



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

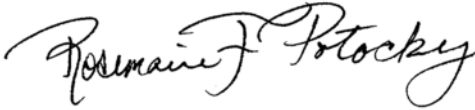
## Forest Glen Annex, Maryland

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PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT FOREST GLEN ANNEX, MARYLAND



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**Preliminary  
Assessment and Site  
Inspection of Per- and  
Polyfluoroalkyl  
Substances**

Forest Glen Annex, Maryland

Prepared for:

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## CONTENTS

Executive Summary .....	ES-1
1 Introduction .....	1
1.1 Project Background .....	1
1.2 PA/SI Objectives.....	2
1.2.1 PA Objectives.....	2
1.2.2 SI Objectives .....	2
1.3 PA/SI Process Description .....	2
1.3.1 Pre-Site Visit .....	2
1.3.2 Preliminary Assessment Site Visit .....	3
1.3.3 Post-Site Visit.....	4
1.3.4 Site Inspection Planning and Field Work .....	4
1.3.5 Data Analysis, Validation, and Reporting .....	5
2 Installation Overview .....	6
2.1 Site Location.....	6
2.2 Mission and Brief Site History .....	6
2.3 Current and Projected Land Use.....	6
2.4 Climate .....	6
2.5 Topography .....	7
2.6 Geology .....	7
2.7 Hydrogeology .....	7
2.8 Surface Water Hydrology .....	7
2.9 Relevant Utility Infrastructure .....	8
2.9.1 Stormwater Management System Description .....	8
2.9.2 Sewer System Description .....	8
2.10 Potable Water Supply and Drinking Water Receptors .....	8
2.11 Ecological Receptors.....	9
2.12 Previous PFAS Investigations .....	9
3 Summary of PA Activities .....	10
3.1 Records Review .....	10

PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT FOREST GLEN ANNEX, MARYLAND

3.2	Personnel Interviews .....	10
3.3	Site Reconnaissance.....	11
4	Potential PFAS Use, Storage, and/or Disposal Areas.....	12
4.1	AFFF Use, Storage, and Disposal Areas .....	12
4.2	Other PFAS Use, Storage, and/or Disposal Areas .....	12
4.3	Readily Identifiable Off-Post PFAS Sources .....	13
5	Summary and Discussion of PA Results .....	14
5.1	Areas Not Retained for Further Investigation .....	14
5.2	AOPs .....	16
5.2.1	Building 609 – Fire Station Company 54.....	16
6	Summary of SI Activities.....	17
6.1	Data Quality Objectives .....	17
6.2	Sampling Design and Rationale .....	18
6.3	Sampling Methods and Procedures .....	18
6.3.1	Field Methods.....	19
6.3.2	Quality Assurance/Quality Control .....	19
6.3.3	Field Change Reports .....	20
6.3.4	Decontamination .....	20
6.3.5	Investigation-Derived Waste .....	20
6.4	Data Analysis.....	20
6.4.1	Laboratory Analytical Methods.....	20
6.4.2	Data Validation .....	21
6.4.3	Data Usability Assessment and Summary.....	21
6.5	Office of the Secretary of Defense Risk Screening Levels .....	22
7	Summary and Discussion of SI Results .....	23
7.1	Building 609 – Fire Station Company 54.....	23
7.1.1	Soil .....	23
7.1.2	Groundwater .....	24
7.2	TOC, pH, and Grain Size .....	24
7.3	Blank Samples.....	24

7.4	Conceptual Site Model .....	25
8	Conclusions and Recommendations .....	27
9	References .....	30
	Acronyms .....	32

## TABLES

Table ES-1	Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at Forest Glen, and Recommendations (in-text)
Table 5-1	Installation Areas Not Retained for Further Investigation (in-text)
Table 6-1	OSD Risk Screening Levels Calculated for PFOS, PFOA, PFBS in Tap Water and Soil Using USEPA's Regional Screening Level Calculator (in-text)
Table 7-1	Soil PFOS, PFOA, and PFBS Analytical Results at Forest Glen Annex
Table 7-2	Groundwater PFOS, PFOA, and PFBS Analytical Results at Forest Glen Annex
Table 7-3	AOPIs and OSD Risk Screening Level Exceedances (in text)
Table 8-1	Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at Forest Glen Annex, and Recommendations (in-text)

## FIGURES

Figure 2-1	Site Location
Figure 2-2	Site Layout
Figure 2-3	Topographic Map
Figure 5-1	AOPI Decision Flowchart (in-text)
Figure 5-2	AOPI Locations
Figure 5-3	Aerial Photo of Building 609 – Fire Station Company 54
Figure 6-1	AOPI Sampling Decision Tree (in-text)
Figure 7-1	Building 609 – Fire Station Company 54 PFOS, PFOA, and PFBS Analytical Results
Figure 7-2	Conceptual Site Model for Building 609 – Fire Station Company 54 AOPI

## APPENDICES

Appendix A	Office of the Secretary of Defense. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15.
Appendix B	Preliminary Assessment/Site Inspection Quality Control Checklist
Appendix C	Antiterrorism/Operations Security Review Cover Sheet
Appendix D	Not Used
Appendix E	Research Log
Appendix F	Compiled Interview Logs for Forest Glen Annex and Fort Detrick
Appendix G	Site Inspection Field Notes
Appendix H	Site Inspection Field Forms
Appendix I	Field Change Report
Appendix J	Site Inspection Investigation Derived Waste Documentation
Appendix K	Data Usability Summary Report (Level IV analytical reports included in final electronic deliverable only)
Appendix L	Site Inspection Laboratory Analytical Results

## EXECUTIVE SUMMARY

The United States Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The PA identifies areas of potential interest (AOPIs) where PFAS-containing materials were used, stored, and/or disposed, or areas where known or suspected releases to the environment occurred. The SI includes multi-media sampling at AOPIs to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required. This Forest Glen Annex 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 (DoD) policy and guidance.

Forest Glen Annex is located in the Forest Glen area of Silver Spring, Maryland in Montgomery County. The installation is bounded by commercial, industrial, and residential properties, as well as by Rock Creek Regional Park, a park along the Montgomery County valley of Rock Creek, a tributary of the Potomac River.

The Forest Glen Annex PA identified one AOPI for investigation during the SI phase. SI sampling results from the AOPI was compared to risk-based screening levels calculated by the Office of the Secretary of Defense (OSD) for PFOS, PFOA, and PFBS. The AOPI had detections of PFOS, PFOA, and PFBS in groundwater and PFOS and PFOA in soil. None of these detections exceeded OSD risk screening levels.

The Forest Glen Annex PA/SI identified the need for no further action for PFAS. **Table ES-1** below summarizes the AOPI identified during the PA, PFOS, PFOA, and PFBS sampling at Forest Glen Annex, and recommendations for no action at this time at the AOPI.

**Table ES-1. Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at Forest Glen Annex, and Recommendations**

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No)		Recommendation
	GW	SO	
Building 609 – Fire Station Company 54	No	No	No action at this time

**Notes:**

GW – groundwater

SO – soil

## 1 INTRODUCTION

The United States (U.S.) Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The Army is the lead agency under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Executive Order 12580 and is conducting the PA/SI consistent with its authority under CERCLA, 42 United States Code §§ 9600, et seq. (as amended), and the Defense Environmental Restoration Program, 10 United States Code §§ 2701, et seq. The PFAS PA/SI included two distinct efforts. The PA identified locations that are areas of potential interest (AOPIs) at Forest Glen Annex, Maryland 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 Forest Glen Annex 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 15 October 2019 Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program is provided for reference as **Appendix A**. The DoD guidance provides risk screening levels for PFOS, PFOA, and PFBS in groundwater (tap water) or soil, calculated using the USEPA's Regional Screening Level (RSL) calculator for residential and industrial/commercial worker receptor scenarios. Following the issuance of the 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 (OSD 2021). The September 2021 Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program is provided for reference as Appendix A. The OSD risk screening levels for tap water (also used to evaluate groundwater 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). All soil data will be screened against both the residential scenario and industrial/commercial risk screening levels (if collected from less than 2 feet below ground surface bgs), regardless of the current and projected land use of the AOPI. 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**, respectively.

## 1.3 PA/SI Process Description

For Forest Glen Annex, PA/SI development followed the process as described below. **Section 3** provides a summary of the PA activities completed, and **Section 6** provides a summary of the SI activities completed for Forest Glen Annex. The PA and SI processes are documented in the PA/SI Quality Control Checklist included as **Appendix B**.

Since Forest Glen Annex is a sub-installation of Fort Detrick, located in Frederick, Maryland, installation personnel are shared between the two installations. PA activities for Forest Glen Annex were conducted concurrently with Fort Detrick PA activities, and all meetings were held at Fort Detrick.

### 1.3.1 Pre-Site Visit

First, an installation kickoff teleconference was held between applicable points of contact (POCs) from United States Army Environmental Command (USAEC), United States Army Corps of Engineers

## PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT FOREST GLEN ANNEX, MARYLAND

(USACE), Fort Detrick and Forest Glen Annex, and Arcadis U.S., Inc. (Arcadis). The kickoff call was conducted on 11 July 2018, approximately four weeks before the site visit to discuss the goals and scope of the PA, project scheduling, installation access, timeline for the site visit, access to installation-specific databases, and to request available records.

Records review was conducted before the site visit to obtain electronically available documents from the installation and external sources for review. The purpose of the records research is to identify any area on the installation that may have been a location where PFAS-containing materials were used, stored, and/or disposed, as well as gather information on the physical setting and site history at Forest Glen Annex.

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

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

### 1.3.2 Preliminary Assessment Site Visit

The site visit was conducted on 07 to 08 August 2018 at Fort Detrick. No site visit to Forest Glen Annex was conducted during the PA. 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 at Fort Detrick with individuals having significant historical knowledge of Forest Glen Annex. 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 was not performed during the site visit because all preliminary locations identified during the records review process, the installation in-brief meeting, and the installation personnel interviews were classified as areas not retained for further investigation. Following the site visit, programmatic guidance detailing AOPI classification was updated to include all fire stations and aqueous film-forming foam [AFFF] storage locations.

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 08 August 2018 with the installation to discuss preliminary findings of the PA site visit.

### **1.3.3 Post-Site Visit**

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

### **1.3.4 Site Inspection Planning and Field Work**

The SI process was initiated at the installation to evaluate PFOS, PFOA, and PFBS presence or absence at the AOPI and determine whether further investigation is warranted. First, an SI kickoff teleconference for both Fort Detrick and Forest Glen Annex was held between the Army PA team and Fort Detrick and Forest Glen Annex on 24 October 2019.

The objectives of the SI kickoff teleconference were to:

- discuss the AOPIs selected for sampling
- gauge regulatory involvement (USEPA and the Maryland Department of the Environment [MDE]) requirements or preferences
- confirm the plan for investigation derived waste (IDW) handling and disposal
- identify specific installation access requirements and potential schedule conflicts
- discuss general SI deliverable and field work schedule information and logistics

Following development of the SI sampling technical approach, an SI scoping teleconference was held on 12 November 2019 to obtain concurrence on the SI sampling plan from USAEC, USACE, and the installation. An additional SI scoping call including regulators was held on 03 December 2019 to obtain concurrence on the SI sampling plan from USEPA and MDE. Additional discussion topics included:

- discuss the proposed sampling plan for each AOPI
- provide an updated SI deliverable and field work schedule.

A Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP) was developed and finalized in October 2019 for the USAEC PFAS PA/SI (Arcadis 2019). The PQAPP details general planning processes for collecting data and describes the implementation of quality assurance (QA) and quality control (QC) activities for the SI portion for Army installations nationwide. Additionally, an installation-specific QAPP Addendum was developed to define the DQOs, present the sampling design

and rationale, and provide qualifications for project personnel. The SI field work was completed in accordance with the PQAPP (Arcadis 2019) and the approved installation-specific QAPP Addendum. A Site Safety and Health Plan (SSHP) was also developed as an attachment to the QAPP Addendum to identify specific health and safety hazards that may be encountered at the installation during sampling. The SSHP was designed to supplement the Accident Prevention Plan (Arcadis 2018), which was developed for Army installations nationwide. The QAPP Addendum and SSHP were submitted to the installation and finalized before commencement of field work.

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

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

### **1.3.5 Data Analysis, Validation, and Reporting**

Environmental samples collected during the SI were submitted to a laboratory which is DoD Environmental Laboratory Accreditation Program (ELAP)-accredited for PFOS, PFOA, and PFBS analysis by liquid chromatography with tandem mass spectrometry and compliant with Table B-15 of the DoD Quality Systems Manual (QSM) 5.1.1 for the 2020 sampling event and QSM 5.3 for the 2021 sampling event (DoD 2018, and DoD and Department of Energy 2019). Laboratory analytical results were then validated following the guidance in the DoD Final Data Validation Guidelines Module 3: PFAS 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 Forest Glen Annex, 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

Forest Glen Annex is located in the Forest Glen area of Silver Spring, Maryland in Montgomery County (**Figure 2-1**). The installation is bounded by commercial, industrial, and residential properties, as well as by Rock Creek Regional Park, a park along the Montgomery County valley of Rock Creek, a tributary of the Potomac River. **Figure 2-2** displays the location and boundaries of Forest Glen Annex and its immediate environs. The installation covers approximately 132 acres (Arcadis PIKA 2017).

### 2.2 Mission and Brief Site History

The Army acquired the original 174-acre Forest Glen property from the National Park College in 1942. The Army utilized the property, an annex to the Walter Reed Army Medical Center (WRAMC), as a convalescent residence for returning World War II soldiers. Following World War II, the facility was converted to a medical research center. In the early 1950s, Walter Reed Army Institute of Research was established, and additional research laboratories and hazardous waste storage facilities were built. During the early 1970s, community facilities and additional research facilities were added. On 01 October 2008, as a direct result of the Defense Base Realignment and Closure Commission recommendation, the command of Forest Glen Annex was passed from WRAMC to Fort Detrick (Arcadis PIKA 2017).

### 2.3 Current and Projected Land Use

Forest Glen Annex is an Army facility under command of Fort Detrick. The primary missions include biomedical research and development and retail services for military personnel and retired military personnel of the Washington, D.C. area. Current tenants at Forest Glen Annex include the Walter Reed Army Institute of Research, the Naval Medical Research Center, Patient Simulation Center, U.S. Army Biomechanical Research Laboratory, Armed Forces Pest Management Board, and the Armed Forces Institute of Pathology. Other activities that directly support the mission include a motor pool, a vaccine preparation facility, a warehouse, and the Fisher House which provides temporary housing to family members of wounded warriors. Additionally, Forest Glen Annex has a childcare facility, recreational ballfields, a fitness center, commissary, and post exchange (Arcadis PIKA 2017).

### 2.4 Climate

The climate in the area of Forest Glen Annex lies in the transition between a humid subtropical zone (Köppen Cfa), with hot, humid summers and cool winters, with significant amounts of precipitation during all seasons. The National Climatic Data Center monthly normals for 1981 to 2010 for nearby Rockville, Maryland indicate an average annual precipitation in the area of Forest Glen Annex of 40.26 inches,

ranging from 2.71 inches in February to 4.13 inches in May. The mean annual temperature is 55.7 degrees Fahrenheit (°F), ranging from 33.7°F in January to 76.9°F in July (Arcadis PIKA 2017).

## 2.5 Topography

Forest Glen Annex consists of flat, developed areas on which facility buildings, roads, and parking lots are built. There are steep, incised stream valleys along and surrounding the Rock Creek tributaries in the western portion of the installation beyond the limit of historical disturbance. This topography is depicted on **Figure 2-3**. Topographic elevations within Forest Glen Annex range from 188 feet above mean sea level in the western valleys to 347 feet above mean sea level along the northern perimeter (Arcadis PIKA 2017).

## 2.6 Geology

Forest Glen Annex lies within the eastern Piedmont Plateau Physiographic Province. The boundary of this Province with the Coastal Plain, known as the Fall Line, is southeast of the Forest Glen Annex. The nearest exposure of the Potomac Group of the Coastal Plain is located approximately 2.5 miles east-southeast of the Forest Glen Annex's eastern boundary. According to published geologic maps, the Forest Glen Annex underlying bedrock is the Kensington Tonalite (formerly known as the Kensington Quartz Diorite).

The middle Ordovician Kensington Tonalite formed as an intrusion into the surrounding Sykesville Formation, a lower Cambrian metasedimentary unit. The north trending Rock Creek Shear Zone separates the Kensington Tonalite from the Laurel Formation at its nearest point, approximately 0.1 mile east of the easternmost point of the Forest Glen Annex. Slightly to the north of this point, the Shear Zone cuts off the northeast trending Burnt Mills thrust fault. To the north of the Burnt Mills, the Shear Zone forms the boundary between the Kensington Tonalite and the lower Cambrian Northwest Branch Formation. Varying degrees of metamorphism are observed in the Kensington Tonalite (Arcadis PIKA 2017).

## 2.7 Hydrogeology

Groundwater Forest Glen Annex predominantly flows from the northeast to southwest mimicking the topographic surface profile and eventually discharges into the surrounding surface water features of Rock Creek and its tributaries in the western portion of the facility (Arcadis PIKA 2017). Groundwater flow direction within the vicinity of the study area is displayed on **Figure 2-2**.

## 2.8 Surface Water Hydrology

Forest Glen Annex is located in the Potomac Subregion of the mid-Atlantic water resources region. Runoff is greatest between March and May due to melting snow, elevated rainfall, reduced evapotranspiration, and soil saturation. The region is drained by the Potomac River and its tributaries. The local drainage features at Forest Glen Annex consist mainly of Rock Creek and its tributaries, which discharge to the Potomac River. The surrounding area is urbanized and drained by numerous stormwater facilities in addition to surface runoff. All streams flow roughly east to west eventually discharging into

Rock Creek, located outside the boundaries of Forest Glen Annex to the west. Accumulated precipitation drains into these stream beds or by overland flow into Rock Creek. Streams A, C, D, and E all receive some drainage from stormwater structures. Streams A and D are perennial streams, while Streams C and E are intermittent (Arcadis PIKA 2017). The perennial and intermittent streams, as well as Rock Creek, are classified as non-potable waters under the MDE classification. No drinking water intakes were identified downstream of Forest Glen Annex.

## 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 Forest Glen Annex.

### 2.9.1 Stormwater Management System Description

The Forest Glen Annex storm drainage system consists of inlets, pipes, culverts, and open ditches which carry surface runoff west to Rock Creek. The Army has also added a system of interceptor dikes (dams), storm drains, sodded ditches, and sediment basins to limit erosion on graded and landfill areas (USACE 2014).

### 2.9.2 Sewer System Description

Sanitary wastewater generated from Forest Glen Annex is handled and treated off-post by the Washington Suburban Sanitary Commission (WSSC) (U.S. Army Garrison Fort Detrick 2011).

## 2.10 Potable Water Supply and Drinking Water Receptors

No on- or off-post potable water wells were identified at or near Forest Glen Annex. Forest Glen Annex obtains its potable water from the WSSC municipal water supply, which derives its water from the Potomac River. AECOM (engineering firm) performed a potable well search within the local area surrounding the Forest Glen Annex to evaluate the potential for use of groundwater potentially hydrogeologically connected to aquifers underlying the Forest Glen Annex as drinking water supplies. An extraction of database records related to permitted water wells within 1 mile of the Forest Glen Annex was requested from the MDE's Water Management Administration. To ensure the capture of all wells within this radius given the irregularity of the facility boundaries, the search for records was conservatively conducted with a radius of 2 miles from a location roughly central to the Forest Glen Annex property. Thus, some wells reviewed may be located at a greater distance than 1 mile of the property boundary. The well database search identified 385 well permits within the 2-mile radius of the search coordinate (Arcadis PIKA 2017).

These wells included:

- Six wells coded for irrigation (all six reference a single address)
- Nine wells coded for geothermal
- 370 wells coded as test wells

No wells within the search radius were coded as water supply wells. (Arcadis PIKA 2017).

An Environmental Data Resources, Inc. (EDR) report includes search results from a variety of environmental, state, city, and other publicly available databases for a referenced property. An EDR report was generated for Forest Glen Annex, which contains the results of the well search. However, based on internal review of the report by the PA team, it was determined that the well point locations presented in the EDR list were mailing addresses for the registered well owners. Further review of the EDR list indicated that the actual well locations were not located within 5 miles of Forest Glen Annex. Therefore, no wells classified for potable use were identified within 5 miles of Forest Glen Annex.

## 2.11 Ecological Receptors

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

The undeveloped western and southwestern portions of Forest Glen Annex, including along the boundaries of Stream E is part of a natural forested corridor extending from Rock Creek National Park through the Rock Creek Regional Park in Maryland (Arcadis PIKA 2017). Wildlife studies throughout the Rock Creek National Park have identified 36 species of mammals, 181 species of birds, and 19 species of reptiles and amphibians that are present or probably present in the park. Species in the park include white-tailed deer, red and grey fox, raccoon, opossum, gray squirrel, beaver, chipmunk, southern flying squirrel, coyote, great horned owl, barred owl, red shouldered hawk, eastern box turtle, spotted salamander, and black rat snake. This flora and fauna would be expected to use the forested area of Forest Glen Annex as a path of migration in moving between the Rock Creek National Park and less developed forest habitat north of the facility in Maryland (National Park Service 2005).

## 2.12 Previous PFAS Investigations

There are no potable water supply wells or water treatment plants at Forest Glen Annex. Public water supply to Forest Glen Annex is provided by the WSSC, which obtains water from the Potomac River. Samples were collected from two WSSC Water Filtration Plant distribution system entry points (Patuxent Filter Plant and Potomac Filter Plant) under the third Unregulated Contaminant Monitoring Rule (UCMR3) as recently as 2015. The USEPA conducted the 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 analyte list published in 2012 included the analysis of PFOS and PFOA in public water systems serving more than 10,000 people (USEPA 2012). The laboratory that analyzed samples under UCMR3 met the USEPA's UCMR3 Laboratory Approval Program application and Proficiency Testing criteria for USEPA Method 537 Version 1.1. Analyses of the samples collected from the Patuxent Filter Plant and Potomac Filter Plant indicated that PFOS and PFOA were not detected above the minimal reporting level. The minimal reporting level during this analysis was 40 and 20 ng/L for PFOS and PFOA respectively, below the 2016 USEPA lifetime health advisory level of 70 ng/L combined for PFOS and PFOA.



### 3 SUMMARY OF PA ACTIVITIES

To document areas where any potential current and/or historical PFAS-containing materials were used, stored and/or disposed at Forest Glen Annex, data was collected from two principal sources of information and are described in the subsections below:

1. Records review
2. Personnel interviews.

Preliminary locations of potential use, storage, and/or disposal of PFAS-containing materials were evaluated in the PA (during records review and personnel interviews) and were categorized as AOPs or as areas not retained for further investigation at this time. A summary of the observations made, and data collected through records reviews (**Appendix E**) and installation personnel interviews (**Appendix F**) during the PA process for Forest Glen is presented in **Section 4**. Further discussion regarding areas not retained for further investigation and AOPs is presented in **Section 5.1** and **Section 5.2**, respectively.

#### 3.1 Records Review

The records reviewed for this PA included, but were not limited to, various Installation Restoration Program (IRP) administrative record documents, compliance documents, and geographic information system files. Internet searches were also conducted to identify publicly available and other relevant information. A list of the specific documents reviewed is provided in **Appendix E**.

#### 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 the installation personnel interviewed during the PA process for Forest Glen Annex is presented below (affiliation is with Fort Detrick and Forest Glen Annex).

- Acting Fire Chief
- Environmental Manager
- Onsite IRP Manager
- Environmental Chief
- Water Quality Program Manager
- Cultural and Natural Resources Manager
- Pest Controller
- Architect Master Planner
- Master Planner
- Fire Captain

The compiled interview logs are provided in **Appendix F**. Since the PA for Forest Glen was done concurrently with the PA for Fort Detrick, these interview logs are combined.

### **3.3 Site Reconnaissance**

Site reconnaissance and visual surveys were not conducted at Forest Glen Annex. All potential AOPIs identified during the records review process, the installation in-brief meeting, and during the installation personnel interviews were reclassified as areas not retained for further investigation following interviews and analysis of received information from Fort Detrick and Forest Glen Annex personnel.

Following the site visit, programmatic guidance detailing AOPI classification was updated to include all fire stations and AFFF storage locations. Based on this guidance, one fire station was reclassified as an AOPI.

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

Forest Glen Annex 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 AFFF is the most prevalent potential source of PFAS chemicals at DoD facilities. As such, this section is organized to summarize the AFFF-related uses first, and all remaining potential PFAS-containing materials in the subsequent section.

### 4.1 AFFF Use, Storage, and Disposal Areas

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

At Forest Glen Annex, fire-related equipment and materials were stored in Building 609 under the operation of Fire Station Company 54. Following personnel interviews and document research, it was concluded that AFFF has not been used to assist with fire training or response operations at Forest Glen Annex. Forty gallons of AFFF is reportedly stored at Forest Glen Annex within a pre-stocked fire truck operated by Fire Station Company 54.

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

Following document research, personnel interviews, and site reconnaissance at Forest Glen Annex, other potential PFAS-containing source types were not identified at the installation. Further discussion regarding areas not retained for further investigation is presented in **Section 5.1**.

Based on document research and personnel interviews, there are no current or historical chromium plating operations at Forest Glen Annex.

The September 2018 Army guidance indicates the mechanisms for potential use, storage, and disposal of PFAS include AFFF, metal plating facilities, wastewater treatment plants (and associated biosolids), and landfills (Army 2018). Other potential PFAS sources were also considered. These potential sources include installation storage warehouses, pesticide use, prescribed burn areas, automobile maintenance shops, photo-processing facilities, laundry/water-proofing facilities, car washes, stormwater or sanitary sewer components, or remediated soil application areas. During a telephonic interview with the IMCOM Pest Management Consultant, it was noted that products containing Sulfluramid (i.e., associated with

insecticides) may have contained PFAS and were phased out in 1996. During the PA records review, the IMCOM Pest Management Consultant provided records of potentially PFAS-containing pesticides and insecticides used at and/or stored at Army installations, and did not identify Forest Glen Annex as an installation having used or stored PFAS-containing pesticides/insecticides. Records reviewed during the PA also did not identify any PFAS-containing pesticides/insecticides. Following document research, personnel interviews, and site reconnaissance at Forest Glen Annex, other potential PFAS source types were not identified at the installation.

### **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 Forest Glen Annex) is not part of the PA/SI. However, potential off-post PFAS sources within a 5-mile radius of the installation that were identified during the records search and site visit are described below.

Nearby Montgomery County community fire stations such as the Bethesda Fire Department, Chevy Chase Fire Department, Kensington Fire Departments, and Washington D.C. Fire Departments could potentially be off-post PFOS/PFOA sources in close proximity to Forest Glen Annex. No information regarding the storage of AFFF at these fire stations was collected as part of this PA. It is also important to note that many or most of the off-post fire departments may still be using older PFOS/PFOA-containing AFFF.

## 5 SUMMARY AND DISCUSSION OF PA RESULTS

The areas evaluated for potential use, storage, and/or disposal of PFAS-containing materials at Forest Glen Annex 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, one area has been identified as an AOPI. The process used for refining these areas is presented on **Figure 5-1**, below.

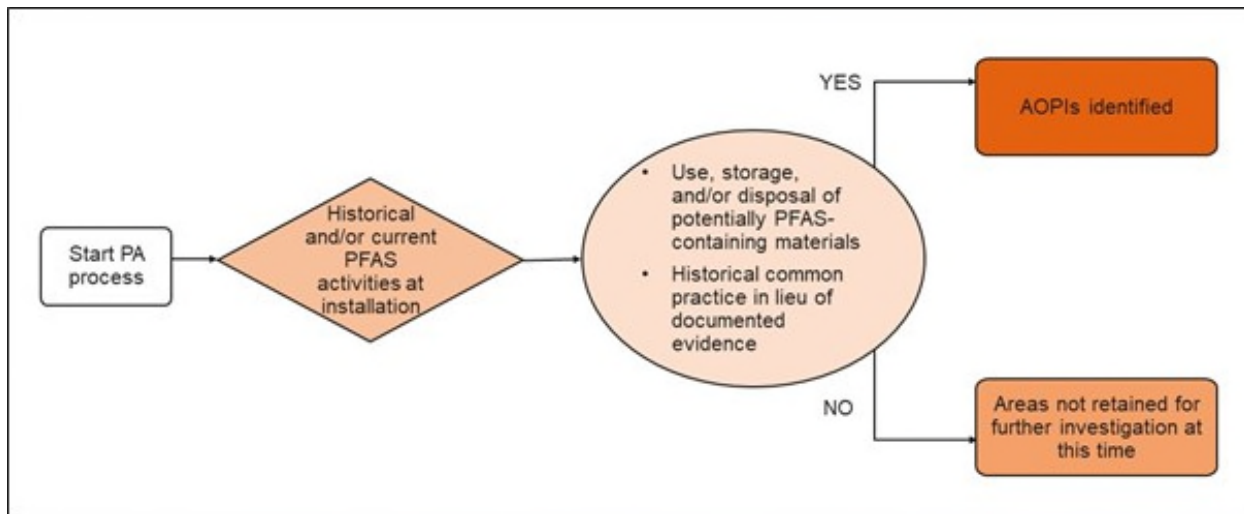


Figure 5-1: AOPI Decision Flowchart

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

None of the AOPIs overlap with Forest Glen Annex IRP sites and/or Headquarters Army Environmental System sites. The AOPI and current site status are discussed within the AOPI subsection presented below. At the time of this PA, none of the Forest Glen Annex IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS.

The AOPI location is shown on **Figure 5-2**. An aerial photograph of the AOPI is presented on **Figure 5-3**.

Data limitations for this PA/SI at Forest Glen Annex 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 are presented in **Table 5-1**, below.

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

PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT FOREST GLEN ANNEX, MARYLAND

Area Description	Dates of Operation	Relevant Site History	Rationale
Building 121 - Garage and Fire Engine Station	Pre-2001 (Exact years unknown)	Former Fire Engine Station for Forest Glen Annex. A data gap exists for details of operations at this Fire Station. No retired Fire Chiefs could be interviewed, and no information regarding AFFF use or storage related to this location was recorded.	A 2004 lease document indicates land containing Building 121 was transferred to the Montgomery County Maryland Government in 2004. This area is no longer part of the Forest Glen Annex.
Building 507 - Hazardous Chemical Lab and Bunker	1990 to Unknown	Identified initially as possible location for disposal of any AFFF containers. Empty hazardous waste containers were stored in this bunker and properly disposed of by a licensed contractor. The building has since been razed. No details available on when demolition of the building occurred.	Confirmed during interview with Fort Detrick Fire Chief that AFFF has never been stored or used at Forest Glen Annex, other than within a pre-stocked fire truck operated by Fire Station Company 54. AFFF containers would not have been disposed of at this location. No evidence of PFOS, PFOA, or PBFS containing materials used, stored, and/or disposed of at this location.
Helicopter Touch Down Area	Unknown	Helipad within Forest Glen Annex. No history of aviation crash or AFFF use/storage. Inactive according to Fort Detrick Fire Chief.	No evidence of PFOS, PFOA, or PBFS containing materials used, stored, and/or disposed of at this location.
Building 189 – Army Prosthetics Research Lab Location	1947 to 1964	Building contained very small-scale electroplating room for prosthetic limb manufacturing. Confirmed with a mechanical engineer and shop supervisor at Forest Glen Annex that chromium plating did not occur at Army Prosthetics Research Lab.	No evidence of PFOS, PFOA, or PBFS containing materials used, stored, and/or disposed of at this location.
Building 163 - Community Services Building	1984	In 1984, approximately 10 liters a month of photographic chemicals were discharged to the WSSC sanitary sewer system. An environmental manager with the Fort Detrick Directorate of Public Works stated that the photoshop	No evidence of PFOS, PFOA, or PBFS containing materials used, stored, and/or disposed of at this location.

Area Description	Dates of Operation	Relevant Site History	Rationale
		would not have used PFAS-containing chemicals.	
Building 602 – Pesticide Storing and Mixing Location	1974 to Unknown	Building 602 had a concrete floor with continuous curbing for spill control and a sink with a backflow prevention device. WRAMC reported using: Ficam, Baygon, Dursban, Diazinon, Drione, Ounglyphosphate, and Chlordane, per the Forest Glen Annex 2014 Archive Search Report (USACE 2014).	The listed pesticides were reviewed and found not to contain PFOS/PFOA. No evidence of PFOS, PFOA, or PBFS containing materials used, stored, and/or disposed of at this location.

## 5.2 AOPIs

An overview for the AOPI identified during the PA process is presented in this section.

The AOPI location is shown on **Figure 5-2**. An aerial photograph of the AOPI is presented on **Figures 5-3**.

### 5.2.1 Building 609 – Fire Station Company 54

The Building 609 – Fire Station Company 54 (**Figure 5-3**) is identified as an AOPI following records research and personnel interviews that discussed historical storage of a fire truck stocked with AFFF at this location. Two cement driveways extend outwards east and west from the main fire station bay, with grass lawns bordering all edges of the driveways. Based on review of aerial photography and topographic maps, surface runoff is suspected to flow radially along the driveways and across topography into the surrounding environment.

The Building 609 – Fire Station Company 54 CSM information is presented below in **Section 7.5**.

## 6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at Forest Glen Annex, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at Forest Glen Annex at one AOPI to evaluate presence or absence of PFOS, PFOA, and PFBS in comparison with the OSD risk screening levels. As such, an installation-specific QAPP Addendum (Arcadis 2020) was developed to supplement the general information provided in the PQAPP (Arcadis 2019) and to detail the site-specific proposed scopes of work for the SI. A preliminary CSM was prepared for the installation's AOPI in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 200-1-12 (USACE 2012). The preliminary CSM identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses. The preliminary CSM identified soil, groundwater, surface water, and sediment pathways as potentially complete which guided the SI sampling. The QAPP Addendum details the sampling design and rationale based on the AOPI's preliminary CSM. The SI scope of work was completed in September 2020 and July 2021 through the collection of field data and analytical samples.

The SI field work was completed in accordance with the standard operating procedures (SOPs), technical guidance instructions (TGIs), sampling design, and QA/QC requirements as detailed in the QAPP Addendum (Arcadis 2020) and PQAPP (Arcadis 2019). The subsections below summarize the DQOs, sampling design and rationale, sampling activities and methods, and data analyses procedures for the SI phase at Forest Glen Annex. 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**.

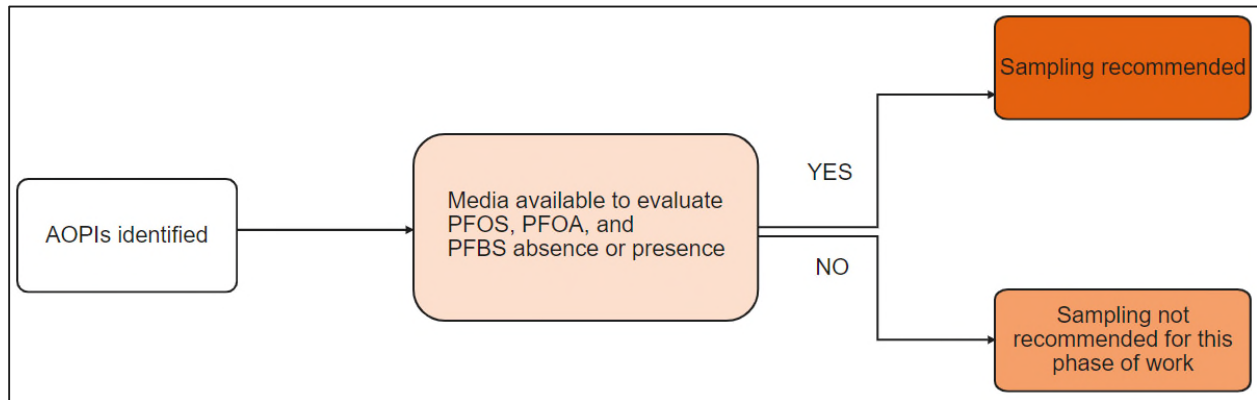
### 6.1 Data Quality Objectives

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 from any of the AOPIs identified in the PA and to determine if further investigation is warranted. This SI evaluated soil and groundwater for PFOS, PFOA, or PFBS presence or absence at the AOPI.



## 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 Forest Glen Annex is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2020). Briefly, at Forest Glen Annex, four soil samples were collected from the Building 609 AOPI in September 2020. One direct-push groundwater sample was to be collected at depth to groundwater, if encountered. However, groundwater was not encountered prior to refusal at 30.5 feet below ground surface (bgs), so a groundwater sample was not collected at Forest Glen Annex in September 2020. A second SI mobilization occurred in July and August 2021, during which two permanent monitoring wells were installed and then sampled.

Soil was sampled to identify PFAS presence, type (of the 19 selected constituents as listed in Worksheet #18 of the PQAPP [Arcadis 2019]), and concentration. Analyses also included total organic carbon (TOC), pH, and grain size in one sample collected per AOPI (i.e., not every soil sample collected). These data were collected as they may be useful in future fate and transport studies. Groundwater was sampled to identify PFAS presence, type (of the selected constituents as listed in Worksheet #15 of the QAPP Addendum [Arcadis 2020]), and concentration. The targeted sampling areas are believed to have the greatest potential for PFAS detections associated with potential releases of AFFF.

## 6.3 Sampling Methods and Procedures

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

considerations were made regarding PFAS-containing materials and equipment and cross-contamination potential.

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

### **6.3.1 Field Methods**

During the September 2020 sampling event, a total of four soil samples were collected via hand auger from 0 to 2 feet bgs. An attempt was also made to collect a single shallow groundwater sample via direct-push technology at one location (FGA-B609-1-GW); however, refusal was encountered at 30.5 feet bgs. Therefore, a groundwater sample was not collected.

During the July 2021 sampling event, two permanent monitoring wells were installed using sonic drilling methods. The boreholes were situated at the same locations as soil sampling points FGA-B609-1-SO-(0-2) and FGA-B609-4-SO-(0-2). The two monitoring wells (FGA-B609-1-GW and FGA-B609-2-GW) were both installed to total depths of 50 feet bgs and screened from 40 to 50 feet bgs. Groundwater samples were collected from each well via low-flow sampling methods in August 2021. PFAS-free sampling equipment was used, including a submersible bladder pump and a Teflon-free water level meter. Both monitoring wells were screened from approximately 40 to 50 feet below top of casing, and groundwater samples were collected from approximately 48 feet below top of casing. Equipment blanks (EBs) were collected as described in **Section 6.3.2**.

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, EBs, 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 during the initial mobilization included hand augers as applicable to the sampled media. EBs were collected from tubing and water level meters used for groundwater sampling during the second mobilization. Analytical results for blank samples are discussed in **Section 7.4**.

### 6.3.3 Field Change Reports

During the initial SI sampling event in September 2020, a groundwater sample was planned at the AOPI. However, the direct-push technology rig hit refusal at 30.5 feet bgs, prior to encountering groundwater. Per discussions with the USAEC, a second SI sampling event consisting of installing and sampling groundwater from two new monitoring wells was performed in July 2021 and August 2021, respectively. This Field Change Report is included as **Appendix I**.

### 6.3.4 Decontamination

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

### 6.3.5 Investigation-Derived Waste

IDW, including soil cuttings, excess sediment, groundwater, surface water, and decontamination fluids, were collected and placed in Department of Transportation-approved 55-gallon drums, labeled as non-hazardous, segregated by medium: waters and soil/sediment, and transported to a staging area prior to shipping and off-post disposal of the materials by U.S. Ecology. Equipment IDW includes personal protective equipment and other disposable materials (e.g., gloves, plastic sheeting, and HDPE and silicon tubing) that may come in contact with sampling media. The IDW was transported off-post for disposal at a Subtitle C Landfill in Belleville, Michigan on 18 November 2021. The completed waste profiles and associated waste manifests are provided in **Appendix J**.

## 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 Eurofins Lancaster Laboratories Environmental, an DoD 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 DoD ELAP-accredited and compliant with QSM 5.1 1 for the 2020 sampling event and QSM 5.3 for the 2021 sampling event, Table B-15 (DoD 2018, DoD and Department of Energy 2019).

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

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

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

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

#### **6.4.2 Data Validation**

All analytical data generated during the SI 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 5.1 for the 2020 sampling event and QSM 5.3 for the 2021 sampling event (DoD 2018, DoD and Department of Energy 2019). Additionally, 10% of the data underwent Stage 4 data validation. Copies of the data validation reports for each sample delivery group are included as attachments to the DUSR in **Appendix K**.

#### **6.4.3 Data Usability Assessment and Summary**

Data usability assessments were completed for all analytical data associated with SI sampling at Forest Glen Annex. Documentation generated during the data usability assessments was prepared in accordance with the USACE Engineer Manual 200-1-10 (USACE 2005), the Final DoD General Data Validation Guidelines (DoD 2019) and the Final DoD Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15 (DoD 2020), that reviewed precision, accuracy, completeness, representativeness, comparability, and sensitivity. Data from 2020 and 2021 were compiled into two separate DUSRs (**Appendix K**). A statement of overall data usability is included in each of the DUSRs.

Based on the final data usability assessments, the environmental data collected at Forest Glen Annex during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUSRs and their associated data validation reports (**Appendix K**), and as indicated in the full analytical tables (**Appendix L**) provided for the SI results. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019) and Fort Detrick and Forest Glen Annex QAPP Addendum (Arcadis 2020). Data qualifiers applied to laboratory analytical results for samples collected during the SI at Forest Glen Annex are provided in the data tables, data validation

reports, and the Data Usability Summary Tables located at the end of DUSRs. Qualifiers for data shown on figures are defined in the notes of figures.

## 6.5 Office of the Secretary of Defense Risk Screening Levels

The OSD risk screening levels for PFOS, PFOA, and PFBS in groundwater (tap water) and soil were calculated using the USEPA’s RSL calculator for residential and industrial/commercial worker receptor scenarios and current toxicity values. These risk screening levels are shown in **Table 6-1**.

**Table 6-1 OSD Risk Screening Levels Calculated for PFOS, PFOA, PFBS in Tap Water and Soil Using USEPA’s Regional Screening Level Calculator**

Chemical	Residential Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator		Industrial/Commercial Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator
	Tap Water (ng/L or ppt) <sup>1</sup>	Soil (mg/kg or ppm) <sup>1,2</sup>	Soil (mg/kg or ppm) <sup>1,2</sup>
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 for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPIs at Forest Glen Annex are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, and PFBS will be used to evaluate detected soil concentrations. The data from the SI sampling event are compared to the OSD risk screening levels in **Section 7**. If concentrations of PFOS, PFOA, or PFBS are detected greater than the applicable OSD risk screening levels, further study in a remedial investigation is recommended in **Section 8**.

## 7 SUMMARY AND DISCUSSION OF SI RESULTS

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

**Tables 7-1** and **7-2** provide a summary of the soil and groundwater analytical results at Forest Glen Annex for PFOS, PFOA, and PFBS. **Table 7-3** summarizes the AOPI and whether its SI results exceed the OSD risk screening levels. **Appendix L** includes the full suite of analytical results, as well as the QA/QC sample results. **Figure 7-1** shows the PFOS, PFOA, and PFBS analytical results in soil at the Forest Glen Annex AOPI Building 609 – Fire Station Company 54. Non-detected results are reported as less than the LOQ. 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. Soil data are reported in mg/kg, or parts per million. 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 H**. Soil descriptions are also provided on the field forms in **Appendix H**. Groundwater was generally encountered at depths of approximately 30 feet bgs in the two installed monitoring wells.

Table 7-3 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
Building 609 – Fire Station Company 54	No

### 7.1 Building 609 – Fire Station Company 54

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Building 609 – Fire Station Company 54.

#### 7.1.1 Soil

Soil sampling was conducted at Building 609 – Fire Station Company 54 at four borings located where potential AFFF runoff from the fire station driveways would likely flow to the surrounding soil. Shallow soil samples were collected from 0 to 2 feet bgs using a hand auger. **Figure 7-1** and **Table 7-1** show the analytical results for soil sampling locations at the Building 609 – Fire Station Company 54 AOPI.

PFOS was detected below the residential and commercial/industrial soil OSD risk screening level at all four soil boring locations, with concentrations ranging from an estimated concentration of 0.00036 mg/kg in FGA-B609-4-SO-(0-2)-090120 to 0.0021 mg/kg in FGA-B609-2-SO-(0-2)-090120.

PFOA was detected below the residential and commercial/industrial soil OSD risk screening level at all four soil boring locations, with concentrations ranging from an estimated concentration of 0.00027 mg/kg in FGA-B609-3-SO-(0-2)-090120 to 0.0033 mg/kg in FGA-B609-1-SO-(0-2)-090120.

PFBS was not detected at any of the four soil boring locations; therefore, PFBS did not exceed OSD risk screening levels.

### 7.1.2 Groundwater

Groundwater sampling was conducted in August of 2021. Groundwater samples were collected from two newly installed monitoring wells located downgradient of the AOPI. **Figure 7-1** and **Table 7-2** show the analytical results for this sampling event. PFOS, PFOA and PFBS were detected in groundwater at both monitoring wells.

PFOS was detected in groundwater from FGA-B609-1 and FGA-B609-2 at concentrations (5 ng/L [4.9 ng/L duplicate] and 3.5 ng/L, respectively) below the OSD risk screening level for tap water.

PFOA was detected in groundwater from FGA-B609-1 and FGA-B609-2 at concentrations (14 ng/L [15 ng/L duplicate] and 21 ng/L, respectively) below the OSD risk screening level for tap water.

PFBS was detected in groundwater from FGA-B609-1 and FGA-B609-2 at concentrations (10 ng/L [9.9 ng/L duplicate] and 3.9 ng/L, respectively) below the OSD risk screening level for tap water.

## 7.2 TOC, pH, and 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. TOC at the Building 609 – Fire Station Company 54 AOPI was recorded at 3,400 mg/kg. The TOC at this installation was lower than typically observed in topsoil: 5,000 to 30,000 mg/kg. The percentage of fines (i.e., silt and clay) in soil was recorded as 33.7%. In general, PFAS constituents tend to be more mobile in soils with less than 20% fines (silt and clay) and lower TOC. The percent moisture of the soil ranged between 13 to 16.5% with an average of 14.54%, which was typical for clay (0 to 20%). The pH of the soil was slightly alkaline. Based on these geochemical and physical soil characteristics, while PFAS constituents are relatively less mobile in soils with high percentages of fines, depleted TOC may allow for enhanced mobility of the constituents in soil.

## 7.3 Blank Samples

Detections of PFOS, PFOA, and PFBS constituents are summarized below for QA/QC samples. Most detected concentrations were low-level. Other than those noted below, concentrations of PFOS, PFOA, and PFBS in all other QA/QC samples were not detected.

- Three source blank samples were collected during the August 2021 mobilization. Data from source blank FGA-SB-3-071521 is representative of source water used by a Hydro-Vac mechanism used during utility clearance operations ahead of drilling operations. Data from source blanks FGA-SB-4-071521 and FGA-SB-5-071921 are representative of source water used as sonic drilling fluid during drilling operations. FGA-SB-4-071521 is representative of source water supplied by the drilling

subcontractors from an off-post source. FGA-SB-5-071921 is representative of source water supplied by an on-post fire-hydrant adjacent to Building 609 – Fire Station Company 54. PFOS, PFOA, and/or PFBS were detected in all three source blanks, with maximum concentrations of 3.3 ng/L for PFOS in FGA-SB-5-071921, 7.4 ng/L for PFOA in FGA-SB-3-071521, and 2.2 ng/L in FGA-SB-5-071921 for PFBS. The detections in the source blanks were two orders of magnitude lower than the OSD risk screening levels for PFOS and PFOA and three orders of magnitude lower than the OSD risk screening levels for PFBS and did not impact decisions made for whether future action is necessary at the AOPI. Additionally, well development procedures as detailed in TGI P-09 (TGI- Monitoring Well Development, Rev. 0, April 2017) referenced in the QAPP Addendum (Arcadis 2020) were followed to recover any drilling fluids that may affect the water quality around the well.

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

## 7.4 Conceptual Site Model

The preliminary CSM presented in the QAPP Addendum (Arcadis 2020) was re-evaluated and updated, if necessary, based on the SI sampling results. The CSM presented on **Figure 7-2** and in this section therefore represents the current understanding of the potential for human exposure.

Many of the PFAS constituents found in AFFF are surfactants (which do not volatilize) and are found in a charged or ionic state at environmentally-relevant pH (i.e., pH 5 to 9 standard units). PFOS, PFOA, and PFBS are each negatively charged at environmentally-relevant pH. The media potentially affected by PFOS, PFOA, and 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 potential use, storage, and/or disposal of PFAS-containing materials at the AOPI, affected media are likely to consist of soil, groundwater, surface water, and sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater, discharge from groundwater to 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 figure. 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 CSM does 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 7-2** shows the CSM for the AOPI at Forest Glen Annex. AFFF was confirmed to be stored in a fire truck located at Building 609 – Fire Station Company 54. Potential releases of AFFF to soil and pavement could migrate to groundwater via desorption and dissolution, and to surface water and sediment of Stream E and Rock Creek via shallow groundwater discharge from Robinson Box Spring.

- PFOS and PFOA were detected in soil at Building 609 – Fire Station Company 54, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete.
- The AOPI is not likely to be regularly accessed by on-installation residents and recreational users, or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- PFOS, PFOA, and PFBS were detected in groundwater at the AOPI. There are no on-post drinking water wells. Future on-post drinking water wells are not likely given Forest Glen Annex obtains its potable water from the WSSC municipal water supply, which derives its water from the Potomac River. The AOPI is downgradient of and not likely to affect the WSSC Potomac and Patuxent Water Filtration Plants used to supply potable water at Forest Glen Annex. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are incomplete.
- Recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-installation recreational users is incomplete.
- Groundwater originating at this AOPI flows off post towards the southern boundary of Forest Glen Annex. Due to the absence of land use controls preventing potable use of groundwater in this area, the groundwater exposure pathway for off-installation drinking water receptors is potentially complete.
- Surface water bodies on-post are not used for drinking water. On-installation site workers and residents are not likely to otherwise contact surface water and sediment in the on-post water bodies; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Stream E through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete.
- Surface water bodies flow off-post through Rock Creek. Although Rock Creek is not used for drinking water within 5 miles downstream of the Forest Glen Annex boundary, there is the potential that this surface water body could be used for drinking water in the future. Therefore, the surface water exposure pathway (via drinking water ingestion and dermal contact) for off-installation drinking water receptors is potentially complete. Additionally, 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 recreational users are potentially complete.

Following the SI sampling, the one AOPI was considered to have complete or potentially complete exposure pathways. Although the CSM indicates 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 6-1**).

## 8 CONCLUSIONS AND RECOMMENDATIONS

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

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

The AOPI was sampled during the SI at Forest Glen Annex to further evaluate PFAS-related releases and identify presence or absence of PFOS, PFOA, and PFBS. The SI scope of work was completed in accordance with the Final PQAPP (Arcadis 2019), the Forest Glen Annex QAPP Addendum (Arcadis 2020), and the subsequent Field Change Report (**Appendix I**).

The AOPI had detections of PFOS, PFOA, and PFBS in soil and groundwater, but none of the concentrations exceeded OSD risk screening levels. In soil, PFOS was detected at a maximum concentration of 0.0021 mg/kg (FGA-B609-2-SO-(0-2)-090120), PFOA was detected at a maximum concentration of 0.0033 mg/kg (FGA-B609-1-SO-(0-2)-090120), and PFBS was not detected. In groundwater, PFOS was detected at a maximum concentration of 5 ng/L (FGA-B609-1), PFOA was detected at a maximum concentration of 21 ng/L (FGA-B609-2-GW-080921), and PFBS was detected at a maximum concentration of 10 ng/L (FGA-B609-1-080921).

Following the SI sampling, the AOPI was considered to have complete and potentially complete exposure pathways. The soil exposure pathway for on-installation site workers is potentially complete. Due to a lack of land use controls off-installation and downgradient of Forest Glen Annex, the groundwater exposure pathway for off-installation drinking water receptors is considered to be potentially complete. Surface water is not used for drinking water at Forest Glen Annex; however, recreational users could contact constituents in surface water and sediment via incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete. Surface water bodies flow off-post through Rock Creek, which is not used for drinking water within 5 miles downstream of the Forest Glen Annex boundary. However, there is the potential that this surface water body could be used for drinking water in the future. Therefore, the surface water exposure pathway for off-installation drinking water receptors is potentially complete. 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 recreational users are potentially complete.

Although the CSM indicates 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 6-1**). **Table 8-1** below summarizes the AOPI identified at Forest Glen Annex, PFOS, PFOA, and

PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT FOREST GLEN ANNEX, MARYLAND

PFBS sampling, and recommendations for the AOPI; further investigation is not warranted at Forest Glen Annex.

**Table 8-1 Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at Forest Glen Annex, and Recommendations**

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No)		Recommendation
	GW	SO	
Building 609 – Fire Station Company 54	No	No	No action at this time

**Notes:**

GW – groundwater

SO – soil

Data collected during the PA (**Sections 3 through 5**) and SI (**Sections 6 through 7**) were sufficient to draw conclusions and recommendations summarized above. The data limitations relevant to the development of this PA/SI for PFOS, PFOA, and PFBS at Forest Glen Annex are discussed below.

Records gathered for the use, storage and/or disposal of PFAS-containing materials were reviewed during the PA process. Documentation specific to AFFF may have been limited (e.g., each AFFF use; procurement records, documentation of AFFF used during fire training activities) due to lack of recordkeeping requirements for the full timeline of common AFFF use. 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 limited by their time spent at the installation in relevant roles.

All preliminary locations identified during the records review process and the installation in-brief meeting were classified as areas not retained for further investigation following interviews and analysis of information received from Fort Detrick personnel, therefore site reconnaissance was not performed during the site visit. Following the site visit, programmatic guidance detailing AOPI classification was updated to include all fire stations and AFFF storage locations. Based on this guidance, one fire station was reclassified as an AOPI (Building 609 – Fire Station Company 54). As detailed in **Table 5-1**, Building 121 - Garage and Fire Engine Station and the land surrounding it was transferred to the Montgomery County Maryland Government in 2004. This area is no longer part of the Forest Glen Annex, and therefore was not classified as an AOPI during this investigation.

A potable well survey was conducted by AECOM in 2011 to search for potable wells within the local area surrounding Forest Glen Annex. No wells within the 2011 search radius were coded as water supply wells. The information found during this survey was used as part of this PA. An EDR report that included a well search was also generated for Forest Glen Annex. However, based on internal research by the PA team, it was determined that the EDR list was inaccurate, and the EDR was not used as a reference.

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 and installation personnel interviews.

## PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT FOREST GLEN ANNEX, MARYLAND

Finally, the available PFOS, PFOA, and PFBS analytical data at Forest Glen Annex is limited to results from groundwater collected from monitoring wells downgradient of the AOPI and shallow soil samples collected from locations surrounding the AOPI. No residential wells or private wells were included in the SI. Available data, including PFOS, PFOA, and PFBS, which were analyzed per the selected analytical method, are listed in **Appendix L**.

Results from this PA/SI report indicate further study in a remedial investigation is not warranted at Forest Glen Annex in accordance with the guidance provided by the OSD.

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PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT FOREST GLEN ANNEX, MARYLAND

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## ACRONYMS

°F	degrees Fahrenheit
%	percent
AFFF	aqueous film-forming foam
AOPI	area of potential interest
Arcadis	Arcadis U.S., Inc.
Army	United States Army
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	conceptual site model
DoD	Department of Defense
DQO	data quality objective
DUSR	Data Usability Summary Report
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
GW	groundwater
IDW	investigation-derived waste
installation	United States Army or Reserve installation
IRP	Installation Restoration Program
LOD	limit of detection
LOQ	limit of quantitation
M	manually integrated compound
MDE	Maryland Department of the Environment
mg/kg	milligrams per kilogram (parts per million)
ng/L	nanograms per liter (parts per trillion)
OSD	Office of the Secretary of Defense
PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate

## PRELIMINARY ASSESSMENT/SITE INSPECTION OF PFAS AT FOREST GLEN ANNEX, MARYLAND

POC	point of contact
ppm	parts per million
ppt	parts per trillion
PQAPP	Programmatic Uniform Federal Policy-Quality Assurance Project Plan
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RSL	Regional Screening Level
SI	site inspection
SO	soil
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
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
WRAMC	Walter Reed Army Medical Center
WSSC	Washington Suburban Sanitary Commission



# TABLES



**Table 7-1**  
**Soil PFOS, PFOA, and PFBS Analytical Results at Forest Glen Annex**  
**USAEC PFAS Preliminary Assessment/Site Inspection**  
**Forest Glen Annex, Maryland**



						Analyte	PFOS (mg/kg)	PFOA (mg/kg)	PFBS (mg/kg)		
						OSD Industrial/Commercial Risk Screening Level	1.6	1.6	25		
						OSD Residential Risk Screening Levels	0.13	0.13	1.9		
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Forest Glen Annex (Building 609)	Soil	FGA-B609-1	FGA-B609-1-SO-(0-2)-090120	09/01/2020	N	<b>0.001</b>		<b>0.0033</b>		0.0023	U
Forest Glen Annex (Building 609)	Soil	FGA-B609-2	FGA-B609-2-SO-(0-2)-090120	09/01/2020	N	<b>0.0021</b>		<b>0.00049</b>	J	0.0023	U
Forest Glen Annex (Building 609)	Soil	FGA-B609-3	FGA-B609-3-SO-(0-2)-090120	09/01/2020	N	<b>0.0015</b>		<b>0.00027</b>	J	0.0023	U
Forest Glen Annex (Building 609)	Soil	FGA-B609-4	FGA-B609-4-SO-(0-2)-090120	09/01/2020	N	<b>0.00036</b>	J	<b>0.00052</b>	J	0.0022	U
			FGA-B609-4-SO-(0-2)-DUP-090120 / FGA-B609-4-SO-(0-2)-090120	09/01/2020	FD	<b>0.00037</b>	J	<b>0.00046</b>	J	0.0022	U

**Notes:**

- Bolded** values indicate the result was detected greater than the limit of detection.
- All soil data was screened against both the Office of the Secretary of Defense (OSD) Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet below ground surface bgs), regardless of the current and projected land use of the AOPI (Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program, September 2021.).
- Gray shaded values indicate the result was detected greater than or equal to the OSD risk screening level for the residential scenario. Italicized values indicate the result was detected greater than the OSD risk screening level for the industrial/commercial and residential scenario.

**Abbreviations\Acronyms:**

AOPI = area of potential interest  
 FD = field duplicate sample  
 ID = identification  
 mg/kg = milligrams per kilogram (parts per million)  
 N = primary sample  
 PFAS = per- and polyfluoroalkyl substances  
 PFBS = perfluorobutanesulfonic acid  
 PFOA = perfluorooctanoic acid  
 PFOS = perfluorooctane sulfonate  
 Qual = qualifier

**Qualifier**

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

**Table 7-2**  
**Groundwater PFOS, PFOA, and PFBS Analytical Results at Forest Glen Annex**  
**USAEC PFAS Preliminary Assessment/Site Inspection**  
**Forest Glen Annex, MD**

Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Analyte Sample Type	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)			
						OSD Tapwater RiskScreening Level		40		40		600	
						Result	Qual	Result	Qual	Result	Qual		
Forest Glen Annex (Building 609)	Monitoring Well	FGA-B609-1	FGA-BD001-080921 / FGA-B609-1-GW-080921	08/09/2021	FD	<b>4.9</b>		<b>15</b>		<b>9.9</b>			
			FGA-B609-1-GW-080921	08/09/2021	N	<b>5.0</b>		<b>14</b>		<b>10</b>			
Forest Glen Annex (Building 609)	Monitoring Well	FGA-B609-2	FGA-B609-2-GW-080921	08/09/2021	N	<b>3.5</b>		<b>21</b>		<b>3.9</b>			

**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 2019 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October.).

**Acronyms/Abbreviations:**

-- = not applicable  
 AOPI = area of potential interest  
 FD = field duplicate sample  
 ID = identification  
 N = primary sample  
 ng/L = nanograms per liter (parts per trillion)  
 PFAS = per- and polyfluoroalkyl substances  
 PFBS = perfluorobutanesulfonic acid  
 PFOA = perfluorooctanoic acid  
 PFOS = perfluorooctane sulfonate  
 Qual = qualifier

# FIGURES



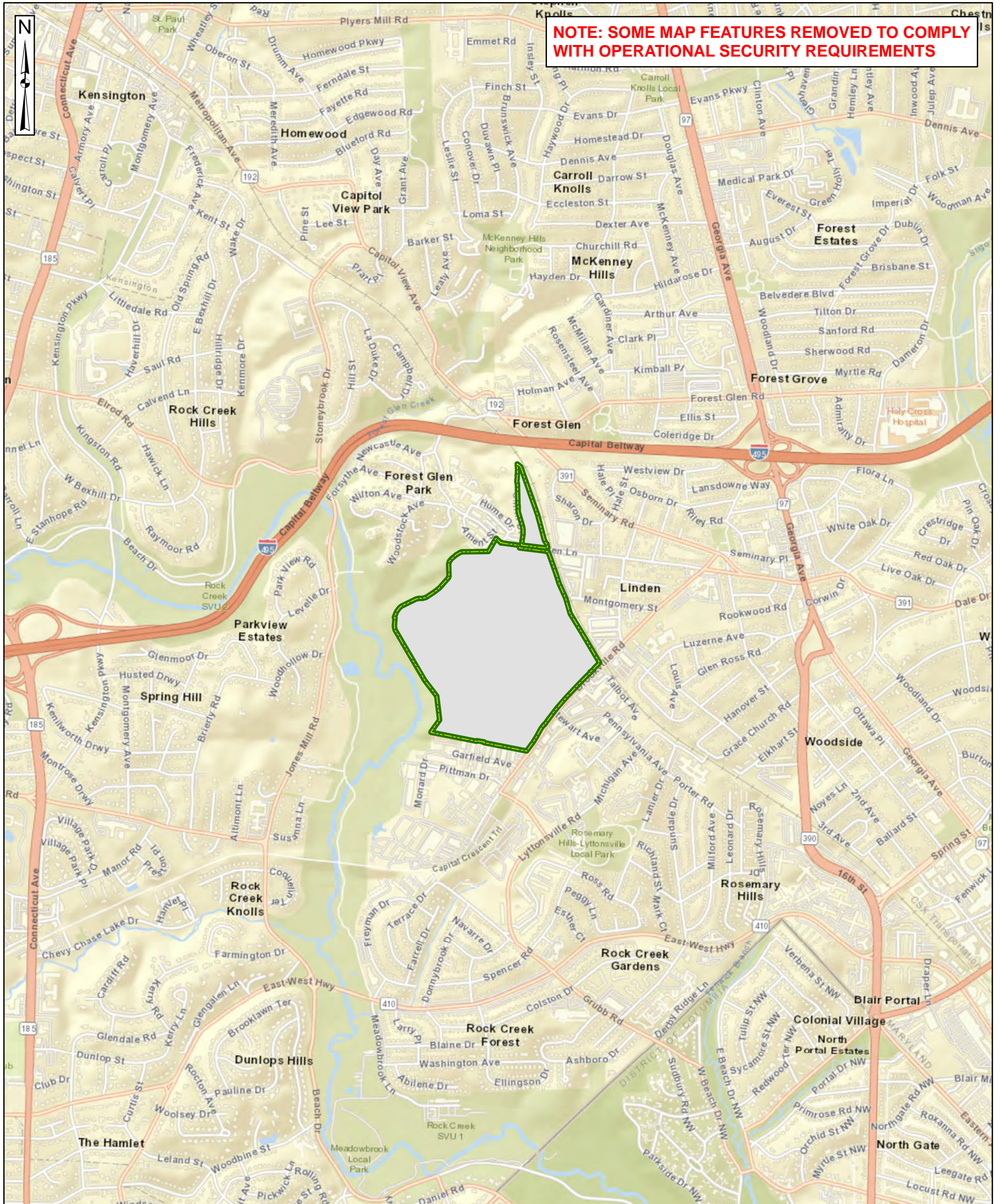




USAEC PFAS Preliminary Assessment / Site Inspection  
Forest Glen Annex, MD



Figure 2-1  
Site Location



**NOTE: SOME MAP FEATURES REMOVED TO COMPLY WITH OPERATIONAL SECURITY REQUIREMENTS**

 Installation Boundary





USAEC PFAS Preliminary Assessment / Site Inspection  
Forest Glen Annex, MD



Figure 2-2  
Site Layout



- Installation Boundary
- Stream
- Stormwater Diversion Feature
- Groundwater Flow Direction
- Surface Water Flow Direction

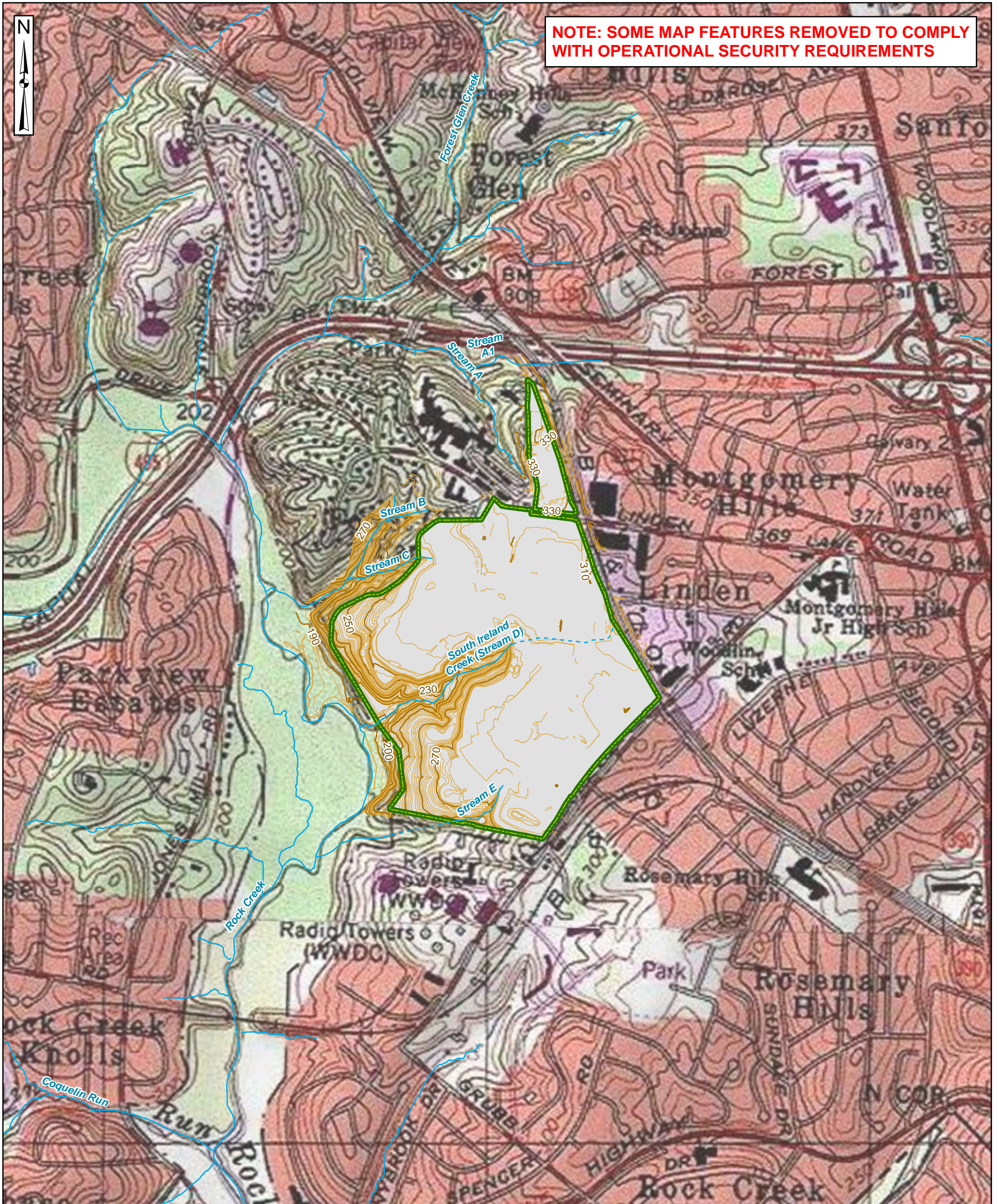
Data Sources:  
ESRI ArcGIS Online, Aerial Imagery






Coordinate System:  
WGS 1984, UTM Zone 18 North





Figure 2-3  
Topographic Map



-  Installation Boundary
-  Stream
-  Stormwater Diversion Feature
-  Elevation Contour (10 feet)
-  Elevation Contour (2 feet)

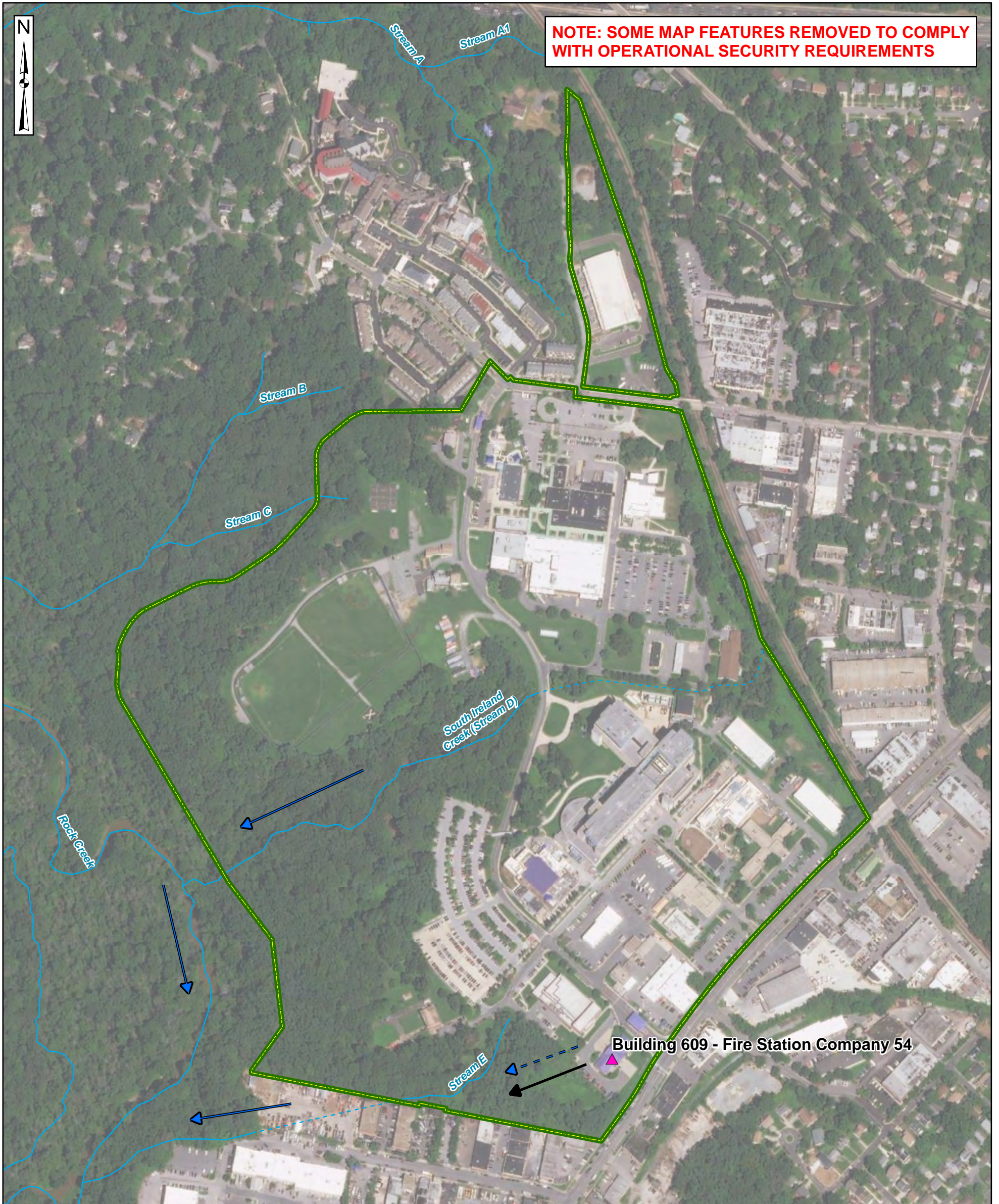
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ESRI ArcGIS Online, Topo Map

Coordinate System:  
WGS 1984, UTM Zone 18 North





Figure 5-2  
AOPI Locations



**NOTE: SOME MAP FEATURES REMOVED TO COMPLY WITH OPERATIONAL SECURITY REQUIREMENTS**

- Installation Boundary
- AOPI Location
- Stream
- Stormwater Diversion Feature
- Groundwater Flow Direction
- Surface Water Flow Direction
- Surface Runoff Flow Direction

AOPI = area of potential interest

Data Sources:  
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:  
WGS 1984, UTM Zone 18 North

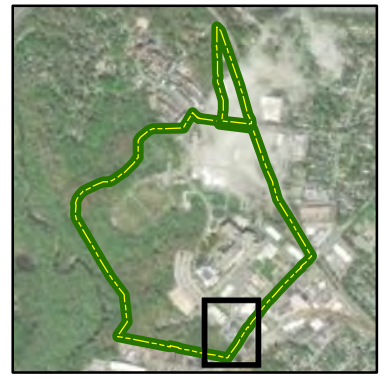




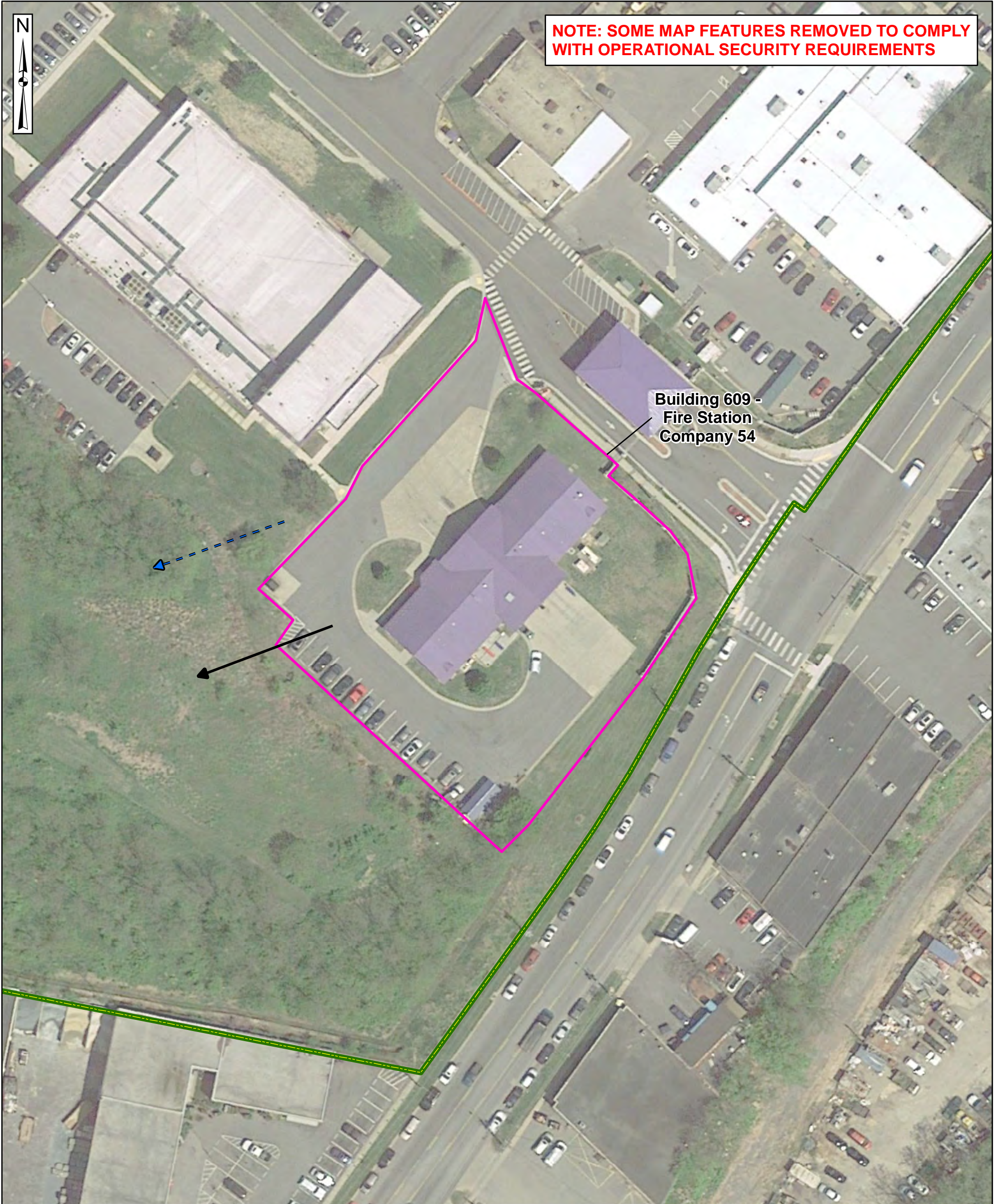
USAEC PFAS Preliminary Assessment / Site Inspection  
Forest Glen Annex, MD







Figure 5-3  
Aerial Photo of  
Building 609 - Fire Station Company 54



**NOTE: SOME MAP FEATURES REMOVED TO COMPLY WITH OPERATIONAL SECURITY REQUIREMENTS**



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

AOPI = area of potential interest

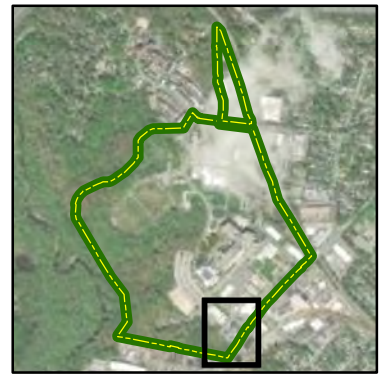
Data Sources:  
Google Earth, Aerial Imagery

Coordinate System:  
WGS 1984, UTM Zone 18 North

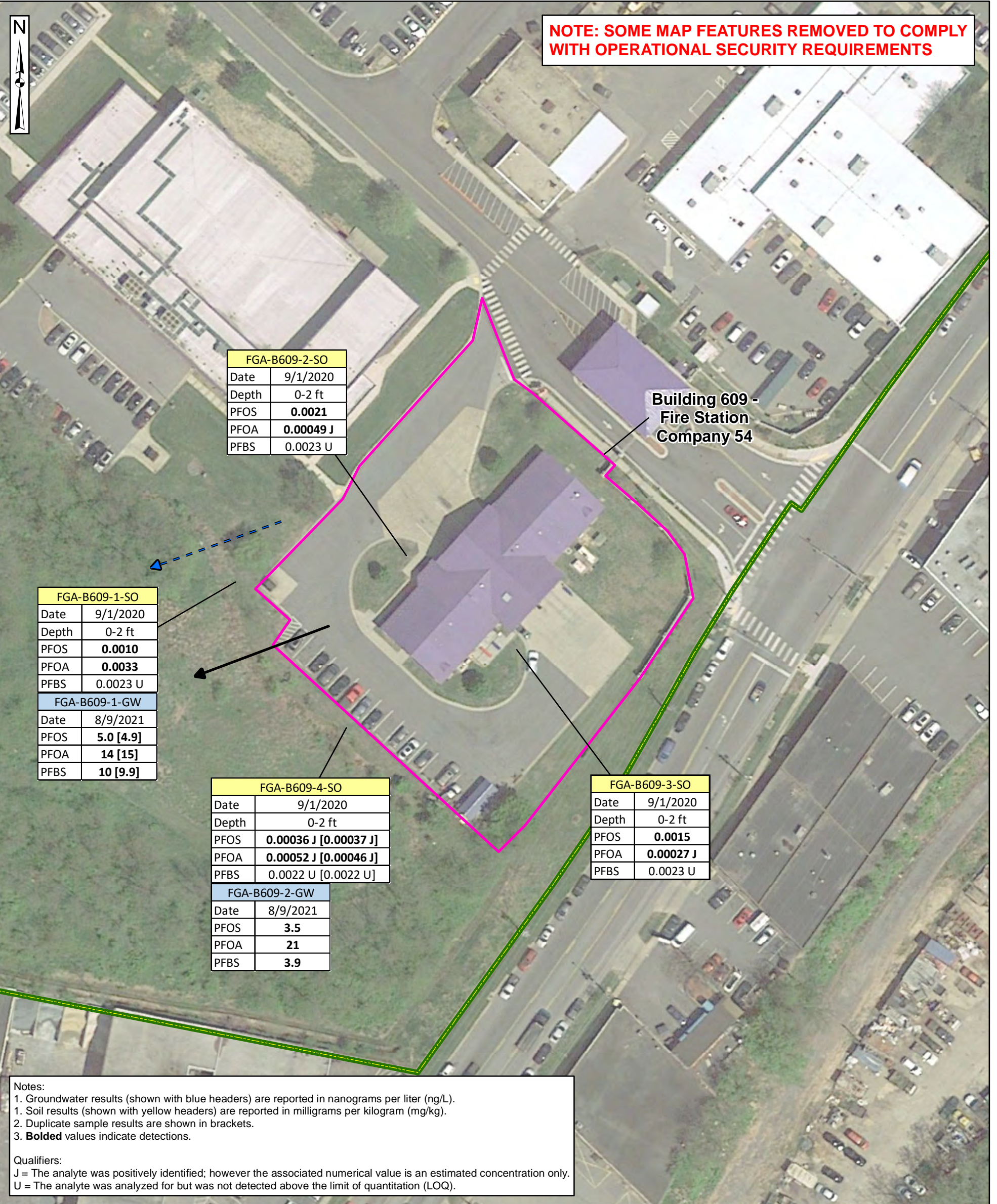




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**Figure 7-1**  
**Building 609 - Fire Station Company 54**  
**PFOS, PFOA, and PFBS Analytical Results**



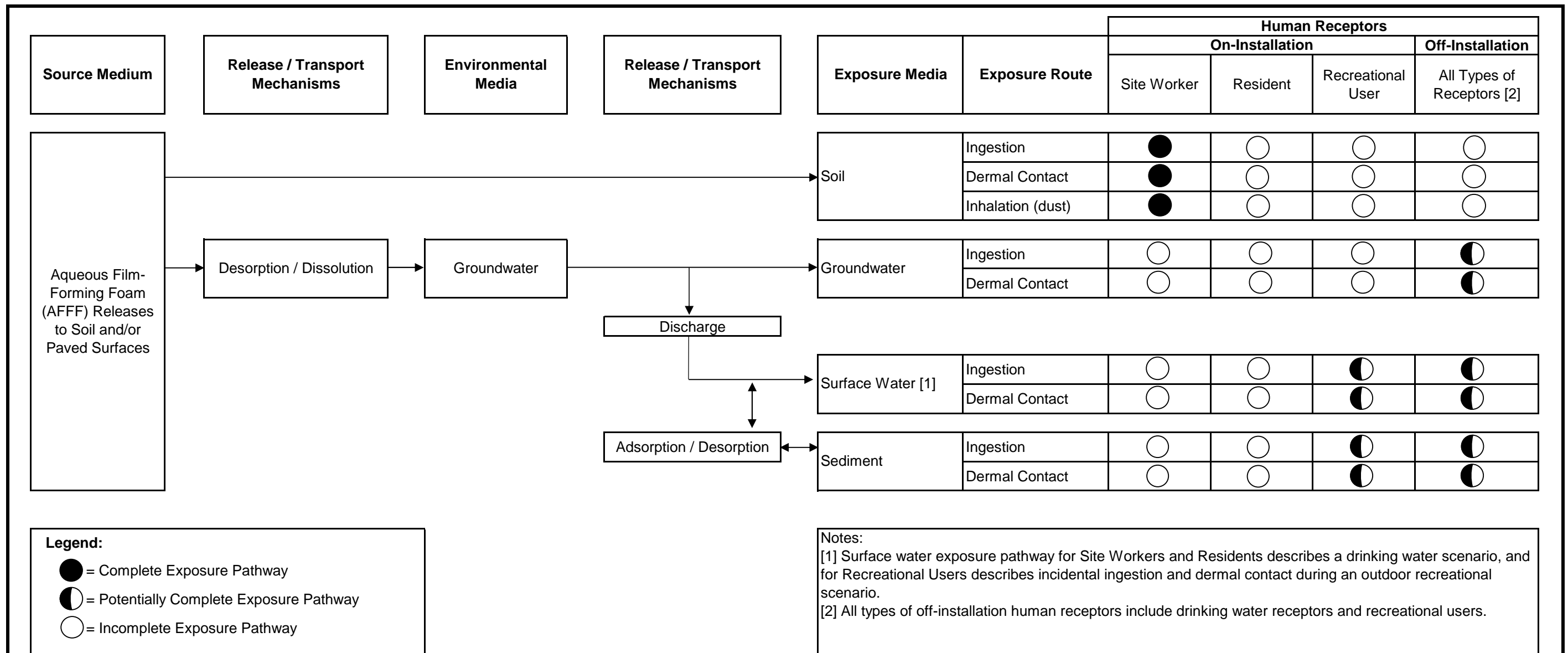
- Installation Boundary
- AOPI
- Groundwater Flow Direction
- Surface Water Flow Direction

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

Data Sources:  
Google Earth, Aerial Imagery

Coordinate System:  
WGS 1984, UTM Zone 18 North





**Conceptual Site Model for Building 609 - Fire Station Company 54 AOPI**  
 USAEC PFAS Preliminary Assessment / Site Inspection  
 Forest Glen Annex, Maryland

**Figure 7-2**