SI at Gillem Enclave 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 Gillem Enclave QAPP Addendum (Arcadis 2020).

Both of the AOPIs had detections of PFOS, PFOA, and/or PFBS in groundwater and/or soil sampled, and one AOPI exceeded OSD risk screening levels. The maximum PFOS, PFOA, and PFBS concentrations observed in groundwater and/or soil, as applicable, are summarized for each AOPI below.

FTG-03 Former IWTP

- The maximum detections of PFOS (5.9 ng/L), PFOA (5.4 ng/L in the duplicate sample), and PFBS (estimated 2.2 ng/L) in groundwater at the FTG-03 Former IWTP did not exceed the OSD risk screening levels.

FTG-13 Former WSTP

- The maximum detections of PFOS (360 ng/L) and PFOA (150 ng/L) in groundwater at the FTG-13 Former WSTP exceeded the OSD risk screening levels. The maximum detection of PFBS (4.8 ng/L) in groundwater at the FTG-13 Former WSTP is below the OSD risk screening level.
- The only detection of PFOS (estimated 0.00096 mg/kg) in soil at the FTG-13 Former WSTP is below the OSD risk screening level. PFOA and PFBS were not detected in soil at FTG-13 Former WSTP.

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

FTG-03 Former IWTP

- Due to limited knowledge regarding the location of former structures and filling and grading activities at the AOPI, soil samples were not collected as part of the SI; therefore, the soil exposure pathway for on-installation site workers remains potentially complete.

- While drinking water is currently supplied to Gillem Enclave by the Clayton County Water Authority, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete to account for potential future use of the on-post groundwater downgradient of the AOPI.
- The groundwater, surface water, and sediment exposure pathways for off-installation receptors are potentially complete.

FTG-13 Former WSTP

- The soil exposure pathway for on-installation site workers is complete.
- While drinking water is currently supplied to Gillem Enclave by the Clayton County Water Authority, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete to account for potential future use of the on-post groundwater downgradient of the AOPI.
- The groundwater, surface water, and sediment exposure pathways for off-installation receptors are potentially complete.

Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for future study in a remedial investigation or no action at this time is based on the comparison of the SI analytical results for PFOS, PFOA, and PFBS to the OSD risk screening levels (**Table 6-2**). **Table 8-1** below summarizes the AOPIs identified at Gillem Enclave, PFOS, PFOA, and PFBS sampling and recommendations for each AOPI; further investigation is warranted at Gillem Enclave. 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 Gillem Enclave, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)		Recommendation
	Groundwater	Soil	
FTG-03 Former Industrial Wastewater Treatment Plant	No	NS	No action at this time
FTG-13 Former Western Sewage Treatment Plant	Yes	No	Further study in a remedial investigation

Notes:
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 Gillem Enclave 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.

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 is limited to results from groundwater samples at two AOPIs and shallow soil samples from one AOPI. Surface water, sediment, and residential or private wells were not sampled as part of the SI. Available data, including PFOS, PFOA, and PFBS, is listed in **Appendix M**, which were analyzed per the selected analytical method.

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

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ACRONYMS

%	percent
AFFF	aqueous film-forming foam
amsl	above mean sea level
AOPI	area of potential interest
Arcadis	Arcadis U.S., Inc.
Army	United States Army
bgs	below ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CID	Criminal Investigation Division
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
FTG	Fort Gillem
GIS	geographic information system
GW	groundwater
HQAES	Headquarters Army Environmental System
IDW	investigation-derived waste
installation	U.S. Army or Reserve installation
IRP	Installation Restoration Program
IWTP	Industrial Wastewater Treatment Plant
LOD	limit of detection
LOQ	limit of quantitation
mg/kg	milligrams per kilogram (parts per million)
ng/L	nanograms per liter (parts per trillion)

NS	not sampled
OSD	Office of the Secretary of Defense
PA	preliminary assessment
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
SI	site inspection
SO	soil
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
SW	surface water
TGI	technical guidance instruction
TOC	total organic carbon
UCMR3	third Unregulated Contaminant Monitoring Rule
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
WSTP	Western Sewage Treatment Plant

TABLES

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

AOPI	Matrix	Sample Identification	Depth Interval[1]	Sample Method	Analytes[2,3]
FTG-03 IWTP	GW	FTG-03-900WELL14-GW-040820	14	Low flow	PFAS
	GW	FTG-03-900WELL14A-GW-040820	39	Low flow	PFAS
FTG-13 WSTP	GW	FTG-13-MW06-GW-040920	28.5	Low flow	PFAS
	GW	FTG-13-MW10-GW-040920	20.65	Low flow	PFAS
	GW	FTG-13-MW14-GW-040920	7.5	Low flow	PFAS
	SO	FTG-13-01-SO(0-1)-040820	0-1	Hand auger	PFAS, TOC, pH, grain size
	SO	FTG-13-02-SO(0-2)-040820	0-2	Hand auger	PFAS

Notes:

1. Depth units are reported in feet below ground surface 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. Field parameters and lithological descriptions are shown on field sampling forms included in **Appendix J**.

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

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
FTG = Fort Gillem
GW = groundwater
IWTP = Industrial Wastewater Treatment Plant
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
TOC = total organic carbon
WSTP = Western Sewage Treatment Plant

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

AOPI	Location	Sample/ Parent Identification	Sample Date	Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
				OSD Risk Screening Level - Tap water	40		40		600	
				Sample Type	Result	Qual	Result	Qual	Result	Qual
FTG-03 IWTP	FTG-03-900WELL14	FTG-03-900WELL14-GW-040820	4/8/2020	N	**5.9**		**4.9**		**2.0**	J
	FTG-03-900WELL14A	FTG-03-900WELL14A-GW-040820	4/8/2020	N	**5.6**		**4.3**		**2.2**	J
		FTG-03-FD1-GW-040820	4/8/2020	FD	**5.5**		**5.4**		**1.9**	J
FTG-13 WSTP	FTG-13-MW06	FTG-13-MW06-GW-040920	4/9/2020	N	**14**		**3.8**		**2.8**	J
	FTG-13-MW10	FTG-13-MW10-GW-040920	4/9/2020	N	**5.7**		3.6	U	**2.0**	J
	FTG-13-MW14	FTG-13-MW14-GW-040920	4/9/2020	N	**360**		**150**		**4.8**	

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
FTG = Fort Gillem
IWTP = Industrial Wastewater Treatment Plant
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFBS = perfluorobutane sulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonic acid
Qual = qualifier
WSTP = Western Sewage Treatment Plant

Qualifier Descriptions:

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 7-2 - Soil PFOS, PFOA, and PFBS Analytical Results
USACE PFAS Preliminary Assessment/Site Inspection
Gillem Enclave, Georgia

AOPI	Location	Sample/Parent Identification	Sample Date	Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
				OSD Industrial/ Commercial	1.6		1.6		25	
				OSD Residential	0.13		0.13		1.9	
				Sample Type	Result	Qual	Result	Qual	Result	Qual
FTG-13-WSTP	FTG-13-01	FTG-13-01-SO(0-1)-040820	04/08/2020	N	**0.00096**	J	0.0011	U	0.0011	U
FTG-13-WSTP	FTG-13-02	FTG-FD1-S0-040820 / FTG-13-02-SO(0-2)-040820	04/08/2020	FD	0.0012	U	0.0012	U	0.0012	U
		FTG-13-02-SO(0-2)-040820	04/08/2020	N	0.0013	U	0.0013	U	0.0013	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 (OSD. 2021). No concentrations of PFOS, PFOA, and PFBS exceeded the OSD risk screening levels.

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
FD = field duplicate sample
FTG = Fort Gillem
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFBS = perfluorobutane sulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonic acid
Qual = qualifier
WSTP = Western Sewage Treatment Plant

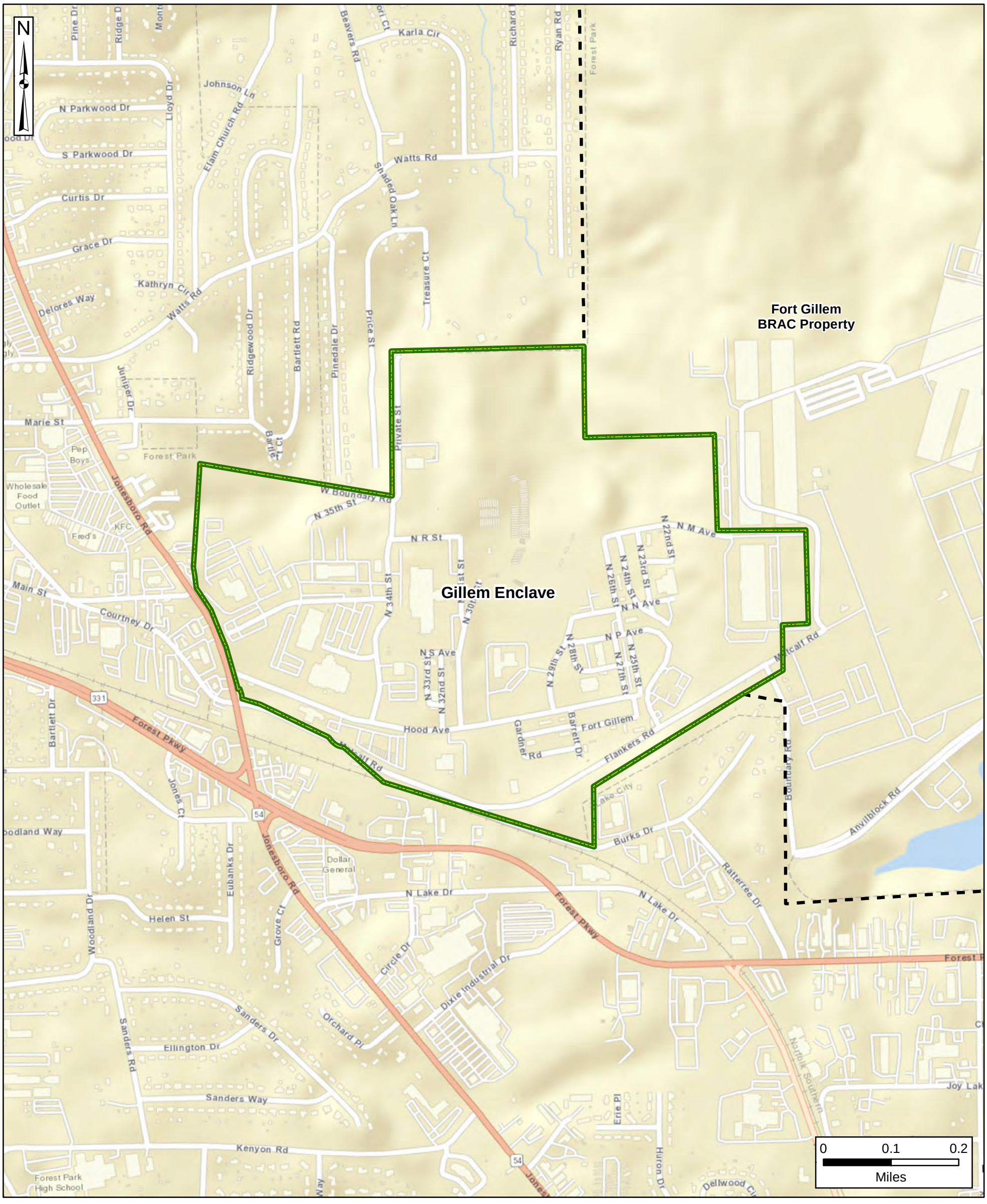
Qualifier Descriptions:

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
Gillem Enclave, GA

Figure 2-1
Site Location



Installation Boundary

BRAC Property

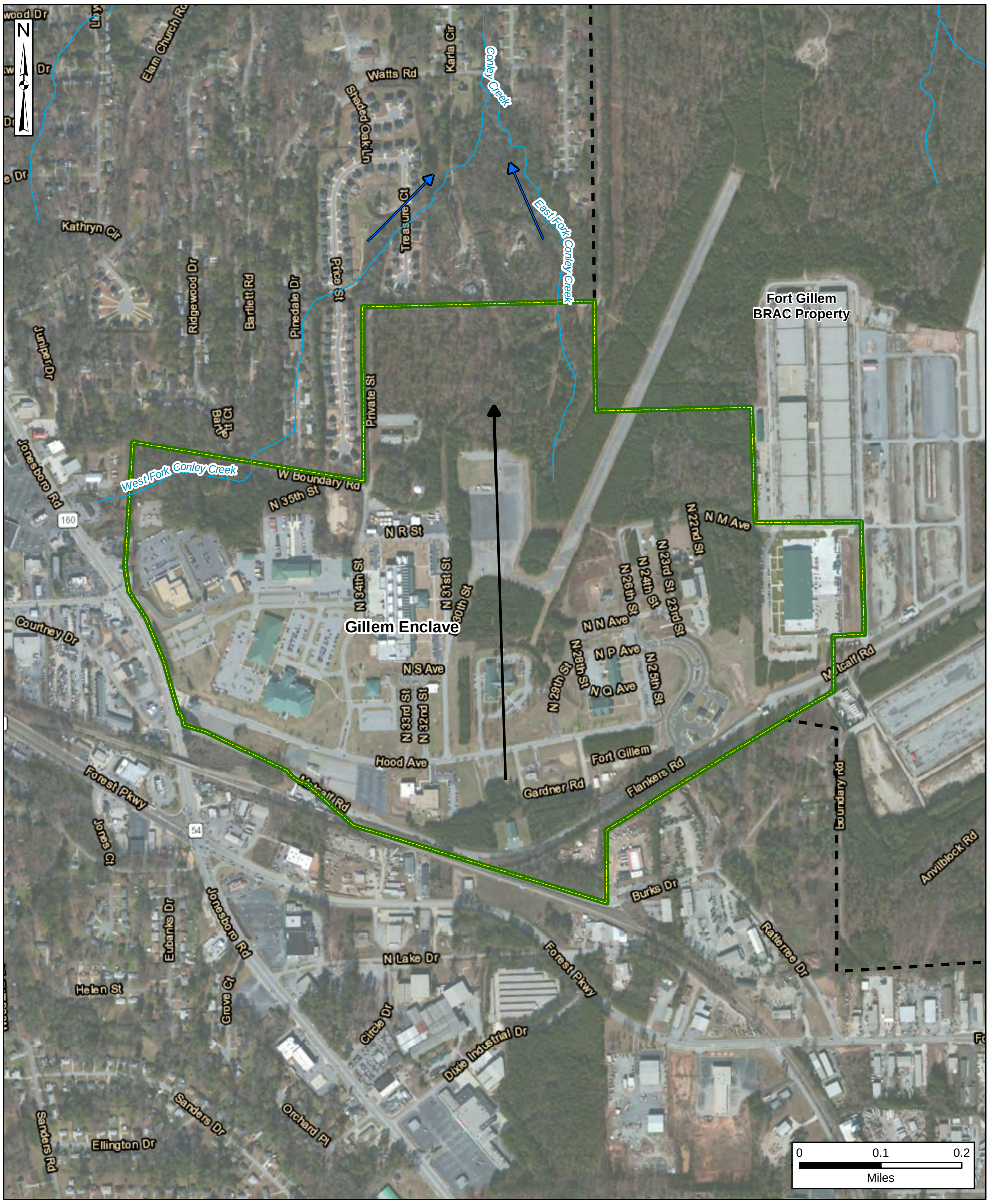
BRAC = Base Realignment and Closure

Data Sources:
ESRI, ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Enclave, GA

Figure 2-2
Site Layout



Installation Boundary

BRAC Property

River/Stream

General Groundwater Flow Direction

Surface Water Flow Direction

BRAC = Base Realignment and Closure

Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Enclave, GA

Figure 2-3
Topographic Map

Installation Boundary

BRAC Property

River/Stream

Elevation Contour (feet)

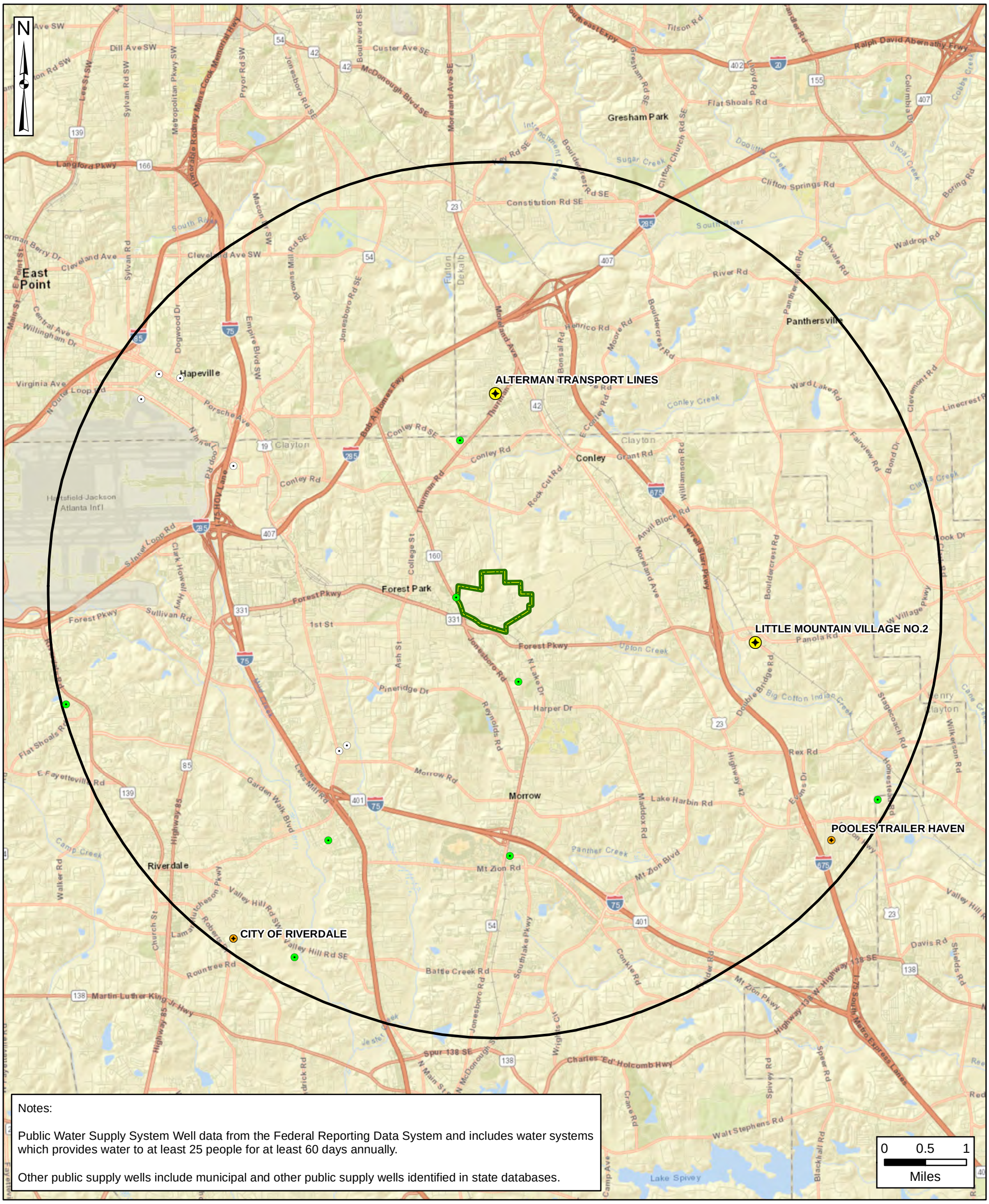
BRAC = Base Realignment and Closure

Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Enclave, GA

Figure 2-4
Off-Post Potable Wells

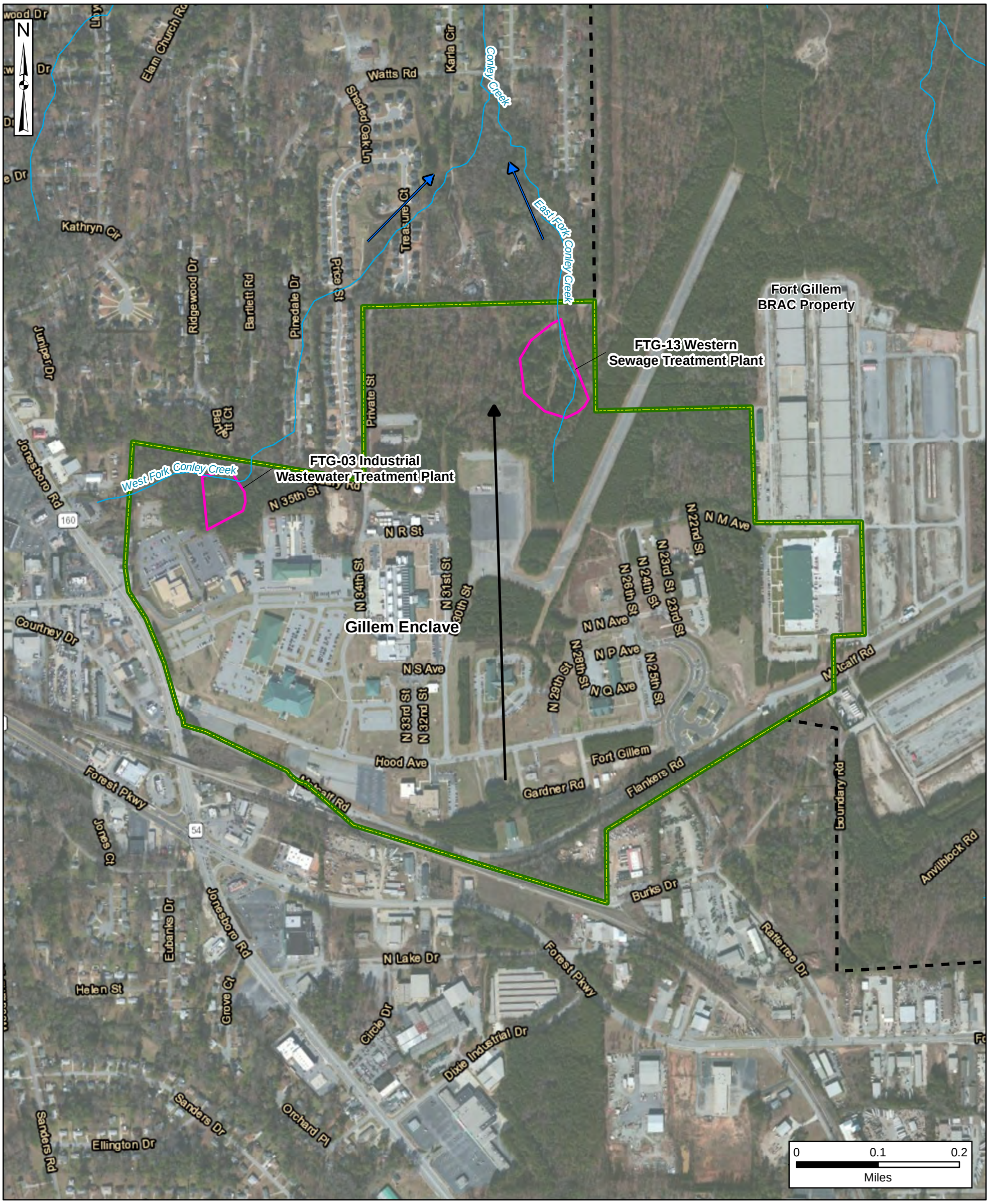


Data Sources:
EDR, Well Data, 2019
ESRI, ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Enclave, GA

Figure 5-2
AOPI Locations



Installation Boundary
BRAC Property
AOPI
River/Stream
General Groundwater Flow Direction
Surface Water Flow Direction

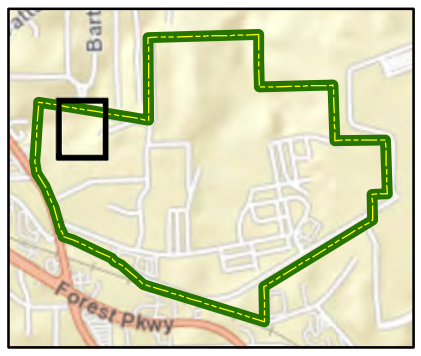
AOPI = area of potential interest
BRAC = Base Realignment and Closure

Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Encalve, GA

Figure 5-3
Aerial Photo of
FTG-03 Industrial Wastewater Treatment Plant



Installation Boundary
AOPI
Approximate Location of
Former Wastewater Treatment Plant Structure
Stream
Groundwater Flow Direction
Surface Water Flow Direction
Monitoring Well

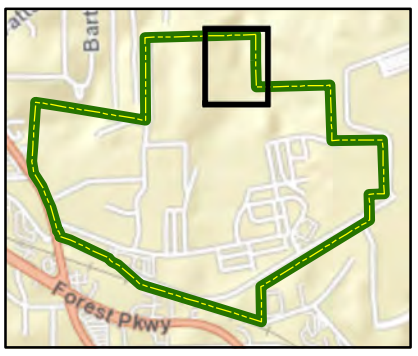
AOPI = area of potential interest

Data Sources:
Google Earth, Aerial Imagery, 2018

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Enclave, GA

Figure 5-4
Aerial Photo of
FTG-13 Western Sewage Treatment Plant



Installation Boundary
BRAC Property
AOPI
Sewage Treatment Plant Structure
Stream (approximate)
Groundwater Flow Direction
Surface Water Flow Direction
Monitoring Well

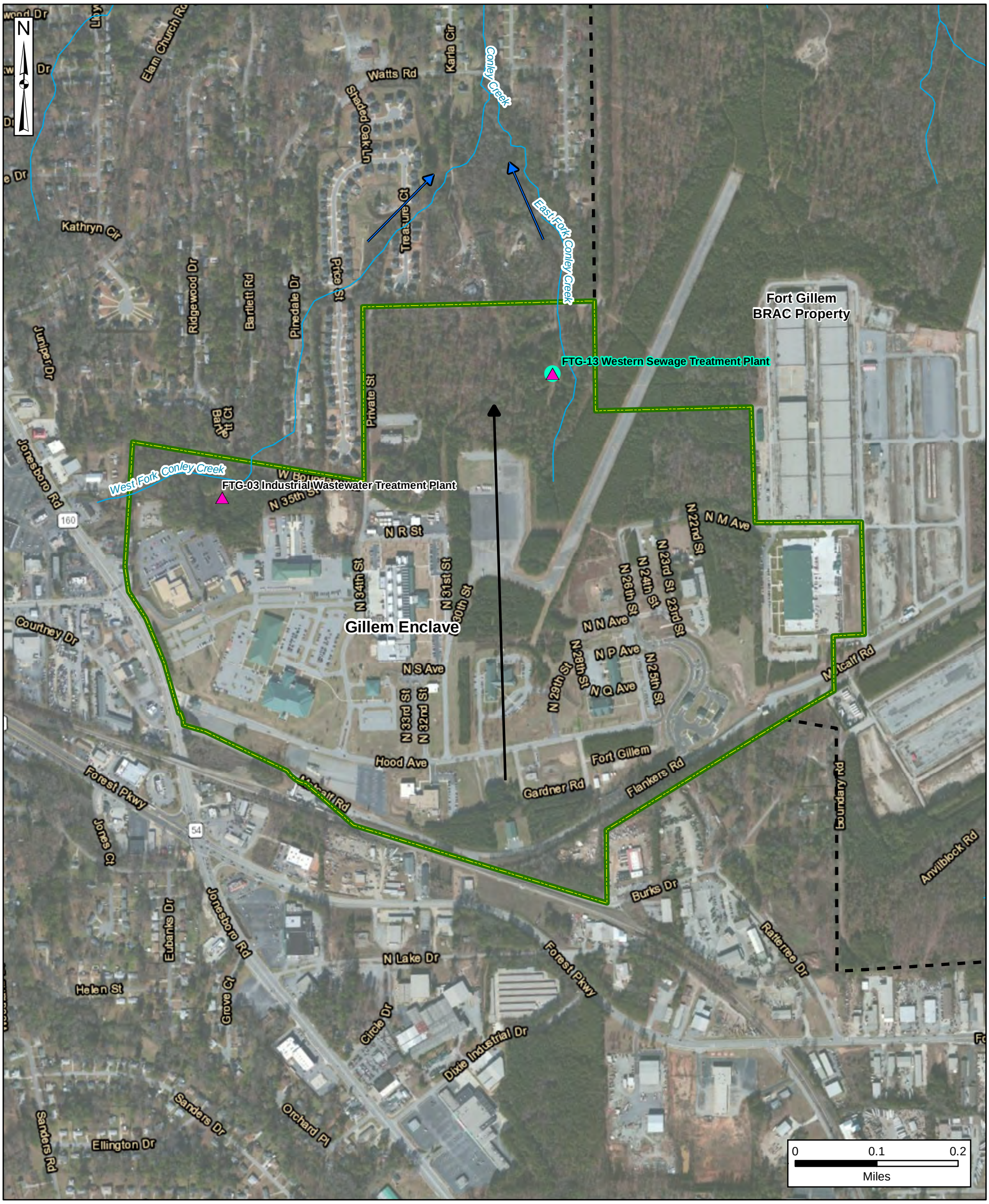
AOPI = area of potential interest
BRAC = Base Realignment and Closure

Data Sources:
Google Earth, Aerial Imagery, 2018

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Enclave, GA

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



Installation Boundary
BRAC Property
AOPI Location
AOPI with OSD Risk Screening Level Exceedance
River/Stream
General Groundwater Flow Direction
Surface Water Flow Direction

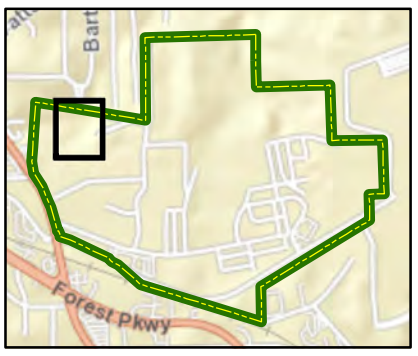
AOPI = area of potential interest
BRAC = Base Realignment and Closure
OSD = Office of the Secretary of Defense

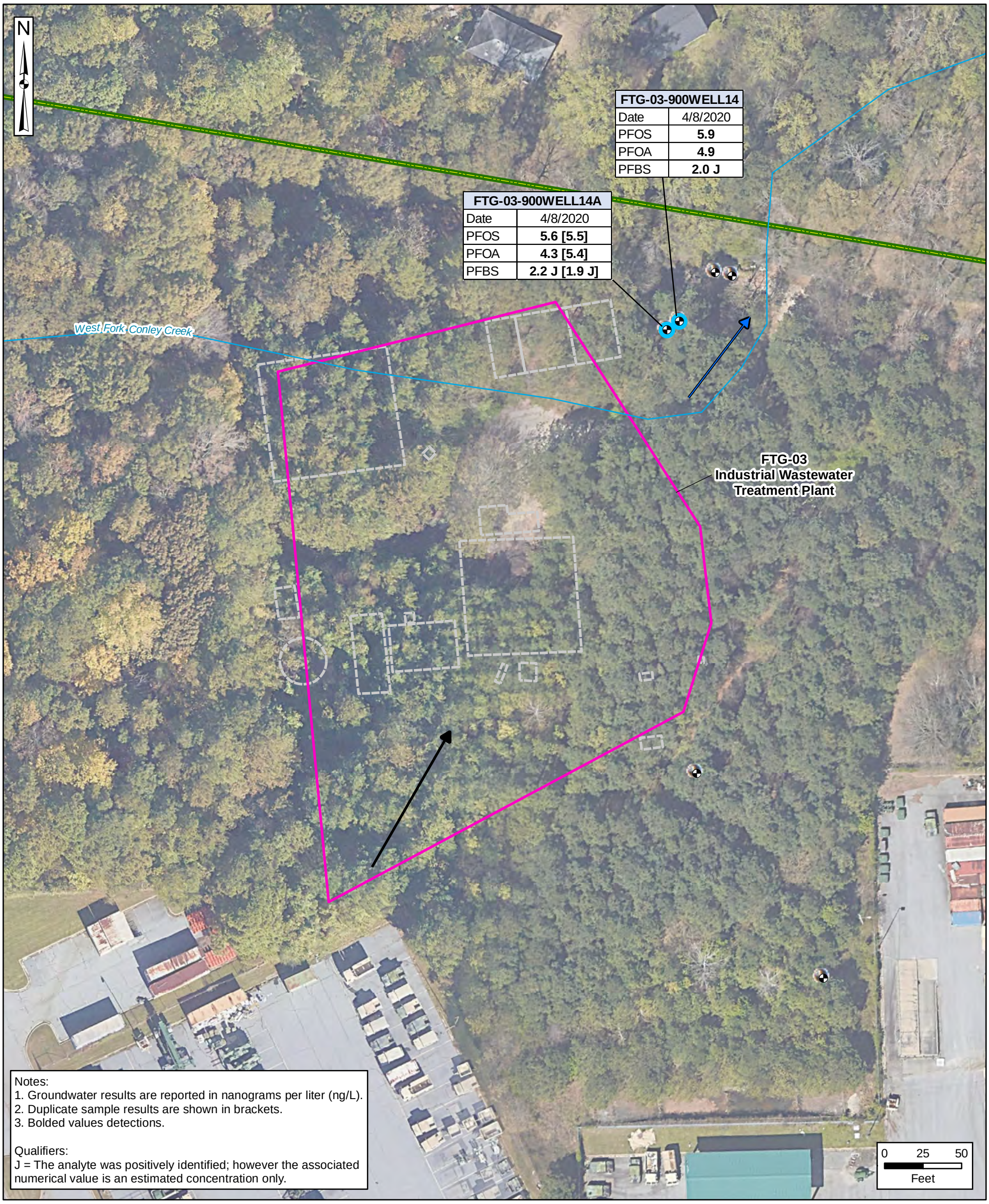
Data Sources:
ESRI, ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Encalve, GA

Figure 7-2
FTG-03 Industrial Wastewater Treatment Plant
PFOS, PFOA, and PFBS Analytical Results





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

Qualifiers:
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.

Installation Boundary
AOPI
Approximate Location of Former Wastewater Treatment Plant Structure
Stream
Groundwater Flow Direction
Surface Water Flow Direction
Monitoring Well
Groundwater Sampling Location (Existing Monitoring Well)

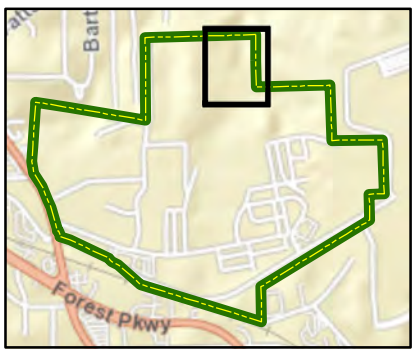
AOPI = area of potential interest
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

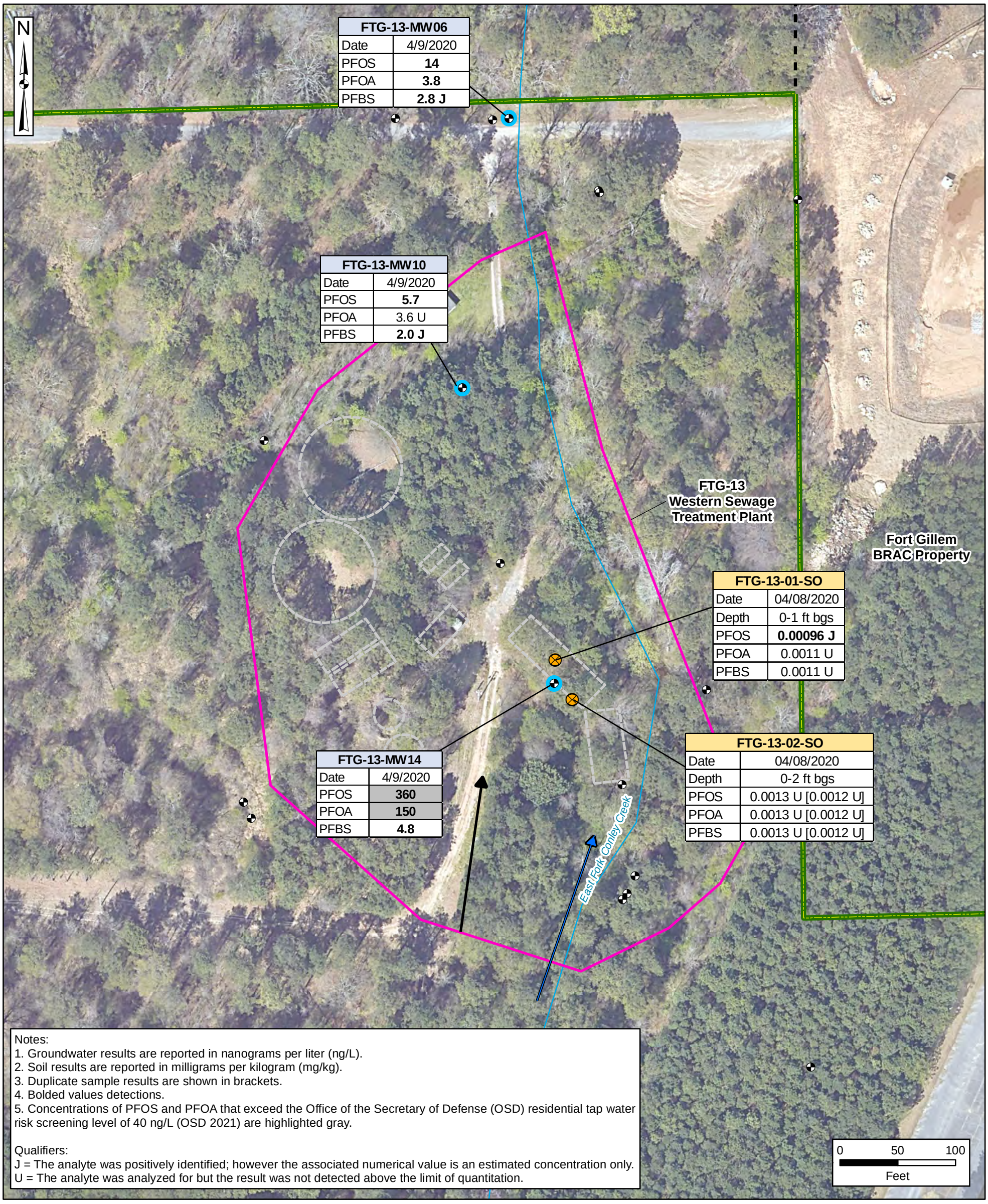
Data Sources:
Google Earth, Aerial Imagery, 2018

Coordinate System:
WGS 1984, UTM Zone 16 North

USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Enclave, GA

Figure 7-3
FTG-13 Western Sewage Treatment Plant
PFOS, PFOA, and PFBS Analytical Results





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

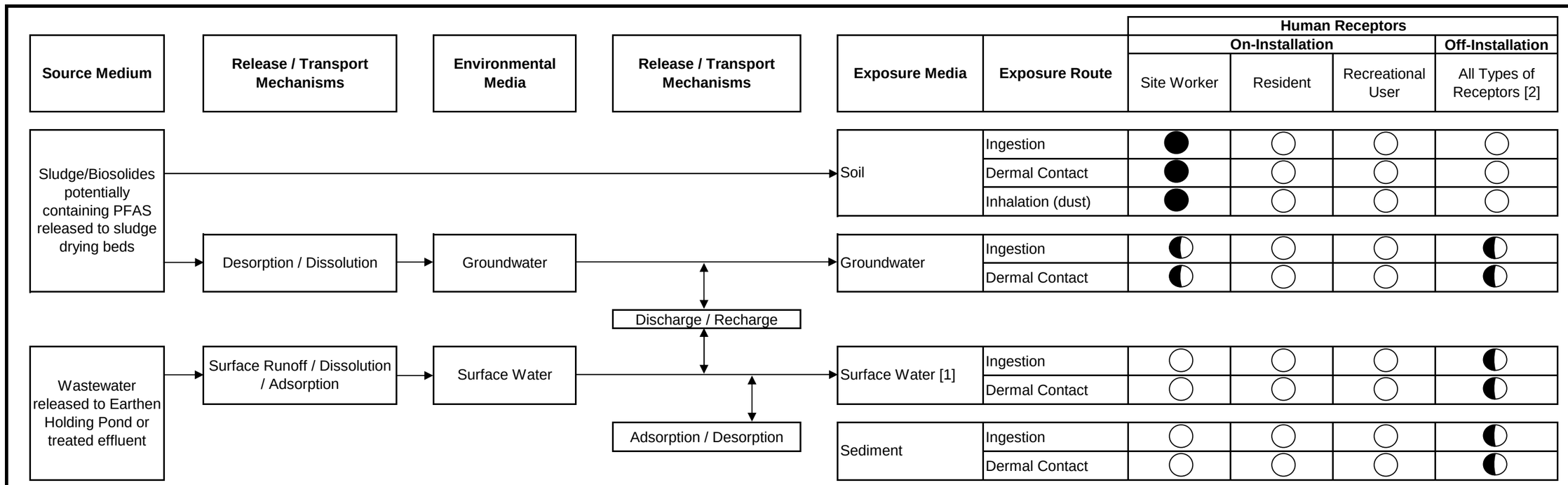
Qualifiers:
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for but the result was not detected above the limit of quantitation.

- Installation Boundary
- BRAC Property
- AOPI
- Sewage Treatment Plant Structure
- Stream (approximate)
- Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well
- Soil Boring
- Groundwater Sampling Location (Existing Monitoring Well)

AOPI = area of potential interest
BRAC = Base Realignment and Closure
ft bgs = feet below ground surface
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Google Earth, Aerial Imagery, 2018

Coordinate System:
WGS 1984, UTM Zone 16 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.

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Conceptual Site Model - Gillem Enclave AOPI FTG-13 Former WSTP
USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Enclave, Georgia

Figure 7-4

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]
Sludge/Biosolides potentially containing PFAS released to sludge drying beds				Soil	Ingestion	◐	○	○	○
					Dermal Contact	◐	○	○	○
					Inhalation (dust)	◐	○	○	○
	Desorption / Dissolution	Groundwater		Groundwater	Ingestion	◐	○	○	◐
					Dermal Contact	◐	○	○	◐
			Discharge / Recharge						
Wastewater released to Earthen Holding Pond or treated effluent	Surface Runoff / Dissolution / Adsorption	Surface Water		Surface Water [1]	Ingestion	○	○	○	◐
					Dermal Contact	○	○	○	◐
			Adsorption / Desorption	Sediment	Ingestion	○	○	○	◐
					Dermal Contact	○	○	○	◐

Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

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

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Conceptual Site Model - Gillem Enclave AOPI FTG-03 Former IWTP
USAEC PFAS Preliminary Assessment / Site Inspection
Gillem Enclave, Georgia

Figure 7-5

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