ARCADIS U.S., Inc.
7550 Teague Road, Suite 210
Hanover, MD 21076
www.arcadis-us.com

Mr. Lee Ackerman
Program Manager
Installation Management Command
4304 Susquehanna Avenue
Aberdeen Proving Ground, Maryland 21005

Subject:
Final Preliminary Assessment/Site Inspection Report for Aberdeen Proving Ground, MD
Contract No: W912DR-13-D-0019
Delivery Order No: W912DR17F0396

Environment

Date:
16 June 2023

Contact:
Keith Shepherd

Phone:
410.923.7826

Email:
Keith.Shepherd@arcadis-us.com

Our ref:
30001996.3BX50

Dear Mr. Lee Ackerman,

Arcadis U.S., Inc. is pleased to provide the Final Preliminary Assessment/Site Inspection Report for per- and polyfluoroalkyl substances at Aberdeen Proving Ground, MD This document has gone through all the necessary reviews and is considered final.

Please call me at 410 923 7826 or Rhonda Stone at 610.563.6122 if you have any questions or comments.

Respectfully,

Keith Shepherd
Arcadis U.S., Inc.
Preliminary Assessment/Site Inspection Project Manager

Copies:

Kent Gonser, USAEC
Mark Ditmore, USAEC
Jacob Holloway, USAEC
Ruby Crysler, USAEC
Riadh Hossain, USACE
Pete Phillips, USACE
Clifford Opdyke, USACE
Brant Crumbling, USACE
Vance Hobbs, APG
Rurik Loder, APG
Paul Harvey, APG
Anna-Lisa Marcum, APG
Rhonda Stone, Arcadis
Kimmie Schrupp, Arcadis

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

Aberdeen Proving Ground, Maryland

Prepared For:
U.S. Army Corps of Engineers, Baltimore District
2 Hopkins Plaza
Baltimore, Maryland 21201

June 2023

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

Aberdeen Proving Ground, Maryland

Keith Shepherd
Site Inspection Project Manager, Arcadis U.S., Inc.

Rhonda Stone, PMP
Project Manager, Arcadis U.S., Inc.

Johnsie Lang
Technical Expert, Arcadis U.S., Inc.

Prepared for:

U.S. Army Corps of Engineers

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Prepared by:

Arcadis U.S., Inc.

7550 Teague Road

Suite 210

Hanover

Maryland 21076

Arcadis Ref.:

30001996

Date:

June 2023

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EXECUTIVE SUMMARY

The United States Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) 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 Aberdeen Proving Ground (APG) 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.

APG is an approximately 72,500-acre Army installation located in southern Harford and southeastern Baltimore counties in Maryland, on the western shore of the upper Chesapeake Bay. The installation is bordered to the east and south by the Chesapeake Bay; to the west by Gunpowder Falls State Park and residential areas; and to the north by the City of Aberdeen and the towns of Edgewood, Joppatowne, Magnolia, and Perryman. The Bush River divides APG into two areas with the Edgewood Area (APG-EA) to the west and the Aberdeen Area (APG-AA) east of the river.

APG (both APG-EA and APG-AA) has more than 21,000 military, civilian, and employees of private businesses that commute on post. Census data from 2020 estimates that there are approximately 2,700 on-post residents within APG (Data USA, 2020).

The APG PA identified 57 AOPIs. Forty-two of the AOPIs were sampled during the SI phase. One of the AOPIs (G-Street Salvage Yard and Former Fire Training Area) was not sampled under the Army PFAS PA/SI program, but historical data collected from the site in 2017 exhibited exceedances of PFOS and PFOA at concentrations exceeding their respective Office of the Secretary of Defense (OSD) risk screening level values. SI sampling results from the 42 AOPIs were compared to risk-based screening levels calculated by the OSD for PFOS, PFOA, PFBS, PFHxS, and PFNA. Of the six PFAS compounds presented in the 06 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at APG because HFPO-DA is generally not a component of military specification (MIL-SPEC) aqueous film forming foam (AFFF) and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

Thirty-six of the 57 AOPIs are recommended for further study in a RI. A summary of the rationale detailing future recommendation decisions are presented below:

- PFOS, PFOA, PFBS, PFHxS and/or PFNA were detected in soil, groundwater, surface water and/or sediment at 40 of the 42 AOPIs sampled as part of the Army PFAS PA/SI. 35 of these 42

AOPIs had PFOS, PFOA, PFBS, PFHxS and/or PFNA present in groundwater, soil, or sediment at concentrations greater than the risk-based screening levels and are therefore recommended for further study in a RI.

- One AOPI, the G-Street Salvage Yard and Former Fire Training Area, is recommended for further study in a RI based on PFOS and PFOA data collected as part of a 2018 RI (ECC 2018). The analytical results of this historic RI, supplemented by comparison to OSD risk screening levels in this PA/SI Report, are considered sufficient to complete SI requirements under CERCLA.
- Seven of the 57 AOPIs that exhibited non-detects or concentrations of PFOS, PFOA, PFBS, PFHxS, and/or PFNA below their respective OSD risk screening values in groundwater, soil, and/or sediment are recommended for no action at this time.
- Based on a lack of sampling data and/or uncertainties surrounding source identification, fourteen biosolid application field AOPIs may warrant further investigation. Rationale for the fourteen AOPIs that may warrant further investigation is detailed below:

Detailed rational supporting AOPI recommendations are summarized in **Section 8**. **Table ES-1** below summarizes the PA/SI sampling results and provides recommendations for further study or no action at this time at each AOPI.

Table ES-1. Summary of AOPIs Identified during the PA, PFOS, PFOA, PFBS, PFHxS, and PFNA Sampling at Aberdeen Proving Ground and Recommendations

AOPI Name	PFOS, PFOA, PFBS, PFHxS, and PFNA detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Air Base Range (ABR) 3	Yes	Yes	Further study in a remedial investigation
ABR 6	Yes	Yes	Further study in a remedial investigation
ABR 7	Yes	ND	Further study in a remedial investigation
PAAF Runways	Yes	NS	Further study in a remedial investigation
PAAF – Aircraft Boneyard	Yes	No	Further study in a remedial investigation
Former Aberdeen Fire Training Area	Yes	Yes	Further study in a remedial investigation
Building 1074 – Former Maryland Fire and Rescue Institute (MFRI) Fire Training Area	Yes	No	Further study in a remedial investigation
PAAF – Airfield Fire Station Building 1059	Yes	Yes	Further study in a remedial investigation
PAAF – Hangar 1060	Yes	Yes	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, PFBS, PFHxS, and PFNA detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
PAAF – Crash Truck Storage Bay Building 1065	Yes	No	Further study in a remedial investigation
PAAF – Loading Pad	Yes	No	Further study in a remedial investigation
Michaelsville Landfill	Yes	NS	Further study in a remedial investigation
Building 300 – Former Aberdeen Fire Station and Building 250 - Potable Supply Wells	Yes	Yes	Further study in a remedial investigation
Building 2200 – Current Aberdeen Fire Station	Yes	No	Further study in a remedial investigation
Building 2308 – Fire Department Storage Building	Yes	NS	Further study in a remedial investigation
AA5 Range	Yes	NS	Further study in a remedial investigation
Poverty Island - Minefield Range	Yes	No	Further study in a remedial investigation
Poverty Island - Range 12	Yes	No	Further study in a remedial investigation
Ford's Farm	ND	NS	No action at this time
EF-15	Yes	NS	Further study in a remedial investigation
Fuze Range	Yes	NS	Further study in a remedial investigation
Building E5005 - Edgewood Fire Department Storage	Yes	No	Further study in a remedial investigation
Building E5180 – Edgewood Fire Station	Yes	Yes	Further study in a remedial investigation
CASY Site	Yes	ND	Further study in a remedial investigation
G-Street Plane Crash Area	Yes	ND	Further study in a remedial investigation
G-Street Salvage Yard and Former Fire Training Area[1]	Yes[1]	Yes[1]	Further study in a remedial investigation
Noble Road – Former Fire Training Area	Yes	Yes	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, PFBS, PFHxS, and PFNA detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Building E4040 – Aircraft Maintenance Building	Yes	No	Further study in a remedial investigation
Building E4081 – Army Aviation Support Facility	Yes	ND	Further study in a remedial investigation
Weide Airfield – Tarmac AFFF Release Area	Yes	ND	Further study in a remedial investigation
H-Field – Helicopter Fire Response Area	Yes	ND	Further study in a remedial investigation
H-Field – Tank Fire Response Area	NS	NS	No action at this time
Biosolid Application Field A-1	Yes	No	Further study in a remedial investigation
Biosolid Application Field A-2	NS	NS	May warrant further investigation
Biosolid Application Field A-3	NS	NS	May warrant further investigation
Biosolid Application Field B	Yes	Yes	Further study in a remedial investigation
Biosolid Application Field D	Yes	No	Further study in a remedial investigation
Biosolid Application Field C-1	NS	NS	May warrant further investigation
Biosolid Application Field C-2	NS	NS	May warrant further investigation
Biosolid Application Field C-3	NS	NS	May warrant further investigation
Biosolid Application Field E	Yes	ND	Further study in a remedial investigation
Biosolid Application Field F	NS	NS	May warrant further investigation
Biosolid Application Field G	NS	NS	May warrant further investigation
Biosolid Application Field H	NS	NS	May warrant further investigation
Biosolid Application Field I	NS	NS	May warrant further investigation
Biosolid Application Field ATC-1	ND	ND	No action at this time
Biosolid Application Field ATC-2	No	ND	No action at this time
Biosolid Application Field S-1A	No	ND	No action at this time
Biosolid Application Field S-2	NS	NS	May warrant further investigation
Biosolid Application Field S-3	Yes	ND	Further study in a remedial investigation
Biosolid Application Field S-5	NS	NS	May warrant further investigation

AOPI Name	PFOS, PFOA, PFBS, PFHxS, and PFNA detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Biosolid Application Field S-6	Yes	ND	Further study in a remedial investigation
Biosolid Application Field E-1	NS	NS	May warrant further investigation
Biosolid Application Field E-2	NS	NS	May warrant further investigation
Biosolid Application Field E-3	ND	No	No action at this time
Biosolid Application Field E-4	ND	ND	No action at this time
Biosolid Application Field E-6	NS	NS	May warrant further investigation

Notes:
Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
ND – non-detect
NS – not sampled
SO – soil
[1] - AOPI was not sampled under the Army PFAS PA/SI program, but historical data showed OSD exceedances of PFOS and PFOA. Recommendations are based solely on data collected separately from a Remedial Investigation (RI; ECC 2018). The analytical results of this investigation supplemented by comparison to OSD risk screening levels in this PA/SI Report, are considered sufficient to complete SI requirements under CERCLA.

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), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) 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 Aberdeen Proving Ground (APG) 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 analyical results were compared to the Office of the Secretary of Defense (OSD) PFOS, PFOA, PFBS, PFHxS, and PFNA risk screening levels to determine whether further investigation is warranted. HFPO-DA was not in the suite of PFAS compounds analyzed during the SI; therefore, there are no HFPO-DA SI analytical results to screen against the OSD risk screening levels. This report provides the PA/SI for APG and was completed in accordance with CERCLA and The National Oil and Hazardous Substances Pollution Contingency Plan.

1.1 Project Background

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

In 2016, the United States Environmental Protection Agency (USEPA) established a lifetime health advisory of 70 nanograms per liter (ng/L) in drinking water for PFOS or PFOA and for the sum of PFOS and PFOA when both are present (USEPA 2016). On 15 October 2019, the OSD provided guidance on the investigation of PFOS, PFOA, and PFBS at Department of Defense (DoD) restoration sites (OSD 2019). The DoD guidance provides risk screening levels for PFOS, PFOA, and PFBS in tap water and 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). On 18 May 2022, the USEPA published an update to the RSLs table. The May 2022 RSL table included six PFAS constituents: PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA (USEPA 2022). On 06 July 2022, the OSD issued a memorandum to include

revised risk screening levels based on the May 2022 USEPA RSLs (OSD 2022). The July 2022 Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program is provided for reference as **Appendix A**. These screening criteria are discussed further in **Section 6.5**.

1.2 PA/SI Objectives

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

1.2.1 PA Objectives

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

1.2.2 SI Objectives

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

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

1.3 PA/SI Process Description

For APG, PA/SI development followed a similar 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 APG. The PA and SI processes are documented in the PA/SI Quality Control Checklist included as **Appendix B**.

1.3.1 Pre-Site Visit

First, an installation kickoff teleconference was held between applicable points of contact (POCs) from United States Army Environmental Command (USAEC), United States Army Corps of Engineers (USACE), APG, and Arcadis U.S., Inc. (Arcadis). The kickoff call occurred on 03 May 2018, three weeks before the site visit to discuss the goals and scope of the PA, project scheduling, installation access, timeline for the site visit, access to installation-specific databases, and to request available records.

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

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

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

- The Installation Management Command (IMCOM) operation order
- The Army PA Operations Security requirements package, which includes the antiterrorism/operations security review cover sheet
- 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 21 to 24 May 2018. An in-brief meeting was held to provide installation staff with the objectives of the site visit and team introductions. **Section 3** includes information regarding personnel interviewed.

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

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

An exit briefing was offered to installation personnel at the conclusion of the site visit to raise any items identified during the site visit, discuss any follow-up items, and review the schedule for submitting deliverables. The installation declined an exit briefing.

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, PFBS, PFHxS, and PFNA presence or absence at each AOPI and determine whether further investigation is warranted. First, an SI kickoff teleconference was held between the Army PA team and the APG.

The objectives of the SI kickoff teleconference were to:

- discuss the AOPIs selected for sampling and the proposed sampling plan for each AOPI
- gauge regulatory involvement (the USEPA and Maryland Department of Environment [MDE]) requirements or preferences
- discuss general SI deliverable and field work schedule information and logistics

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

- identify overlapping unexploded ordnance or cultural resource areas
- confirm the plan for investigation-derived waste (IDW) handling and disposal
- identify specific installation access requirements and potential schedule conflicts
- provide an updated SI deliverable and field work schedule.

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

The DQOs, sampling design and rationale, and field methods employed for the SI are summarized from the QAPP Addendum developed for APG (Arcadis 2021) in **Sections 6.1** through **6.3**.

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

1.3.5 Data Analysis, Validation, and Reporting

Environmental samples collected during the SI were submitted to a laboratory which is DoD Environmental Laboratory Accreditation Program (ELAP)-accredited for PFOS, PFOA, PFBS, PFHxS, and PFNA analysis by liquid chromatography with tandem mass spectrometry and compliant with Table B-15 of the DoD Quality Systems Manual (QSM) 5.3 (DoD and Department of Energy 2019). Laboratory analytical results were then validated and verified by a project chemist to assess the usability of the data collected. Validated analytical results were summarized in the context of OSD risk screening levels (defined in **Section 6.5**).

2 INSTALLATION OVERVIEW

The following subsections provide general information about APG, 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

APG is an approximately 72,500-acre Army installation located in southern Harford and southeastern Baltimore counties in Maryland, on the western shore of the upper Chesapeake Bay (**Figure 2-1**). The installation is bordered to the east and south by the Chesapeake Bay; to the west by Gunpowder Falls State Park and residential areas; and to the north by the City of Aberdeen and the towns of Edgewood, Joppatowne, Magnolia, and Perryman. The Bush River divides APG into two areas with the Edgewood Area (APG-EA) to the west and the Aberdeen Area (APG-AA) east of the river (**Figure 2-1**) (U.S. Army Garrison [USAG] APG 2008).

The APG (both APG-EA and APG-AA) has more than 21,000 military, civilian, and employees of private businesses that commute on post. Census data from 2020 estimates that there are approximately 2,700 on-post residents within APG (Data USA, 2020). The site layout is presented on **Figure 2-2**.

2.2 Mission and Brief Site History

Established as the Ordnance Proving Ground in 1917, the APG-AA of the installation became a formal military post, designated as APG, in 1919. Traditionally, APG's primary mission involved the testing and development of weapon systems, munitions, vehicles, and a wide variety of military support material (USAG APG 2008). The original APG-AA comprised 29,162 upland acres and 34,600 acres of water. Ordnance officer training began in 1919 with the activation of the Ordnance School of Application. Prior to World War II (WWII), activities at APG were characterized by intense research and development, as well as large-scale testing of a wide variety of munitions, weapons, and materiel. In 1940, enlisted specialist training was consolidated with the officers' training. On 01 July 1940, the Ordnance School became operational. From 1939 to 1942, during the WWII build-up, the Army acquired approximately 6,800 acres adjacent to the reservation and purchased an additional 244 acres near Churchville for automotive testing. Spesutie Island, providing an additional 1,834 acres, was added to the APG-AA in 1945. During the Korean and Vietnam conflicts, smaller-scale munitions, material development and testing activities at APG increased. During the Korean conflict, the Ordnance Training Command was established, and the Ordnance School was placed under this Command. In 1962, the Ordnance Training Command was discontinued with the advent of the Army Materiel Command (USAG APG 2003).

In October 1917, by Presidential Proclamation, land southwest of the APG-AA was appropriated for use as a military reservation, known as the Gunpowder Reservation. In May 1918, this reservation was officially designated as Edgewood Arsenal (now APG-EA). Edgewood Arsenal remained an ordnance installation until 01 July 1918, when it was transferred to the newly created Chemical Warfare Service. During the 1920s, the Chemical Warfare School was established. The Fort Hoyle Military Reservation became part of Edgewood Arsenal in 1940, adding 5,000 acres to the APG-EA. In 1942, the installation

was designated as the Chemical Warfare Center, and in 1945, the name of the installation was changed to Army Chemical Center. In 1962, with the organization of Army Materiel Command, the Army Chemical Center once again became Edgewood Arsenal, and the U.S. Army Chemical-Biological-Radiological Agency was organized. On 01 July 1971, Edgewood Arsenal became a part of APG (USAG APG 2003). Historically, all of the military chemical warfare research, development, and related activities at APG have occurred in the APG-EA. Since 1917, the APG-EA has been the site of laboratory research, field testing of chemical materiel and munitions, pilot-scale manufacturing, production-scale chemical agent manufacturing (during WWII), and related test and disposal operations. The APG-EA has also been a center for the storage of chemical warfare materiel and a major receiving center for waste handling operations, including low-level radiological waste (USAG APG 2003).

The mission of the APG is to serve as a center for Army materiel testing, laboratory research, and military training. The installation is a key element in the nation's defense. APG is home to 11 commands and supports more than 90 tenants, 20 satellites activities, and 17 private activities. Major tenants include:

- U.S. Army Research Laboratory (ARL)
- U.S. Army Edgewood Chemical Biological Center (ECBC)
- U.S. Aberdeen Test Center (ATC)
- Maryland Army National Guard (MDARNG)

ATC, located in the APG-AA, conducts planning and development tests, as well as production tests of weapons and weapons systems, rockets and missile systems, munitions, components, survey and target acquisition equipment, armor plated, combat, general- and special-purpose vehicles. ATC also provides advice and guidance on test and evaluation materials to material developers, material producers, (e.g., ARL). ARL which is headquartered in the APG-AA, primarily performs research in ballistics and conducts human factors engineering and robotics research and development. (USAG APG 2003).

Headquartered in the APG-EA, ECBC and its parent organization, the U.S. Army Soldier and Biological Chemical Command, is responsible for the research, development, management, and maintenance support functions for all chemical and biological defense systems; central management of chemical weapons treaty compliance; and worldwide technical escorts for planned or emergency disposal. (USAG APG 2003)

The MDARNG operates within APG-EA. Weide Airfield, located within APG-EA, is leased to and operated by the MDARNG at the time of this PA/SI report.

2.3 Current and Projected Land Use

The mission of the APG is to serve as a center for Army materiel testing, laboratory research, and military training. The post is a key element in the nation's defense. All tanks and wheeled vehicles which have served U.S. forces for over 50 years have been tested for performance and durability at APG.

The installation also supports a wide variety of training, including mechanical maintenance, health promotion and preventive medicine, chemical and biological defense, chemical casualty care, and chemical demilitarization. APG also is host to the National Guard and U.S. Army Reserve operations and training (USAG APG 2017b).

In addition to the Edgewood and Aberdeen areas, APG operates the 221-acre Churchville Test Area, which consists of cross-country courses and slopes for endurance testing of all types of automotive vehicles and equipment. The area is bordered by Deer Creek and off-post farmland and residential housing. To minimize conflicts between military activities and off-post land uses, APG partnered with Harford Land Trust to secure a conservation easement on a 162-acre parcel of land adjacent to the Churchville Test Area's northern boundary (USAG APG 2017a).

2.4 Climate

The climate of APG is temperate and moderately humid. Due to the proximity of the Chesapeake Bay and the Atlantic Ocean, the climate tends to be moderate as compared to the inland areas. The average temperature in the APG area is 54.5 degrees Fahrenheit, with an average relative humidity of 73.8 percent (%). Precipitation averages 44.8 inches per year, with the maximum rainfall occurring in the summer and the minimum rainfall occurring during the winter. Precipitation as snowfall averages 12 inches per year. Prevailing winds average 6.8 knots in a northwesterly to north-northwesterly direction in the winter months and southerly to south-southwesterly direction in the summer months (USAG APG 2012).

2.5 Topography

APG is located within the Atlantic Coastal Plain Physiographic Province and is predominantly low lying along the shores of the Chesapeake Bay. Elevations within APG-EA and APG-AA range from sea level to approximately 60 feet above mean sea level. The elevation of the western part of APG-AA varies from a high of approximately 70 feet above the North American Vertical Datum 88 in the northern portion of the site to approximately 10 feet above the North American Vertical Datum 88 in the southern portion of the site (**Figure 2-3**). The site is generally flat lying with a gentle slope to the south and east (USAG APG 2012).

2.6 Geology

Regionally, APG is located in the low-lying, gently rolling terrain of the Atlantic Coastal Plain Physiographic Province. The marine and non-marine sediments of the Coastal Plain were deposited on the eastern continuation of the Piedmont Crystalline Complex where seas and streams deposited interbedded layers of clay, silt, sand, and gravel. The layers start at the Fall Line, which is a boundary between the Piedmont Plateau metamorphic rocks and the Atlantic Coastal Plain sedimentary units to the northwest of APG and thicken to the southeast (USAG APG 2012). Atlantic Coastal Plain sediments in the area are divided into three major units, defined below from oldest to youngest:

- The Lower Cretaceous Potomac Group (comprised from oldest to youngest of the Patuxent, Arundel, and Patapsco Formations)
- The Quaternary Talbot Formation (Pleistocene)
- The Holocene (Recent) Sediments

The contact between the Talbot Formation and the lower Cretaceous Potomac Group is unconformable and the surface of the Cretaceous Potomac Group is an erosional feature. As a result, the surface of the

Cretaceous Group dips overall to the southeast but has variable relief. Beneath APG, the top of the Cretaceous Potomac Group is principally the Patapsco Formation. Within the APG-AA area, three Quaternary terraces (Qts) are identified as former floodplains of the ancestral Susquehanna River system during the Quaternary. These three surfaces are identified from youngest to oldest as Qt1, Qt2 and Qt3. (U.S. Army Public Health Command [USAPHC] 2013).

2.7 Hydrogeology

Regionally, groundwater in Harford County is withdrawn from crystalline Pre-Cambrian basement rock and the Atlantic Coastal Plain sediments. In the APG area of the county, the thicker Atlantic Coastal Plan sediments are found with aquifers that can yield up to 1,000 gallons per minute (USAG APG 2012). A 1997 Maryland Geological Survey report divided the Atlantic Coastal Plain sedimentary sequence beneath APG into one paleo-channel aquifer, three aquifers (1, 2, 3 and 4, from shallowest to deepest), and two confining units (1 and 2).

The paleochannel aquifer is defined as being comprised of predominantly Pleistocene Talbot Formation fluvial and estuarine sediments. Where the fluvial sediments are overlain by estuarine clays and silty clays, confined groundwater conditions occur within hydrogeologic units. In the Spesutie Island area, this aquifer system is coincident with the identified Qt1.

Aquifer 1 is a shallow water-table aquifer that extends throughout most of the Coastal Plain and the unit relevant to PFAS investigation at APG. It consists mostly of silty sands, but also contains areas of sand and gravel with fine-grained material, and areas that are predominantly clay. Aquifer 1 receives recharge from precipitation, and discharges through evapotranspiration, base flow from streams, and estuarine discharge. Water also flows to and from the deeper aquifers as leakage through the underlying confining unit 1. Aquifer 1 consists of the Qts of the Talbot Formation and the shallow part of the Potomac Group where it crops out. Confining unit 1 underlies aquifer 1, where present, and consists of silt and clay.

Aquifer 2 is a semi-confined to confined aquifer which underlies aquifer 1. Where confining unit 1 is very thin or absent, Aquifer 2 is semi-confined or possibly unconfined. Where confining unit 1 is present (such as in the vicinity of the Building 250 Potable Supply Wells), Aquifer 2 exhibits confined or artesian conditions (USACE 1983). The aquifer includes sediments from the Potomac Group and the Talbot Formation. It consists predominantly of sand and gravel with some areas of low permeability silt and clay. It receives recharge mostly as leakage from aquifer 1, but also receives recharge as leakage from the underlying aquifer 3 and overlying estuaries. Confining unit 2 underlies aquifer 2, and consists predominantly of silt and clay, but could also include some isolated pockets of sand and gravel. Aquifer 3 is a confined aquifer that underlies aquifer 2. It is composed entirely of Potomac Group sediments. It consists predominantly of sand with some gravel (USAPHC 2013).

In APG-AA, the water table aquifer is approximately 30 feet below ground surface (bgs; USAG APG 2012). The groundwater flow patterns in the shallow, water table aquifer vary in different APG-AA areas and are affected by proximity of natural discharge points, location and size of recharge zones, lithology, seasonal precipitation fluctuations, and groundwater extraction at production wells (PWs; USAG APG 2012). An APG-AA groundwater model developed in 1998 indicated that if all pumping at the City of Aberdeen Production (CAP) and Harford County Production (HCP) well fields ceased, APG groundwater would discharge to the Chesapeake Bay (USAG APG 2012 and Woodward-Clyde 1998).

The APG-EA is also described as being located in an area of Coastal Plain sediments consisting of unconsolidated clay, silt, and sand layers with occasional gravel lenses. In the northern portion of APG-EA, the groundwater system at the Canal Creek Study Area consists from youngest to oldest of the Surficial Aquifer, the Upper Confining Unit, the Canal Creek Aquifer, the Lower Confining Unit, and the Lower Confined Aquifer.

The Surficial Aquifer is an unconfined aquifer consisting primarily of fine to medium grained sand. The Upper Confining Unit underlies the Surficial Aquifer and contains silty clay and outcrops in the northern and eastern portion of the study area, resulting in an absence of the Surficial Aquifer in those directions. The Canal Creek Aquifer is confined over most of the study area by the Upper Confining Unit which thins in the up-dip (northwest) direction as the result of erosional disconformities. The Canal Creek Aquifer mainly consists of medium to coarse grained sand and gravel, and subcrops within the recent marsh and creek sediment of the West Branch Canal Creek. There is also an erosional window (paleochannel) in the Upper Confining Unit beneath the East Branch of Canal Creek where the Canal Creek Aquifer subcrops the Surficial Aquifer. The Lower Confining Unit is continuous and lies beneath the Canal Creek Aquifer. The less permeable, Lower Confining Unit contains a larger percentage of clay than the Upper Confining Unit. The Lower Confined Aquifer lies beneath the Lower Confining Unit and consists primarily of poorly sorted, silty, fine-grained sand, intermixed with lenses of well sorted medium grained sand. The Canal Creek Aquifer, Lower Confining Unit, and Lower Confined Aquifer all follow a southeastern regional dip (Environmental Chemical Corporation 2018).

There is a groundwater hydraulic divide that separates the Canal Creek Aquifer into a local flow system discharging to the West Branch Canal Creek and a regional, confined flow system with a gradient to the southeast. The Surficial Aquifer is thin to absent over most of the area west of the hydraulic divide (General Physics Corporation 2008). In addition to the groundwater hydraulic divide, a local flow system occurs where the confined Canal Creek Aquifer is unconfined along the East Branch of Canal Creek due to the presence of the paleochannel aquifer. This paleochannel aquifer transects the Upper Confining Unit with upward vertical hydraulic gradients. Unconfined groundwater at Beach Point, a peninsula along the eastern edge of APG-EA, is encountered between 13 to 16 feet bgs and is both tidally influenced and hydraulically interconnected to surface water features (Burton et al.1994).

2.8 Surface Water Hydrology

Surface drainage at APG is to the Chesapeake Bay, Bush and Gunpowder Rivers, or to creeks that discharge to these water bodies. The topography of the APG region is broadly flat with occasional low hills, resulting in generally shallow and sluggish surface waters. The average depth of the Chesapeake Bay in the vicinity of APG is 15 feet. Surface waters of APG range from fresh (0 practical salinity units) to brackish (up to 12 practical salinity units). There are numerous creeks and streams on the installation (13 in the APG-AA and 10 in the APG-EA). Romney Creek, which flows north to south through the Aberdeen peninsula, is a major tributary draining into the Chesapeake Bay.

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 APG.

2.9.1 Stormwater Management System Description

Storm water drainage within the more developed areas of APG, such as the Aberdeen Cantonment Area and the Canal Creek area, is managed by storm sewers and catch basins. Storm sewers within the APG-AA discharge to Dipper Creek via the Aberdeen Area wastewater treatment plant (WWTP). Dipper Creek flows into Spesutie Narrows, which eventually discharges into the Chesapeake Bay (EA Engineering 2005). Storm sewers within the APG-EA discharge to Bush River via the Edgewood Area WWTP (USAPHC 2016). Bush River eventually flows into the Chesapeake Bay.

In less developed areas, runoff is managed by drainage swales that discharge storm water to surface drainage. Surface drainage at APG is to the Chesapeake Bay, Bush and Gunpowder Rivers, or to creeks that discharge to these water bodies (USAG APG 2017a). The principal drainage channel flowing through the APG-AA is Romney Creek. Within the APG-EA, the principal drainage channel is Canal Creek.

2.9.2 Sewer System Description

Sanitary wastewater generated within the APG-AA and APG-EA are conveyed via sewer lines to respective WWTPs. The Aberdeen Area WWTP is located towards the southeast of the Aberdeen Cantonment Area, along Spesutie Narrows. The Edgewood Area WWTP is located along Beach Point Road directly southeast of Weide Airfield, along Bush River.

Facilities outside of the main cantonment regions of the APG-AA and APG-EA, such as Poverty Island, Spesutie Island, and H-Field, are located outside of the installation's sanitary sewer network. The facilities are primarily operated by ATC and ARL, are fairly remote and are surrounded by wetlands and woods for which the land use is designated as testing ranges. Onsite wastewater systems consist of septic holding tanks, which are pumped out on a regular basis. None of the on-site septic systems consists of a leaching field.

From the inception of the installation, through the heavy manufacturing and filling operations of the World War I (WWI) and WWII periods (1918 through 1945), the principal means of waste disposal at the APG-EA was by discharge to sewer systems. Building locations, construction techniques and operating protocols provided for the discharge of liquids from process and clean-up activities to storm and sanitary sewers. These sewer systems were typically constructed using vitrified clay tile and many of the chemical and filling plant lines discharged ultimately to either Canal Creek or Kings Creek, and the marshes that flank them. During the 1940s, a sanitary sewer system and treatment plant was constructed in the APG-EA. The sewer lines were constructed of reinforced concrete, vitrified clay, terra cotta, and corrugated metal. At that time, chemical wastes from Edgewood Area plants generally did not go to this new system (Environmental Chemical Corporation 2018).

Over time, APG protocols governing chemical handling and disposal evolved to include alternatives to 'chemical sewer drain line disposal'. Additionally, infrastructure upgrades included elimination of direct

discharge conveyance to Buried Legacy Chemical Sewer Lines (BLCSL), and connection of these BLCSL to the wastewater treatment sanitary sewer system, and/or incorporation of these BLCSL into the current storm water system network. The majority of the suspected BLCSL have been identified as part of the current storm or sanitary sewer system (Environmental Chemical Corporation 2018).

2.9.3 WWTP Biosolid Application Fields

A total of 25 biosolid application areas were permitted for APG WWTP sludge disposal by the MDE between 1993 and 2003 or 2004. Of these 25 areas, five reside within the APG-EA, and 20 reside within the APG-AA.

Per Page 3 of Modification 1 to the MDE Sewage Sludge Utilization Permit (dated 1995 to the original permit issued in 1993), biosolids from the Aberdeen and Edgewood Area WWTPs were confirmed to have been applied to five land parcels identified as A-1, B, D, E and S-6 within the APG-AA. Due to the confirmed release of aqueous film-forming foam (AFFF) into the APG-AA sanitary sewer system via run-off from nozzle-testing and fire equipment training at the Building 300 and Building 2200 fire stations, these biosolids are suspected to be impacted by PFAS.

The remaining 20 biosolid application areas were approved as WWTP biosolid disposal areas in a permit issued by the MDE in 1993. Although biosolids generated at the APG WWTPs are suspected to be impacted by PFAS, it cannot be confirmed from the permits whether WWTP sludge was disposed at these parcels.

Starting sometime between 2003 and 2008, sludge generated at the Edgewood Area WWTP has been transported off post to an incineration facility in Chester, Pennsylvania. In 1999, the Aberdeen Area WWTP was privatized. At the time of this PA/SI report, waste sludges generated at the Aberdeen Area WWTP are taken by Harford County and sold as compost to the public.

2.10 Potable Water Supply and Drinking Water Receptors

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 APG, which along with state and county well data provided by the installation identified several off-post public and private wells within 5 miles of the installation boundary. The EDR report providing well search results provided as **Appendix E**. Information detailing on-post and off-post potable supply wells provided by the installation is provided below. The locations of potable supply wells and water treatment plants/systems provided in the EDR report and by the installation are presented on **Figure 2-4**.

Building 250 Water Treatment System: The Building 250 Supply Wells consist of five drinking water supply wells that have been installed by APG in the Cantonment Area of APG. The wells are located directly northeast of the Building 300 Former Fire Station AOPI. These wells are operated by the City of Aberdeen to supply potable water to the APG-AA. All Building 250 wells are separated from the surficial aquifer by a thick confining clay layer (confining unit 1) and are screened within a confined portion of Aquifer 2 (USACE 1983). Screen intervals for these supply wells are presented in **Table 2-1**. The Building 250 Water Treatment System has a granular activated carbon (GAC) system in place that can be connected as a risk mitigation measure.

Aberdeen Water Treatment Plant (WTP): The CAP Well Field Area comprises 15 wells (designated CAP-01 through CAP-15) and one WTP. Four of the 15 wells are located within the northwestern Cantonment Area of APG. The well field is operated by the City of Aberdeen. Water extracted from these supply wells is treated at the City of Aberdeen WTP before use as potable water to off-installation human receptors in the City of Aberdeen. Screen intervals for these supply wells were not available for review when this PA/SI report was written.

APG-AA Range Wells: Multiple ARL and ATC range wells are located in the Poverty Island and Spesutie Island areas of APG-AA. Though bottled water is supplied for drinking water in these buildings, measures are not in place to prevent occupants from drinking well water supplied to the buildings. No treatment systems are in place for ATC supply wells. Screen intervals for these supply wells are presented on **Table 2-1**. There are no potable water supply wells located in the northern portion of the APG-EA. One potable ATC range well (HA-81-0403) resides in the southern portion of the APG-EA, directly west and upgradient of the H-Field Tank Fire Response Area and H-Field Helicopter Fire Response Area AOPIs.

Perryman WTP: Residents in the APG-EA are serviced by the Harford County Department of Public Works, which receives water from the Loch Raven Reservoir and Susquehanna River (which are located off-post and hydraulically upgradient of identified AOPIs at the APG-AA and APG-EA), and the HCP well field. The HCP well field area comprises nine wells (designated HCP-01 through HCP-09). Screen intervals for these wells were not available for review at the time of this PA/SI report. Seven of these wells provide source water to the Perryman WTP operated by Harford County and supply potable water to the APG-EA, off-installation human receptors in Harford County and back-up water to the City of Aberdeen operated Chapel Hill WTP. The remaining two wells, HCP-03 and HCP-07, are no longer used. In 2003, the Army constructed a GAC pretreatment system for the Perryman WTP to address trichloroethene in the ground/source water, which is also addressing PFAS. The GAC pretreatment system consists of 11 carbon vessels, with 20,000 pounds of carbon per vessel, which are replaced on a biannual frequency unless PFAS (or trichloroethene) is detected in any of the GAC effluent and finished water above USEPA lifetime health advisories.

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.

Approximately 36 percent of the total APG acreage is comprised of upland areas. Upland areas are dominated by forest vegetation, but also include fields, maintained lawn/landscaped areas, and developed areas (buildings and roads). Upland plant communities on APG are primarily mixed deciduous forests, meadows and grasslands, and monocultures of lawn grasses.

APG is home to more than 300 species of birds, mammals, reptiles, and amphibians, along with commercially important fish species. Species can be found in both the cantonment areas and the restricted areas; however, the greatest diversity is found in the less developed restricted areas.

At least 24 species of mammals are found on APG. Most species are found in the less developed restricted areas, while some have adapted quite well to living in the cantonment areas in proximity to

human activities. Red foxes, coyotes, and white-tailed deer are easily habituated to humans and are commonly seen around developed areas.

APG is situated along the Atlantic Flyway, a major bird migratory route. It is estimated that up to 250 species of birds may occur at APG throughout the year. Coupled with its diverse habitats and large expanses of undeveloped land, APG's location makes it particularly important for a number of bird groups including waterfowl, colonial water birds, raptors, neotropical migrants, and forest interior dwelling species. APG's larger forest stands (100 or more contiguous acres) and riparian forests (width of at least 300 feet) provide valuable forest interior dwelling species habitat. APG's forested, open upland, and open water habitats provide raptors with nesting, foraging, and roosting areas. Many waterfowl species utilize APG's open waters, tidal marshes, beaver ponds, and ephemeral pools as breeding, foraging, and wintering habitats. Important colonial water bird habitats at APG include tidal marshes and other wetlands, shallow waters along shorelines, and riparian forests isolated from human disturbance.

At least 24 species of amphibians and reptiles occur on APG. Most of the species inhabit streams, ponds, wetlands, and forests. Amphibians are highly sensitive to environmental contaminants and diseases on land and in water and are considered an indicator species for ecosystem health.

The waters of APG provide quality habitats that support at least 27 species of fish, including several species of high commercial and recreational importance. Fish commonly encountered include freshwater and anadromous species. Anadromous fish are those that live in saltwater and migrate to freshwater to spawn. Catadromous species migrate from freshwater to saltwater to spawn. One catadromous species, the American eel, can be found in APG waters. Marine species such as the bluefish (Pomatomus saltatrix) are occasionally reported in APG waters but are only expected to be found during periods when low flows from tributaries reduce freshwater input, allowing higher salinities to occur. Within APG waters, blue crabs (Callinectes sapidus) are likely the most important shellfish from a socioeconomic and ecological perspective. Blue crabs are one of the most important commercial and recreational fisheries in the Chesapeake Bay, are major predators of benthic communities, and are prey for many finfish species. Blue crabs can be found from the mouth of the Chesapeake Bay to tidal fresh waters that include portions of APG waters. The population of blue crabs in the Chesapeake Bay has fluctuated significantly during the past decade. Reasons include the natural life cycle of crabs, harvest levels, and cycles in climate/current patterns that affect crab reproduction (USAG APG 2017a).

2.12 Previous PFAS Investigations

Previous (i.e., pre-PA) PFAS investigations relative to APG, including both those conducted and not conducted by the Army, are summarized to provide full context of available PFAS data for APG. However, only data collected by the Army will be used to make recommendations for further investigation. Historical PFAS Analytical Results are presented on **Table 2-2**.

In response to the third Unregulated Contaminant Monitoring Rule (UCMR3) and IMCOM Operations Order 16-088, one public water system located within 5 miles of APG was sampled for six PFAS compounds, including PFOS, PFOA, PFBS, PFHxS and PFNA. PFOA was detected in finished water samples collected in September 2013 from the Perryman WTP at a concentration equal to the minimum reporting limit of 20 ng/L. PFOS, PFBS, PFHxS and PFNA were not detected at concentrations equal to or above their respective minimum reporting limits of 40 ng/L, 90 ng/L, 30 ng/L, and 20 ng/L. The

laboratory which analyzed samples under UCMR3 met the USEPA's UCMR3 Laboratory Approval Program application and Proficiency Testing criteria for USEPA Method 537.1.1. The UCMR3 study did not have sufficient detection limits to detect PFOS, PFOA, PFBS, PFNA, and PFHxS at the current OSD risk screening levels, therefore, the non-detection of these compounds under UCMR3 is not indicative of non-contamination. The Perryman WTP is located along the western boundary of the APG-AA.

Starting in 2012, multiple areas and well fields located both on and immediately off post have been investigated for PFAS. These Army orchestrated PFAS investigations are summarized below.

Since 2012, the HCP PWs, Perryman WTP influent, effluent and finished water, and various monitoring wells in the Western Boundary Study Area have been sampled for PFAS. Previous PFAS investigations at APG conducted in 2018 have shown maximum detections of PFOS, PFOA, and/or PFBS at concentrations of 280 ng/L for PFOS, 290 ng/L for PFOA, and 42 ng/L for PFBS at well HCP-05, and at concentrations of 210 ng/L for PFOS, 480 for ng/L PFOA, and 45 ng/L for PFBS at well HCP-06. PFHxS and PFNA were not analyzed during this investigation (**Figure 2-5a**). Both wells are located in the HCP well field area. Many of the Western Boundary area AOPIs identified during the PA are upgradient of the HCP wells that provide source water to the Perryman WTP. As of December 2018, all finished water samples from the Perryman WTP have been reported as non-detect (ND) for PFOS, PFOA, and PFBS.

Previous PFAS sampling conducted at the Building 250 Water Treatment System Supply Wells in 2019 detected PFOS at a maximum reported concentration of 1.4 J ng/L (J qualifier indicates that the analyte was positively identified; however, the associated numerical value is an estimated concentration only) at well Building 250 PW-5, and PFOA at a maximum reported concentration of 2.4 ng/L at well Building 250 PW-1 (**Figure 2-5b**; EA Engineering Science, and Technology 2019). PFBS, PFHxS, and PFNA were not analyzed during this investigation.

Samples collected from monitoring wells located within the Northern Cantonment Area – Aberdeen and downgradient of the CAP Well Field Area as part of the City of Aberdeen Source Water Protection Assessment (SWPA) in April 2017 exhibited detections of PFOS, PFOA, PFBS and PFHxS. The maximum detections for PFOS, PFBS, and PFHxS were observed in one monitoring well (WHP-02A; total depth of 62.77 feet below top of casing [btc]). The recorded maximum detections were 240 ng/L for PFOS, 10.1 ng/L for PFBS, and 56.4 ng/L for PFHxS (**Figure 2-5b**; USAPHC 2016). PFOA was detected at a maximum concentration of 9.89 ng/L in monitoring well PLP-8 (total depth of 54.35 ft btc). PFNA was not detected in any of the samples collected as part of this investigation.

In addition to the 2017 SWPA sampling, in late 2019, the MDE implemented a multi-phased approach to assess PFAS in drinking water sources across Maryland. Phase 1 of this effort spanned from September 2020 to February 2021. As part of this study, a finished water sample was collected from the Aberdeen WTP on 16 November 2020 and submitted to the Maryland Department of Health Laboratories Administration for analysis of 18 PFAS compounds under EPA Method 537.1. PFOS, PFOA, PFBS, PFNA, and PFHxS six of the 18 compounds included in this analysis. PFOS and PFOA were detected at concentrations of 14.4 ng/L and 8.28 ng/L, respectively (MDE 2021). Phase 2 of the MDE investigation spanned from March to May 2021, though the Aberdeen WTP was not sampled as part of this phase (MDE 2022).

Based on groundwater flow direction in the vicinity of the Northern Cantonment Area - Aberdeen, PFAS may be migrating into this area and on post from unknown off-post sources. The Northern Cantonment

Area – Aberdeen was not sampled as part of this SI; however, recommendations for future investigations of this area are summarized in **Section 8**.

All ARL and ATC range wells were sampled for PFAS by the USAPHC in 2016 and 2019. All ATC wells sampled in 2016 were ND for PFAS. In 2019, three potable supply wells (HA-94-5830, HA-95-1098, and HA-94-5829) and the potable water distribution system for the ATC-operated Building 722K (supplied by ATC well HA-93-0750) were sampled for PFAS; these potable supply wells were not sampled in 2016. All three potable supply well samples were ND for PFAS (**Figure 2-5c**). Potable water from Building 722K was collected via a bathroom sink faucet and detected concentrations of 2.9 ng/L for PFOA and 3.8 ng/L for PFBS. Influent samples from two ARL wells (EF-7 and EF-7A) were collected in 2016 and analyzed for PFAS. PFOS was detected at a concentration 2.1 ng/L from EF-7 influent. PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected above the limit of detection (LOD) of 20 ng/L in influent samples collected from EF-7A. All supplied water from ARL wells passes through a water treatment system. The water treatment system filters sediment with a depth filter and polisher cartridge, removes dissolved iron by ion exchange, injects soda ash and chlorine for additional iron removal, and finally removes residual chlorine through carbon filtration. Post treatment effluent samples for EF-7 and EF-7A were ND for PFOS, PFOA, PFBS, PFHxS, and PFNA (**Figure 2-5d**).

The G-Street Salvage Yard located in the North Edgewood area was identified as a former fire-fighting training area in the Edgewood Area Resource Conservation and Recovery Act Facility Assessment (USAEHA 1989). As part of the 2018 West Canal Creek Study Area RI (ECC 2018), two direct-push technology (DPT) soil and two DPT groundwater samples were first collected in February 2015 and analyzed for volatile organic compounds (VOCs), PFOS, and PFOA. In addition, 10 downgradient wells from the G-Street area were sampled in March 2017 for VOCs, PFOS, and PFOA analysis. PFOS and PFOA were detected at maximum concentrations of 36,900 ng/L and 712 ng/L, respectively in existing monitoring well CC-039A (**Figure 2-5e**). PFBS, PFHxS, and PFNA were not analyzed during this investigation. PFAS samples collected from this investigation were analyzed by the laboratory Société Générale de Surveillance (SGS) Accutest using USEPA Method 537. SGS Accutest received DoD ELAP accreditation for PFAS analysis in 2016.

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

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

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

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, APG fire department documents, APG Directorate of Public Works documents, and geographic information system (GIS) files. Internet searches were also conducted to identify publicly available and other relevant information. A list of the specific documents reviewed for APG is provided in **Appendix F**.

3.2 Personnel Interviews

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

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

Chief, Environmental Division

IRP Manager

Fire Chief

Assistant Fire Chief

Chief, Hazardous Waste Branch, Environmental Division

Chief, Environmental Compliance Branch

Senior GIS Analyst, Master Planning and Real Property Division

Lead General Engineer, Directorate of Public Works , Electronic Command Division, Engineering Branch

Installation GIS Manager

Historian

Petroleum, Oil, and Lubricant (POL) Tank Program Manager

Permit Preparation Specialist

Private Contractor

Environmental Protection Specialist

National Environmental Policy Act Program Manager

Engineering Technician, Engineering and Construction Division

Senior Realty Specialist, Master Planning and Real Property Division

Army Public Health Center Hydrologist, Drinking Water Branch

ARL Environmental Protection Specialist, Safety and Environmental Branch

Safety Specialist Fire Marshall

Range Operations Specialist

Lead, Compliance and Conservation Team, Environmental Division

ATC Chief

ATC “Environmental Specialist, Jacobs Technology Inc., Aberdeen Test Support Services”

ATC Chief Safety Process Improvement

MDARNG Environmental Branch Chief

MDARNG Deputy Construction and Facility Management Officer Plans and Programs Branch Chief

MDARNG Instructor Pilot

Maryland Fire and Rescue Institute (MFRI) Captain

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

3.3 Site Reconnaissance

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

Access to existing groundwater monitoring wells, if present, were also noted during the site reconnaissance in case the monitoring wells could be proposed for SI sampling.

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

APG was evaluated for all potential current and historical use, storage, and/or disposal of PFAS-containing materials. 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 Storage 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% 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.

AFFF used by fire department personnel is stored in two locations at APG: Building 2308 and Building 1059. Building 2308 is the APG Fire Department's current storage building and has operated as the fire department's main AFFF storage bay since the mid-1990s. Building 1065 is located directly next to Building 1059 and serves as the APG Fire Department's crash fire tender storage bay. AFFF is stored along with a crash fire tender at Building 1065 for emergency responses at Phillips Army Airfield (PAAF).

Army-wide installation AFFF inventory records provided by USAEC were reviewed prior to the APG PA site visit. The inventory file, titled FES AFFF Data, recorded the reported amounts of AFFF in both vehicle and building storage at APG and recorded that the Aberdeen Fire Department had 550 gallons of AFFF in storage at "Storage-Airfield Station", and 195 gallons of AFFF in storage at "2308 FD Storage." During the PA site visit, it was confirmed that Storage-Airfield Station referred to Building 1065, and the storage of eight 55-gallon drums of National Foam Aer-O-Light 3% AFFF was recorded during a PA site reconnaissance visit to the building. An empty 55-gallon drum of the same Aer-O-Light 3% AFFF was also stored along with the other eight drums. The APG Fire Department Assistant Fire Chief stated that the fire department crash fire tender, which was co-located with the AFFF drums, was filled with this AFFF.

The "2308 FD Storage" refers to Building 2308, where during a PA site reconnaissance visit to the building, multiple 5-gallon and 55-gallon drums of AFFF were observed being stored. The types of AFFF stored at this location included 55-gallon drums of National Foam Centurion 3% Alcohol Resistant (AR)-AFFF and National Foam Universal Gold 1%/3% AR-AFFF, as well as 5-gallon drums of National Foam Aer-O-Water 3EM 3% AFFF, and National Foam Centurion 3%/6% AR-AFFF. AFFF drum totals were not recorded during the PA site reconnaissance visit to this location.

Historically within the APG-AA, the APG Fire Department Assistant Fire Chief stated that AFFF was previously stored within the Building 300 Fire Station until the mid-1990s, at which point the APG Fire Department moved its AFFF stock to Building 2308. From 1990 until its demolition in the early 2000s, the APG Fire Department stored AFFF for use by the Building E5180 Edgewood Area fire station at Building E5005. No AFFF inventory records for this building were available for review. At the time of this PA/SI report, no AFFF is stored in buildings by the APG Fire Department in Edgewood.

In addition to building storage, the Fire Emergency Services AFFF Data inventory document listed one fire engine, also referred to as a pumper truck, with an AFFF storage capacity of 55-gallons. The APG Fire Department Assistant Fire Chief confirmed that this fire engine is stationed at the Aberdeen Area Fire Station and is stocked with 55-gallons of AFFF at the time of this PA/SI report. In addition to the identified fire engine, an emergency crash fire tender is stationed at Building 1065. The APG Fire Department Assistant Fire Chief stated that the crash fire tender was stocked with 55-gallons of AFFF.

In addition to the APG Fire Department, ARL and ATC purchased and used AFFF for weapons training and fire-suppression purposes. Two 55-gallon drums of Buckeye AFFF 3% Low Temperature were identified at the ATC operated Poverty Island – Minefield Range. One drum was noted to be connected to an outdoor AFFF suppression cannon, used to extinguish fires on the Minefield Range test pad. The second drum was found in a storage building located at the entrance to the Minefield Range. No AFFF inventory was available for ARL.

AFFF suppression systems were identified during the PA site reconnaissance visits to the PAAF Hangar Building 1060 in the APG-AA, and the MDARNG operated buildings E4040 and E4081 at Weide Airfield in the APG-EA. The AFFF suppression system at PAAF Hangar Building 1060 was reported by an ATC Compliance and Conservation Team member to have been stocked with Viking AFFF 3%S C6 Foam Concentrate. The total number of gallons of AFFF stored within this suppression system was not recorded during the PA site visit. The Building E4040 and Building E4081 suppression systems were reported by MDARNG Deputy Construction and Facilities Management Office Plans and Programs Branch Chief to have been stocked with Chemguard C3LT 3% AFFF. The Building E4040 and Building E4081 AFFF suppression system tanks stored 400-gallons and 900-gallons, respectively.

During and following the PA site visit, Safety Data Sheets and Material Safety Data Sheets for the various types of AFFF stored at APG were requested from relevant site POCs.

The APG Fire Department used AFFF for both dry and live fire-training exercises, incident response, and in support and in emergency response to various APG weapons test exercises conducted by ATC, ARL and ECBC. The APG Fire Department Assistant Fire Chief stated that ATC purchased its own AFFF for testing purposes and would occasionally provide the APG Fire Department with unwanted drums of AFFF. The APG Fire Department Assistant Fire Chief added that these transactions were not recorded. AFFF suppression systems were tested regularly at the PAAF Hangar Building 1060 and Building E4081, and a single un-planned release of AFFF occurred at Building E4040. Further details on AFFF releases by the APG Fire Department, ATC, ARL, ECBC, PAAF Hangar Building 1060, Building E4040 and Building E4081 are presented in the next section.

Fire Stations

At the time of this PA/SI report, there are three firehouses at APG operated by the APG Fire Department: Building 2200, Building E5180, and Building 1059. Building 2200 was constructed in the early 2000s and

serves as the main APG-AA fire station for the APG Fire Department. Building E5180 serves as the main Edgewood Area fire station for the APG Fire Department. Building 1059 – Phillips Airfield Station is located directly north of the PAAF and operates as a supplementary fire station for emergency responses at PAAF. None of the current fire stations at APG have historically stored AFFF or store AFFF at the time of this PA/SI report. From 1917 until the construction of Building 2200 in the early 2000s, Building 300 served as the main fire station for the APG Fire Department.

Fire truck washing and AFFF tank flushing was regularly performed at the four identified fire stations following the use or release of AFFF. APG Fire Department personnel stated that following fire training exercises or emergency responses that involved AFFF, fire vehicles were driven back to their respective fire stations and AFFF was then cleaned off the exterior of the vehicle. AFFF storage tanks and hoses were also flushed out to prevent the clogging of hoses or apparatuses. AFFF from these cleaning activities was directed towards driveway drains, as well as grassed areas alongside the fire station driveways.

Fire Training Areas

Four dedicated fire training areas were identified within the Aberdeen and Edgewood Areas of APG during pre-site visit document reviews, interviews with installation personnel, and PA site reconnaissance visits.

Live-fire training using AFFF was confirmed at the Old Aberdeen Fire Training Area, the Former MFRI Fire Training Area, and the Noble Road Fire Training Area. The APG Fire Department Assistant Fire Chief stated that from the early 1980s until the mid-2000s, controlled oil fires, refuse, and retired railcars, tanks and planes were placed in designated spots at the Old Aberdeen Fire Training Area and the Former MFRI Fire Training Area, ignited, and extinguished using AFFF for training purposes. Training at the Noble Road Fire Training Area did not reportedly include the use of retired vehicles, but similar fire training activities involving the use of AFFF to extinguish controlled oil and refuse fires were reported to have occurred here from the late 1970s to the early 2000s. The exact training methods used by the APG Fire Department for training at these locations was not evaluated during the PA site visit.

The G-Street Salvage Yard and Former Fire Training Area located in the northern portion of the APG-EA was identified as a historical fire training area operated between 1972 and 1978. Although AFFF release at this location could not be confirmed through personnel interviews and historical records, existing PFAS sampling results indicate that AFFF may have been used for fire training at this location.

Nozzle-testing and Fire Equipment Testing Areas

The APG Fire Department Assistant Fire Chief stated that nozzle-testing utilizing AFFF was conducted on a monthly basis at various firehouses until approximately 2009. Nozzle-testing was conducted to ensure optimal flow and release of AFFF mixture in case of emergency use. Nozzle-testing involved spraying AFFF through APG Fire Department equipment, which could lead to a release to the environment if the mixture was not fully contained. The APG Fire Department Assistant Fire Chief stated that on one occasion in the 1990s, APG Fire Department personnel sprayed AFFF onto a tree in front of Building E5081 as part of a nozzle-testing exercise.

Interviews with APG Fire Department personnel confirmed that nozzle-testing utilizing AFFF was also historically conducted at all five fire training areas. In addition to nozzle-testing, arc training was conducted in the area surrounding the Building E5005 Fire Department Storage in APG-EA. Arc training

within this area did not involve a live fire but was performed as part of fire equipment training to maximize the arc, reach, and distance covered of AFFF in case of emergency use.

At the time of this PA/SI report, the APG Fire Department uses the Former MFRI training area, located directly north of the PAAF airfield, and the Current MFRI training area, located in Edgewood, Maryland, for nozzle-testing and fire training exercises. The Former MFRI training area was leased back to APG from MFRI in 2013. The lease termination document provided by APG Fire Department personnel stated that AFFF was never used by MFRI for training operations due to the cost of the product, but that the APG Fire Department did on occasion use expired foam products on site as they were permitted to do so within the lease. A MFRI Fire Captain interviewed during the PA site visit to APG stated that AFFF has never been used at the Current MFRI training area, and that AFFF use is strictly prohibited. Fire departments training at this location exclusively use soaps to replicate AFFF mixing and application.

Fire Response Activities

In addition to fire training activities, AFFF use related to emergency fire responses by the APG Fire Department, various test activities conducted by ARL, ATC, and ECBC, and AFFF suppression systems at PAAF and Weide Airfield were confirmed during the PA site visit.

The APG Fire Department utilized AFFF to extinguish various ARL and ATC test range fires across the Aberdeen and Edgewood areas of APG. Emergency firefighting activities involving AFFF were confirmed at the following locations:

- Ford's Farm Tank Fire Incident
- H-Field Tank Fire Incident
- H-Field Helicopter Crash
- PAAF Loading Platform Unmanned Aerial Vehicle Crash

In 1987, the APG Fire Department responded to a plane crash in a wooded area around the G-Street Salvage Yard. It was not confirmed that the APG Fire Department used AFFF in response to this fire.

The APG Fire Department also deployed AFFF in response to various controlled fires at ARL test ranges and for chemical emergency testing. As confirmed by an ARL Environmental Specialist, between 1988 and 2005, the APG Fire Department regularly utilized AFFF to extinguish aircraft test fires at Air Base Range (ABR) 3, ABR 6, ABR 7 and the Fuze Range. For a four-year period in the 1990s, APG Fire Department personnel also utilized AFFF in support of ECBC chemical vapor suppression tests at the Chemical Agent Storage Yard (CASY) area.

Fire Suppression Activities

Both ATC and ARL used AFFF for various test exercises without aid from the APG Fire Department. Certain ATC ranges across the Poverty Island area of APG operated outdoor AFFF suppression cannons to extinguish fires following ordnance and vehicle tests. As confirmed during interviews with ATC personnel and PA site reconnaissance visits, three ATC ranges operated outdoor AFFF suppression system cannons to rapidly extinguish test range fires. These suppression systems, located at the Minefield Range, Range 12, and AA5 were directly connected to 55-gallon drums of AFFF, mixed with water, and operated by a single user to extinguish fires. An ARL Environmental Specialist confirmed that

AFFF was utilized on five occasions in support of an explosive suppression exercise at the ARL operated Range E-15 on Spesutie Island.

In addition to ARL, ATC and ECBC testing exercises, three indoor fire suppression systems were identified at APG.

- PAAF Hangar Building 1060 (Aberdeen Area)
- Weide Airfield Building E4040 (Edgewood Area)
- Weide Airfield Building E4081 (Edgewood Area)

The release of AFFF to the environment surrounding these three buildings due to accidental release or purposeful testing of AFFF suppression systems was confirmed during the PA site visit to APG.

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

Following document research, personnel interviews, and site reconnaissance at APG, chrome-plating operation areas, WWTPs, biosolid application fields, burn-pits, landfills, pesticide/herbicide storage areas, photograph and X-ray operation centers, vehicle maintenance areas, waste dump areas, cloth impregnating facilities, and fuel spill response sites were also identified as preliminary locations for use, storage, and/or disposal of PFAS-containing materials. A summary of information gathered in the PA for each of these preliminary locations is described below. Specific discussion regarding areas not retained for further investigation is presented in **Section 5.1** and specific discussion regarding areas retained as AOPIs is presented in **Section 5.2**.

Chrome Plating Operation Sites

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

Four sites were identified at APG as potential locations where chrome plating operations involving the use of chemical-mist suppressants may have occurred: Building 4025A –Fuel Service Station, Area 20, Building 3516 – Old Plating Shop, and Building 4600 Chrome Plating. Following the review of installation archive documents reviewed during the PA site visit, no chrome plating operations or the use of PFAS-containing mist suppressants at Building 4025A –Fuel Service Station, Area 20, or the Building 3516 – Old Plating Shop were identified. Chrome plating operations were conducted at Building 4600 in a small scale, bench-shop environment for a 2-week period. An ARL Environmental Protection specialist conducted a search for a standard operating-procedure (SOP) detailing the chrome plating process at Building 4600, but no documentation was uncovered.

Wastewater Treatment Plants

Two WWTPs were identified at APG as locations where testing and sewage wastes potentially containing residual AFFF were disposed and treated. In the APG-AA, wastes generated as part of test range activities in the Poverty Island and Spesutie Island areas were reportedly extracted via vacuum-truck and transported to the WWTP for processing. In the APG-EA, the storm-sewer system may have carried and eventually introduced residual AFFF released as part of hangar fire-suppression system testing in the Weide Airfield area into the APG-EA WWTP. As described in **Section 2.9.2**, one active WWTP resides in the APG-AA, and the other in the APG-EA.

Biosolid Application Fields

Following the review of documentation provided by both APG, MDE, and USEPA, interview logs, and site-reconnaissance logs, 25 land parcels were identified across the Aberdeen and Edgewood Areas of APG that were permitted to receive biosolid sludges generated at the Aberdeen and Edgewood Area WWTPs. AFFF was either potentially disposed or eventually treated due to the introduction of AFFF waste into the storm-sewer systems at both the Aberdeen and Edgewood Area WWTPs.

During the PA site visit, an interviewed APG Permit Preparation Specialist stated that two areas east and west of the PAAF had received biosolid sludges generated at the APG WWTPs sometime in the late 1980s, and that since the early 1990s, all biosolid sludge applications required sludge utilization permits. Further information detailing Sewage Sludge Utilization Permits were requested from the MDE in May 2018. Copies of three permits were received: S-93-12-3162-ABE, S-96-12-3162-ABE, and S-01-12-4153-A.

Permit S-93-12-3162-ABE was issued in June 1993 and authorized the collection, transportation, and handling of digested sewage sludges generated at the Aberdeen and Edgewood Area WWTPs to the approved parcel areas designated by the following codes: A-1, A-2, A-3, B, C-1, C-2, C-3, D, E, F, G, H, I, E-1, E-2, E-3, E-4, E-6, S-1A, S-2, S-3, S-5, S-6 and CSTA-1 and CSTA-2 (later renamed ATC-1 and ATC-2).

A modification to permit S-93-12-3162-ABE, titled S-96-12-3162-ABE was issued in February 1995, allowing for the application or subsurface injection of biosolids in liquid or cake form to all biosolid areas. Additional text in the modification confirmed that biosolid sludges were applied to Biosolid Application Fields A-1, B, D and E (located along the northwest boundary of PAAF), and Biosolid Application Field S-6 (located along the western edge of Spesutie Island). A series of maps were also submitted along with the approved permit modification that displayed the locations, bounds, and acreage totals of all approved biosolid application fields. These parcel boundaries were digitized utilizing GIS, and are presented on **Figures 5-2a, 5-2c, 5-2d, and 5-2e**.

Permit S-01-12-4153-A was issued in February 2001 in accordance with a permit renewal request for the 1995 permit S-96-12-3162-ABE. This permit applied only to the 92.6-acre area associated with the biosolid fields B, C-1, C-2, C-3, D, E, F and G identified in the 1993 permit and 1995 permit modification.

According the interviewed APG Permit Preparation Specialist, all land-application of biosolids ceased between 2003 and 2004. Biosolid sludges generated at the Edgewood WWTP no longer met the required application specifications, and the sludges were transported off post for incineration. The final destination of these sludges is unknown. Following the privatization of the Aberdeen Area WWTP, biosolid sludges were no longer land applied, and were instead sold for composting purposes.

Burn-Pits

Multiple areas across the Aberdeen and Edgewood Areas of APG were identified as locations where waste, munitions, equipment, chemicals, and other materials were burned in refuse pits under controlled circumstances. These sites were identified ahead of the PA site visit due to the potential for fire-response requiring the use of AFFF at these locations. APG Fire Department personnel confirmed during the PA site visit that fire-response actions involving AFFF never occurred at controlled burn sites.

Landfills and Waste Dump Areas

Landfills and waste dump areas across APG were identified as sites that potentially received PFAS-containing wastes. Following the PA site visit, information from interviews and acquired documents were reviewed to trace waste-streams between PFAS-containing materials and the identified waste disposal areas. A review of information identified one landfill (Michaelsville Landfill) as having potentially received PFAS-containing wastes from the Aberdeen WWTP.

Pesticide/Herbicide Use and Storage Areas

One building was identified as a potential storage area for PFAS-containing pesticides. A telephonic interview with an IMCOM Pest Management Consultant was conducted following the PA site visit. It was noted during this interview that products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS. Sulfluramid containing products were phased out of use in 1996. During the PA records review, the IMCOM Pest Management Consultant provided records of pesticides and insecticides that may have potentially contained PFAS used at and/or stored at Army installations and did not identify APG as an installation having used or stored PFAS-containing pesticides/insecticides.

Photograph and X-Ray Operation Centers

Buildings identified as having historical photograph and X-ray operations were identified as preliminary locations that may have used PFAS-containing materials as part of photo-processing operations. Review of relevant documentation did not indicate that PFAS containing products were used as part of x-ray or photographic operations at APG.

Vehicle Maintenance

Buildings and areas used for vehicle maintenance were identified as potential storage or release areas for PFAS-containing materials due to the possibility that AFFF capable fire-response vehicles may have been maintained at these locations. During the PA site visit, the APG Fire Department confirmed that fire-response vehicle maintenance activities would have been outsourced to a third-party contractor and conducted off-post.

Cloth Impregnating Facilities

PFAS-containing compounds have historically been used to waterproof clothing and other fabric materials. Cloth impregnating facilities were identified as locations that may have used PFAS-containing materials as part of cloth impregnating operations to waterproof clothing items. Three sites at APG were identified to have been used for cloth impregnation operations. The Building E5483 – Protective Clothing Laundry was identified as having potentially used PFAS containing materials due to the recorded use of the chemical Impregnite. Review of the pertinent chemical data for Impregnite indicated that the compound did not contain PFAS. The two other identified sites were found to operate during the 1940s.

Furthermore, it was determined that cloth impregnation was not conducted to waterproof clothing items at APG. This information, along with the chemical review of Impregnite and years of operation, deemed the use of PFAS containing materials as part of impregnating operations unlikely.

Fuel Spill Response Sites

Various incident reports reviewed ahead of the PA site visit stated that the APG Fire Department responded to oil and fuel spills across APG. These areas were identified as preliminary locations where APG Fire Department personnel may have released AFFF at the site of the spill to mitigate fuel fires. During the PA site visit, an APG Fire Department Fire Chief stated that while APG Fire Department personnel may have travelled to the spill sites to oversee clean-up operations, AFFF was never released as a mitigation effort.

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 APG) 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 PA site visit are described below.

Nearby community fire departments such as the Aberdeen Fire Department, Harford County Fire Department, Bel Air Volunteer Fire Company, Abingdon Fire Company, and Kingsville Volunteer Fire Company could potentially be upgradient off-post PFAS sources within close proximity of APG, if they use AFFF.

Interviews with APG Fire Department personnel identified several occasions when AFFF was used during fire responses at the Mullins Tire Storage Yard, which is located off-post, approximately 1.0-mile northeast of the APG North Visitor Control Center within the Aberdeen Cantonment Area of APG. On three occasions in 1982, 1983, and 1995, the APG and Harford County Fire Departments responded to tire-fires at this location with AFFF. The APG Fire Department Assistant Fire Chief stated that thousands of gallons of AFFF were applied to extinguish these three fires.

5 SUMMARY AND DISCUSSION OF PA RESULTS

The preliminary locations evaluated for potential use, storage, and/or disposal of PFAS-containing materials at APG, 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, 57 areas have been identified as AOPIs. The process used for refining these areas is presented on **Figure 5-1**, below.

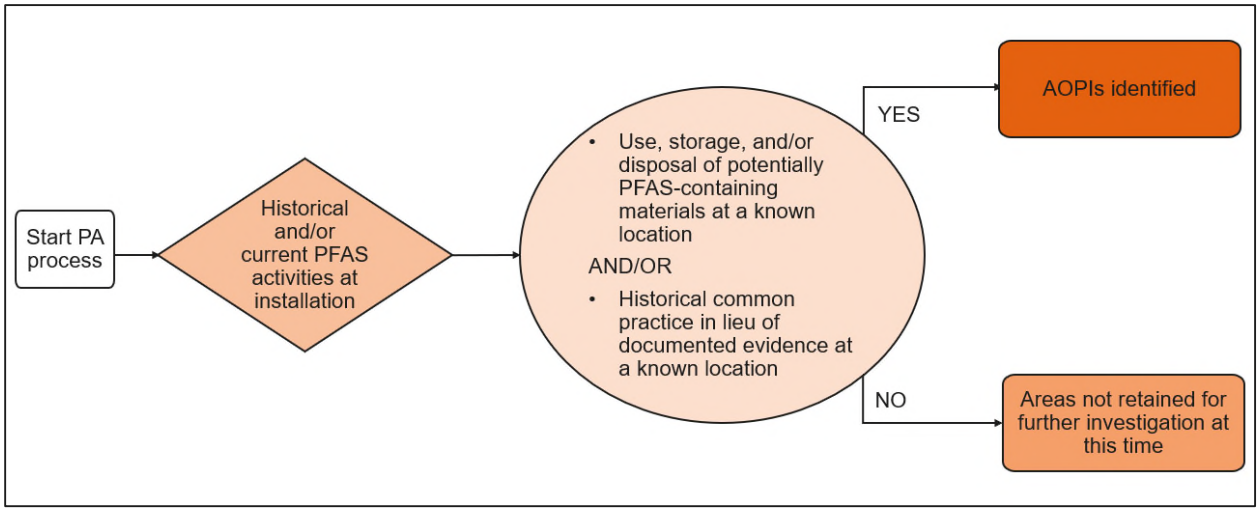

Figure 5-1: AOPI Decision Flowchart

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

Data limitations for this PA/SI at APG 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

Area Description	Dates of Operation	Relevant Site History	Rationale
Building 5215 – POL Facility	Unknown	This facility was the site of a POL spill, potential use of AFFF as a precautionary measure identified pre site visit.	Fire Department confirmed they did not use AFFF as a hazard mitigation during response to this incident. No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Beach Point Test Site – Mobile and Stationary Laundry Plants	1940s	These plants were used for clothing impregnation operations at the Beach Point Test Site located within the APG-EA.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location. PFOS/PFOA use unlikely given the dates of operation.
Building 4025A –Fuel Service Station	Unknown	This building was the site of a fuel service station and machine shop. Suspected that machine shop could have included chromium plating operations.	No chromium plating operations were conducted at the identified machine shop.
Building 5010	Unknown	Pesticide Storing and Mixing Facility	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Building E5265 – Smoke Pilot Plant	Unknown	A burn site located behind Building E5265 (previously named Building 503) was primarily used to burn gas masks and other materials.	Confirmed during the PA site visit that the APG Fire Department would not have responded to burn pit fires with AFFF.
Controlled Burn Areas	Unknown	Areas where refuse/waste/munitions/combustible liquids were openly burned.	Fire response would not be provided to controlled burn areas; specific controlled burn areas included separately as other non-AOPIs
Decontamination Pits – Cluster 4	Unknown	Fuel oil was used to burn Chemical Warfare Materiel in burn pits on Carroll Island.	Confirmed during the PA site visit that the APG Fire Department would not have responded to burn pit fires with AFFF.

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

Area Description	Dates of Operation	Relevant Site History	Rationale
Building E5238 – Cloth Impregnating Facility	1941-1942	This building was utilized as a cloth impregnating facility.	Years of operation do not coincide with the use of PFOS/PFOA. No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Building E5103 – Photographic Laboratory	1965 – Unknown	The Photographic Laboratory, located in Edgewood, was constructed to replace the photo and duplicating facility in the Old Hospital and Administration Area. Photographic chemical waste from this facility was discharged directly into the sanitary sewer system.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Building E5185 – Vehicle Maintenance Facility	Unknown – Present	This building served as an active shop and fabrication facility until 1975. Recently, the Ordnance School has used this building for vehicle maintenance training. Suspected that the fabrication facility could have included chrome plating operations.	It was determined shop and fabrication operations would not have included chrome plating. No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Building E5483 – Protective Clothing Laundry	1967 – mid 1970s	Building was utilized as a clothing impregnation facility.	The active ingredient used for clothing impregnation; Impregnite, does not contain PFAS material
Building E-5695 – Old X-Ray and Metallurgical Facility	Unknown	Area was used for X-ray processing and metal working.	It was determined that chrome plating operations would not have been conducted at this building. No evidence of PFOS, PFOA, or PFBS containing materials used, stored, and/or disposed of at this location.
Building E5762 – Railroad Yard	Unknown	Building within the Aberdeen Railroad Yard served as a locomotive storage and maintenance barn.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.

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

Area Description	Dates of Operation	Relevant Site History	Rationale
Building E4057 – Aircraft Fuel Facility	Unknown	Building listed in Army and MDARNG leasing agreement. Document lists this fuel facility under MDARNG control. Identified as the possible location of an AFFF suppression system.	No AFFF suppression system was reported to have existed here.
Building E4306 – MDARNG Vehicle Maintenance Shop	Unknown	Building listed in Army and MDARNG leasing agreement. Document lists this fuel facility under MDARNG control.	Confirmed during the PA site visit that this area did not contain AFFF suppression system to protect against vehicle fires. No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Old Hospital and Administrative Area	Unknown	Building used for photo production and duplication. No specific information on dates used and waste discharge methods.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Weide Airfield – Old Shop and Motorpool Area	Unknown	Area housed a locomotive maintenance shop, metal working shop, painting shed, motor pool, service station and a dye shop.	Removed after confirming an AFFF suppression system was not installed here, and that metal working did not involve chrome plating. No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
26th Street Dump Site	1970s	The eastern portion of this dump site was primarily used as a burn pit area for gas masks.	Removed from the AOPI list after the fire department confirmed AFFF was not used on burn areas.
Aberdeen Area WWTP	Unknown – Present	Wastes generated as part of test range activities in the Poverty Island and Spesutie Island areas were reportedly extracted via vacuum-truck and transported to the WWTP for processing.	No release or discharge of treatment waste to the environment was identified at this AOPI

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

Area Description	Dates of Operation	Relevant Site History	Rationale
Area 20	2012	Listed in the excel document "Army Plating workplaces Past_Present" provided to Arcadis by USAEC.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
ARL Range 12 (EF-12)	Unknown	ARL operated test range. Interviewees indicated that a fuel tank was set on fire and allowed to burn. Suspected use of AFFF at this location.	Confirmed during the PA site visit that AFFF was not used in response to this tank fire.
Beach Point Test Site	Early 1960s – Mid 1970s	Area was used for liquid rocket and munitions testing. Suspected use of AFFF at this location.	Removed from list after multiple interviewees stated AFFF was never used in this area.
Building 1092 – Phillips Army Airfield Disposal Plant	Unknown	This area was referenced in the 2003 Installation Action Plan report as a waste disposal plant for PAAF.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location.
Building 3516 – Old Plating Shop	Unknown	Added as a possible AOPI during the PA site visit. Plating operations occurred at this location, suspected that chrome plating operations may have occurred here.	Removed from AOPI list after APG personnel performed a document search using keywords pertinent to PFAS. No reference to chrome plating operations or PFAS-containing materials at this building were documented.
Building 4600 Chrome Plating	Unknown	Chrome plating was performed in a very small-scale environment (under a fume hood) for a two-week period. An ARL Environmental Protection specialist conducted a search for an SOP detailing the chrome plating process but was unable to find the document.	Small scale operations performed in a fume hood over 2-week period, but the laboratory protocol detailing plating procedures was not available for review. This building was removed from the AOPI list due to the controlled and small-scale plating operations at this building
Building 525 – Building Explosion	Unknown	Site of Building explosion referenced during site-recon. Suspected area of AFFF release.	APG Fire Department confirmed AFFF was not deployed in response to this fire incident.

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

Area Description	Dates of Operation	Relevant Site History	Rationale
Building E4039 – Aviation Unit Operations	Unknown	Listed in two Army National Guard (ARNG)/Army land lease agreements as a building under MDARNG control. Area added to list as possible location for an AFFF suppression system.	Area was removed from the possible AOPI list after it was confirmed no AFFF suppression system was present at the location.
Building E4060 – Storage Building	Unknown	Listed in two ARNG/Army land lease agreements as a building under MDARNG control. Area added to list as possible location for an AFFF suppression system.	Area was removed from the possible AOPI list after it was confirmed no AFFF suppression system was present at the location.
Building E4062 – Fuel Oil Pump Station	Unknown	Listed in two ARNG/Army land lease agreements as a building under MDARNG control. Area added to list as possible location for an AFFF suppression system.	Area was removed from the possible AOPI list after it was confirmed no AFFF suppression system was present at the location.
Building E4082 – Flammable Material Storage	Unknown	Listed in two ARNG/Army land lease agreements as a building under MDARNG control. Area added to list as possible location for an AFFF suppression system.	Area was removed from the possible AOPI list after it was confirmed no AFFF suppression system was present at the location.
Building E4083 – Flammable Material Storage	Unknown	Listed in two ARNG/Army land lease agreements as a building under MDARNG control. Area added to list as possible location for an AFFF suppression system.	Area was removed from the possible AOPI list after it was confirmed no AFFF suppression system was present at the location.
Building E5190 – Flammable Liquid Storage Facility	Unknown	Listed in two ARNG/Army land lease agreements as a building under MDARNG control. Area added to list as possible location for an AFFF suppression system.	Area was removed from the possible AOPI list after it was confirmed no AFFF suppression system was present at the location.
Edgewood Area WWTP	Unknown – Present	This WWTP received potentially PFAS-containing wastes via the capture and transport of residual AFFF released from hangar suppression systems to sanitary sewer system components in the Weide Airfield area of APG-EA.	No release or discharge of treatment waste to the environment was identified at this AOPI.

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

Area Description	Dates of Operation	Relevant Site History	Rationale
J-Field – Prototype Building	Unknown	Chemical, ordnance, and munitions testing facility. Listed in the 2003 Installation Action Plan as a burn area. Suspected that AFFF was used to suppress burn pit fires.	Removed from the AOPI list after the fire department confirmed AFFF was not used on burn areas.
J-Field – Riot Control Burn Pit	Unknown	Burn area for incendiary riot materials. Suspected that AFFF was used to suppress burn pit fires.	Removed from the AOPI list after the fire department confirmed AFFF was not used on burn areas.
J-Field – Toxic Burn Pit	Unknown	Burn pit for toxic test waste. Suspected that AFFF was used to suppress burn pit fires.	Removed from the AOPI list after the fire department confirmed AFFF was not used on burn areas.
J-Field – White Phosphorous Burn Pit	Unknown	Burn pit for pyrotechnic and incendiary phosphorous munitions	Removed from the AOPI list after the fire department confirmed AFFF was not used on burn areas.
L-Field Rocket Sled	Unknown	Test area used for munitions and rocket testing in Edgewood. Area was a suggested to Arcadis during an interview with APG Fire Chiefs as an area of AFFF use.	Subsequent questioning uncovered no relevant information regarding AFFF use at this location. Removed from the AOPI list.
M-Field – Cluster 24 Southeast Test Area and Landfill	1996	Test and burn area located in southern Edgewood. Randy Cerar recalled conducting a foam test for decontaminating equipment around 1996.	APG Fire Department Assistant Fire Chief confirmed that AFFF was never used at this location during this time frame.
New MFRI Test Area	2011 – Present	Fire training area located within APG and under the operation of the MFRI. Fire training occurred here on two environmental test pads directly east of the old Aberdeen Fire Training Area.	MFRI Fire Captain confirmed that AFFF has never been used at this location.
New O-Field	Unknown	Area was used as dump and burn area for Edgewood range waste, identified as potential AFFF use area due to burning.	Removed from the possible AOPI list after confirmation that the fire department would not respond to burn areas.

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

Area Description	Dates of Operation	Relevant Site History	Rationale
PAAF Refuse Burning Pit	Unknown	Identified as possible AFFF release area due to burning. No relevant information related to location and materials burned.	Removed from the possible AOPI list after confirmation that the fire department would not respond to burn areas.
PAAF Landfill Areas	1950s to uncertain	The PAAF Landfill (~35 acres) has been used since the 1950s for the disposal of construction debris, oils, solvents, and general refuse.	No record or reference of PFAS containing materials disposed of in landfill.
Poverty Island – Range 18	Unknown	Visited during the PA site visit to Poverty Island. Discovered one environmental test pad on location.	Informed by ATC range manager that this test area had never been used for testing.

5.2 AOPIs

Overviews for each AOPI identified during the PA process are separated by area and presented in this section. The AOPI locations for each area are shown on **Figures 5-2a** through **5-2e**. Aerial photographs of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-3** through **5-43** and include active monitoring wells in the vicinity of each AOPI.

5.2.1 Western Boundary Study Area AOPIs

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

The AOPI locations are shown on **Figure 5-2a**. Location overviews of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-3** through **5-11** and include active monitoring wells in the vicinity of each AOPI.

5.2.1.1 Air Base Range 3

The ABR 3 is displayed on **Figure 5-3** and is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical release of AFFF as part of a vehicle and aircraft testing exercise. The AOPI predominantly consists of tarmac roads, gravel flats used to store various testing debris, concrete test pads and grassed areas. The parcel is bounded to the southwest by heavy trees and foliage, and to the northeast by the Army Test Course circuit. The AFFF release reportedly

occurred to a heavily weathered and cracked concrete test pad located within the southeastern portion of the AOPI. Based on review of aerial photography, site-reconnaissance notes, and topographic contours; surface water and precipitation from the identified concrete test pad where AFFF was released would flow along topography into a drainage swale and southwest into the surrounding environment. Review of aerial photography shows a possible drainage swale southeast of the AOPI that directs surface water towards Romney Creek.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – Operable Unit [OU]1) and AAWB04 and HQAES Number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**).

For IRP Site ID AAWB01, in July 2000, a Record of Decision (ROD) was published which required the construction of a new plant to treat all county production wells and groundwater monitoring. The new plant is located off post and was completed in October 2003. All drinking water wells located in the Perryman Well Field are treated by the new plant. A memorandum of agreement with Harford County was established for the Army to treat trichloroethene with a GAC system. Remedial action operation (RAO) will continue into the foreseeable future. RAO includes carbon replacement and vessel maintenance/supplementing operating costs for the GAC system and semiannual groundwater monitoring of the treatment plant wells and annual monitoring of the public water supply wells. Additional groundwater monitoring wells will continue to be monitored every 5 years in support of the required installation 5-year review (USAG APG 2017b).

For IRP Site ID AAWB04, environmental sampling within OU3 has been accomplished to support a human health risk assessment (HHRA) for the Western Boundary Study Area and an ecological study for the entire APG-AA. The collected data was screened and validated. The RI found that further work was warranted at the Former Aberdeen Fire Training Area, but unwarranted at the ABR and PAAF areas within OU3 (USAG APG 2017b).

5.2.1.2 Air Base Range 6

The ABR 6 is displayed on **Figure 5-4** and is identified as an AOPI following personnel interviews, and site reconnaissance due to the historical and repetitive release of AFFF to a steel test pad as part of vehicle and aircraft testing exercises between the years of 1988 to 2005. APG Fire Department personnel would regularly deploy AFFF from a distance to extinguish fuel fires on the test pad. The test pad is also equipped with drainage inlets which connect and drain test waste to an oil-water separator (OWS) system located approximately 500 feet northwest of the AOPI. Non-test waste and captured precipitation were collected via the same system and discharged through a separate drainage valve to a former retention pond located approximately 500 feet up-topography and southwest of the test pad. The test pad measures approximately 100 by 100 feet and is contained on all sides by a tarmac buffer and a grassed berm approximately 15 feet tall. Based on review of aerial photography, site-reconnaissance notes, and topographic contours, applied AFFF and residual AFFF in surface water that was not captured by the pad drains would have been applied to the tarmac buffer and elevated grassed berm surrounding the test pad before being left to the elements to either blow away or dissipate.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other

Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.1.3 Air Base Range 7

The ABR 7 is displayed on **Figure 5-4** and is identified as an AOPI following personnel interviews and site reconnaissance due to the historical and repetitive release of AFFF to a steel test pad as part of vehicle and aircraft testing exercises between the years of 1988 to 2005. Similar to ABR 6, APG Fire Department personnel would regularly deploy AFFF from a distance to extinguish fuel fires on the test pad. The test pad is also equipped with drainage inlets which connect and drain test waste to an OWS system located approximately 500 feet northeast of the AOPI. Non-test waste and captured precipitation were collected via the same system and discharged through a separate drainage valve to a former retention pond located approximately 600 feet southeast of the test pad. The test pad measures approximately 100 x 100 feet and is surrounded by a tarmac buffer. Based on review of aerial photography, site-reconnaissance notes, and topographic contours, applied AFFF and residual AFFF in surface water that was not captured by the pad drains would have been applied to the tarmac buffer surrounding the test pad before being left to the elements to either blow away or dissipate.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.1.4 Phillips Army Airfield Runways

The PAAF runways are displayed on **Figure 5-5** and is identified as an AOPI following personnel interviews due to the historical release of AFFF at multiple unidentified locations as part of fire department emergency response training operations around the airfield runway during the 1990s. The environment surrounding the AOPI consists primarily of the grassed Biosolid Application Field AOPIs and the paved Army Test Circuit. Based on review of aerial photography, site-reconnaissance notes, and topographic contours, multiple stormwater management utility lines and ditches capture and divert surface water away to outfalls located east of the PAAF. These outfalls are located within drainage areas that flow into unnamed streams feeding Romney Creek. During a PA site reconnaissance visit to the area, the airfield tarmac was observed to be in good condition.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.1.5 Phillips Army Airfield – Aircraft Boneyard

The PAAF – Aircraft Boneyard is displayed on **Figure 5-6** and is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical release of residual AFFF from aircraft parked in the area to the surrounding environment. Aircraft doused with AFFF during testing activities at ABRs 3, 6 and 7 were parked at this location between the years of 1989 and 2005. The

boneyard area is primarily defined as grass and soil with little to no topographic relief. Various support buildings are located toward the west and southwest of the AOPI boundary. An access road to these buildings transects the AOPI parcel boundary. No surface water bodies are present within the vicinity of this AOPI, and surface water runoff is presumed to infiltrate to groundwater. Multiple aircraft were observed to be parked at the boneyard during a PA site reconnaissance visit to the AOPI. According to interviewed personnel, the boneyard area had historically extended further north before it was truncated to allow for the development of the Army Test Course track.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.1.6 Former Aberdeen Fire Training Area

The Former Aberdeen Fire Training Area is displayed on **Figure 5-7** and is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical release of AFFF as part of fuel and vehicle-based fire training exercises starting in the 1960s and ending in 1989. The former fire training area resides within a highly vegetated and overgrown wetland area located directly north of the PAAF. No dedicated surface water management features were identified during the PA site reconnaissance visit to the area but standing surface water was observed to flow south by southeast along topography. During its use as a fire training area, three berm areas were used as dedicated training grounds within the fire training area for AFFF related training exercises. Of these three berms, Berm 1 and Berm 2 were excavated in 1993 to a maximum depth of 12 feet bgs. Berm 3 was excavated further from 13 to 20 feet bgs in 1994. The approximated boundaries of these berm areas are presented on **Figure 5-7**. The final location of excavated soil was not tracked.

This AOPI is included in the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1), AAWB03 and HQAES Number 24015.1018 (Fire Training Area), and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). IRP Site IDs AAWB01 and AAWB04 are described in **Section 5.2.1.1** above.

For IRP Site ID AAWB03, a removal action was performed at this fire training area to remove soil contaminated with trichloroethene and total petroleum hydrocarbons in 1993. As a result of this 1993 removal action, no further action was recommended. Wells installed to address contamination originating from this site were historically sampled for PFOS and PFOA (USAG APG 2017b).

5.2.1.7 Building 1074 – Former Maryland Fire and Rescue Institute Training Area

The Building 1074 – Former MFRI Training Area is displayed on **Figure 5-8** and is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical release of AFFF to two concrete test pads at this location. This fire training area was leased to MFRI and operated by both APG and MFRI personnel starting in 1987. MFRI ceased use of the property in 2011 and terminated its lease shortly afterwards, although according to an APG fire chief, the area continued to be used for fire training activities by the APG Fire Department. MFRI representatives reported in correspondence to APG personnel that supporting ancillary equipment and associated piping at the fire

training area was excavated and removed in 2012. During the PA site visit, it was noted that the APG Fire Department was the only training party to release AFFF at this location. This AOPI is located directly northeast of the Former Aberdeen Fire Training Area. The area is surrounded by trees and bordered to the north by the Army Test Course. Building 1074 and a concrete parking lot are located towards the east of the AOPI parcel. Buildings 1075, 1076 and 1076B, and a concrete training structure are located towards the west of the AOPI parcel. The former concrete training pads that were excavated in 2012 were located in the center or the parcel and north of the main access road as displayed on **Figure 5-8**. Review of site reconnaissance logs, aerial photography, existing stormwater maps, and topographic contours indicates that stormwater ditches are located east and west of the Building 1074 parking lot, as well as directly south of Buildings 1075, 1076 and 1076B.

This AOPI is included in the APG IRP under the Site IDs AAWB03 and HQAES Number 24015.1018 (Fire Training Area) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** and **Section 5.2.1.6** above.

5.2.1.8 PAAF – Airfield Station Building 1059

The PAAF – Airfield Station Building 1059 is displayed on **Figure 5-9** and is identified as an AOPI following personnel interviews, and site reconnaissance due to the release of residual AFFF from the cleaning of both fire trucks and fire-fighting equipment at this location directly following training and/or responses that utilized AFFF. The AOPI is located within the confines of the PAAF and directly north of PAAF Hangar 1060. APG fire department personnel operated this fire station strictly for airfield emergency response operations. The tarmac driveway where APG fire department personnel washed equipment and fire trucks was found to be in good condition during a PA site reconnaissance visit to the area. GIS files provided by APG personnel show a stormwater utility line running beneath the fire station driveway, though no drains or storm water culverts were identified within the driveway or around the building during the PA site reconnaissance visit. Four floor drains were observed within the engine bay of Building 1059. These drains transport surface water north towards a drainage ditch located along Phillips Field Road. Cracks in the cement of the engine bay floors were also observed. Based on review of aerial photography and topographic contours, surface water from the driveway is suspected to flow southwest along the driveway slope or towards a grass area bordering the southern side of the building.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.1.9 PAAF – Hangar 1060

The PAAF – Hangar 1060 is displayed on **Figure 5-9** and is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical release of AFFF to the surrounding environment following regular testing of an AFFF hangar suppression system. It is uncertain when testing of this suppression system started, but photos of a testing exercise that occurred in 2016 were provided to Arcadis during the PA site visit. This 2016 test was the last known suppression system test to have taken place at this location. According to APG fire department personnel, AFFF released

during the test was blown directly out of the hangar bay doors to the surrounding environment using industrial fans. The hangar floor is made of concrete and was observed to be in good condition during a PA site reconnaissance visit. An asphalt taxiway leads from both the eastern and western hangar bay doors to the surrounding environment and is bordered to the south by grass. Floor drains within the hangar were reportedly plugged between 2014 and 2015. Review of GIS storm water lines indicates that these plugged drains led to a storm water system that diverted interior runoff south towards the PAAF runway and northeast towards a discharge point located directly east of Building 1062. The residual AFFF blown out of the hangar was left to the elements and was either blown away by wind or washed south by precipitation and surface water runoff to the grass bordering Hangar 1060 or the taxiway asphalt.

This AOPI is overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 [Other Media – OU3 (Surface Water, Sediment, Soil)] and HQAES number 24015.1019 (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.1.10 PAAF – Crash Truck Bay Building 1065

The PAAF – Crash Truck Bay Building 1065 is displayed on **Figure 5-9** and is identified as an AOPI following personnel interviews and site reconnaissance due to the release of residual AFFF from the cleaning of both a fire crash truck and fire-fighting equipment at this location directly following training and/or responses that utilized AFFF. The AOPI is located directly west and across the road of PAAF – Airfield Station Building 1059. During a PA site reconnaissance visit to this location, eight 55-gallon drums of AFFF, as well as a specialized crash truck used to extinguish vehicle and aircraft fires were observed to be stored within the building. In addition to multiple cracks within the cement floor of the building storage bay, a storm water drainage line leading to the southward facing exterior of the building was observed. Heavy staining was also noted along the interior entryway to the drainage line. Review of existing stormwater maps indicates a series of stormwater utility lines surround Building 1065, though no such lines were noted during site reconnaissance. Residual AFFF stuck to the crash truck exterior was rinsed off directly outside of the storage bay. Review of aerial photography shows visible staining along the grass berm located directly alongside the building storage bay, as well as visible pooling of water further south within the Building 1065 parking lot.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.1.11 PAAF – Loading Pad

The PAAF – Loading Pad is displayed on **Figure 5-10** and is identified as an AOPI following personnel interviews and site reconnaissance due to the release of AFFF in response to an aircraft fire that occurred in 2012. The AOPI is located directly east of the main PAAF runway and directly south of the Biosolid Application Field I AOPI. Photos of the 2012 incident were provided to Arcadis by APG personnel during the PA site visit. The photos showed AFFF had been applied to both tarmac and grass areas within the southeastern quadrant of the loading platform. Review of aerial photography and stormwater maps indicate that multiple storm water ditches and surface water bodies encircle the PAAF Loading Pad.

Surface water from these ditches and bodies appears to flow southeast towards an unnamed stream that eventually flows into Romney Creek.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.1.12 Michaelsville Landfill

The Michaelsville Landfill is displayed on **Figure 5-11** and is identified as an AOPI following document research, personnel interviews and site reconnaissance due to the disposal of wastewater treatment sludges generated at the Aberdeen Area WWTP suspected to have been impacted by AFFF wastes. The AOPI is a 20-acre, unlined municipal landfill located within the north-central portion of the APG-AA. Operations at this landfill began in 1969 and ended in 1980. The landfill parcel is covered primarily by grass with rolling topographic highs and lows. The landfill is bordered by heavy vegetation, trees, and wetland conditions. No buildings or support infrastructure exist around the AOPI. Review of existing stormwater maps indicates that multiple drainage ditches encircle the landfill, directing precipitation and surface water runoff to three drainage outfalls located to the southwest. These outfalls direct surface runoff towards a wetland marsh which feeds an unnamed tributary that eventually discharges to Romney Creek.

This AOPI is included in the APG IRP under the Site IDs AAML01 and HQAES Number 24015.1001 (Michaelsville Landfill – OU1 Source) and AAML02 (Michaelsville Landfill – OU2 Groundwater) and HQAES number 24015.1002 (**Figure 5-2a**).

For IRP Site ID AAML01, in June 1992, a ROD was published which recommended installation of a landfill cap. The installation of a multilayered cap system with a geosynthetic membrane and fill with a minimum thickness of 5 feet was completed in accordance with MDE requirements for sanitary landfills in August 1994. The Michaelsville Landfill Close Out Report was approved by the USEPA in 2002. The USEPA has reported that there is a delay in delisting this as a National Priority List site. Quarterly inspections of the landfill and groundwater monitoring are conducted at the site. Long term management (LTM) consists of inspections and maintenance of the landfill cap and gravel road surrounding the landfill, land-use control (LUC) monitoring and maintenance and groundwater sampling every five years to support the five-year review (USAG APG 2017b).

For IRP Site ID AAML02, a ROD was signed for OU2 that required LTM of the site, annual sampling, and the establishment of a 0.25-mile drinking water well restriction zone in September 1997. In 1999, the first round of sampling was completed. In 2002 the third round of surface water, sediment and groundwater sampling was completed. A groundwater-only sampling was conducted in March 2005. In June 2004 the monitoring plan for the Michaelsville Landfill was revised to reduce the frequency and number of wells being sampled. LTM of the Michaelsville Landfill will continue into the foreseeable future. LTM consists of groundwater sampling every 5 years to support the 5-year review and LUC monitoring and maintenance (USAG APG 2017b).

5.2.2 Aberdeen Cantonment Area AOPIs

Overviews for each AOPI identified during the PA process within the Cantonment Area of the APG-AA are presented in this section. None of the AOPIs overlap with APG IRP sites and/or HQAES sites.

The AOPI locations are shown on **Figure 5-2a**. Location overviews of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-12** and **5-13** and include active monitoring wells in the vicinity of each AOPI.

5.2.2.1 Building 300 – Former Aberdeen Fire Station and Building 250 Potable Supply Wells

The Building 300 – Former Aberdeen Fire Station and the Building 250 - Potable Supply Wells are displayed on **Figure 5-12** and is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical release of residual AFFF to the fire station driveway and surrounding grass as a result of fire truck cleaning post-training and response. The building operated as the main APG fire station from the 1910s until its retirement in the early 2000s. The AOPI is located within the central portion of the Aberdeen Cantonment Area, approximately 0.60 mile southwest of Plum Point, and is surrounded by multiple residential and commercial buildings, open grassed areas, trees and high-traffic roadways. Review of aerial photography and existing stormwater maps show a series of stormwater and sewer lines and inlets surrounding the AOPI. A PA site reconnaissance visit to the AOPI made note that surface water originating from the fire station driveway would flow north along the driveway, Long Corner Road, and the bordering grass before diverting eastward and into a stormwater inlet located directly down topography. The AOPI is also directly upgradient of the Building 250 water supply wells. Cracking and vegetative growth was also documented on the building driveway. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.2.2 Building 2200 – Current Aberdeen Fire Station

The Building 2200 – Current Aberdeen Fire Station is displayed on **Figure 5-13** and is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical release of AFFF as part of fire truck foam tank emptying, in addition to the release of residual AFFF to the fire station driveway, surrounding grass and interior and exterior stormwater inlets as a result of fire truck cleaning post-training and response. The building has operated as the main APG fire station since the early 2000s. The AOPI is located within the central portion of the Aberdeen Cantonment Area, approximately 0.30 mile southwest of the northern APG boundary and Swan Creek; a major tributary to the Chesapeake Bay. The AOPI is surrounded by multiple commercial buildings, open grassed areas, trees, and high-traffic roadways. Review of aerial photography and existing stormwater maps shows two stormwater lines running parallel to either side of the west facing and north facing fire station driveways. A PA site reconnaissance visit to the AOPI made note that surface water originating from the west facing fire station driveway, where residual AFFF was released, would flow along the driveway, before being captured by two storm water drains along Frankford Street. Drain inlets identified within the fire station engine bays are shown on existing stormwater maps to discharge to an outfall located directly south of Building 2308. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.2.3 Building 2308 – Fire Department Storage Building

The Building 2308 – Fire Department Storage Building is displayed on **Figure 5-13** and is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical storage and suspected release of AFFF to a possible storm drain and cement cracks within the storage building. The building has operated as the main AFFF and fire equipment storage area for the APG-AA branch of the APG Fire Department since Building 2200 became the main fire station in the early 2000s. The AOPI is located within the central portion of the Aberdeen Cantonment Area, directly across the road from Building 2200 and approximately 0.30 mile southwest of the northern APG boundary and Swan Creek; a major tributary to the Chesapeake Bay. The AOPI is surrounded by multiple commercial buildings, open grassed areas, trees, and high-traffic roadways. Review of aerial photography and existing stormwater maps shows storm water lines originating from the east and west facing interiors of the building. These lines are shown on stormwater maps and aerial photography to connect with a sanitary sewer utility line that runs parallel to Frankfort Street. The sanitary sewer line is connected to the Aberdeen Area WWTP. During a PA site reconnaissance visit to the area, multiple 55-gallon drums of AFFF were observed to be stored on a steel shelfing unit installed along the northern facing side of the building. Evidence of AFFF leakage from the drums onto a metal plate was noted. The metal plate is suspected to have covered a former stormwater drainage inlet. Cracks in the cement floor surrounding the area of staining were also observed. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.3 Poverty Island AOPIs

Overviews for each AOPI identified during the PA process within the Poverty Island Area of the APG-AA are presented in this section. The AOPI-specific CSM summaries are provided in **Section 7.13**. None of the AOPIs overlap with APG IRP sites and/or HQAES sites.

The AOPI locations are shown on **Figure 5-2b**. Location overviews of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-14** through **5-17** and include active monitoring wells in the vicinity of each AOPI.

5.2.3.1 AA5 Range

AA5 Range is displayed on **Figure 5-14** and is identified as an AOPI following personnel interviews and site reconnaissance due to the release of AFFF via portable AFFF suppression systems used to extinguish oil fires caused by vehicle testing. The AOPI is located in the southern-most portion of Poverty Island, approximately 750 feet northeast of Bridge Creek. Wetland areas surround the AOPI parcel, with trees and vegetation bordering the AOPI on all sides. The main test area within the AOPI is comprised of three steel pads atop gravel. AFFF as well as other test wastes were captured via drainage grates built into the test pads. Waste was then funneled to an OWS located within the northwestern confines of the AOPI parcel, containerized, sampled, and either disposed of off-post as hazardous waste or sent to the Aberdeen Area WWTP for processing. Non-test waste, precipitation and residual AFFF captured by the same pad drainage system was discharged via a separate valve system to an outfall located approximately 90 feet southwest of the three test pads. Review of aerial photography and topographic contours indicates that discharge to this outfall location flows directly into the mouth of Bridge Creek via a

naturally occurring surface runoff pathway. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.3.2 Poverty Island – Minefield Range

Poverty Island – Minefield Range is displayed on **Figure 5-15** and is identified as an AOPI following personnel interviews and site reconnaissance due to the release of AFFF via portable AFFF suppression systems used to extinguish oil fires as part of vehicle testing starting in the 1990s. The AOPI is located in the southwestern portion of Poverty Island. Grass covered hills, wetland areas, trees and heavy vegetation surround the AOPI. The access roads and test areas are comprised primarily of weathered asphalt and gravel. Starting in the 1990s until 2008, vehicle testing that included the release of AFFF occurred atop an excavated hole covered with a plastic liner. Waste materials and contaminated soil were containerized and transported to a steel storage box located north of the AA5 range before being disposed off post as hazardous waste. In 2008, a dedicated steel test pad measuring approximately 50 by 40 feet was installed over the excavated pit. The test pad was reinforced along the southern and western facing edges with a 10-foot-tall steel barricade that served to contain shrapnel, oil and AFFF to the test pad area. The steel test pad was also equipped with a drainage system designed to capture and transport test waste and AFFF to two OWSs located in the northern confines of the AOPI parcel. OWS waste was containerized, sampled, and either disposed off post as hazardous waste or sent to the Aberdeen Area WWTP for processing. Non-test waste, precipitation and residual AFFF captured by the same drainage system was discharged via a separate valve system to an outfall located within the wetland area approximately 250 feet east of the test pad area. Review of aerial photography and topographic contours indicates that discharge to this outfall location flows through wetland water bodies into Romney Creek. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.3.3 Poverty Island – Range 12

Poverty Island – Range 12 is displayed on **Figure 5-16** and is identified as an AOPI following personnel interviews and site reconnaissance due to the release of AFFF through portable AFFF suppression systems used to extinguish oil fires as part of vehicle testing starting in the 1990s. The AOPI is located in the southwestern portion of Poverty Island and approximately 0.5 mile southwest of the Poverty Island Minefield Range. Grassed wetland areas, trees and heavy vegetation surround the AOPI parcel. The access roads and test range areas within the AOPI parcel are comprised primarily of weathered asphalt and gravel. Vehicle testing that included the application of AFFF occurred to an unbounded steel test pad measuring approximately 45 by 45 feet located in the southwestern quadrant of the AOPI parcel. Similar to the Poverty Island Minefield Range, the test pad is also equipped with a drainage system designed to capture and transport test waste and AFFF to an OWSs located in the southeastern confines of the AOPI parcel. OWS waste was containerized, sampled, and either disposed off post as hazardous waste or sent to the Aberdeen Area WWTP for processing. Non-test waste, precipitation and residual AFFF captured by the same drainage system was discharged via a separate valve system to an unidentified outfall. Review of aerial photography and topographic contours indicates that AFFF discharged to this location would flow through wetland water bodies into Romney Creek. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.3.4 Ford's Farm

Ford's Farm is displayed on **Figure 5-17** and is identified as an AOPI following personnel interviews and site reconnaissance due to two confirmed releases of AFFF: One release in 1990 as part of a fire suppression exercise, and one release in 2012 as part of an emergency tank fire response. The AOPI is located within the central portion of Poverty Island, approximately 1.0 mile northwest of the Poverty Island Minefield Range. A main access road transects the AOPI, generally dividing the AOPI into two distinct areas. The eastern portion of the AOPI is defined by graveled test areas interspersed with grass and wetland areas bordered by heavy trees and vegetation. In 1990, AFFF was released within a domed structure located along the western boundary of this AOPI section. The AFFF released to this domed structure was reportedly funneled to and contained within a concrete trough directly to the southeast, where it was held along with wastewater, pumped out and evaporated by ARL personnel at an undisclosed location. The remaining AFFF stored at this location was transported to the AA5 range to support testing purposes. The western portion of this AOPI is defined by a large gravel vehicle graveyard and testing area. AFFF was applied in this area by the APG Fire Department in response to a tank fire in 2012. The vehicle graveyard is bordered on all sides by grass, wetland conditions and heavy vegetation. Review of aerial photography shows a possible man-made drainage pathway along the southern boundary of this vehicle graveyard and indicates that surface water runoff from this location would flow through wetland water bodies into Bridge Creek. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.4 Spesutie Island AOPIs

Overviews for each AOPI identified during the PA process within the Spesutie Island area of the APG-AA are presented in this section. The AOPI-specific CSM summaries are provided in **Section 7.13**. One of the AOPIs overlap with APG IRP sites and/or Headquarters Army Environmental System (HQAES) sites (**Figure 5-2c**). The AOPI, overlapping IRP site identifier, HQAES number, and current site status are discussed within the Biosolid Application Field AOPIs **Section 5.2.7** below. At the time of this PA, none of the APG IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS.

The AOPI locations are shown on **Figure 5-2c**. Location overviews of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-18** and **5-19** and include active monitoring wells in the vicinity of each AOPI.

5.2.4.1 EF-15

EF-15 is displayed on **Figure 5-18** and is identified as an AOPI following records review, personnel interviews and site reconnaissance due to the use of AFFF as part of ordnance suppression testing activities between the years of 2003 and 2012. The AOPI is located along the western coastline of Spesutie Island. AFFF was released within a large 45 by 65-foot tent located within the northeastern most portion of the AOPI. The remainder of the test area is defined by weathered asphalt and steel test structures within a wetland area dominated by grass and surrounded by trees. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features managing stormwater runoff at this AOPI. Natural surface drainage features include a drainage channel located along the southern boundary of the AOPI and the surrounding wetland areas. Both drainage

pathways drain directly west into Spesutie Narrows. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.4.2 Fuze Range

The Fuze Range is displayed on **Figure 5-19** and is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to the use of AFFF to extinguish tank fires following ordnance testing activities between the years of 1993 and 2013. The AOPI is located along the southeastern coastline of Spesutie Island. AFFF was released to a large steel test container that contained the tanks. The AFFF and other test wastes were contained and diverted to two 2,500-gallon hazardous waste storage tanks located directly north of the test pad. The filled tanks were pumped out by the APG Fire Department and transported away for hazardous waste disposal. The AOPI resides atop gravel surrounded by grassy wetland. A retention pond where non test waste and precipitation were suspected to be dumped is located directly northwest of the test area within a predominantly wetland area directly south of Back Creek. Based on review of site reconnaissance notes, aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features managing stormwater runoff at this AOPI. Natural surface drainage features include the surrounding wetland areas. The wetland areas drain directly north into Back Creek, which eventually drains to the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.5 Edgewood Area North AOPIs

Overviews for each AOPI identified during the PA process within the northern portion of the APG-EA are presented in this section. The AOPI-specific CSM summaries are provided in **Section 7.13** Ten of the AOPIs overlap with APG IRP sites and/or HQAES sites (**Figure 5-2d**). The AOPI, overlapping IRP site identifier, HQAES number, and current site status are discussed within each AOPI subsection presented below. At the time of this PA, none of the APG IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS.

The AOPI locations are shown on **Figure 5-2d**. Location overviews of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-20** through **5-27** and include active monitoring wells in the vicinity of each AOPI.

5.2.5.1 Building E5005 – Edgewood Fire Department Storage

The Building E5005 – Edgewood Fire Department Storage is displayed on **Figure 5-20** and is identified as an AOPI following personnel interviews, and site reconnaissance due to the historical storage of AFFF at this building and the release of AFFF to the surrounding environment as part of nozzle testing and training exercises between the 1970s and 1990s. The AOPI is located within the developed and administrative area of Canal Creek in APG-EA. Building E5005 was demolished at some point in the early 2000s. The immediate vicinity surrounding the building where AFFF releases occurred is primarily grassed, with remnant portions of asphalt and gravel from the former building driveway located along Black Hawk Road. The East Branch Canal Creek also transects the AOPI. This creek eventually drains into the Gunpowder River, a major tributary of the Chesapeake Bay. Review of aerial photography and existing stormwater maps shows multiple stormwater and sanitary sewer line features originating from

and transecting the AOPI. Stormwater originating from this AOPI discharges via outfalls to a drainage ditch to the northeast located along Wise Road. This drainage ditch eventually feeds into East Branch Canal Creek approximately 700 feet southwest of the AOPI boundary. Sanitary sewer lines within the APG-EA funnel waste and collected run-off to the Edgewood Area WWTP. In addition to current stormwater and sanitary sewer lines, a suspected remnant of the Edgewood Area BLCSL system transects the area from the southwest to the northeast.

This AOPI overlaps with the APG IRP under the Site IDs EACC2B and HQAES Number 24015.1072 (Building E5023 WWI WP Filling PNT-CLU 2B) and EACC2I-B HQAES Number 24015.1082 (Old Shop and Motorpool Area – Cluster 2I) (**Figure 5-2d**).

IRP Site ID EACC2B was added to the IRP to assess metals, pesticides, and white phosphorous contamination from white phosphorous filling operations at Building E5023. No remedial action was required (USAG APG 2017b).

IRP Site ID EACC2I-B was added to the IRP to assess contamination from historical operations at this location. No remedial action was required (USAG APG 2017b).

5.2.5.2 Building E5180 – Edgewood Fire Station

The Building E5180 – Edgewood Fire Station is displayed on **Figure 5-21** and is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical release of AFFF as part of fire truck foam tank emptying, AFFF nozzle testing and training exercises, and the release of residual AFFF to the fire station driveway, surrounding grass and interior and exterior stormwater inlets as a result of fire truck cleaning post-training and response. The building has operated as the main fire station in APG-EA since fire department operations at APG began. The AOPI is located within the developed and administrative area of Canal Creek. Asphalt parking lots, administrative buildings, grass lawns, and trees surround the AOPI. Two asphalt driveways extend northward and eastward from the fire station building. The driveways are equipped with entry drains to the stormwater management system. Review of aerial photography and existing stormwater maps shows stormwater from these drains discharge to two drainage ditches located northeast and southwest of the building. A third stormwater drainage ditch located along Hoadley Road captures additional surface water runoff from the east facing driveway.

This AOPI overlaps with the APG IRP under the Site ID EACC4A-B and HQAES Number 24015.1102 (West Area CC Aquifer-Cluster4A-B) (**Figure 5-2d**).

For IRP Site ID EACC4A-B, a RI document has been prepared, and the HHRA has been finalized. However, at the time of this report, USEPA is requesting a data gap analysis. This site continues to be studied. The anticipated remedy is in situ and ex situ soil treatment, phytoremediation, biomats, natural attenuation and LUCs (USAG APG 2017b).

5.2.5.3 CASY Site

The CASY Site is displayed on **Figure 5-22** and is identified as an AOPI following personnel interviews and site reconnaissance due to the historical release of AFFF as part of chemical vapor suppression test exercises conducted at this location in the 1990s. The AOPI is located within the developed and administrative Bush River area of APG-EA. The AOPI is comprised of heavily weathered, cracked, and

vegetated asphalt within a fenced area now used for storage. The area directly north and east of the AOPI is comprised of grassed wetlands. Review of aerial photography and existing stormwater maps shows surface water from this location flows southward along topography. A stormwater drain transects and collects surface runoff from the AOPI before terminating at a drainage ditch that runs parallel to the southern boundary of the AOPI.

This AOPI overlaps with the APG IRP under the Site ID EABR18-F and HQAES Number 24015.1045 (Surficial Aquifer – Cluster 18) (**Figure 5-2d**).

For IRP Site ID EABR18-F, groundwater sampling was performed within Cluster 18 during the RI, Phase I Focused Feasibility Study (FFS), and Phase II FFS field activities completed in 2002. Cluster 18 contains a portion of the large VOC plume which underlies the Southern Bush River Area. Several potential VOC source areas have been identified within Clusters 15 and 18. The RI recommended work should be completed to evaluate potential remedial alternatives for OU1, including the contaminated surficial aquifer groundwater in the southern portion of the Southern Bush River Area (EABR15-D and EABR18-F), and the VOC source area in the offshore groundwater at the Bush River Dock. The 2013 FFS recommended hot spot removal and treatment followed by bioremediation and monitored natural attenuation to reduce the VOC concentrations in the aquifer. The anticipated remedy is ex situ treatment of hot spots in soils followed by bioremediation, monitored natural attenuation/monitoring and LUCs for groundwater (USAG APG 2017b).

5.2.5.4 G-Street Plane Crash Area

The G-Street Plane Crash Area is displayed on **Figure 5-23** and is identified as an AOPI following personnel interviews and site reconnaissance due to the suspected release of AFFF in response to a plane crash at this location in 1987. The AOPI is located approximately 0.20 mile west of the Hoadley Road access gate, within an undeveloped and heavily forested area of Canal Creek. Based on review of aerial photography, topographic contours, and stormwater maps, there are no buildings or stormwater utility lines that manage surface water runoff at this AOPI. A stormwater drainage ditch that may manage surface water runoff from this AOPI is located approximately 130 feet northwest of the suspected crash site.

This AOPI overlaps with the APG IRP under the Site ID EACC1A-B and HQAES Number 24015.1051 (G Street Salvage Yard-Cluster 1A) (**Figure 5-2d**).

IRP Site ID EACC1A-B was added to the IRP to address metals contamination from salvage yard operations at the G Street Salvage Yard, located directly southwest of the identified G Street Plane Crash Area AOPI. In September 2007 the ROD for this site was signed. The selected remedy (implemented under an existing polychlorinated biphenyl site) included excavation within the contaminated soils area of the G Street Salvage Yard (to an approximate depth of about 2 feet), excavation of the Burn Residue Disposal Area (to a total depth of 9 feet), and off-site disposal. LTM will continue into the foreseeable future (USAG APG 2017b).

5.2.5.5 G-Street Salvage Yard and Former Fire Training Area

The G-Street Salvage Yard and Former Fire Training Area is displayed on **Figure 5-24** and is identified as an AOPI following document reviews, personnel interviews, and site reconnaissance due to the

release of AFFF as part of fire training exercises that were conducted at this location between the years of 1972 and 1978. The AOPI is located between the G-Street Plane Crash AOPI and the Hoadley Road access gate, within a highly vegetated, overgrown, undeveloped and heavily forested area of Canal Creek. Based on review of aerial photography, topographic contours, and stormwater maps, there are no buildings, stormwater utility lines or drainage ditches that manage surface water runoff at this AOPI.

As discussed in **Section 2.12**, the G-Street Salvage Yard was identified as a former fire-fighting training area in the APG-EA Resource Conservation and Recovery Act (RCRA) Facility Assessment (USAEHA 1989) and sampled for PFOS and PFOA as part of the 2018 West Canal Creek Study Area RI (ECC 2018). PFOS and PFOA were detected at maximum concentrations of 36,900 ng/L and 712 ng/L for PFOS and PFOA respectively in existing monitoring well CC-039A (**Figure 2-5e**). PFAS samples collected from this investigation were analyzed using USEPA Method 537.

This AOPI is included in the APG IRP under the Site ID EACC1A-B and HQAES Number 24015.1051 (G Street Salvage Yard-Cluster 1A) (**Figure 5-2d**). This IRP Site ID is described in **Section 5.2.5.4** above, however the fire training area identified during this PA/SI was not excavated as part of this selected remedy.

5.2.5.6 Noble Road – Former Fire Training Area

The Noble Road – Former Fire Training Area is displayed on **Figure 5-25** and is identified as an AOPI following document reviews, personnel interviews, and site reconnaissance due to the release of AFFF to surface soil as well as two now demolished buildings (E5292 and E5294) as part of fire training exercises that were conducted at this location in the 1990s. The AOPI is located in the southern portion of the Canal Creek Study Area along the northern side of Noble Road. The environment surrounding the AOPI consists of grass lawns and weathered roadways. Based on review of aerial photography, topographic contours, and stormwater maps, all buildings surrounding the AOPI have since been demolished. A stormwater utility line that discharges into East Branch Canal Creek originates from the area of suspected AFFF release.

This AOPI overlaps with the APG IRP under the Site ID EACC2E and HQAES Number 24015.1075 (Noble Road Incinerators-Cluster 2E) (**Figure 5-2d**).

IRP Site ID EACC2E includes the Noble Road Incinerators (EACC2EA) and the East Canal Creek Marsh and Landfill (EACC2EB). This site was added to the IRP to address metals and VOC contamination from incinerator burning of waste including animal carcasses, classified documents, mustard distillation residues, and general sanitary waste. Phase I RI activities included geophysical surveys and the collection and analysis of soil gas, sediment, surface water, surface soil, and incinerator ash samples. Arsenic detections in soil (26.9 milligrams per kilogram [mg/kg]) and ash (32.5 mg/kg) samples exceeded the USEPA industrial risk based concentrations and reference background levels. Toxicity tests indicated no effects for plants, but growth effects for worms. In 2003, X-ray fluorescence screening and soil sampling were conducted in support of the ecological risk assessment. In 2004 and 2005, Phase III RI subsurface soil samples were collected. There were no significant ecological risks. The draft final RI, including risk assessments, for this site was completed in July 2009. Data gaps will likely need to be filled before the RI and risk assessments can be completed. The anticipated remedy is LUCs. The LTM phase will be opened at response complete (USAG APG 2017b).

5.2.5.7 Building E4040 – Aircraft Maintenance Building

The Building E4040 – Aircraft Maintenance Building is displayed on **Figure 5-26** and is identified as an AOPI following document reviews, personnel interviews, and site reconnaissance due to the confirmed release of 400 gallons of AFFF to both the building interior and surrounding environment from a hangar fire suppression system leak in 1998. Interviewed personnel recalled a potential pipe leak from this same AFFF suppression system sometime in 1998 or 1999, and 2015. Neither leak was confirmed. The AOPI is in the Canal Creek Study Area, within the confines of the Weide Airfield and adjacent to the airfield runway. The immediate environment surrounding the AOPI consists of grass lawns, asphalt roadways and parking lots, and a tarmac taxiway leading to the Weide Airfield runway. Based on review of aerial photography, topographic contours, and stormwater maps, sanitary sewer and stormwater lines surround the AOPI. A single sanitary sewer line connected to the north side of the building eventually discharges to the Edgewood Area WWTP. Two stormwater lines located to the east and south of the building capture surface water runoff from both the tarmac taxiway and surrounding grass and direct it north towards East Branch Canal Creek.

This AOPI overlaps with the APG IRP under Site IDs EACC2I-A and HQAES Number 24015.1081 [Airfield Area (Weide Field) – Cluster 2I] and EACC4A and HQAES Number 24015.1101 (East Area CC Aquifer-Cluster4A-A) (**Figure 5-2d**).

IRP Site ID EACC21-A was added to the IRP to assess metals, pesticides, and polycyclic aromatic hydrocarbon (PAH) contamination from historical airfield activities. Risk assessments found no unacceptable risks under an industrial land-use scenario and no remedial action was required.

For IRP Site ID EACC4A, a ROD was signed in July 2000 that addressed the VOC contamination within the East Canal Creek Area plume and described the initial treatment plant discharge to the surface water. APG is now using the treatment plant effluent as make-up water for the boiler. The groundwater treatment plant (GWTP) began operation in April 2003. In 2008, the plant was shut down and major upgrades were performed including new absorptive resin and carbon polishing. The plant was restarted in January 2010. RAO will continue. Long-term operation and maintenance of the treatment system to address the plume of contaminated groundwater will continue into the foreseeable future (USAG APG 2017b).

5.2.5.8 Building E4081 – Army Aviation Support Facility

The Building E4081 – Army Aviation Support Facility is displayed on **Figure 5-27** and is identified as an AOPI following document reviews, personnel interviews, and site reconnaissance due to the confirmed release of AFFF as part of regular hangar fire suppression system tests from 1977 onwards. Released AFFF from the fire suppression system tests were routed via both sanitary sewer lines to the Edgewood Area WWTP, as well as through stormwater lines to two retention ponds located north and southeast of the building. The immediate environment surrounding the AOPI consists of grass lawns, asphalt roadways and parking lots to the north, west and south. A large tarmac taxiway equipped with helicopter landing pads extends eastward from the building area leading to the Weide Airfield runway. Based on review of aerial photography, topographic contours, and stormwater maps, two sanitary sewer lines are connected to the northwest side of the building which eventually discharge to the Edgewood Area WWTP. A stormwater line runs north-south through the main interior hangar of the building. These stormwater lines discharge to two retention ponds, displayed on **Figure 5-28** as Retention Pond #1 and Retention

Pond #2, as well as to two outfalls located directly northeast of the building that discharge into East Branch Canal Creek.

This AOPI overlaps with the APG IRP under the Site IDs EACC2I-A and HQAES Number 24015.1081 [Airfield Area (Weide Field) – Cluster 2I] and EACC4A and HQAES Number 24015.1101 (East Area CC Aquifer-Cluster4A-A) (**Figure 5-2d**). These IRP Site IDs are described in **Section 5.2.5.7** above.

5.2.5.9 Weide Airfield – Tarmac AFFF Release Area

The Weide Airfield – Tarmac AFFF Release Area is displayed on **Figure 5-27** and is identified as an AOPI following personnel interviews and site reconnaissance due to the confirmed release of AFFF to the airfield tarmac as part of a foam training and verification exercise sometime in the 1970s. The central portion of the Weide Airfield runway, as well as a large tarmac taxiway equipped with helicopter landing pads makes up the majority of the AOPI. The environment immediately east of the approximate AFFF application area consists of a large grass lawn bordering the east side of the airfield runway. Based on review of aerial photography, topographic contours, and stormwater maps, multiple stormwater lines run beneath and capture runoff from the large tarmac taxiway. Captured surface water is diverted south and north away from the airfield into Retention Ponds #1 and #2, as well as to two outfalls located directly northeast of Building E4081 that discharge into East Branch Canal Creek.

This AOPI overlaps with the APG IRP under the Site IDs EACC2I-A and HQAES Number 24015.1081 [Airfield Area (Weide Field) – Cluster 2I] and EACC4A and HQAES Number 24015.1101 (East Area CC Aquifer-Cluster4A-A) (**Figure 5-2d**). These IRP Site IDs are described in **Section 5.2.5.7** above.

5.2.6 Edgewood Area South AOPIs

Overviews for each AOPI identified during the PA process within the southern portion of the APG-EA are presented in this section. The AOPI-specific CSM summaries are provided in **Section 7.13.** One of the AOPIs overlap with APG IRP sites and/or HQAES sites (**Figure 5-2e**). The AOPI, overlapping IRP site identifier, HQAES number, and current site status are discussed within each AOPI subsection discussed in the Biosolid Application Field AOPIs **Section 5.2.7** below. At the time of this PA, none of the APG IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS.

The AOPI locations are shown on **Figure 5-2e**. Location overviews of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-28** and **5-29** and include active monitoring wells in the vicinity of each AOPI.

5.2.6.1 H-Field – Helicopter Fire Response Area

The H-Field – Helicopter Fire Response Area is displayed on **Figure 5-28** and is identified as an AOPI following personnel interviews and site reconnaissance due to the release of AFFF in response to a helicopter crash at this location sometime in 1991 or 1992. The AOPI parcel resides in a heavily vegetated wetland area along an access road leading from the H-Field Tank Test Range. Based on review of aerial photography, topographic contours, and stormwater maps, there are no buildings or man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from this AOPI would flow northeast into the wetland features of Tripcellar Swamp and Boone Creek into Bush River, a

major tributary of the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.6.2 H-Field – Tank Fire Response Area

The H-Field – Tank Fire Response Area is displayed on **Figure 5-29** and is identified as an AOPI following personnel interviews and site reconnaissance due to the release of AFFF in response to a tank fire at this location in 2009. The AOPI parcel resides in a heavily vegetated wetland area along the outskirts of Tripcellar Swamp. The exact extent of AFFF release was based on review of aerial photography, which showed tank tracks and ground scarring at the suspected release location. Based on review of aerial photography, topographic contours, and stormwater maps, there are no buildings or man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from this AOPI would flow northeast through the wetland features of Tripcellar Swamp and Boone Creek into Bush River, a major tributary of the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

5.2.7 Biosolid Application Field AOPIs

Overviews for each biosolid application field AOPI identified during the PA process at APG are presented in this section. The AOPI-specific CSM summaries are provided in **Section 7.13.** Sixteen of the AOPIs overlap with APG IRP sites and/or HQAES sites (**Figures 5-2a, 5-2c, 5-2d,** and **5-2e**). The AOPI, overlapping IRP site identifier, HQAES number, and current site status are discussed within each AOPI subsection presented below. At the time of this PA, none of the APG IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS.

The AOPI locations are shown on **Figures 5-2a, 5-2c, 5-2d,** and **5-2e**. Location overviews of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-30** and **5-43** and include active monitoring wells in the vicinity of each AOPI.

5.2.7.1 Biosolid Application Field A-1

The Biosolid Application Field A-1 is displayed on **Figure 5-30** and is identified as an AOPI following records research and personnel interviews due to the confirmed application of biosolids generated at the Aberdeen and Edgewood Area WWTPs sometime between 1986 and 2003/2004. These biosolids are suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI consists of two featureless, grassed land parcels located directly northwest of the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made storm water utility lines within or surrounding the AOPI parcel. Two drainage ditches, one located south and perpendicular, and the other located northeast and parallel to the AOPI parcels manage surface water drainage. Surface water runoff from this AOPI is presumed to infiltrate to groundwater. Due to the confirmed application of biosolids to this land parcel, Biosolid Application Field A-1 was sampled as part of the SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other

Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.2 Biosolid Application Field A-2

The Biosolid Application Field A-2 is displayed on **Figure 5-30** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI is a featureless, grassed land parcel located directly west of the PAAF runway and borders the Biosolid Application Field A-1 parcels. Based on review of aerial photography, topographic contours, and stormwater maps there are no man-made stormwater utility features within or surrounding the AOPI parcel. A single drainage ditch located in between the parcel application boundaries manages surface water drainage. Surface water runoff from this AOPI is presumed to infiltrate to groundwater. Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field A-2 was not sampled as part of this SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.3 Biosolid Application Field A-3

The Biosolid Application Field ATC-1 is displayed on **Figure 5-30** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI is a featureless, grassed land parcel located directly west of the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features within or surrounding the AOPI parcel. Surface water runoff from this AOPI is presumed to infiltrate to groundwater. Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field A-3 was not sampled as part of this SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.4 Biosolid Application Field B

The Biosolid Application Field B is displayed on **Figure 5-31** and is identified as an AOPI following records research and personnel interviews due to the confirmed application of biosolids generated at the Aberdeen and Edgewood Area WWTPs sometime between 1986 and 2003/2004. These biosolids are suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area

WWTPs. The AOPI is a featureless, grassed land parcel located directly northwest of the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features originating from the AOPI parcel. Surface water runoff from this AOPI is presumed to infiltrate to groundwater. Due to the confirmed application of biosolids to this land parcel, Biosolid Application Field B was sampled as part of the SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.5 Biosolid Application Field D

The Biosolid Application Field D is displayed on **Figure 5-31** and is identified as an AOPI following records research and personnel interviews due to the confirmed application of biosolids generated at the Aberdeen and Edgewood Area WWTPs sometime between 1986 and 2003/2004. These biosolids are suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI is a featureless, grassed land parcel located directly northwest of the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features originating from the AOPI parcel. Surface water runoff from this AOPI is presumed to infiltrate to groundwater or migrate eastwards across topography into an unnamed stream that eventually feeds into Romney Creek. Due to the confirmed application of biosolids to this land parcel, Biosolid Application Field D was sampled as part of the SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.6 Biosolid Application Field E

The Biosolid Application Field E is displayed on **Figure 5-31** and is identified as an AOPI following records research and personnel interviews due to the confirmed application of biosolids generated at the Aberdeen and Edgewood Area WWTPs sometime between 1986 and 2003/2004. These biosolids are suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI is a featureless, grassed land parcel located directly northwest of the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features originating from the AOPI parcel. Surface water runoff from this AOPI is presumed to infiltrate to groundwater or migrate eastwards across topography into an unnamed stream that eventually feeds into Romney Creek. Due to the confirmed application of biosolids to this land parcel, Biosolid Application Field E was sampled as part of the SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.7 Biosolid Application Field C-1

The Biosolid Application Field C-1 is displayed on **Figure 5-32** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 and 2001 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel is a predominantly featureless, grassed area located directly north and along the northern tip of the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features originating from the AOPI parcel. Surface water runoff from this AOPI is presumed to infiltrate to groundwater or migrate eastwards across topography into an unnamed stream that eventually feeds into Romney Creek. Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field C-1 was not sampled as part of this SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1), AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)], and AAWB02 and HQAES Number 24015.1017 (PAAF Landfill/City of Aberdeen Wells-OU2) (**Figure 5-2a**). IRP Site IDs AAWB01 and AAWB04 are described in **Section 5.2.1.1** above.

5.2.7.8 Biosolid Application Field C-2

The Biosolid Application Field C-2 is displayed on **Figure 5-32** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 and 2001 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel is a predominantly featureless, grassed area that borders the northern tip of the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, a stormwater drainage feature originating from the northern tip of the PAAF runway transects the southern portion of the AOPI parcel. Surface water from this AOPI likely flows from this stormwater feature and into an unnamed stream that eventually feeds into Romney Creek. Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field C-2 was not sampled as part of this SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1), AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)], and AAWB02 and HQAES Number 24015.1017 (PAAF Landfill/City of Aberdeen Wells-OU2) (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** and **5.2.7.7** above.

5.2.7.9 Biosolid Application Field C-3

The Biosolid Application Field C-3 is displayed on **Figure 5-32** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 and 2001 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel extends westward away from

the PAAF runway, and its western boundary borders the eastern side of Biosolid Application Field C-2. The eastern most portion of the parcel intersects with the Army Test Course circuit that encircles the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features within or surrounding the AOPI parcel. Surface water from this AOPI and the Army Test Course circuit likely flow east along topography and towards an unnamed stream that eventually feeds into Romney Creek. Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field C-3 was not sampled as part of this SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1), AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)], and AAWB02 and HQAES Number 24015.1017 (PAAF Landfill/City of Aberdeen Wells-OU2) (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** and **5.2.7.7** above.

5.2.7.10 Biosolid Application Field F

The Biosolid Application Field F is displayed on **Figure 5-32** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 and 2001 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel is a predominantly featureless, grassed land parcel that borders both Biosolid Application Field C-3 and a now defunct and deconstructed portion of the PAAF runway. The eastern most portion of the parcel intersects with the Army Test Course circuit that encircles the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features within or surrounding the AOPI parcel. Surface water from this AOPI and the Army Test Course is presumed to infiltrate to groundwater or migrate eastwards across topography into an unnamed stream that eventually feeds into Romney Creek. Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field F was not sampled as part of this SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.11 Biosolid Application Field G

The Biosolid Application Field G is displayed on **Figure 5-32** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 and 2001 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel is a predominantly featureless, grassed area located directly east of the PAAF runway. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features originating from the AOPI parcel. Surface water runoff from this AOPI is presumed to infiltrate to groundwater or migrate eastwards across topography into an unnamed stream that eventually feeds into

Romney Creek. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field G was not sampled as part of this SI.

5.2.7.12 Biosolid Application Field H

The Biosolid Application Field H is displayed on **Figure 5-33** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel is a predominantly featureless, grassed area located directly east of the PAAF runway. The parcel is bordered to the east by Biosolid Application Field I. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features originating from the AOPI parcel. Surface water runoff from this AOPI is presumed to infiltrate to groundwater or migrate eastwards across topography into an unnamed stream that eventually feeds into Romney Creek. Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field H was not sampled as part of this SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.13 Biosolid Application Field I

The Biosolid Application Field I is displayed on **Figure 5-33** and is identified as an AOPI following personnel interviews and site reconnaissance due to the approval of this land parcel by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI consists of two featureless, grassed land parcels located directly east of the PAAF runway. The parcel is bordered to the west by Biosolid Application Field H. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features within or surrounding the AOPI parcel. Surface water runoff from this AOPI is presumed to infiltrate to groundwater or migrate eastwards across topography into an unnamed stream that eventually feeds into Romney Creek. Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field I was not sampled as part of this SI.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.14 Biosolid Application Field ATC-1

The Biosolid Application Field ATC-1 is displayed on **Figure 5-34** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 and 2001 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel is located approximately 0.6 mile southwest of the Building 300 Former Fire Station AOPI and the Building 250 Supply Wells. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features within or surrounding the AOPI parcel. The AOPI parcel is bordered to the east and west by two unnamed streams that feed into Romney Creek. Surface runoff is presumed to flow radially across topography into these two streams. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

While the application of biosolids to this land parcel could not be confirmed, Biosolid Application Field ATC-1 was sampled as part of this SI to assess the presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA due to the potential application of biosolids at APG. This Biosolid Application Field was selected for sampling due to its location hydraulically upgradient or geographically away from other AOPIs.

5.2.7.15 Biosolid Application Field ATC-2

The Biosolid Application Field ATC-2 is displayed on **Figure 5-35** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 and 2001 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel is predominantly covered with grassed areas, with trees and vegetation surrounding most of the parcel boundary. Two buildings (892 and 893) in addition to tarmac road infrastructure also reside atop the parcel. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features within or surrounding the AOPI parcel. Surface water runoff from this AOPI is presumed to infiltrate to groundwater or flow east across topography into Romney Creek. While the application of biosolids to this land parcel could not be confirmed, Biosolid Application Field ATC-2 was sampled as part of this SI to assess the presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA due to the potential application of biosolids at APG. This Biosolid Application Field was selected for sampling due to its location hydraulically upgradient or geographically away from other AOPIs.

This AOPI overlaps with the APG IRP under the Site IDs AAWB01 and HQAES Number 24015.1016 (Western Boundary Area Groundwater – OU1) and AAWB04 and HQAES number 24015.1019 [Other Media – OU3 (Surface Water, Sediment, Soil)] (**Figure 5-2a**). These IRP Site IDs are described in **Section 5.2.1.1** above.

5.2.7.16 Biosolid Application Field S-1A

The Biosolid Application Field S-1A is displayed on **Figure 5-36** and is identified as an AOPI following records research and personnel interviews due to the approval of these seven land parcels by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcels are defined by featureless grass lawns

that extend southward between Spesutie Island Road and northwestern edge of Spesutie Island. Various access roads separate the AOPI parcel boundaries from one another. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features originating from or connecting the identified parcels to one another. Surface water runoff from these AOPI parcels flow directly east into the Chesapeake Bay. While the application of biosolids to this land parcel could not be confirmed, Biosolid Application Field S-1A was sampled as part of this SI to assess the presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA due to the potential application of biosolids at APG. This Biosolid Application Field was selected for sampling due to its location hydraulically upgradient or geographically away from other AOPIs.

This AOPI overlaps with the APG IRP under the Site ID AAOA03-2 and HQAES Number 24015.1005 (Other Aberdeen Areas – Drainage Ditches) (**Figure 5-2c**).

For Site ID AAOA03-2, Phase I and II RIs were conducted at the site in 1998 and 2001, respectively. A subsequent HHRA and baseline ecological risk assessment were conducted in 2005. Additional post-RI groundwater and sediment sampling was performed in 2008 and 2009, resulting in a human health risk reevaluation that was performed in 2009. The results of the HHRA and the human health risk reevaluation, as well as the baseline ecological risk assessment reports, were used to identify the media of concern (groundwater and sediment) and constituents of concern for this site. A proposed plan for the Shell Washout Wastewater Ditch was finalized and a public meeting conducted in May 2010. The final ROD was signed October 2010. The completion report for the soil excavation was completed January 2011. The explosive compound 2,4,6-trinitrotoluene and the 2,4,6-trinitrotoluene degradation product 4-amino-2,6-dinitrotoluene were identified as constituents of concern in groundwater. Explosives were also identified as constituents of concern in sediment. Groundwater is being monitored to evaluate effectiveness of the soil excavation and until groundwater remediation goals have been met. RAO will continue, consisting of groundwater sampling and LUC monitoring and maintenance (USAG APG 2017b).

5.2.7.17 Biosolid Application Field S-2

The Biosolid Application Field S-2 is displayed on **Figure 5-37** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel resides within a wetland area dense in trees and vegetation. Two ranges, EF-7 and EF-7A, as well as two surface water bodies, border the parcel to the north and west respectively. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from this AOPI would flow directly north and west into the two unidentified surface water bodies that eventually feed into the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field S-2 was not sampled as part of this SI.

5.2.7.18 Biosolid Application Field S-3

The Biosolid Application Field S-3 is displayed on **Figure 5-38** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel resides within a grassy wetland area surrounded by heavy vegetation and trees. Two range areas (designated as EF-20) built on tarmac border the AOPI. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from this AOPI would flow radially across topography, westward toward an unnamed stream feeding into the Chesapeake Bay, and eastward directly into the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

While the application of biosolids to this land parcel could not be confirmed, Biosolid Application Field S-3 was sampled as part of this SI to assess the presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA due to the potential application of biosolids at APG. This Biosolid Application Field was selected for sampling due to its location hydraulically upgradient or geographically away from other AOPIs.

5.2.7.19 Biosolid Application Field S-5

The Biosolid Application Field S-5 is displayed on **Figure 5-39** and is identified as an AOPI following records research and personnel interviews due to the approval of the two land parcels by the MDE in 1993 as application areas for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcels reside within a grass and tree dominated wetland area located directly along the western Spesutie Island coastline and north of the Sonic Range. Building 1118A overlaps the southeastern portion of the east S-5 parcel. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from these two biosolid application parcels would flow through naturally occurring wetland features directly east into the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

Due to a lack of data confirming the historical application of biosolids at this land parcel and its proximity to neighboring AOPIs with exceedances of PFOS, PFOA, PFBS, PFHxS, and PFNA, Biosolid Application Field S-5 was not sampled as part of this SI.

5.2.7.20 Biosolid Application Field S-6

The Biosolid Application Field S-6 is displayed on **Figure 5-39** and is identified as an AOPI following records research and personnel interviews due to the confirmed application of biosolids generated at the Aberdeen and Edgewood Area WWTPs sometime between 1986 and 2003/2004. These biosolids are suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel resides within a grass and tree dominated wetland area located directly south of the Biosolid Application Field S-5 and along the western Spesutie Island coastline. Based on review of aerial photography, topographic contours, and stormwater maps, there are no buildings or man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from these two biosolid

application parcels would flow through naturally occurring wetland features directly east into the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

Due to the confirmed application of biosolids to this land parcel, Biosolid Application Field A-1 was sampled as part of the SI.

5.2.7.21 Biosolid Application Field E-1

The Biosolid Application Field E-1 is displayed on **Figure 5-40** and is identified as an AOPI following records research and personnel interviews due to the approval of the land parcel by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI resides within a grass and tree dominated wetland area located within the central portion of APG-EA. Based on review of aerial photography, topographic contours, and stormwater maps, there are no man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from this biosolid application parcel would flow either through wetland features east into Wright Creek or west into the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

Due to a lack of data confirming the historical application of biosolids at this land parcel, Biosolid Application Field E-1 was not sampled as part of this SI.

5.2.7.22 Biosolid Application Field E-2

The Biosolid Application Field E-2 is displayed on **Figure 5-40** and is identified as an AOPI following records research and personnel interviews due to the approval of the land parcel by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI resides in a grass and tree dominated wetland area located within the central portion of APG-EA. Based on review of aerial photography, topographic contours, and stormwater maps, there are no buildings or man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from this biosolid application parcel would flow through radially through wetland features east into Wright Creek and west into the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site.

Due to a lack of data confirming the historical application of biosolids at this land parcel, Biosolid Application Field E-1 was not sampled as part of this SI.

5.2.7.23 Biosolid Application Field E-3

The Biosolid Application Field E-3 is displayed on **Figure 5-41** and is identified as an AOPI following records research and personnel interviews due to the approval of four land parcels by the MDE in 1993 as application areas for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The four parcels that make up this AOPI extend southward through the central portion of APG-EA along Ricketts Point Road. All four identified parcels reside in a grass and tree dominated wetland area. Buildings E7152, E7153, E1437 and an unidentified circular, gravel range area resides atop the largest and southern-most application parcel. Based on review of

aerial photography, topographic contours, and stormwater maps, there are no buildings or man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from these biosolid application parcels would flow through radially through wetland features east into Wright Creek or west into the Chesapeake Bay.

While the application of biosolids to this land parcel could not be confirmed, Biosolid Application Field E-3 was sampled as part of this SI to assess the presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA due to the potential application of biosolids at APG. This Biosolid Application Field was selected for sampling due to its location hydraulically upgradient or geographically away from other AOPIs.

This AOPI overlaps with the APG IRP under the Site ID EAOE41 and HQAES Number 24015.1215 (G-Field Tunnel Complex Cluster 41) (**Figure 5-2d**).

For Site ID EAOE41, an RI was completed in 2014 including surface water, sediment, surface soil, and groundwater sampling. DPT groundwater samples contained the VOCs cis-1,2-dichloroethene at 92 parts per billion (ppb), trichloroethene at 63 ppb, 1,1-dichloroethene at 8 ppb, and vinyl chloride at low levels; however, these constituents are sporadic and confined to a very small area. Results indicate no further groundwater investigation is needed. Additional site characterization samples were collected in 2009. The HHRA identified potential concerns for future resident exposure to media in Area 2, primarily due to exposure to groundwater as a tap water source. This was driven by perchlorate in Cluster 26 groundwater. One hot spot of PAHs in sediment at the Rifle Range was also identified as driving risk to residents and trespassers; however, no PAHs were detected in a sediment sample collected from the same location during a subsequent sampling event. No other concerns were identified in the HHRA. Because the DQOs were developed based on future military/industrial land usage, the number and spatial distribution of environmental samples, while appropriate for that land use, are not sufficient to conclude that there are no unidentified areas of elevated constituents that could pose risk to hypothetical future residents. If land use changes are contemplated in the future, additional investigations may be required. The anticipated remedy is soil removal and LUCs (USAG APG 2017b).

5.2.7.24 Biosolid Application Field E-4

The Biosolid Application Field E-4 is displayed on **Figure 5-42** and is identified as an AOPI following records research and personnel interviews due to the approval of two land parcels by the MDE in 1993 as application areas for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The two parcels that make up this AOPI extend northeastward through the southwestern area of APG-EA along the outer boundaries of the H-Field tank test range. The two identified parcels reside in a grass and tree dominated wetland area. Based on review of aerial photography, topographic contours, and stormwater maps, there are no buildings or man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from these biosolid application parcels would flow southeast through wetland features into Bush River, a major tributary of the Chesapeake Bay.

While the application of biosolids to this land parcel could not be confirmed, Biosolid Application Field E-4 was sampled as part of this SI to assess the presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA due to the potential application of biosolids at APG. This Biosolid Application Field was selected for sampling due to its location hydraulically upgradient or geographically away from other AOPIs.

This AOPI overlaps with the APG IRP under the Site ID EAOE28 and HQAES Number 24015.1208 (H-Field Concrete Target Area Cluster 28) (**Figure 5-2e**).

For Site ID EAOE28, an RI was completed including surface water, sediment, surface soil, and groundwater sampling and contamination above criteria was not detected in the soil samples from the sand and gravel pile and munitions disposal sites. Additional groundwater and media sampling is underway to determine the impact from past testing and disposal activities around the 5-acre munitions disposal site. A comprehensive site reconnaissance and limited geophysical surveys completed in 2006 identified numerous areas of magnetic anomalies within the site. Test digs at the locations of the anomalies conducted in late 2006 identified scrap metal, munitions components, empty drums, and similar debris. Further characterization of the waste material and soil at the munitions disposal site was completed in fall 2008. Additional RI sampling was completed in 2009 including an X-ray fluorescence survey at the munitions disposal site. All rounds have been removed from the site. In 2014, the project plan for this site was finalized. Residential LUCs were the preferred alternative (USAG APG 2017b).

5.2.7.25 Biosolid Application Field E-6

The Biosolid Application Field E-6 is displayed on **Figure 5-43** and is identified as an AOPI following records research and personnel interviews due to the approval of this land parcel by the MDE in 1993 as an application area for biosolids suspected to have contained waste AFFF that were generated at the Aberdeen and Edgewood Area WWTPs. The AOPI parcel resides in a grass and tree dominated wetland area along the southwestern border of an unidentified test area in the southwestern-most area of APG-EA. Based on review of aerial photography, topographic contours, and stormwater maps, there are no buildings or man-made drainage features managing stormwater runoff at this AOPI. Surface water runoff from this biosolid application parcel would flow either southeast or southwest through wetland features into Bush River or Gunpowder River respectively. Both rivers are major tributaries of the Chesapeake Bay. At the time of this PA/SI report, there are no installation IRP identifiers or HQAES numbers associated with this site. Due to a lack of data confirming the historical application of biosolids at this land parcel, Biosolid Application Field E-1 was not sampled as part of this SI.

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at APG, an SI for PFOS, PFOA, PFBS, PFHxS, and PFNA was conducted in accordance with CERCLA. SI sampling was completed at APG at 44 AOPIs to evaluate presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA in comparison with the OSD risk screening levels. In addition to the 44 AOPIs, pre-treatment source groundwater samples from the Building 250 supply wells and effluent samples from the Canal Creek GWTP were collected and analyzed to determine presence and absence of PFOS, PFOA, PFBS, PFHxS, and PFNA. As such, an installation-specific QAPP Addendum (Arcadis 2021) was developed to supplement the general information provided in the PQAPP (Arcadis 2019) and to detail the site-specific proposed scopes of work for the SI. A preliminary CSM was prepared for each of the installation's AOPIs in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 200-1-12 (USACE 2012). The preliminary CSMs identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses. The preliminary CSMs identified soil, groundwater, surface water, and/or sediment pathways as potentially complete which guided the SI sampling. The QAPP Addendum details the sampling design and rationale based on each AOPI's preliminary CSM. The SI scope of work was completed in December 2021 through the collection of field data and analytical samples.

The SI field work was completed in accordance with the SOPs, technical guidance instructions (TGIs), sampling design, and QA/QC requirements as detailed in the QAPP Addendum (Arcadis 2021) 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 APG. 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 2021), the objective of the SI is to identify whether there has been a release to the environment at the AOPIs identified in the PA and to determine if further investigation is warranted. This SI evaluated groundwater, soil, surface water, and sediment for PFOS, PFOA, PFBS, PFHxS, and PFNA presence or absence at each of the sampled AOPIs.

6.2 Sampling Design and Rationale

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

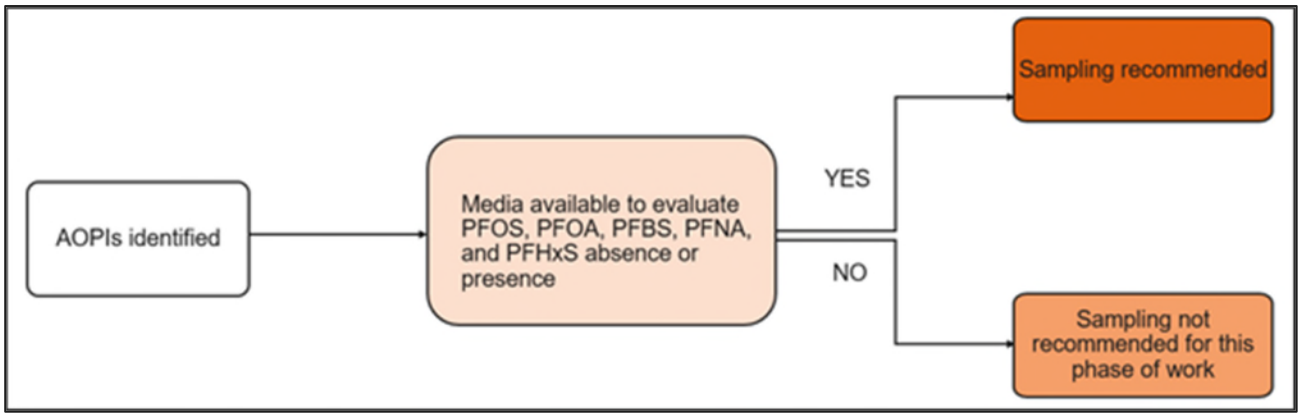

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI sampling activities at APG is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2021). Briefly, the areas of focus for this SI (i.e., Aberdeen Western Boundary and Cantonment Area, Poverty Island, Spesutie Island, Edgewood North, and Edgewood South) were selected based on PA results.

Thirty-five of the 57 identified AOPIs were sampled for PFOS, PFOA, PFBS, PFHxS, and PFNA between 02 March 2021 and 22 April 2021. One AOPI (Ford's Farm) was not sampled during this mobilization due to radiological concerns identified at the site during the SI planning stages.

A secondary mobilization was conducted between 15 December 2021 and 31 January 2021 to collect groundwater samples from existing monitoring wells at the Ford's Farm AOPI, and to collect soil and grab-groundwater samples via DPT from six additional biosolid application field AOPIs located hydraulically upgradient of AOPIs sampled under the first mobilization. The supplemental biosolid application field sampling plan was implemented to increase the certainty of presence/absence determination as it pertained to the application of biosolids across APG.

Forty-two of the 57 identified AOPIs were sampled for PFOS, PFOA, PFBS, PFHxS, and PFNA during this SI. Rationale for sampling exclusion of the other 15 identified AOPIs are presented below:

The G-Street Salvage Yard and Former Fire Training Area AOPI was previously sampled for PFOS and PFOA as part of the 2018 Canal Creek Study Area RI. The RI found the G-Street Salvage Yard and Former Fire Training Area to be the source of PFOS/PFOA detections in groundwater, with maximum reported concentrations of 712 ng/L for PFOS and 21,300 ng/L for PFOA at well CC-039A. PFOS was also detected in soil, with a maximum reported concentration of 6.0 microgram per kilogram at a depth of 5.0 to 5.5 feet bgs at sample point MIP-01. Due to the confirmed presence of PFOS/PFOA at this AOPI, sampling was not included as part of this SI. The historical analytical results for the G-Street Salvage Yard and Former Fire Training Area AOPI are presented on **Figure 2-5e**.

The Biosolid Application Field AOPIs A-2, A-3, C-1, C-2, C-3, F, G, H, I, E-1, E-2, E-4, S-2 and S-5 were identified as AOPIs following the review of Biosolid Application Permits issued by the MDE in 1993, 1995 and 2001. The issued permits approved the application of biosolids that were generated at the Aberdeen and Edgewood Area WWTPs, which had received waste AFFF via storm-sewer capture and disposal

practices; however, it could not be confirmed from the permits whether biosolids were actually applied at these identified biosolid application fields.

Groundwater samples were collected from 41 of the 42 AOPIs sampled during the SI. Groundwater samples were also collected from existing monitoring wells (i.e., FTA-M09 at Biosolid Application Field A-1, FTA-M10 at Biosolid Application Field B, WB-MW-11A and WB-MW-14A at the PAAF Runways, FTA-M08 at the Former Aberdeen Fire Training Area, and WES-M09, WES-M14, WES-M17, WES-M18, WES-M21 at Michaelsville Landfill, and FF2 and FF3 at the Ford's Farm AOPI), and from the Building 250 supply wells. Grab groundwater samples were collected from the approximated center of the saturated screened interval. **Table 6-1** includes the monitoring well construction details for the wells sampled during the SI (if available).

One aqueous effluent sample was collected from the Canal Creek GWTP system. Soil samples were collected from 34 of the 42 AOPIs sampled during the SI. Surface water samples were collected at three of the 42 AOPIs. Sediment samples were collected at three of the 42 AOPIs.

Sampling points were positioned at locations of known or suspected AFFF releases, locations of runoff collection, and locations downgradient of known or suspected releases of AFFF and were determined based on specific historical evidence and surface runoff/groundwater flow conditions at each AOPI. The sample counts for all media at each sampled AOPI and their respective analytical data are presented in **Section 7**.

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 2021), and the safety procedures specified in the Accident Prevention Plan (Arcadis 2018) and SSHP (Arcadis 2021). 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 2021). The subsections below provide a summary of the field methods and procedures utilized to complete the SI scope of work. Field notes and field forms (i.e., soil boring logs, groundwater purging logs, equipment calibration forms, tailgate health and safety forms, and sample collection logs) documenting the SI sampling activities are included in **Appendices J** and **K**, respectively.

6.3.1 Field Methods

Grab groundwater samples were collected from discrete direct-push points using DPT in accordance with the PFAS-Specific Drilling and Monitoring Well Installation Technical Guidance Instruction (TGI) (Arcadis 2019). Shallow (first encountered) groundwater was sampled at each of the sampling points.

Groundwater samples were collected via low-flow purging methods from approximately the center of the saturated screened interval at existing monitoring wells in accordance with the PFAS Sampling Procedures and Low-Flow Groundwater Purging for Monitoring Wells TGI (Arcadis 2019).

Pre-treatment source groundwater samples were collected from the tap on supply wells while in pumping and steady state conditions in accordance with the PFAS Sampling Procedures and Low-Flow Groundwater Purging for Monitoring Wells TGI (Arcadis 2019).

Effluent groundwater samples were collected directly from a sampling port in accordance with the PFAS Sampling Procedures and Low-Flow Groundwater Purging for Monitoring Wells TGI (Arcadis 2019).

At sampling locations where only soil was collected, a hand auger was used to collect a grab soil sample. At sampling locations where both soil and groundwater were collected, soil samples were collected via hand auger prior to sampling the co-located grab groundwater. Boreholes were then advanced via DPT and grab groundwater samples were collected from discrete direct-push points. Soil samples were collected by method of a stainless-steel hand auger from 0 to 2 feet bgs. If redevelopment and/or excavation had occurred at the AOPI since the suspected release of PFAS-containing materials and the surface soil had been disturbed, soil samples were collected below the maximum depth of excavation. Stainless steel trowels were used to place soil directly into a polyethylene bag before being mixed and placed in lab provided jars. Soil samples were collected in accordance with the PFAS Sampling Procedures and Low-Flow Groundwater Purging for Monitoring Wells TGI (Arcadis 2019). Alconox® or Liquinox® in conjunction with laboratory certified PFAS-free water provided by ELLE was used for decontamination between boring locations. A peristaltic pump with PFAS-free disposable high-density polyethylene tubing was used to collect groundwater samples through a screen-point sampler.

Surface water and sediment samples were collected from downstream to upstream to reduce siltation in sequential samples. At sampling locations where both surface water and sediment were collected, surface water samples were collected before sediment samples to reduce siltation. Surface water sampled were collected via direct-fill methods just below the water surface. Sediment samples were collected from the upper 10 centimeters using dedicated Lexan™ tubes. Sediment samples were decanted before bottling for laboratory analysis.

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

6.3.2 Quality Assurance/Quality Control

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

QA/QC samples were collected at the frequencies specified in the QAPP Addendum (Arcadis 2021), 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, PFBS, PFHxS, and PFNA, and total organic carbon (TOC) only. EBs were collected for media sampled for PFOS, PFOA, PFBS, PFHxS, and PFNA, at a frequency of one per piece of relevant equipment for each sampling event, as specified in the QAPP Addendum (Arcadis 2021). The decontaminated reusable equipment from which EBs were collected

include a peristaltic pump, a hand auger, and a bladder pump as applicable to the sampled media. Source blanks were collected from a fire hydrant and from the water used to pressure-wash drill tooling. Analytical results for blank samples are discussed in **Section 7.12**.

6.3.3 Field Change Reports

In some cases, clarifications to the established scope of work were needed but do not necessarily constitute a non-conformance from the sampling plans described in the QAPP Addendum. Minor modifications from and clarifications for the procedures and scope of work detailed in the QAPP Addendum and PQAPP and that did not affect DQOs are documented in Field Change Reports (FCRs) included as **Appendix L** and are summarized below:

- FCR-APG-01: One FCR was completed for samples that were planned for collection at the Building E5005 – Edgewood Fire Department Storage AOPI. One co-located surface soil and grab groundwater sample was moved from the center of the AOPI parcel to the downgradient edge of the AOPI parcel. Additionally, two soil samples were added to the scope of work and positioned along the boundaries of the former Building E5005 outline. During the PA conducted in 2018, the Building E5005 – Edgewood Fire Department Storage AOPI was cleared entirely of vegetation and trees. While conducting utility mark-outs, hundreds of planted trees were observed to have been planted throughout the area. It was determined that rig access would not be possible at the identified location. Following discussions with APG Assistant Fire Chief about AFFF release in the area, a new sample plan was developed. This FCR had no impact on the overall scope of project work.
- FCR-APG-02: One FCR was completed for samples that were planned for collection at the Ford's Farm AOPI (discussed in NCR-APG-01 below) and for the collection of samples from six additional AOPIs at the Aberdeen and Edgewood Areas of APG. The initial SI mobilization completed in April 2021 included sampling for groundwater and soil at five other biosolid application field AOPIs (A-1, B, D, E, and S-6) where historical information indicated biosolids generated at the Aberdeen and Edgewood Area WWTPs suspected to contain PFAS-containing materials were applied. Following review of the SI data collected, exceedances of PFOS and PFOA in concentrations greater than the OSD risk screening levels were observed in groundwater at three of the five biosolid application fields sampled (Biosolid Application Field A-1, B, and D). Biosolid Application Fields A-1, B, and D are located hydraulically downgradient and side-gradient of multiple AOPIs that exhibited OSD risk screening level exceedances of PFOS and PFOA in groundwater during the SI. To properly assess the presence/absence of PFOS, PFOA, PFBS, PFHxS, and PFNA in biosolid application fields across APG and rule out potential PFOS, PFOA, PFBS, PFHxS, and PFNA contributions from neighboring AOPIs, soil and grab-groundwater sample collection was added at biosolid application fields isolated from nearby AOPIs identified during the PA (ATC-1, ATC-2, S-1A, S-3, E-3, and E-4).
- FCR-APG-03: One FCR was completed for the PAAF Runways AOPI. Three monitoring wells WB-MW-11A, FTA-PZ-11, and WB-MW-14B were identified downgradient of the PAAF Runways AOPI and selected for sampling of PFOS, PFOA and PFBS. WB-MW-11A and WB-MW-14A were sampled; however, it was determined that FTA-PZ-11 had been abandoned when the well bottom

was tagged at approximately 11.0 feet bgs, approximately 17.5 feet shallower than the anticipated total depth of 28.5 feet bgs. No groundwater sample was collected from FTA-PZ-11.

Non-conformances to the approved sampling scope and/or procedures occurred during the sampling events. Non-conformances were reviewed and approved in accordance with the following chain of communication: 1) minor modifications or clarifications were communicated within the field team; and 2) major modifications were communicated to USACE in the daily/periodic field status email updates submitted by the SI project manager during the sampling event. Non-conformances to the approved sampling plan which affect the DQOs are documented in non-conformance reports (NCRs) included as **Appendix M** and are summarized below:

- NCR-APG-01: One NCR was completed for the two grab groundwater samples and one subsurface soil sample that were planned for collection at Ford's Farm AOPI located within the Poverty Island area at APG. All originally proposed samples at this location were removed from the SI scope of work following health and safety concerns at the site. During schedule coordinating with ATC, it was determined that there were existing radiation concerns at the site and that subsurface intrusive activities could potentially expose staff and equipment to radiation. The removal of the proposed sampling points from the scope of work impacts the ability to determine presence/absence of PFAS at the Fords Farm AOPI. The APG SI data quality objectives as described in Worksheet #11 of the Arcadis 2020 APG UFP-QAPP Addendum state: If PFAS concentrations are less than the project screening levels, then a further stage of sampling will not be excluded. Therefore, the lack of sampling at the identified AOPI does not significantly impact the DQOs of the SI. Additionally, the CSM for the Fords Farm AOPI does not identify any on-post or off-post receptor exposure scenarios for PFAS. As described in FCR-APG-02 above, a remobilization occurred to collect groundwater samples from two existing monitoring wells located hydraulically downgradient of the Ford's Farm AOPI to determine an appropriate path forward (e.g., no action or further study in an RI).
- NCR-APG-02: One NCR was completed for the co-located surface soil and grab groundwater samples that were planned for collection at the Range 12 AOPI. All originally proposed samples at this location were removed from the SI scope of work following the utility mark-outs at the Poverty Island Minefield Range AOPI. During this utility mark-out, the range manager informed Arcadis staff that the identified "Range 12" site was in fact named Range 18 and confirmed that AFFF was not released in this area. The range manager escorted Arcadis staff to the actual Range 12 location and detailed the history of AFFF release in the area. Arcadis staff on site, along with the APG IRP representative, reviewed the information provided by the range manager and groundwater flow direction to develop a new sample plan at the actual Range 12 to determine presence/absence of PFAS. As a result, two co-located surface soil and grab groundwater samples were added to the SI scope of work at the actual location of AFFF release at Range 12.

6.3.4 Decontamination

Non-dedicated reusable sampling equipment (e.g., stainless-steel trowels, hand augers, drill cutting shoes and casing, screen-point samplers, water-level meters) that came into direct contact with sampling media was decontaminated before first use, between sampling locations/intervals, and before

demobilization in accordance with P-09, TGI – Groundwater and Soil Sampling Equipment Decontamination (Arcadis 2019, Appendix A).

6.3.5 Investigation-Derived Waste

As outlined in the site-specific QAPP Addendum (Arcadis 2021), IDW (e.g. groundwater, surface water, soils and sediments collected as part of field activities) and IDW (i.e. decontamination fluids, disposable sampling equipment, personal protective equipment) were collected and placed in Department of Transportation-approved 55-gallon drums, labeled as non-hazardous, segregated by medium: waters, soil/sediment, and equipment, stored on site pending analysis, and subsequently transported to an approved facility for disposal or recycling. Analytical results for IDW samples collected during the SI are discussed in **Section 7.10**. IDW documentation is included as **Appendix N** and physical copies of the generated waste manifests are managed by the APG Directorate of Public Works and are available through the APG Waste Management Branch and the Installation Restoration Program. This report and its contents will be posted to the APG Administrative Record and will be available for public review should waste manifest review be required in the future.

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 ELLE, an ELAP-accredited laboratory for PFAS analysis, including PFOS, PFOA, PFBS, PFHxS, and PFNA, 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, PFBS, PFHxS, and PFNA, were analyzed for in groundwater, soil, surface water, and sediment samples using an analytical method that is ELAP-accredited and compliant with QSM 5.3 (DoD and Department of Energy 2019), Table B-15. Potable water samples were analyzed for 14 PFAS compounds, including PFOS, PFOA, PFBS, PFHxS, and PFNA, according to USEPA Method 537, in accordance with Worksheet #15 of the APG QAPP Addendum (Arcadis 2021).

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 2021) 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 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 O**).

6.4.2 Data Validation

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

6.4.3 Data Usability Assessment and Summary

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

Based on the final data usability assessment, the environmental data collected at APG during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUSR and its associated data validation reports (**Appendix O**), and as indicated in the full analytical tables (**Appendix P**) provided for the SI results. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019) and APG QAPP Addendum (Arcadis 2021). Data qualifiers applied to laboratory analytical results for samples collected during the SI at APG are provided in the data tables, data validation reports, and the Data Usability Summary Table located at the end of DUSR. Qualifiers for data shown on figures are defined in the notes of figures.

6.5 Office of the Secretary of Defense Risk Screening Levels

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

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

Chemical	Residential Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator		Industrial/Commercial Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator
	Tap Water (ng/L or ppt) [1]	Soil (mg/kg or ppm) [1,2]	Soil (mg/kg or ppm) [1,2]
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFHxS	39	0.13	1.6
PFNA	6	0.019	0.25
HFPO-DA[3]	6	0.023	0.35

Notes:

1. Risk screening levels for tap water and soil provided by the OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July 06 (**Appendix A**).
2. All soil and/or sediment 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. Soil samples collected from greater than 2 feet but less than 15 feet bgs will be compared to the industrial/commercial risk screening levels only, and soil samples collected from greater than 15 feet bgs will not be compared to either risk screening level.
3. Of the six PFAS compounds presented in the 06 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at APG because HFPO-DA is generally not a component of military specification (MIL-SPEC) aqueous film forming foam (AFFF) and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

mg/kg = milligram per kilogram
ng/L = nanograms per liter
ppm = parts per million
ppt = parts per trillion

The OSD residential tap water risk screening levels will be used to compare all groundwater data for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPIs at APG are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, PFBS, PFHxS, and PFNA 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, PFBS, PFHxS, or PFNA are detected greater than the applicable OSD risk screening levels, further study in a RI 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 APG (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 2021). The sample results discussion below focuses on the PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results because they have OSD risk screening levels. The Army will make subsequent investigation decisions based on these constituents' concentrations relative to the OSD risk screening levels.

Tables 7-1 through **7-4** provide a summary of the groundwater, soil, surface water, and sediment analytical results for PFOS, PFOA, PFBS, PFHxS, and PFNA. **Table 7-5** summarizes AOPIs and whether their groundwater and soil SI results exceed the OSD risk screening levels. **Appendix P** includes the full suite of analytical results for these media, as well as for the QA/QC samples. An overview of AOPIs at APG with OSD risk screening level exceedances are depicted on **Figures 7-1a** through **7-1e**. **Figures 7-2** through **7-39** show the PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results in groundwater, soil, surface water, and sediment for each AOPI. Non-detected results are reported as less than the LOQ. Detections of PFOS, PFOA, PFBS, PFHxS, and PFNA greater than the applicable OSD risk screening levels in groundwater and soil are highlighted in summary tables and on figures. Final qualifiers applied to the data by the laboratory and the project chemist (as defined in **Section 6.4.3**) are presented on the analytical tables. Groundwater and surface water data collected during the SI are reported in ng/L, or parts per trillion, and soil and sediment data are reported in mg/kg, or parts per million.

Field parameters measured for groundwater during low-flow purging and sample collection and for surface water during sample collection are provided on the field forms in **Appendix K**. Soil and sediment descriptions are provided on the field forms in **Appendix K**. The results of the SI are grouped by AOPI and discussed for each medium as applicable. Groundwater was generally first encountered at depths of approximately 4.47 to 47.72 feet bgs in the Aberdeen Western Boundary and Cantonment Area, 6.03 to 8.48 feet bgs in the Poverty Island Area, 4.8 to 6.86 feet bgs in the Spesutie Island Area, 3.48 to 15.10 feet bgs in the APG-EA, and 23.35 to 27.77 feet bgs in the Biosolid Application Field Area temporary borings installed as part of DPT operations. Groundwater was encountered between 16.61 and 29.19 feet bgs at existing monitoring wells across the installation.

Table 7-5 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
ABR 3	Yes
ABR 6	Yes
ABR 7	Yes
PAAF Runways	Yes
PAAF – Aircraft Boneyard	Yes
Former Aberdeen Fire Training Area	Yes
Building 1074 – Former MFRI Fire Training Area	Yes

Table 7-5 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
PAAF – Airfield Fire Station Building 1059	Yes
PAAF – Hangar 1060	Yes
PAAF – Crash Truck Storage Bay Building 1065	Yes
PAAF – Loading Pad	Yes
Michaelsville Landfill	Yes
Building 300 – Former Aberdeen Fire Station and Building 250 - Potable Supply Wells	Yes
Building 2200 – Current Aberdeen Fire Station	Yes
Building 2308 – Fire Department Storage Building	Yes
AA5 Range	Yes
Poverty Island – Minefield Range	Yes
Poverty Island – Range 12	Yes
Ford's Farm	No
EF-15	Yes
Fuze Range	Yes
Building E5005 – Edgewood Fire Department Storage	Yes
Building E5180 – Edgewood Fire Station	Yes
CASY Site	Yes
G-Street Plane Crash Area	Yes
Noble Road – Former Fire Training Area	Yes
Building E4040 – Aircraft Maintenance Building	Yes
Building E4081 – Army Aviation Support Facility	Yes
Weide Airfield – Tarmac AFFF Release Area	Yes
H-Field – Helicopter Fire Response Area	Yes
H-Field – Tank Fire Response Area	No
Biosolid Application Field A-1	Yes
Biosolid Application Field B	Yes
Biosolid Application Field D	Yes
Biosolid Application Field E	Yes
Biosolid Application Field ATC-1	No
Biosolid Application Field ATC-2	No
Biosolid Application Field S-1A	No
Biosolid Application Field S-3	Yes

Table 7-5 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
Biosolid Application Field S-6	Yes
Biosolid Application Field E-3	No
Biosolid Application Field E-4	No

7.1 Western Boundary Study Area AOPIs

7.1.1 Air Base Range 3

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Air Base Range 3 AOPI shown on **Figure 7-2** and **Tables 7-1** and **7-2**.

7.1.1.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Air Base Range 3 AOPI (APG-ABR3-1-GW; **Figure 7-2**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-ABR3-1-GW-030821 (17,000 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-ABR3-1-GW-030821 (1,700 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-ABR3-1-GW-030821 (140 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-ABR3-1-GW-030821 (5,900 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-ABR3-1-GW-030821 (320 ng/L).

7.1.1.2 Soil

One surface soil sample was collected from one location at the Air Base Range 3 AOPI (APG-ABR3-1-SO; **Figure 7-2**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-ABR3-1-(0-2)-030821 (0.1 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-ABR3-1-(0-2)-030821 (0.0012 mg/kg).

PFBS was not detected in the soil sample collected at the Air Base Range 3 AOPI.

PFHxS was detected at a concentration less than the residential OSD risk screening level of 0.13 mg/kg in the soil sample APG-ABR3-1-(0-2)-030821 (0.0056 mg/kg).

PFNA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-ABR3-1-(0-2)-030821 (0.0012 mg/kg).

7.1.2 Air Base Range 6

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Air Base Range 6 AOPI shown on **Figure 7-3** and **Tables 7-1** and **7-2**.

7.1.2.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Air Base Range 6 AOPI (APG-ABR6-1-GW; **Figure 7-3**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-ABR6-1-GW-030521 (14,000 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-ABR6-1-GW-030521 (110 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-ABR6-1-GW-030521 (7.7 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-ABR6-1-GW-030521 (190 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-ABR6-1-GW-030521 (45 ng/L).

7.1.2.2 Soil

Soil samples were collected from two locations at the Air Base Range 6 AOPI (APG-ABR6-1-SO and APG-ABR6-2-SO; **Figure 7-3**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-ABR6-1-SO-(0-2)-030521 (0.061 mg/kg). PFOS was detected at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-ABR6-2-SO-(0-2)-030521 (0.0028 mg/kg).

PFOA was detected at concentrations less than the residential OSD risk screening level of 0.019 mg/kg in the soil samples: APG-ABR6-1-SO-(0-2)-030521 (0.006 mg/kg) and APG-ABR6-2-SO-(0-2)-030521 (0.00056 J mg/kg).

PFBS was not detected in the soil samples collected at the Air Base Range 6 AOPI.

PFHxS was detected at a concentration less than the residential OSD risk screening level of 0.13 mg/kg in the soil sample APG-ABR6-1-SO-(0-2)-030521 (0.01 mg/kg).

PFNA was detected at concentrations less than the residential OSD risk screening level of 0.019 mg/kg in the soil samples: APG-ABR6-1-SO-(0-2)-030521 (0.0076 mg/kg) and APG-ABR6-2-SO-(0-2)-030521 (0.001 mg/kg).

7.1.3 Air Base Range 7

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Air Base Range 7 AOPI shown on **Figure 7-3** and **Tables 7-1** and **7-2**.

7.1.3.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Air Base Range 7 AOPI (APG-ABR7-1-GW; **Figure 7-3**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-ABR7-1-GW-030521 (24 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-ABR7-1-GW-030521 (60 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-ABR7-1-GW-030521 (4.2 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-ABR7-1-GW-030521 (92 ng/L).

PFNA was not detected in the groundwater sample collected at the Air Base Range 7 AOPI.

7.1.3.2 Soil

One surface soil sample was collected from one location at the Air Base Range 7 AOPI (APG-ABR7-1-SO; **Figure 7-3**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Air Base Range 7 AOPI.

7.1.4 PAAF Runways

The subsections below summarize the groundwater PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with PAAF Runways AOPI on **Figure 7-4** and **Table 7-1**.

7.1.4.1 Groundwater

Groundwater samples were collected from two existing monitoring wells at the PAAF Runways AOPI (APG-WB-MW-11A and APG-WB-MW-14A; **Figure 7-4**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-WB-MW-11A-030921 (21 J ng/L). PFOS was detected at a concentration less than the OSD risk screening level of 4 ng/L in the groundwater sample APG-WB-MW-14A-030921 (1.4 J ng/L).

PFOA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-WB-MW-11A-030921 (8.1 ng/L) and APG-WB-MW-14A-030921 (43 ng/L).

PFBS was detected at concentrations less than the OSD risk screening level of 601 ng/L in the groundwater samples: APG-WB-MW-11A-030921 (1.3 J ng/L) and APG-WB-MW-14A-030921 (2.5 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-WB-MW-14A-030921 (39 ng/L). PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-WB-MW-11A-030921 (7.4 ng/L).

PFNA was not detected in the groundwater samples collected at the PAAF Runways AOPI.

7.1.5 PAAF – Aircraft Boneyard

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with PAAF – Aircraft Boneyard AOPI shown on **Figure 7-5** and **Tables 7-1** and **7-2**.

7.1.5.1 Groundwater

Grab groundwater samples were collected from seven borings via DPT at first-encountered groundwater at the PAAF – Aircraft Boneyard AOPI (APG-BONEYARD-1-GW, APG-BONEYARD-2-GW, APG-BONEYARD-3-GW, APG-BONEYARD-4-GW, APG-BONEYARD-5-GW, APG-BONEYARD-6-GW, and APG-BONEYARD-7-GW; **Figure 7-5**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater samples: APG-BONEYARD-1-GW-031121 (23 ng/L), APG-BONEYARD-2-GW-030821 (110 ng/L), APG-BONEYARD-3-GW-030821 (48 ng/L), APG-BONEYARD-4-GW-030821 (18 ng/L), APG-BONEYARD-5-GW-030821 (92 ng/L), and APG-BONEYARD-6-GW-031121 (17 ng/L). PFOS was detected at a concentration less than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BONEYARD-7-GW-031121 (1.7 J ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-BONEYARD-1-GW-031121 (19 ng/L), APG-BONEYARD-2-GW-030821 (84 ng/L), APG-BONEYARD-3-GW-030821 (23 ng/L), APG-BONEYARD-4-GW-030821 (6.2 ng/L), APG-

BONEYARD-5-GW-030821 (35 ng/L), APG-BONEYARD-6-GW-031121 (13 ng/L), and APG-BONEYARD-7-GW-031121 (6.9 ng/L).

PFBS was detected at concentrations less than the OSD risk screening level of 601 ng/L in the groundwater samples: APG-BONEYARD-1-GW-031121 (1.9 J ng/L), APG-BONEYARD-2-GW-030821 (6.1 ng/L), APG-BONEYARD-3-GW-030821 (2.9 ng/L), APG-BONEYARD-5-GW-030821 (3.5 ng/L), and APG-BONEYARD-6-GW-031121 (1.6 J ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater samples: APG-BONEYARD-2-GW-030821 (250 ng/L), APG-BONEYARD-3-GW-030821 (59 ng/L), and APG-BONEYARD-5-GW-030821 (100 ng/L). PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater samples: APG-BONEYARD-1-GW-031121 (27 ng/L), APG-BONEYARD-4-GW-030821 (13 ng/L), APG-BONEYARD-6-GW-031121 (26 ng/L), and APG-BONEYARD-7-GW-031121 (25 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BONEYARD-1-GW-031121 (10 ng/L). PFNA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-BONEYARD-2-GW-030821 (1.4 J ng/L), BONEYARD-5-GW-030821 (1.4 J ng/L), APG-BONEYARD-6-GW-031121 (1.5 J ng/L), and APG-BONEYARD-7-GW-031121 (2.0 J ng/L).

7.1.5.2 Soil

Soil samples were collected from seven locations at the PAAF – Aircraft Boneyard AOPI (APG-BONEYARD-1-SO, APG-BONEYARD-2-SO, APG-BONEYARD-3-SO, APG-BONEYARD-4-SO, APG-BONEYARD-5-SO, APG-BONEYARD-6-SO, and APG-BONEYARD-7-SO; **Figure 7-5**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at concentrations less than the residential OSD risk screening level of 0.013 mg/kg in the soil samples: APG-BONEYARD-2-SO-(0-2)-030821 (0.0023 mg/kg), APG-BONEYARD-3-SO-(0-2)-030821 (0.0006 J mg/kg), and APG-BONEYARD-5-SO-(0-2)-030821 (0.0052 mg/kg).

PFOA was detected at concentrations less than the residential OSD risk screening level of 0.019 mg/kg in the soil samples: APG-BONEYARD-1-SO-(0-2)-031121 (0.00048 J mg/kg), APG-BONEYARD-2-SO-(0-2)-030821 (0.00074 mg/kg), APG-BONEYARD-5-SO-(0-2)-030821 (0.00064 J mg/kg), APG-BONEYARD-6-SO-(0-2)-031121 (0.00056 J mg/kg).

PFBS, PFHxS, and PFNA were not detected in the soil samples collected at the PAAF – Aircraft Boneyard AOPI.

7.1.6 Former Aberdeen Fire Training Area

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Former Aberdeen Fire Training Area AOPI shown on **Figure 7-6** and **Tables 7-1** and **7-2**.

7.1.6.1 Groundwater

Groundwater samples were collected from two borings via DPT at first-encountered groundwater and from one existing monitoring well at the Former Aberdeen Fire Training Area AOPI (APG-OLD-FTA-1-GW, APG-OLD-FTA-2-GW, and APG-FTA-M08-GW [duplicate sample collected at APG-FTA-M08-GW]; **Figure 7-6**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at concentrations greater than the OSD risk screening level of 4 ng/L in the groundwater samples: APG-OLD-FTA-1-GW-031121 (7,000 ng/L), APG-OLD-FTA-2-GW-031121 (22,000 J- ng/L) (J- qualifier indicates that the result is an estimated quantity and may be biased low) and APG-FTA-M08-GW-031121 (9,000 ng/L [8,500 ng/L]).

PFOA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-OLD-FTA-1-GW-031121 (720 ng/L), APG-OLD-FTA-2-GW-031121 (27,000 ng/L), and APG-FTA-M08-GW-031121 (6,500 ng/L [6,600 ng/L]).

PFBS was detected at a concentration greater than the OSD risk screening level of 601 ng/L in the groundwater sample APG-OLD-FTA-2-GW-031121 (680 ng/L). PFBS was detected at concentrations less than the OSD risk screening level of 601 ng/L in the groundwater samples: APG-OLD-FTA-1-GW-031121 (130 ng/L) and APG-FTA-M08-GW-031121 (160 ng/L [150 ng/L]).

PFHxS was detected at concentrations greater than the OSD risk screening level of 39 ng/L in the groundwater samples: APG-OLD-FTA-1-GW-031121 (1,200 ng/L), APG-OLD-FTA-2-GW-031121 (11,000 ng/L), and APG-FTA-M08-GW-031121 (2,900 ng/L [3,100 ng/L]).

PFNA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-OLD-FTA-1-GW-031121 (220 ng/L), APG-OLD-FTA-2-GW-031121 (6,600 ng/L), and APG-FTA-M08-GW-031121 (1,700 ng/L [1,600 ng/L]).

7.1.6.2 Soil

Soil samples were collected from two locations at the Former Aberdeen Fire Training Area AOPI (APG-OLD-FTA-1-SO and APG-OLD-FTA-2-SO; **Figure 7-6**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-OLD-FTA-2-SO-(0-2)-031121 (0.019 mg/kg). PFOS was detected at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-OLD-FTA-1-SO-(0-2)-031121 (0.0052 mg/kg).

PFOA was detected at concentrations less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-OLD-FTA-1-SO-(0-2)-031121 (0.00095 mg/kg).

PFHxS was detected at concentrations less than the residential OSD risk screening level of 0.13 mg/kg in the soil samples: APG-OLD-FTA-1-SO-(0-2)-031121 (0.00086 mg/kg) and APG-OLD-FTA-2-SO-(0-2)-031121 (0.0005 J mg/kg).

PFBS and PFNA were not detected in the soil samples collected at the Former Aberdeen Fire Training Area AOPI.

7.1.7 Building 1074 – Former Maryland Fire and Rescue Institute Training Area

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Building 1074 – Former MFRI Training Area AOPI shown on **Figure 7-7** and **Tables 7-1** and **7-2**.

7.1.7.1 Groundwater

Groundwater samples were collected from two borings via DPT at first-encountered groundwater at the Building 1074 – Former MFRI Training Area AOPI (APG-MFRI-1-GW and APG-MFRI-2-GW; **Figure 7-7**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at concentrations greater than the OSD risk screening level of 4 ng/L in the groundwater samples: APG-MFRI-1-GW-030421 (250 ng/L) and APG-MFRI-2-GW-030421 (41 ng/L).

PFOA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-MFRI-1-GW-030421 (28 ng/L) and APG- MFRI-2-GW-030421 (8.9 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater samples: APG-MFRI-1-GW-030421 (63 ng/L) and APG-MFRI-2-GW-030421 (15 ng/L).

PFHxS was detected at concentrations greater than the OSD risk screening level of 39 ng/L in the groundwater samples: APG-MFRI-1-GW-030421 (250 ng/L) and APG- MFRI-2-GW-030421 (150 ng/L).

PFNA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-MFRI-1-GW-030421 (17 ng/L).

7.1.7.2 Soil

Soil samples were collected from two locations at the Building 1074 – Former MFRI Training Area AOPI (APG-MFRI-1-SO and APG-MFRI-2-SO [duplicate sample collected at APG-MFRI-1-SO]; **Figure 7-7**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at concentrations less than the residential OSD risk screening level of 0.013 mg/kg in the duplicate soil sample collected at APG-MFRI-1-SO-(8-10), APG-DUP-01-030421 (0.00067 J mg/kg).

PFOA, PFBS, PFHxS, and PFNA were not detected in the soil samples collected at the Building 1074 – Former MFRI Training Area AOPI.

7.1.8 PAAF – Airfield Station Building 1059

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with PAAF – Airfield Station Building 1059 AOPI shown on **Figure 7-8** and **Tables 7-1** and **7-2**.

7.1.8.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the PAAF – Airfield Station Building 1059 AOPI (APG-BLDG-1059-1-GW; **Figure 7-8**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BLDG-1059-1-GW-030321 (42,000 J- ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-1059-1-GW-030321 (3,600 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-BLDG-1059-1-GW-030321 (230 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BLDG-1059-1-GW-030321 (15,000 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-1059-1-GW-030321 (990 ng/L).

7.1.8.2 Soil

One surface soil sample was collected from one location at the PAAF – Airfield Station Building 1059 AOPI (APG-BLDG-1059-1-SO; **Figure 7-8**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-BLDG-1059-1-SO-(0-2)-030321 (0.14 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-BLDG-1059-1-SO-(0-2)-030321 (0.0012 mg/kg).

PFBS was not detected in the soil sample collected at the PAAF – Airfield Station Building 1059 AOPI.

PFHxS was detected at a concentration less than the residential OSD risk screening level of 0.13 mg/kg in the soil sample APG-BLDG-1059-1-SO-(0-2)-030321 (0.0037 mg/kg).

PFNA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-BLDG-1059-1-SO-(0-2)-030321 (0.0016 mg/kg).

7.1.9 PAAF – Hangar 1060

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with PAAF – Hangar 1060 AOPI shown on **Figure 7-8** and **Tables 7-1** and **7-2**.

7.1.9.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the PAAF – Hangar 1060 AOPI (APG-HANGAR-1060-1-GW; **Figure 7-8**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-HANGAR-1060-1-GW-030421 (1,200 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-HANGAR-1060-1-GW-030421 (110 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-HANGAR-1060-1-GW-030421 (27 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-HANGAR-1060-1-GW-030421 (540 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-HANGAR-1060-1-GW-030421 (33 ng/L).

7.1.9.2 Soil

One surface soil sample was collected from one location at the PAAF – Hangar 1060 AOPI (APG-HANGAR-1060-1-SO; **Figure 7-8**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-HANGAR-1060-1-SO-(0-2)-030421 (0.013 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-HANGAR-1060-1-SO-(0-2)-030421 (0.0006 J mg/kg).

PFBS was not detected in the soil sample collected at the PAAF – Hangar 1060 AOPI.

PFHxS was detected at a concentration less than the residential OSD risk screening level of 0.13 mg/kg in the soil sample APG-HANGAR-1060-1-SO-(0-2)-030421 (0.00049 J mg/kg).

PFNA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-HANGAR-1060-1-SO-(0-2)-030421 (0.00062 J mg/kg).

7.1.10 PAAF – Crash Truck Bay Building 1065

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with PAAF – Crash Truck Bay Building 1065 AOPI shown on **Figure 7-8** and **Tables 7-1** and **7-2**.

7.1.10.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the PAAF – Crash Truck Bay Building 1065 AOPI (APG-BLDG-1065-1-GW; **Figure 7-8**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BLDG-1065-1-GW-030321 (19,000 J- ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-1065-1-GW-030321 (2,300 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-BLDG-1065-1-GW-030321 (410 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BLDG-1065-1-GW-030321 (12,000 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-1065-1-GW-030321 (690 ng/L).

7.1.10.2 Soil

One surface soil sample was collected from one location at the PAAF – Crash Truck Bay Building 1065 AOPI (APG-BLDG-1065-1-SO; **Figure 7-8**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration less than the residential OSD risk screening level of 0.103 mg/kg in the soil sample APG-BLDG-1065-1-SO-(0-2)-030321 (0.0042 mg/kg).

PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the PAAF – Crash Truck Bay Building 1065 AOPI.

7.1.11 PAAF – Loading Pad

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with PAAF – Loading Pad AOPI shown on **Figure 7-9** and **Tables 7-1** and **7-2**.

7.1.11.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the PAAF – Loading Pad AOPI (APG-LOADING-PAD-1-GW; **Figure 7-9**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-LOADING-PAD-1-GW-030421 (5.7 ng/L).

PFOA, PFBS, PFHxS, and PFNA were not detected in the groundwater sample collected at the PAAF – Loading Pad AOPI.

7.1.11.2 Soil

One surface soil sample was collected from one location at the PAAF – Loading Pad AOPI (APG-LOADING-PAD-1-SO; **Figure 7-9**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-LOADING-PAD-1-SO-(0-2)-030321 (0.0022 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-LOADING-PAD-1-SO-(0-2)-030321 (0.00062 J mg/kg).

PFHxS was detected at a concentration less than the residential OSD risk screening level of 0.13 mg/kg in the soil sample APG-LOADING-PAD-1-SO-(0-2)-030321 (0.002 mg/kg).

PFBS and PFNA were not detected in the soil sample collected at the PAAF – Loading Pad AOPI.

7.1.12 Michaelsville Landfill

The subsections below summarize the groundwater PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Michaelsville Landfill AOPI shown on **Figure 7-10** and **Table 7-1**.

7.1.12.1 Groundwater

Groundwater samples were collected from five existing monitoring wells at the Michaelsville Landfill AOPI (APG-WES-M09, APG-WES-M14, APG-WES-M17, APG-WES-M18, and APG-WES-M21; **Figure 7-10**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at concentrations greater than the OSD risk screening level of 4 ng/L in the groundwater samples: APG-WES-M09-032021 (34 ng/L), APG-WES-M14-032021 (36 ng/L), and APG-WES-M17-032021 (5.8 ng/L). PFOS was detected at concentrations less than the OSD risk screening level of 4 ng/L in the groundwater samples: APG-WES-M18-032021 (1.0 J ng/L), and APG-WES-M21-032021 (2.9 ng/L).

PFOA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-WES-M09-032021 (52 ng/L), APG-WES-M14-032021 (29 ng/L), and APG-WES-M17-032021 (54 ng/L). PFOA was detected at concentrations less than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-WES-M18-032021 (2.5 ng/L), and APG-WES-M21-032021 (8.6 ng/L).

PFBS was detected at concentrations less than the OSD risk screening level of 601 ng/L in the groundwater samples: APG-WES-M09-032021 (8.9 ng/L), APG-WES-M14-032021 (5.6 ng/L), APG-WES-M17-032021 (4.9 ng/L), and APG-WES-M21-032021 (2.5 ng/L).

PFHxS was detected at concentrations less than the OSD risk screening level of 39 ng/L in the groundwater samples: APG-WES-M09-032021 (16 ng/L), APG-WES-M14-032021 (21 ng/L), APG-WES-M17-032021 (11 ng/L), APG-WES-M18-032021 (3.6 ng/L), and APG-WES-M21-032021 (5.9 ng/L).

PFNA was detected at concentrations less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-WES-M09-032021 (3.8 ng/L).

7.2 Aberdeen Cantonment Area AOPIs

7.2.1 Building 300 – Former Aberdeen Fire Station and Building 250 Potable Supply Wells

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Building 300 – Former Aberdeen Fire Station AOPI and Building 250 Potable Supply Wells shown on **Figure 7-11** and **Tables 7-1** and **7-2**.

7.2.1.1 Groundwater

Groundwater samples were collected from two borings via DPT at first-encountered groundwater at the Building 300 – Former Aberdeen Fire Station AOPI (APG-BLDG-300-1-GW and APG-BLDG-300-2-GW; **Figure 7-11**) and from five existing potable water supply wells at the Building 250 Potable Supply Wells (APG-BLDG-250-PW-1, APG-BLDG-250-PW-2, APG-BLDG-250-PW-3, APG-BLDG-250-PW-4, and APG-BLDG-250-PW-5; **Figure 7-11**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at concentrations greater than the OSD risk screening level of 4 ng/L in the groundwater samples: APG-BLDG-300-1-GW-031521 (170 ng/L) and APG-BLDG-300-2-GW-031521 (220 ng/L).

PFOA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-BLDG-300-1-GW-031521 (9.7 ng/L) and APG-BLDG-300-2-GW-031521 (83 ng/L).

PFBS was detected at concentrations less than the OSD risk screening level of 601 ng/L in the groundwater samples: APG-BLDG-300-1-GW-031521 (1.6 J ng/L) and APG-BLDG-300-2-GW-031521 (54 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater samples APG-BLDG-300-2-GW-031521 (350 ng/L). PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater samples APG-BLDG-300-1-GW-031521 (27 ng/L).

PFNA was detected at concentrations less than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-BLDG-300-1-GW-031521 (3.5 ng/L) and APG-BLDG-300-2-GW-031521 (5.5 ng/L).

7.2.1.2 Soil

Soil samples were collected from two locations at the Building 300 – Former Aberdeen Fire Station AOPI (APG-BLDG-300-1-SO and APG-BLDG-300-2-SO; **Figure 7-11**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg in soil sample APG-BLDG-300-2-SO-(0-2)-031521 (0.017 mg/kg). PFOS was detected at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in soil sample APG-BLDG-300-1-SO-(0-2)-031521 (0.0063 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in soil sample APG-BLDG-300-2-SO-(0-2)-031521 (0.0023 mg/kg).

PFHxS was detected at concentrations less than the residential OSD risk screening level of 0.13 mg/kg in soil samples: BLDG-300-1-SO-(0-2)-031521 (0.00065 J mg/kg) and APG-BLDG-300-2-SO-(0-2)-031521 (0.0051 mg/kg).

PFBS and PFNA were not detected in the soil samples collected at the Building 300 – Former Aberdeen Fire Station AOPI.

7.2.2 Building 2200 – Current Aberdeen Fire Station

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Building 2200 – Current Aberdeen Fire Station AOPI shown on **Figure 7-12** and **Tables 7-1** and **7-2**.

7.2.2.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Building 2200 – Current Aberdeen Fire Station AOPI (APG-BLDG-2200-1-GW; **Figure 7-12**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BLDG-2200-1-GW-031821 (180 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-2200-1-GW-031821 (66 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-BLDG-2200-1-GW-031821 (41 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BLDG-2200-1-GW-031821 (340 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-2200-1-GW-031821 (15 ng/L).

7.2.2.2 Soil

Soil samples were collected from two locations at the Building 2200 – Current Aberdeen Fire Station AOPI (APG-BLDG-2200-1-SO and APG-BLDG-2200-2-SO; **Figure 7-12**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at concentrations less than the residential OSD risk screening level of 0.013 mg/kg in soil samples: APG-BLDG-2200-1-SO-(0-2)-031221 (0.0012 mg/kg) and APG-BLDG-2200-2-SO-(0-2)-031221 (0.0033 mg/kg).

PFOA was detected at concentrations less than the residential OSD risk screening level of 0.019 mg/kg in soil samples APG-BLDG-2200-1-SO-(0-2)-031221 (0.00078 mg/kg) and APG-BLDG-2200-2-SO-(0-2)-031221 (0.00094 mg/kg).

PFBS and PFHxS were not detected in the soil samples collected at the Building 2200 – Current Aberdeen Fire Station AOPI.

PFNA was detected at concentrations less than the residential OSD risk screening level of 0.019 mg/kg in soil samples APG-BLDG-2200-1-SO-(0-2)-031221 (0.0012 mg/kg) and APG-BLDG-2200-2-SO-(0-2)-031221 (0.002 mg/kg).

7.2.3 Building 2308 – Fire Department Storage Building

The subsections below summarize the groundwater PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Building 2308 – Fire Department Storage Building AOPI shown on **Figure 7-12** and **Table 7-1**.

7.2.3.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Building 2308 – Fire Department Storage Building AOPI (APG-BLDG-2308-1-GW; **Figure 7-12**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BLDG-2308-1-GW-031221 (210 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-2308-1-GW-031221 (190 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-BLDG-2308-1-GW-031221 (43 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BLDG-2308-1-GW-031221 (990 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-2308-1-GW-031221 (24 ng/L).

7.3 Poverty Island AOPIs

7.3.1 AA5 Range

The subsections below summarize the groundwater and sediment PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with AA5 Range AOPI shown on **Figure 7-13** and **Tables 7-1** and **7-4**.

7.3.1.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the AA5 Range AOPI (APG-AA5-1-GW; **Figure 7-13**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-AA5-1-GW-031621 (64,000 EJ ng/L) (EJ qualifier indicates that the result is over the calibration range of the instrument and the reported result is an estimate).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-AA5-1-GW-031621 (4,200 ng/L).

PFBS was detected at a concentration greater than the OSD risk screening level of 601 ng/L in the groundwater sample APG-AA5-1-GW-031621 (5,000 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-AA5-1-GW-031621 (42,200 EJ ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-AA5-1-GW-031621 (650 ng/L).

7.3.1.2 Sediment

One sediment sample was collected at the AA5 Range AOPI (APG-AA5-1-SE [duplicate sample collected at APG-AA5-1-SE]; **Figure 7-13**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA sediment analytical results is provided in **Table 7-4**

PFOS was detected at a concentration of 0.031 J+ mg/kg [0.067 J mg/kg] in the sediment sample APG-AA5-1-SE-031621 (J+ qualifier indicates that the result is an estimated quantity and may be biased high).

PFOA was detected at a concentration of 0.0036 J mg/kg [0.0075 J mg/kg] in the sediment sample APG-AA5-1-SE-031621 .

PFBS was not detected in the sediment sample collected at the AA5 Range AOPI.

PFHxS was detected at a concentration of 0.0022 mg/kg [0.0037 mg/kg] in the sediment sample APG-AA5-1-SE-031621

PFNA was detected at a concentration of 0.0014 mg/kg [0.0027 mg/kg]in the sediment sample APG-AA5-1-SE-031621 .

7.3.2 Poverty Island – Minefield Range

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Poverty Island – Minefield Range AOPI shown on **Figure 7-14** and **Tables 7-1** and **7-2**.

7.3.2.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Poverty Island – Minefield Range AOPI (APG-PI-MINEFIELD-1-GW; **Figure 7-14**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG–PI-MINEFIELD-1-GW-031521 (260 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG–PI-MINEFIELD-1-GW-031521 (160 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG–PI-MINEFIELD-1-GW-031521 (7.6 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG–PI-MINEFIELD-1-GW-031521 (53 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG–PI-MINEFIELD-1-GW-031521 (82 ng/L).

7.3.2.2 Soil

Soil samples were collected from two locations at the Poverty Island – Minefield Range AOPI (APG-PI-MINEFIELD-1-SO and APG-PI-MINEFIELD-2-SO; **Figure 7-14**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at concentrations less than the residential OSD risk screening level of 0.013 mg/kg in soil samples: APG-PI-MINEFIELD-1-SO-(0-2)-031521 (0.00093 mg/kg) and APG-PI-MINEFIELD-2-SO – (0-2)-031521 (0.002 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in soil sample APG-PI-MINEFIELD-1-SO-(0-2)-031521 (0.0011 mg/kg).

PFBS and PFHxS were not detected in the soil samples collected at the Poverty Island – Minefield Range AOPI.

PFNA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in soil sample APG-PI-MINEFIELD-1-SO-(0-2)-031521 (0.00077 mg/kg).

7.3.3 Poverty Island – Range 12

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Poverty Island – Minefield Range AOPI shown on **Figure 7-15** and **Tables 7-1** and **7-2**.

7.3.3.1 Groundwater

Groundwater samples were collected from two borings via DPT at first-encountered groundwater at the Poverty Island – Range 12 AOPI (APG-PI-12-1-GW and APG-PI-12-2-GW [duplicate sample collected at

APG-P1-12-2-GW]; **Figure 7-15**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at concentrations greater than the OSD risk screening level of 4 ng/L in the groundwater samples: APG-PI-12-1-GW-031521 (3,000 ng/L) and APG-PI-12-2-GW-031821 (4,800 ng/L [5,100 ng/L]).

PFOA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-PI-12-1-GW-031521 (330 ng/L) and APG-PI-12-2-GW-031821 (1,200 ng/L [1,100 ng/L]).

PFBS was detected at concentrations less than the OSD risk screening level of 601 ng/L in the groundwater samples: APG-PI-12-1-GW-031521 (47 ng/L) and APG-PI-12-2-GW-031821 (480 ng/L [420 ng/L]).

PFHxS was detected at concentrations greater than the OSD risk screening level of 39 ng/L in the groundwater samples: APG-PI-12-1-GW-031521 (610 ng/L) and APG-PI-12-2-GW-031821 (2,800 ng/L [3,100 ng/L]).

PFNA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-PI-12-1-GW-031521 (120 ng/L) and APG-PI-12-2-GW-031821 (180 ng/L [190 ng/L]).

7.3.3.2 Soil

Soil samples were collected from two locations at the Poverty Island – Range 12 AOPI (APG-PI-12-1-SO and APG-PI-12-2-SO; **Figure 7-15**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at concentrations less than the residential OSD risk screening level of 0.013 mg/kg in soil samples: APG-PI-12-1-SO-(0-2)-031521 (0.003 mg/kg) and APG-PI-12-2-SO-(0-2)-031521 (0.0077 mg/kg).

PFOA, PFBS, and PFHxS were not detected in the soil samples collected at the Poverty Island – Range 12 AOPI.

PFNA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in soil sample APG-PI-12-2-SO-(0-2)-031521 (0.0011 mg/kg).

7.3.4 Ford's Farm

The subsections below summarize the groundwater PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Ford's Farm AOPI shown on **Figure 7-16** and **Table 7-1**.

7.3.4.1 Groundwater

Groundwater samples were collected from two borings via DPT at first-encountered groundwater at the Ford's Farm AOPI (APG-FF2-1-GW and APG-FF3-2-GW; **Figure 7-16**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the groundwater samples collected at the Ford's Farm AOPI.

7.4 Spesutie Island AOPIs

7.4.1 EF-15

The subsections below summarize the groundwater PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with EF-15 AOPI shown on **Figure 7-17** and **Table 7-1**.

7.4.1.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the EF-15 AOPI (APG-EF15-1-GW; **Figure 7-17**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-EF15-1-GW-031621 (1,300 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-EF15-1-GW-031621 (170 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-EF15-1-GW-031621 (440 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-EF15-1-GW-031621 (220 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-EF15-1-GW-031621 (48 ng/L).

7.4.2 Fuze Range

The subsections below summarize the groundwater, surface water, and sediment PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Fuze Range AOPI shown on **Figure 7-18** and **Tables 7-1, 7-3,** and **7-4**.

7.4.2.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Fuze Range AOPI (APG-FUZE-1-GW; **Figure 7-18**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-FUZE-1-GW-031621 (4,300 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-FUZE-1-GW-031621 (7,800 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-FUZE-1-GW-031621 (91 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-FUZE-1-GW-031621 (4,400 ng/L).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-FUZE-1-GW-031621 (2,300 ng/L).

7.4.2.2 Surface Water

One surface water sample was collected at the Fuze Range AOPI (APG-FUZE-1-SW [duplicate sample collected at APG-FUZE-1-SW]; **Figure 7-18**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-3**.

PFOS was detected at a concentration of 400 ng/L in the surface water sample APG-FUZE-1-SW-031621 .

PFOA was detected at a concentration of 930 ng/L in the surface water sample APG-FUZE-1-SW-031621.

PFBS was detected at a concentration of 6.3 ng/L in the surface water sample APG-FUZE-1-SW-031621.

PFHxS was detected at a concentration of 530 ng/L in the surface water sample APG-FUZE-1-SW-031621 .

PFNA was detected at a concentration of 540 ng/L in the surface water sample APG-FUZE-1-SW-031621 .

7.4.2.3 Sediment

One sediment sample was collected at the Fuze Range AOPI (APG-FUZE-1-SE; **Figure 7-18**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA sediment analytical results is provided in **Table 7-4**

PFOS was detected at a concentration of 0.061 mg/kg in the sediment sample APG-FUZE-1-SE-031621.

PFOA was detected at a of 0.019 mg/kg in the sediment sample APG-FUZE-1-SE-031621.

PFBS was not detected in the sediment sample collected at the Fuze Range AOPI.

PFHxS was detected at a concentration of 0.008 mg/kg in the sediment sample APG-FUZE-1-SE-031621.

PFNA was detected at a concentration of 0.03 mg/kg in the sediment sample APG-FUZE-1-SE-031621.

7.5 Edgewood Area North AOPIs

7.5.1 Building E5005 – Edgewood Fire Department Storage

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Building E5005 – Edgewood Fire Department Storage AOPI shown on **Figure 7-19** and **Tables 7-1** and **7-2**.

7.5.1.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Building E5005 – Edgewood Fire Department Storage AOPI (APG-BLDG-E5005-1-GW; **Figure 7-19**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BLDG-E5005-1-GW-042221 (67 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-E5005-1-GW-042221 (15 ng/L).

PFBS was not detected in the groundwater sample collected at the Building E5005 – Edgewood Fire Department Storage AOPI.

PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BLDG-E5005-1-GW-042221 (22 ng/L).

PFNA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-E5005-1-GW-042221 (5.6 ng/L).

7.5.1.2 Soil

Soil samples were collected from three locations at the Building E5005 – Edgewood Fire Department Storage AOPI (APG-BLDG-E5005-1-SO, APG-BLDG-E5005-2-SO, and APG-BLDG-E5005-3-SO; **Figure 7-19**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at concentrations less than the residential OSD risk screening level of 0.013 mg/kg in soil samples: APG-BLDG-E5005-1-SO-042221 (0.0028 mg/kg), APG-BLDG-E5005-2-SO-042221 (0.01 mg/kg), and APG-BLDG-E5005-3-SO-042221 (0.0093 mg/kg).

PFOA was detected at concentrations less than the residential OSD risk screening level of 0.019 mg/kg in soil samples: APG-BLDG-E5005-1-SO-042221 (0.00044 J mg/kg), APG-BLDG-E5005-2-SO-042221 (0.0021 mg/kg), and APG-BLDG-E5005-3-SO-042221 (0.00052 J mg/kg).

PFBS was not detected in the soil samples collected at the Building E5005 – Edgewood Fire Department Storage AOPI.

PFHxS was detected at concentrations less than the residential OSD risk screening level of 0.13 mg/kg in soil samples: APG-BLDG-E5005-2-SO-042221 (0.0012 mg/kg) and APG-BLDG-E5005-3-SO-042221 (0.0018 mg/kg).

PFNA was detected at concentrations less than the residential OSD risk screening level of 0.019 mg/kg in soil samples: APG-BLDG-E5005-2-SO-042221 (0.0029 mg/kg) and APG-BLDG-E5005-3-SO-042221 (0.00048 mg/kg).

7.5.2 Building E5180 – Edgewood Fire Station

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Building E5180 – Edgewood Fire Station AOPI shown on **Figure 7-20** and **Tables 7-1** and **7-2**.

7.5.2.1 Groundwater

Groundwater samples were collected from two borings via DPT at first-encountered groundwater at the Building E5180 – Edgewood Fire Station AOPI (APG-BLDG-E5180-1-GW and APG-BLDG-E5180-2-GW; **Figure 7-20**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at concentrations greater than the OSD risk screening level of 4 ng/L in the groundwater samples: APG-BLDG-E5180-1-GW-031721 (530 ng/L) and APG-BLDG-E5180-2-GW-031721 (9,300 ng/L).

PFOA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-BLDG-E5180-1-GW-031721 (2,700 ng/L) and APG-BLDG-E5180-2-GW-031721 (6,500 ng/L).

PFBS was detected at concentrations greater than the OSD risk screening level of 601 ng/L in the groundwater sample APG-BLDG-E5180-1-GW-031721 (830 ng/L). PFBS was detected at concentrations less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-BLDG-E5180-2-GW-031721 (220 ng/L).

PFHxS was detected at concentrations greater than the OSD risk screening level of 39 ng/L in the groundwater samples: APG-BLDG-E5180-1-GW-031721 (4,300 ng/L) and APG-BLDG-E5180-2-GW-031721 (10,000 ng/L).

PFNA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-BLDG-E5180-1-GW-031721 (49 ng/L) and APG-BLDG-E5180-2-GW-031721 (1,100 ng/L).

7.5.2.2 Soil

One surface soil sample was collected from one location at the Building E5180 – Edgewood Fire Station AOPI (APG-BLDG-E5180-1-SO; **Figure 7-20**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-BLDG-E5180-1-SO-(0-2)-031721 (0.019 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-BLDG-E5180-1-SO-(0-2)-031721 (0.0016 mg/kg).

PFBS and PFHxS were not detected in the soil sample collected at the Building E5180 – Edgewood Fire Station AOPI.

PFNA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-BLDG-E5180-1-SO-(0-2)-031721 (0.0046 mg/kg).

7.5.3 CASY Site

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with CASY Site AOPI shown on **Figure 7-21** and **Tables 7-1** and **7-2**.

7.5.3.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at CASY Site AOPI (APG-CASEY-YARD-1-GW; **Figure 7-21**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-CASEY-YARD-1-GW-031921 (130 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-CASEY-YARD-1-GW-031921 (9.5 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-CASEY-YARD-1-GW-031921 (18 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-CASEY-YARD-1-GW-031921 (120 ng/L).

PFNA was not detected in the groundwater sample collected at the CASY Site AOPI.

7.5.3.2 Soil

One surface soil sample was collected from one location at the CASY Site AOPI (APG-CASEY-YARD-1-SO; **Figure 7-21**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the CASY Site AOPI.

7.5.4 G-Street Plane Crash Area

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with G-Street Plane Crash Area AOPI shown on **Figure 7-22** and **Tables 7-1** and **7-2**.

7.5.4.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at G-Street Plane Crash AOPI (APG-G-STREET-1-GW; **Figure 7-22**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-G-STREET-1-GW-031921 (5.0 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-G-STREET-1-GW-031921 (58 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-G-STREET-1-GW-031921 (20 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-G-STREET-1-GW-031921 (110 ng/L).

PFNA was not detected in the groundwater sample collected at the G-Street Plane Crash Area AOPI.

7.5.4.2 Soil

One surface soil sample was collected from one location at the G-Street Plane Crash AOPI (APG-G-STREET-1-SO; **Figure 7-22**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the G-Street Plane Crash Area AOPI.

7.5.5 Noble Road – Former Fire Training Area

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Noble Road – Former Fire Training Area AOPI shown on **Figure 7-23** and **Tables 7-1** and **7-2**.

7.5.5.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at Noble Road – Former Fire Training Area AOPI (APG-NOBLE-ROAD-1-GW [duplicate sample collected at APG-NOBLE-ROAD-1-GW]; **Figure 7-23**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-NOBLE-ROAD-1-GW-031721 (740 ng/L [700 ng/L]).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-NOBLE-ROAD-1-GW-031721 (170 ng/L [170 ng/L]).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-NOBLE-ROAD-1-GW-031721 (30 ng/L [29 ng/L]).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-NOBLE-ROAD-1-GW-031721 (580 ng/L [540 ng/L]).

PFNA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-NOBLE-ROAD-1-GW-031721 (14 ng/L [15 ng/L]).

7.5.5.2 Soil

Soil samples were collected from two locations at the Noble Road – Former Fire Training Area AOPI (APG-NOBLE-ROAD-1-SO and APG-NOBLE-ROAD-2-SO; **Figure 7-23**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg in soil sample APG-NOBLE-ROAD-1-SO-(0-2)-031021 (0.014 mg/kg). PFOS was detected at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in soil sample APG-NOBLE-ROAD-2-SO-(0-2)-031021 (0.0099 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in soil sample APG-NOBLE-ROAD-2-SO-(0-2)-031021 (0.00095 mg/kg).

PFBS was not detected in the soil samples collected at the Noble Road – Former Fire Training Area AOPI.

PFHxS was detected at concentrations less than the residential OSD risk screening level of 0.13 mg/kg in soil samples: APG-NOBLE-ROAD-1-SO-(0-2)-031021 (0.0015 mg/kg) and APG-NOBLE-ROAD-2-SO-(0-2)-031021 (0.0023 mg/kg).

PFNA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in soil sample APG-NOBLE-ROAD-2-SO-(0-2)-031021 (0.00053 J mg/kg).

7.5.6 Building E4040 – Aircraft Maintenance Building

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Building E4040 – Aircraft Maintenance Building AOPI shown on **Figure 7-24** and **Tables 7-1** and **7-2**.

7.5.6.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at Building E4040 – Aircraft Maintenance Building AOPI (APG-BLDG-E4040-1-GW; **Figure 7-24**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BLDG-E4040-1-GW-031921 (5.0 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-E4040-1-GW-031921 (15 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-BLDG-E4040-1-GW-031921 (2.0 J ng/L).

PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BLDG-E4040-1-GW-031921 (7.5 ng/L).

PFNA was not detected in the groundwater sample collected at the Building E4040 – Aircraft Maintenance Building AOPI.

7.5.6.2 Soil

One surface soil sample was collected from one location at the Building E4040 – Aircraft Maintenance Building AOPI (APG-BLDG-E4040-1-SO; **Figure 7-24**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-BLDG-E4040-1-SO-(0-2)-031921 (0.00051 J mg/kg).

PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Building E4040 – Aircraft Maintenance Building AOPI.

7.5.7 Building E4081 – Army Aviation Support Facility

The subsections below summarize the groundwater, soil, surface water, and sediment PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Building E4081 – Army Aviation Support Facility AOPI shown on **Figure 7-25** and **Tables 7-1** through **7-4**.

7.5.7.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at Building E4081 – Army Aviation Support Facility AOPI (APG-BLDG-E4081-1-GW; **Figure 7-25**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BLDG-E4081-GW-031721 (33 ng/L).

PFOA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-E4081-GW-031721 (5.1 ng/L).

PFBS was not detected in the groundwater sample collected at the Building E4081 – Army Aviation Support Facility AOPI.

PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BLDG-E4081-GW-031721 (4.6 ng/L).

PFNA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BLDG-E4081-GW-031721 (2.0 J ng/L).

7.5.7.2 Soil

Soil samples were collected from two locations at the Building E4081 – Army Aviation Support Facility AOPI (APG-BLDG-E4081-1-SO and APG-BLDG-E4081-2-SO [duplicate sample collected at APG-BLDG-E4081-2-SO]; **Figure 7-25**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil samples collected at the Building E4081 – Army Aviation Support Facility AOPI.

7.5.7.3 Surface Water

Surface water samples were collected from two locations at the Building E4081 – Army Aviation Support Facility AOPI (APG-BLDG-E4081-1-SW and APG-BLDG-E4081-2-SW; **Figure 7-25**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-3**.

PFOS was detected at a maximum concentration of 2.4 ng/L in the surface water sample APG-BLDG-E4081-1-SW-031021.

PFOA was detected at a maximum concentration of 6.3 ng/L ng/L in the surface water sample APG-BLDG-E4081-1-SW-031021 .

PFBS was detected at a maximum concentration of 14 ng/L in the surface water sample APG-BLDG-E4081-2-SW-031021.

PFHxS was detected at a maximum concentration of 2.1 J ng/L in the surface water sample APG-BLDG-E4081-1-SW-031021.

PFNA was detected at a maximum concentration of 2.1 ng/L in the surface water sample APG-BLDG-E4081-1-SW-031021.

7.5.7.4 Sediment

Sediment samples were collected from two locations at the Building E4081 – Army Aviation Support Facility AOPI (APG-BLDG-E4081-1-SE and APG-BLDG-E4081-2-SE; **Figure 7-25**). PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the sediment samples collected at the Building E4081 – Army Aviation Support Facility AOPI.

7.5.8 Weide Airfield – Tarmac AFFF Release Area

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Weide Airfield – Tarmac AFFF Release Area AOPI shown on **Figure 7-25** and **Tables 7-1** and **7-2**.

7.5.8.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Weide Airfield – Tarmac AFFF Release Area AOPI (APG-WEIDE-1-GW; **Figure 7-25**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-WEIDE-1-GW-031721 (35 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-WEIDE-1-GW-031721 (17 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-WEIDE-1-GW-031721 (3.1 ng/L).

PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-WEIDE-1-GW-031721 (16 ng/L).

PFNA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-WEIDE-1-GW-031721 (4.9 ng/L).

7.5.8.2 Soil

One surface soil sample was collected from one location at the Weide Airfield – Tarmac AFFF Release Area AOPI (APG-WEIDE-1-SO; **Figure 7-25**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Weide Airfield – Tarmac AFFF Release Area AOPI.

7.6 Edgewood Area South AOPIs

7.6.1 H-Field – Helicopter Fire Response Area

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with H-Field – Helicopter Fire Response Area AOPI shown on **Figure 7-26** and **Tables 7-1** and **7-2**.

7.6.1.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the H-Field – Helicopter Fire Response Area AOPI (APG-HELIFIRE-1-GW; **Figure 7-26**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-HELIFIRE-1-GW-031221 (200 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-HELIFIRE-1-GW-031221 (8.1 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-HELIFIRE-1-GW-031221 (4.8 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-HELIFIRE-1-GW-031221 (84 ng/L).

PFNA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-HELIFIRE-1-GW-031221 (1.3 J ng/L).

7.6.1.2 Soil

One surface soil sample was collected from one location at the H-Field – Helicopter Fire Response Area AOPI (APG-HELIFIRE-1-SO; **Figure 7-26**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the H-Field – Helicopter Fire Response Area AOPI.

7.6.2 H-Field – Tank Fire Response Area

The subsections below summarize the surface water and sediment PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with H-Field – Tank Fire Response Area AOPI shown on **Figure 7-27** and **Tables 7-3** and **7-4**. Due to permanent wetland conditions in the vicinity of this AOPI and the inability to safely navigate a drilling equipment to collect groundwater samples, representative surface water and sediment samples were collected to inform on the presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA at this AOPI.

7.6.2.1 Surface Water

One surface water sample was collected at the H-Field – Tank Fire Response Area AOPI (APG-TANKFIRE-1-SW; **Figure 7-27**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA surface water analytical results is provided in **Table 7-3**.

PFOS was detected at a concentration of 4.3 ng/L in the surface water sample APG-TANKFIRE-1-SW-031021.

PFOA was detected at a concentration of 2.6 ng/L in the surface water sample APG-TANKFIRE-1-SW-031021.

PFBS was detected at a concentration of 0.97 ng/L in the surface water sample APG-TANKFIRE-1-SW-031021.

PFHxS was detected at a concentration of 1.3 J ng/L in the surface water sample APG-TANKFIRE-1-SW-031021.

PFNA was detected at a concentration of 1.3 J ng/L in the surface water sample APG-TANKFIRE-1-SW-031021.

7.6.2.2 Sediment

One sediment sample was collected at the H-Field – Tank Fire Response Area AOPI (APG-TANKFIRE-1-SE; **Figure 7-27**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA sediment analytical results is provided in **Table 7-4.**

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the sediment sample collected at the H-Field – Tank Fire Response Area AOPI.

7.7 Biosolid Application Field AOPIs – March 2021 Mobilization

As detailed in **Section 4.2**, a series of Biosolid Application Fields were identified as areas that may have received sludge wastes that potentially included AFFF disposed at the Aberdeen and Edgewood Area WWTPs as waste. This PA/SI included a desktop evaluation to understand the locations of approved biosolid application, the years of application, and whether PFOS, PFOA, PFBS, PFHxS and/or PFNA may be present in applied biosolids.

Following the review of documentation provided by both APG, MDE, and USEPA, interview logs, and site-reconnaissance logs, 25 land parcels were identified across APG-AA and APG-EA that were permitted to receive biosolid sludges generated at the Aberdeen and Edgewood Area WWTPs. Of these 25 parcels, five were confirmed to have received biosolids between 1993 and 1995 (Biosolid Application Field AOPIs A-1, B, D, E, and S-6).

Interviewed personnel, review of historical aerial photography, and review of permitting information provided by the MDE in 2018 could not confirm the application of biosolids at the remaining 20 approved land-parcels.

During the Technical Project Planning meeting held between the Army, MDE, and USEPA representatives in October 2019, it was agreed that all 25 identified land parcels would be designated as Biosolid Application Field AOPIs. Furthermore, the five parcels confirmed to have received biosolids would be sampled to evaluate the presence/absence of PFOS, PFOA, PFBS, PFHxS, and PFNA, with the subsequent analytical data being used to determine whether sampling was warranted at the remaining 20 Biosolid Application Field AOPIs. These determinations are presented in **Section 8**.

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with the five Biosolid Application Fields confirmed to have received biosolids between 1993 and 1995.

7.7.1 Biosolid Application Field A-1

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field A-1 AOPI shown on **Figure 7-28** and **Tables 7-1** and **7-2**.

7.7.1.1 Groundwater

Groundwater samples were collected from two borings via DPT at first-encountered groundwater and from one existing monitoring well at the Biosolid Application Field A-1 AOPI (APG-BAF-A1-1-GW, APG-BAF-A1-2-GW, and APG-FTA-M09; **Figure 7-28**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at concentrations greater than the OSD risk screening level of 4 ng/L in the groundwater samples: APG-BAF-A1-1-GW-030221 (330 J ng/L), APG-BAF-A1-2-GW-030221 (3,900 ng/L), and APG-FTA-M09-030221 (11,000 ng/L).

PFOA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-BAF-A1-1-GW-030221 (120 ng/L), APG-BAF-A1-2-GW-030221 (700 ng/L), and APG-FTA-M09-030221 (1,100 ng/L).

PFBS was detected at concentrations less than the OSD risk screening level of 601 ng/L in the groundwater samples: APG-BAF-A1-1-GW-030221 (14 ng/L), APG-BAF-A1-2-GW-030221 (37 ng/L), and APG-FTA-M09-030221 (55 ng/L).

PFHxS was detected at concentrations greater than the OSD risk screening level of 39 ng/L in the groundwater samples: APG-BAF-A1-1-GW-030221 (71 ng/L), APG-BAF-A1-2-GW-030221 (1,100 ng/L), and APG-FTA-M09-030221 (1,700 ng/L).

PFNA was detected at concentrations greater than the OSD risk screening level of 6 ng/L in the groundwater samples: APG-BAF-A1-2-GW-030221 (99 ng/L) and APG-FTA-M09-030221 (210 ng/L). PFNA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BAF-A1-1-GW-030221 (4.7 ng/L).

7.7.1.2 Soil

Surface soil samples were collected from two locations at the Biosolid Application Field A-1 AOPI (APG-BAF-A1-1-SO, and APG-BAF-A1-2-SO; **Figure 7-28**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in the soil samples: APG-BAF-A1-1-SO-(0-2)-030221 (0.0018 mg/kg) and APG-BAF-A1-2-SO-(0-2)-030221 (0.0036 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil samples: APG-BAF-A1-1-SO-(0-2)-030221 (0.0008 mg/kg) and APG-BAF-A1-2-SO-(0-2)-030221 (0.0012 mg/kg).

PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field A-1 AOPI.

7.7.2 Biosolid Application Field B

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field B AOPI shown on **Figure 7-29** and **Tables 7-1** and **7-2**.

7.7.2.1 Groundwater

One groundwater sample was collected from an existing monitoring well at the Biosolid Application Field B AOPI (APG-FTA-M10; **Figure 7-29**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-FTA-M10-030221 (14 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-FTA-M10-030221 (49 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-FTA-M10-030221 (41 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-FTA-M10-030221 (2,500 ng/L).

PFNA was not detected in the groundwater sample collected at the Biosolid Application Field B AOPI.

7.7.2.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field B AOPI (APG-BAF-B-1-SO; **Figure 7-29**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration greater than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-BAF-B-1-SO-(0-2)-030221 (0.03 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-BAF-B-1-SO-(0-2)-030221 (0.0023 mg/kg).

PFBS was not detected in the soil sample collected at the Biosolid Application Field B AOPI.

PFHxS was detected at a concentration less than the residential OSD risk screening level of 0.13 mg/kg in the soil sample APG-BAF-B-1-SO-(0-2)-030221 (0.0019 mg/kg).

PFNA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-BAF-B-1-SO-(0-2)-030221 (0.0026 mg/kg).

7.7.3 Biosolid Application Field D

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field D AOPI shown on **Figure 7-29** and **Tables 7-1** and **7-2**.

7.7.3.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Biosolid Application Field D AOPI (APG-BAF-D-1-GW; **Figure 7-29**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BAF-D-1-GW-030321 (86 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BAF-D-1-GW-030321 (23 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-BAF-D-1-GW-030321 (27 ng/L).

PFHxS was detected at a concentration greater than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BAF-D-1-GW-030321 (760 ng/L).

PFNA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BAF-D-1-GW-030321 (3.7 ng/L).

7.7.3.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field D AOPI (APG-BAF-D-1-SO; **Figure 7-29**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-BAF-D-1-SO-(0-2)-030321 (0.0025 mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-BAF-D-1-SO-(0-2)-030321 (0.00079 mg/kg).

PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field D AOPI.

7.7.4 Biosolid Application Field E

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field E AOPI shown on **Figure 7-29** and **Tables 7-1** and **7-2**.

7.7.4.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Biosolid Application Field E AOPI (APG-BAF-E-1-GW; **Figure 7-29**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BAF-E-1-GW-030321 (11 ng/L).

PFOA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BAF-E-1-GW-030321 (2.3 ng/L).

PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BAF-E-1-GW-030321 (5.6 ng/L).

PFBS and PFNA were not detected in the groundwater sample collected at the Biosolid Application Field E AOPI.

7.7.4.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field E AOPI (APG-BAF-E-1-SO; **Figure 7-29**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field E AOPI.

7.7.5 Biosolid Application Field S-6

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field S-6 AOPI shown on **Figure 7-30** and **Tables 7-1** and **7-2**.

7.7.5.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Biosolid Application Field S-6 AOPI (APG-BAF-S6-1-GW; **Figure 7-30**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-BAF-S6-1-GW-031621 (34 ng/L).

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BAF-S6-1-GW-031621 (22 ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-BAF-S6-1-GW-031621 (1.6 J ng/L).

PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-BAF-S6-1-GW-031621 (9.7 ng/L).

PFNA was detected at a concentration less than the OSD risk screening level of 6 ng/L in the groundwater sample APG-BAF-S6-1-GW-031621 (4.3 ng/L).

7.7.5.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field S-6 AOPI (APG-BAF-S6-1-SO; **Figure 7-30**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field S-6 AOPI.

7.8 Biosolid Application Field AOPIs – December 2021 Mobilization

A second Technical Project Planning teleconference was held between the Army, USEPA, and MDE representatives on 12 October 2021 to review the analytical data collected in March 2021 at the five sampled Biosolid Application Field AOPIs and AOPIs neighboring Biosolid Application Fields A-1, B, D and E.

Groundwater and soil samples collected from the five Biosolid Application Fields in March 2021 were analyzed for PFOS, PFOA, PFBS, PFHxS, and PFNA, and their results were examined to confirm

whether the historical biosolids contained PFAS, and to determine whether sampling was warranted at the remaining 20 biosolid application AOPIs. All five of the sampled Biosolid Application Field AOPIs (A-1, B, D, E, and S-6) exhibited detections of PFOS, PFOA, PFHxS, and PFNA above their respective OSD risk screening levels (4 ng/L, 6 ng/L, 39 ng/L and 6 ng/L). Biosolid Application Fields A-1, B, D, E, and S-6 are located hydraulically downgradient and side-gradient of five AOPIs that also exhibited detections of PFOS, PFOA, PFBS, PFHxS, and PFNA at concentrations over their respective OSD risk screening levels (601 ng/L for PFBS).

Monitoring well FTA-09 is located approximately 500 feet hydraulically downgradient of the Former Aberdeen Fire Training Area AOPI. One grab-groundwater sample (APG-OLD-FTA-2-GW), collected along the southwestern edge of the former training area boundaries, exhibited detections of PFOS, PFOA, PFBS, PFHxS, and PFNA at concentrations above their respective OSD risk screening levels.

Similarly, PFOS, PFOA, and PFHxS were observed at concentrations exceeding their OSD risk screening levels in groundwater at the Biosolid Application Fields B, D, and E. Both Biosolid Application Fields B and D are located hydraulically downgradient of the Building 1074 – Former MFRI Training Area AOPI, which exhibited detections of PFOS, PFOA, and PFHxS in groundwater (APG-MFRI-1-GW) above their respective OSD risk screening levels.

Furthermore, PFOS and PFOA were detected in soil (APG-BAF-A1-2-SO) at the Biosolid Application Field A-1 AOPI. This soil sampling location lies closest to the Former Aberdeen Fire Training Area and PAAF – Airfield Station Building 1059 AOPIs, where PFOS, PFOA, PFBS, PFHxS, and PFNA concentrations in groundwater and soil were some of the highest across the installation.

Analytical data collected from Biosolid Application Field S-6, located along the eastern edge of Spesutie Island exhibited detections of PFBS, PFHxS, and PFNA in groundwater below their respective OSD risk screening levels. A surface soil sample collected at Biosolid Application Field S-6 was ND for PFOS, PFOA, PFBS, PFHxS, and PFNA.

The analytical data collected at Biosolid Application Fields A-1, B, D and E was determined to be inconclusive with respect to presence or absence of PFAS attributed to the application of biosolids due to their proximity to neighboring AOPIs located hydraulically upgradient/cross-gradient with OSD risk screening level exceedances in groundwater. The Army, USEPA, and MDE agreement was reached during the Technical Project Planning meeting to sample an additional six Biosolid Application Field AOPIs located hydraulically upgradient or geographically away from other AOPIs to assess PFOS, PFOA, PFBS, PFHxS, and PFNA presence or absence due to the application of biosolids at APG.

All parties agreed to the supplemental mobilization, and sampling of Biosolid Application Field AOPIs ATC-1, ATC-2, S-1A, S-3, E-3, and E-4 commenced in December 2021. As detailed in **Section 5.2.7**, the Biosolid Application Field AOPIs A-2, A-3, C-1, C-2, C-3, F, G, H, I, S-2, S-5, E-1, E-2, and E-6 were not sampled as part of this SI.

Grab-groundwater and soil samples were collected from each of the six Biosolid Application Fields identified for sampling. The PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results for these AOPIs are presented in the subsections below. Conclusions related to the presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA in biosolids across APG are presented in **Section 9**.

7.8.1 Biosolid Application Field ATC-1

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field ATC-1 AOPI shown on **Figure 7-31** and **Tables 7-1** and **7-2**.

7.8.1.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Biosolid Application Field ATC-1 AOPI (APG-ATC1-1-GW; **Figure 7-31**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-AT12-1-GW-121521 (0.96 J ng/L).

PFOS, PFOA, PFBS, and PFNA were not detected in the groundwater sample collected at the Biosolid Application Field ATC-1 AOPI.

7.8.1.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field ATC-1 AOPI (APG-ATC1-1-SO; **Figure 7-31**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field ATC-1 AOPI.

7.8.2 Biosolid Application Field ATC-2

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field ATC-2 AOPI shown on **Figure 7-32** and **Tables 7-1** and **7-2**.

7.8.2.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Biosolid Application Field ATC-2 AOPI (APG-ATC2-1-GW [duplicate sample collected at APG-ATC2-1-GW]; **Figure 7-32**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOA was detected at a concentration less than the OSD risk screening level of 4 ng/L in the groundwater sample APG-ATC2-1-GW-121521 (1.0 J ng/L [1.0 J ng/L]).

PFOS, PFBS, PFHxS, and PFNA were not detected in the groundwater sample collected at the Biosolid Application Field ATC-2 AOPI.

7.8.2.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field ATC-2 AOPI (APG-ATC2-1-SO; **Figure 7-32**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field ATC-2 AOPI.

7.8.3 Biosolid Application Field S-1A

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field S-1A AOPI shown on **Figure 7-33** and **Tables 7-1** and **7-2**.

7.8.3.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Biosolid Application Field S-1A AOPI (APG-S1A-1-GW; **Figure 7-33**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOA was detected at a concentration less than the OSD risk screening level of 4 ng/L in the groundwater sample APG-S1A-1-GW-121521 (1.1 J ng/L).

PFOS, PFBS, PFHxS, and PFNA were not detected in the groundwater sample collected at the Biosolid Application Field S-1A AOPI.

7.8.3.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field S-1A AOPI (APG-S1A-1-SO; **Figure 7-33**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field S-1A AOPI.

7.8.4 Biosolid Application Field S-3

The subsections below the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field S-3 AOPI shown on **Figure 7-34** and **Tables 7-1** and **7-2**.

7.8.4.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Biosolid Application Field S-3 AOPI (APG-S3-1-GW; **Figure 7-34**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS was detected at a concentration greater than the OSD risk screening level of 4 ng/L in the groundwater sample APG-S3-1-GW-121521 (220 J ng/L)

PFOA was detected at a concentration greater than the OSD risk screening level of 6 ng/L in the groundwater sample APG-S3-1-GW-121521 (28 J ng/L).

PFBS was detected at a concentration less than the OSD risk screening level of 601 ng/L in the groundwater sample APG-S3-1-GW-121521 (2.2 J ng/L).

PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-S3-1-GW-121521 (6.0 J ng/L).

PFNA was not detected in the groundwater sample collected at the Biosolid Application Field S-3 AOPI.

7.8.4.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field S-3 AOPI (APG-S3-1-SO; **Figure 7-34**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field S-3 AOPI.

7.8.5 Biosolid Application Field E-3

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field E-3 AOPI shown on **Figure 7-35** and **Tables 7-1** and **7-2**.

7.8.5.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Biosolid Application Field E-3 AOPI (APG-E3-1-GW; **Figure 7-35**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the groundwater sample collected at the Biosolid Application Field E-3 AOPI.

7.8.5.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field E-3 AOPI (APG-E3-1-SO; **Figure 7-35**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS was detected at a concentration less than the residential OSD risk screening level of 0.013 mg/kg in the soil sample APG-E3-1-SO-(0.5-2)-121621 (0.0011 J mg/kg).

PFOA was detected at a concentration less than the residential OSD risk screening level of 0.019 mg/kg in the soil sample APG-E3-1-SO-(0.5-2)-121621 (0.00047 J mg/kg).

PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field E-3 AOPI.

7.8.6 Biosolid Application Field E-4

The subsections below summarize the groundwater and soil PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Biosolid Application Field E-4 AOPI shown on **Figure 7-36** and **Tables 7-1** and **7-2**.

7.8.6.1 Groundwater

One grab groundwater sample was collected from one boring via DPT at first-encountered groundwater at the Biosolid Application Field E-4 AOPI (APG-E4-1-GW; **Figure 7-36**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFHxS was detected at a concentration less than the OSD risk screening level of 39 ng/L in the groundwater sample APG-E4-1-GW-121621 (0.95 J ng/L).

PFOS, PFOA, PFBS, and PFNA were not detected in the groundwater sample collected at the Biosolid Application Field E-4 AOPI.

7.8.6.2 Soil

One surface soil sample was collected from one location at the Biosolid Application Field E-4 AOPI (APG-E4-1-SO; **Figure 7-36**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA soil analytical results is provided in **Table 7-2**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the soil sample collected at the Biosolid Application Field E-4 AOPI.

7.9 Canal Creek GWTP System

The subsections below summarize the groundwater PFOS, PFOA, PFBS, PFHxS, and PFNA analytical results associated with Canal Creek GWTP System shown on **Figure 7-37** and **Tables 7-1**.

7.9.1 Groundwater

One effluent groundwater sample was collected from the Canal Creek GWTP System (APG-GWTP-1-GW; **Figure 7-37**). A summary of PFOS, PFOA, PFBS, PFHxS, and PFNA groundwater analytical results is provided in **Table 7-1**.

PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in the groundwater sample collected at the Canal Creek GWTP System.

7.10 Investigation Derived Waste

The full analytical results for IDW collected during the sampling events are included in **Appendix P**. Based on the IDW analytical results from the March 2021 mobilization, IDW was collected by US Ecology

and transported off post to US Ecology's Wayne Disposal Subtitle C Landfill in Belleville, Michigan on 01 June 2021. The IDW was disposed as non-hazardous waste based on concentrations of all analyzed constituents.

IDW generated during the December 2021 mobilization was disposed of under the same waste profile as the March 2021 IDW. The generated IDW was collected by US Ecology and transported off post to US Ecology's Wayne Disposal Subtitle C Landfill in Belleville, Michigan on 24 February 2022. The full analytical results (i.e., for all constituents analyzed) for IDW samples collected during the SI are included in **Appendix P**.

7.11 TOC, pH, and Grain Size

In addition to sampling soil for PFOS, PFOA, PFBS, PFHxS, and PFNA, one soil sample per AOPI was analyzed for TOC, pH, moisture content, and grain size data as they may be useful in future fate and transport studies. The TOC in the soil samples ranged from 979 J+ mg/kg [in samples: APG-MFR1-2-SO-(8-10)-030421 and APG-ABR7-1-SO-(0-2)-030521] to 18,500 J+ mg/kg [in sample APG-ABR3-1-SO-(0-2)-030821]. The TOC at this installation was within range of typical organic content observed in topsoil (topsoil: 5,000 to 30,000 mg/kg) at most of the AOPIs. The combined percentage of fines (i.e., silt and clay) in soils at APG ranged from 18.8 to 95.4% with an average of 62.2%. 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 was between 7.3% and 26.1% with an average of 15.8% and was typical for clay (0 to 20%). The pH of the soil was neutral (approximately 7 standard units). Based on these geochemical and physical soil characteristics observed underlying the installation during the SI, PFAS constituents are expected to be relatively less mobile in soils with high percentages of fines, however depleted TOC may allow for enhanced mobility of the constituents in soil.

7.12 Blank Samples

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

7.13 Conceptual Site Models

The preliminary CSMs presented in the QAPP Addendum (Arcadis 2021) were re-evaluated and updated, if necessary, based on the SI sampling results. The CSMs presented on **Figures 7-38** through **7-63** and in this section therefore represent the current understanding of the potential for human exposure. For some AOPIs, the CSM is the same and thus shown on the same figure.

Many of the PFAS constituents found in AFFF and metal plating operations are surfactants (which do not volatilize) and are found in a charged or ionic state at environmentally-relevant pH (i.e., pH 5 to 9 standard units). PFOS, PFOA, PFBS, PFHxS, and PFNA are each negatively charged at environmentally-relevant pH. The media potentially affected by PFOS, PFOA, PFBS, PFHxS, and PFNA releases at Army installations are soil, groundwater, surface water, and sediment. Once released to the environment, a primary factor that inhibits the movement of PFAS constituents is the presence of organic matter and

organic co-constituents in soils and sediments. Generally, PFAS constituents are mobile in the potentially affected media, and they are not known to be fully broken down by natural processes.

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

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

CSMs were developed for each individual AOPI and were combined where source media, potential migration pathways and exposure media, and human exposure pathway determinations are congruent.

CSMs were developed for each individual AOPI and were combined where source media, potential migration pathways and exposure media, and human exposure pathway determinations are congruent. The following exposure pathway determinations apply to most CSMs (where applicable, exceptions are noted where each CSM figure is described):

- The AOPIs are not used for residential or recreational purposes, and they are wholly located within the installation boundaries. Therefore, the soil exposure pathways for on-installation residents and recreational users and for off-installation receptors are incomplete.
- Recreational users are not likely to contact groundwater during outdoor recreational activities. Therefore, the groundwater exposure pathway for on-installation recreational users is incomplete.
- No surface water bodies at APG are used for potable water supply. The Chesapeake Bay is classified for recreational use, but not classified for potable water use. Therefore, the surface water exposure pathways (via drinking water ingestion and dermal contact) for on-installation and off-installation drinking water receptors are incomplete.

- On-installation residents are not likely to contact surface water and sediment unless under a recreational scenario, and in that case, they would be considered “on-installation recreational users.” Therefore, the surface water and sediment exposure pathways for on-installation residents are incomplete.

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

Figure 7-38 shows the CSM for the Air Base Range 3 AOPI. AFFF was historically released to the area as part of a vehicle and aircraft testing exercise.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in soil at the Air Base Range 3 AOPI. Based on the SI sample results, the soil exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the Air Base Range 3 AOPI and the AOPI is upgradient of the HCP Supply Well Field, which is used to supply potable water to the APG-EA, Harford County, and back-up potable water to the Chapel Hill WTP. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents and for off-installation receptors are potentially complete.
- Surface water and sediment samples were not collected at this AOPI, however, surface water and shallow groundwater originating from this AOPI could discharge into Romney Creek, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in the on-post portions of Romney Creek; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Romney Creek (on post) and the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-39 shows the CSM for Hangar 1060 and PAAF – Loading Pad AOPIs. AFFF was historically released to the area as part of regular testing of an AFFF hangar suppression system and in response to an aircraft fire that occurred in 2012.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in soil at the Hangar 1060 and PAAF – Loading Pad AOPIs. Site workers (could contact constituents in soil via incidental ingestion, dermal contact, and inhalation; therefore, the soil exposure pathway for on-installation site workers is complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at these AOPIs. The AOPIs are upgradient of the HCP Supply Well Field, which is used to supply potable water to the APG-EA, Harford County, and back-up potable water to the Chapel Hill WTP. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents and for off-installation receptors are potentially complete.
- Surface water and sediment samples were not collected at these AOPIs, however, surface water and shallow groundwater originating from these AOPIs could discharge into Romney Creek, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in the on-post portions of Romney Creek; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Romney Creek (on post) and the Chesapeake Bay (off post) through incidental ingestion and dermal contact;

therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-40 shows the CSM for the PAAF – Runways AOPI. AFFF was historically released at multiple unidentified locations as part of fire department emergency response training operations around the airfield runway during the 1990s.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in soil at the PAAF – Runways AOPI. If constituents are present in soil, site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is potentially complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the PAAF – Runways AOPI and the AOPI is upgradient of the HCP Supply Well Field, which is used to supply potable water to the APG-EA, Harford County, and back-up potable water to the Chapel Hill WTP. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents and for off-installation receptors are potentially complete.
- Surface water and sediment samples were not collected at this AOPI, however, surface water and shallow groundwater originating from this AOPI could discharge into Romney Creek, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in the on-post portions of Romney Creek; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Romney Creek (on post) and the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-41 shows the CSM for the AOPIs with Groundwater Exposure at the HCP Well Field. These AOPIs include the Air Base Range 6, Biosolid Application Field A-1, B, and D, Building 1074 – Former MFRI Fire Training Area, Former Aberdeen Fire Training Area, PAAF – Aircraft Boneyard, PAAF – Airfield Fire Station Building 1059, and PAAF - Crash Truck Storage Bay Building 1065. AFFF was historically released directly upgradient of the HCP Well Field.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in soil at these AOPIs, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater, and the AOPIs are upgradient of the HCP Supply Well Field, which is used to supply potable water to the APG-EA, Harford County and back-up potable water to the Chapel Hill WTP. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents and for off-installation receptors are potentially complete.
- Surface water and sediment samples were not collected at these AOPIs, however, surface water and shallow groundwater originating from these AOPIs could discharge into Romney Creek, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in the on-post portions of Romney Creek; therefore, these exposure

pathways are incomplete. Recreational users could contact constituents in Romney Creek (on-post) and the Chesapeake Bay (off-post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-42 shows the CSM for the Air Base Range 7 and Biosolid Application Field E AOPIs. AFFF was historically released to a steel test pad as part of vehicle and aircraft testing exercises between the years of 1988 to 2005 and during application of biosolids suspected to have contained waste AFFF generated at the Aberdeen and Edgewood Area WWTPs.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in soil at the Air Base Range 7 and Biosolid Application Field E AOPIs. Based on the SI sample results, the soil exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the Air Base Range 7 and Biosolid Application Field E. The AOPIs are upgradient of the HCP Supply Well Field, which is used to supply potable water to the APG-EA, Harford County, and back-up potable water to the Chapel Hill WTP. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents and for off-installation receptors are potentially complete.
- Surface water and sediment samples were not collected at these AOPIs, however, surface water and shallow groundwater originating from these AOPIs could discharge into Romney Creek, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in the on-post portions of Romney Creek; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Romney Creek (on post) and the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-43 shows the CSM for the AA5 Range AOPI. AFFF was historically released to the area via a portable AFFF fire suppression system used to extinguish oil fires caused by vehicle testing.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in soil at the AA5 Range AOPI. If constituents are present in soil, site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is potentially complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the AA5 Range AOPI. This AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at this AOPI flows off-post in various directions into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in sediment at the AA5 Range AOPI; therefore, the sediment exposure pathway is complete, and the stormwater/surface water exposure pathway is potentially complete, for on-installation site workers. Surface runoff from this AOPI flows off-post into the Chesapeake Bay via multiple on-post surface water channels. Recreational users on- and off-post could contact constituents in surface water and sediment of the Chesapeake Bay through incidental ingestion and dermal contact; therefore, the sediment and surface water exposure pathways are potentially complete for on- and off-installation recreational users.

Figure 7-44 shows the CSM for the Poverty Island – Range 12 and Building E4040 – Aircraft Maintenance Building AOPIs. AFFF was historically released to the area through portable AFFF suppression systems used to extinguish oil fires as part of vehicle testing starting in the 1990s and during a release of 400 gallons of AFFF to both the building interior and surrounding environment from a hangar fire suppression system leak in 1998.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in soil at the Poverty Island – Range 12 and Building E4040 – Aircraft Maintenance Building AOPIs. Site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation; therefore, the soil exposure pathway for on-installation site workers is complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the Poverty Island – Range 12 and Building E4040 – Aircraft Maintenance Building AOPIs. The AOPIs are downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at these AOPIs flows off-post in various directions into the Chesapeake Bay. There are no off-post areas between the AOPIs and the Chesapeake Bay where future potable supply wells could be installed for off post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- Surface water and sediment samples were not collected at these AOPIs, however, surface water and shallow groundwater originating from these AOPIs could discharge into Romney Creek, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in the on-post portions of Romney Creek; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Romney Creek (on post) and the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-45 shows the CSM for the CASY Site and H-Field Helicopter Fire Response Area AOPIs. AFFF was historically released to the area as part of chemical vapor suppression test exercises conducted at this location in the 1990s and in response to a helicopter crash at this location.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in soil at the CASY Site and H-Field Helicopter Fire Response Area AOPIs. Based on the SI sample results, the soil exposure pathways for all receptors are incomplete.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater. The AOPIs are downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at these AOPIs flows off-post in various directions into the Chesapeake Bay. There are no off-post areas between the AOPIs and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- Surface water and sediment samples were not collected at these AOPIs, however, surface water and shallow groundwater originating from these AOPIs could discharge into Romney Creek, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in the on-post portions of Romney Creek; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Romney Creek (on post) and the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-46 shows the CSM for the EF-15 AOPI. AFFF was historically released to the area during the use of AFFF as part of ordnance suppression testing activities between the years of 2003 and 2012.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in soil at the EF-15 AOPI. If constituents are present in soil, site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is potentially complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the EF-15 AOPI. This AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at this AOPI flows off-post in various directions into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- Surface water and sediment samples were not collected at this AOPI, however, surface water and shallow groundwater originating from this AOPI could discharge into Romney Creek, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in the on-post portions of Romney Creek; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Romney Creek (on post) and the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-47 shows the CSM for the Fuze Range AOPI. AFFF was historically released to the area to extinguish tank fires following ordnance testing activities between the years of 1993 and 2013.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in soil at the Fuze Range AOPI. If constituents are present in soil, site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is potentially complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the Fuze Range AOPI. This AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at this AOPI flows off-post in various directions into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in surface water and sediment at the Fuze Range AOPI. Site workers (i.e., installation personnel) could contact constituents in surface water and sediment via ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for on-installation site workers are complete.
- Surface runoff from this AOPI flows off-post into the Chesapeake Bay via multiple on-post surface water channels proximal to the identified AOPIs. Recreational users on and off post could contact constituents in Spesutie Narrows and the Chesapeake Bay through incidental ingestion and dermal contact; therefore, the sediment and surface water exposure pathways are potentially complete for on- and off-installation recreational users.

Figure 7-48 shows the CSM for the H-Field Tank Fire Response Area AOPI. AFFF was historically released to the area in response to a tank fire at this location in 2009.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in soil at the H-Field Tank Fire Response Area AOPI. If constituents are present in soil, site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is potentially complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in groundwater at the H-Field Tank Fire Response Area AOPI. This AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at this AOPI flows off-post in various directions into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in surface water at the H-Field Tank Fire Response Area AOPI. Although site workers are not likely to contact surface water at this AOPI, the surface water exposure pathway for on-installation site workers is complete.
- Surface runoff from this AOPI flows off-post into the Chesapeake Bay via multiple on-post surface water channels proximal to the identified AOPI. Recreational users could contact constituents in surface water through incidental ingestion and dermal contact; therefore, the surface water exposure pathway is potentially complete for on- and off-installation recreational users.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in sediment at the H-Field Tank Fire Response Area AOPI. Based on the SI sample results, the sediment exposure pathways for all receptors are incomplete.

Figure 7-49 shows the CSM for the Building 2200 – Current Aberdeen Fire Station and Building 300 – Former Aberdeen Fire Station AOPIs. At Building 2200, AFFF was historically released to the area as part of fire truck AFFF tank emptying and refueling efforts, in addition to the release of residual AFFF to the fire station driveway, surrounding grass and interior and exterior stormwater inlets as a result of fire truck cleaning post-training and response. At Building 300, AFFF was historically releases to the fire station driveway and surrounding grass as a result of fire truck cleaning post-training and response.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in soil at the AOPIs, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation; therefore, the soil exposure pathway for on-installation site workers is complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the AOPIs. The Building 2200 – Current Aberdeen Fire Station AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, there are no LUCs in place that prohibit the future installation of drinking water wells downgradient of this AOPI; therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete. The Building 300 – Former Aberdeen Fire Station AOPI is upgradient of the Building 250 Supply Wells, which supply potable water to the APG-AA. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete here as well.
- Groundwater originating at the AOPIs flows off post and eventually into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water and sediment at these AOPIs. However, no surface water bodies were identified to originate or intersect with the AOPIs; therefore, the surface water and sediment exposure pathways for on-installation receptors are incomplete.
- Recreational users off-post could contact constituents in surface water and sediment of the Chesapeake Bay through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-50 shows the CSM for the Building 2308 – Fire Department Storage Building AOPI. AFFF has been stored at this location since the early 2000s and there was a suspected release of AFFF to a possible storm drain and cement cracks within the storage building.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in soil at the Building 2308 – Fire Department Storage Building AOPI. However, no direct release of AFFF to soil was documented at this AOPI. Therefore, soil is not a potential exposure medium in the CSM figure for this AOPI.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the Building 2308 – Fire Department Storage Building AOPI. This AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at this AOPI flows northeast and off-post into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water and sediment at the Building 2308 – Fire Department Storage Building AOPI. However, no surface water bodies were identified to originate or intersect with this AOPI; therefore, the surface water and sediment exposure pathways for on-installation receptors are incomplete.
- Recreational users could contact constituents in the Chesapeake Bay through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-51 shows the CSM for the Building E5005 – Edgewood Fire Department Storage, Building E5180 – Edgewood Fire Station, and G-Street Salvage Yard AOPIs. AFFF was historically stored and released to soil and pavement during nozzle testing, training exercises, fire truck AFFF tank refueling and emptying efforts, and fire truck cleaning post-training and response.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in soil at these AOPIs. Site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation; therefore, the soil exposure pathway for on-installation site workers is complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater. The AOPIs are downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at these AOPIs discharges on-post to East Branch Canal Creek and West Branch Canal Creek, and off-post into the Chesapeake Bay. There are no off-post areas between the AOPIs and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water and sediment at the Building E5005 – Edgewood Fire Department Storage, Building E5180 – Edgewood Fire Station, and G-Street Salvage Yard AOPIs. However, on-installation site workers are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in the on-post portions of East Branch Canal Creek and West Branch Canal Creek; therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete. Additionally, recreational users off post could contact constituents in surface water and sediment of the Chesapeake Bay through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-52 shows the CSM for the G-Street Plane Crash Area AOPI. AFFF was historically released in response to a plane crash at this location in 1987.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in soil at the G-Street Plane Crash Area AOPI. Based on the SI sample results, the soil exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the G-Street Plane Crash Area AOPI. This AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at this AOPI discharges on-post to East Branch Canal Creek and West Branch Canal Creek, and off-post into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water and sediment at the G-Street Plane Crash AOPI. However, on-installation site workers are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in the on-post portions of East Branch Canal Creek and West Branch Canal Creek; therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete. Additionally, recreational users off-post could contact constituents in surface water and sediment of the Chesapeake Bay through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-53 shows the CSM for the Michaelsville Landfill AOPI. AFFF was historically released to this location via disposal of wastewater treatment sludges generated at the Aberdeen Area WWTP suspected to have been impacted by AFFF wastes.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in soil at the Michaelsville Landfill AOPI. At the time of this PA/SI report, the Michaelsville Landfill is capped, and there are LUCs in place at this AOPI. The soil exposure pathways for all receptors are considered to be incomplete.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at the Michaelsville Landfill AOPI. This AOPI is upgradient of the Building 250 Supply Wells, which supply potable water to APG. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete.
- Groundwater originating at this AOPI flows north and east off post into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water or sediment at the Michaelsville Landfill AOPI. However, the main surface water body leading from this AOPI is Romney Creek, which drains into the Chesapeake Bay. Recreational users could contact constituents in Romney Creek (on-post) or the Chesapeake Bay (off-post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-54 shows the CSM for the Noble Road – Former Fire Training Area AOPI. AFFF was historically released to soil and pavement during fire training exercises that were conducted at this location in the 1990s.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in soil at the AOPI, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Additionally, the AOPI lies within a horse stable and pasture area that is likely accessed by recreational users; therefore, the soil exposure pathways for on-installation site workers and recreational users are complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater. This AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.
- Groundwater originating at this AOPI discharges on-post to East Branch Canal Creek, and off-post into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water or sediment at the Noble Road – Former Fire Training Area AOPI. On-installation site workers are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in the on-post portions of East Branch Canal Creek and West Branch Canal Creek; therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete. Additionally, recreational users off-post could contact constituents in surface water and sediment of the Chesapeake Bay through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-55 shows the CSM for the Biosolid Application Fields S-3 and S-6 AOPIs. AFFF was potentially released to the soil during application of biosolids suspected to have contained waste AFFF generated at the Aberdeen and Edgewood Area WWTPs.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in soil at the Biosolid Application Fields S-3 and S-6 AOPIs. Based on the SI sample results, the soil exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater. The AOPIs are upgradient and cross-gradient of ATC and ARL range wells, which are classified as potable and could be used by APG-AA range personnel for potable water. Wells downgradient or side-gradient of these AOPIs were sampled for PFAS in 2016 and 2019, and all samples were ND for PFOS, PFOA, PFBS, PFHxS, and PFNA. However, because there may be ongoing AFFF releases at the AOPIs and groundwater wells could be impacted in the future, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers are potentially complete. These range wells do not serve residential areas; therefore, the groundwater exposure pathway for on-installation residents is incomplete.
- Groundwater originating at these AOPIs flows off-post through the installation's southern (for the Poverty Island Minefield Range and Ford's Farm AOPIs) and northern (for the Biosolid Application Field S-6 AOPI) boundary into the Chesapeake Bay. There are no off-post areas between the AOPIs and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water or sediment at the Biosolid Application Fields S-3, and S-6 AOPIs. However, shallow groundwater originating from these AOPIs could discharge into Spesutie Narrows, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in Spesutie Narrows; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Spesutie Narrows (on post) and the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-56 shows the CSM for the Biosolid Application Field S-1A and Poverty Island – Minefield Range AOPIs. At the Biosolid Application Field S-1A AOPI, AFFF was potentially released to the soil during application of biosolids suspected to have contained waste AFFF generated at the Aberdeen and Edgewood Area WWTPs. At the Poverty Island – Minefield Range AOPI, AFFF was historically released to soil as part of vehicle testing and fire suppression exercises.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in soil at the AOPIs, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation; therefore, the soil exposure pathway for on-installation site workers is complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater at these AOPIs. The AOPIs are upgradient and cross-gradient of ATC and ARL range wells, which are classified as potable and could be used by APG-AA range personnel for potable water. Wells downgradient or side-gradient of these AOPIs were sampled for PFAS in 2016 and 2019, and all samples were ND for PFOS, PFOA, PFBS, PFHxS, and PFNA. However, because there may be ongoing AFFF

releases at the AOPIs and groundwater wells could be impacted in the future, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers are potentially complete. These range wells do not serve residential areas; therefore, the groundwater exposure pathway for on-installation residents is incomplete.

- Groundwater originating at these AOPIs flows off-post through the installation's southern (for the Poverty Island Minefield Range AOPI) and northern (for the Biosolid Application Field S-6 AOPI) boundary into the Chesapeake Bay. There are no off-post areas between the AOPIs and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water or sediment at these AOPIs. However, shallow groundwater originating from these AOPIs could discharge into Spesutie Narrows or Romney Creek, which eventually drain into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in these water features; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Spesutie Narrows or Romney Creek (both on-post) and the Chesapeake Bay (off-post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-57 shows the CSM for the Ford's Farm AOPI. AFFF was historically released to soil as part of a fire suppression exercise and in response to a tank fire.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in soil at the Ford's Farm AOPI. If constituents are present in soil, site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is potentially complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in groundwater at the Ford's Farm AOPI. Based on the SI sample results, the groundwater exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water or sediment at the Ford's Farm. Shallow groundwater originating from this AOPI could discharge into Romney Creek, which drains into the Chesapeake Bay. However, considering that PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in groundwater, the surface water and sediment exposure pathways are considered to be incomplete.

Figure 7-58 shows the CSM for the Building E4081 – Army Aviation Support Facility AOPI. AFFF was historically released to sanitary sewer lines as part of regular hangar fire suppression system tests from 1977 onwards.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in soil at the Building E4081 – Army Aviation Support Facility AOPI. Based on the SI sample results, the soil exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater. The AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater is potentially captured by the Canal Creek Extraction Wells and used as process water for steam generation. Treated effluent used for steam generation was sampled

for PFOS, PFOA and PFBS in 2019. The effluent sample was ND for all three compounds; however, there is noted potential for breakthrough of PFAS in the system. Therefore, the groundwater exposure pathway via dermal contact with process water for on-installation site workers is potentially complete. Additionally, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.

- Groundwater not collected by the Canal Creek GWTP system flows southwest through the APG-EA and off-post into the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in surface water at the Building E4081 – Army Aviation Support Facility AOPI. AFFF released during suppression system tests at this AOPI was funneled into Retention Pond #1 and Retention Pond #2, located north and east of Building E4081. Site workers could contact constituents in Retention Pond #1 and #2 via incidental ingestion and dermal contact; therefore, the surface water exposure pathway for on-installation site workers is complete.
- Groundwater originating from this AOPI is either extracted and treated by the Canal Creek GWTP system and released via effluent line directly into East Branch Canal Creek or flows south and off-post into the Chesapeake Bay. Treated effluent samples taken from the GWTP system were all ND for PFOS, PFOA and PFBS, and recreational users are unlikely to contact constituents in East Branch Canal Creek (on post). Therefore, the surface water exposure pathway for on-installation recreational users is incomplete. Recreational users could contact constituents in the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water exposure pathway for off-installation recreational users is potentially complete.
- While PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in sediment at the Building E4081 – Army Aviation Support Facility AOPI, there is a potential for desorption of the PFOS, PFOA, PFBS, PFHxS, and PFNA from surface water to sediment. Therefore, the sediment exposure pathways for on-installation site workers and for off-installation recreational users are potentially complete.

Figure 7-59 shows the CSM for the Weide Airfield – Tarmac AFFF Release Area AOPI. AFFF was historically released to soil and pavement during a foam training and verification exercise sometime in the 1970s.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in soil at this AOPI. Based on the SI sample results, the soil exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in groundwater. The AOPI is downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater is potentially captured by the Canal Creek Extraction Wells and used as process water for steam generation. Treated effluent used for steam generation was sampled for PFOS, PFOA and PFBS in 2019. The effluent sample was ND for all three compounds; however, there is noted potential for breakthrough of PFAS in the system. Therefore, the

groundwater exposure pathway via dermal contact with process water for on-installation site workers is potentially complete. Additionally, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water or sediment at the Weide Airfield – Tarmac AFFF Release Area AOPI. Treated effluent from the Canal Creek GWTP system can be released via effluent line directly into East Branch Canal Creek. Treated effluent samples taken from the GWTP system were all ND for PFOS, PFOA and PFBS, and recreational users are unlikely to contact constituents in East Branch Canal Creek (on post). Therefore, the surface water and sediment exposure pathways for on-installation site workers and recreational users are incomplete.
- Groundwater not collected by the Canal Creek GWTP system would flow south and off-post to the Chesapeake Bay. There are no off-post areas between the AOPI and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for off-installation receptors are incomplete.
- Recreational users off-post could contact constituents in the Chesapeake Bay through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-60 shows the CSM for the Biosolid Application Field A-2, A-3, C-1, C-2, C-3, F, G, H, and I AOPIs. AFFF was potentially released to the soil during application of biosolids suspected to have contained waste AFFF generated at the Aberdeen and Edgewood Area WWTPs.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in soil at the above mentioned Biosolid Application Field AOPIs. If constituents are present in soil, site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is potentially complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in groundwater at the above mentioned Biosolid Application Field AOPIs. However, the AOPIs are upgradient of the HCP Supply Well Field, which is used to supply potable water to the APG-EA, Harford County and back-up potable water to the Chapel Hill WTP. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents and for off-installation receptors are potentially complete.
- Surface water and sediment samples were not collected at the above mentioned Biosolid Application Field AOPIs. Surface water and shallow groundwater originating from these AOPIs could discharge into Romney Creek, which drains into the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment in the on-post portions of Romney Creek; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Romney Creek (on post) and the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Figure 7-61 shows the CSM for the Biosolid Application Field E-3 AOPI. AFFF was potentially released to the soil during application of biosolids suspected to have contained waste AFFF generated at the Aberdeen and Edgewood Area WWTPs.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were detected in soil at the AOPI, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is complete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in groundwater at the Biosolid Application Field E-3 AOPI. Based on the SI sample results, the groundwater exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water or sediment at the Biosolid Application Field E-3 AOPI. Shallow groundwater originating from this AOPI could discharge into Gunpowder River, which drains into the Chesapeake Bay. However, considering that PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in groundwater, the surface water and sediment exposure pathways are considered to be incomplete.

Figure 7-62 shows the CSM for the Biosolid Application Field ATC-1, ATC-2, and E-6 AOPIs. AFFF was potentially released to the soil during application of biosolids suspected to have contained waste AFFF generated at the Aberdeen and Edgewood Area WWTPs.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in soil at the Biosolid Application Field ATC-1, ATC-2, and E-6 AOPIs. Based on the SI sample results, the soil exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in groundwater at the Biosolid Application Field ATC-1, ATC-2, and E-6 AOPIs. Based on the SI sample results, the groundwater exposure pathways for all receptors are incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water or sediment at the Biosolid Application Field ATC-1, ATC-2, and E-6 AOPIs. Shallow groundwater originating from these AOPIs drains into the Chesapeake Bay via Romney Creek or Gunpowder River. However, considering that PFOS, PFOA, PFBS, PFHxS, and PFNA were not detected in groundwater, the surface water and sediment exposure pathways are considered to be incomplete.

Figure 7-63 shows the CSM for the Biosolid Application Field E-1, E-2, E-4, S-2, and S-5 AOPIs. AFFF was potentially released to the soil during application of biosolids suspected to have contained waste AFFF generated at the Aberdeen and Edgewood Area WWTPs.

- Soil samples were not collected from the above mentioned Biosolid Application Field AOPIs because PFOS, PFOA, PFBS, PFHxS, and PFNA release to these biosolid application fields could not be confirmed. If constituents are present in soil, site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation. Therefore, the soil exposure pathway for on-installation site workers is potentially complete.
- These AOPIs are downgradient of and unlikely to affect drinking water wells used to supply potable water at APG. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to consider the potential future use of downgradient on-post groundwater as a potable water source.

- Groundwater originating at these AOPIs flows off-post in various directions into the Chesapeake Bay. There are no off-post areas between the AOPIs and the Chesapeake Bay where future potable supply wells could be installed for off-post use. Therefore, the groundwater exposure pathway for off-installation receptors is incomplete.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were not sampled in surface water or sediment at the above mentioned Biosolid Application Field AOPIs. However, surface water and shallow groundwater originating from these AOPIs could discharge directly into the Chesapeake Bay, or into Bush River which eventually discharges to the Chesapeake Bay. On-installation site workers are not likely to contact surface water and sediment off-post; therefore, these exposure pathways are incomplete. Recreational users could contact constituents in Bush River or the Chesapeake Bay (off post) through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on- and off-installation recreational users are potentially complete.

Following the SI sampling, 46 of the 57 AOPIs were considered to have complete or potentially complete exposure pathways. Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for RI is based on the comparison of analytical results for PFOS, PFOA, PFBS, PFHxS, and PFNA to the OSD risk screening levels (**Table 6-2**).

8 CONCLUSIONS AND RECOMMENDATIONS

The PFAS PA/SI included two distinct efforts. The PA identified AOPIs at APG 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, PFBS, PFHxS, and PFNA to the environment occurred.

OSD provided residential risk screening levels based on the USEPA oral reference dose for PFOS, PFOA, PFBS, PFHxS, and PFNA in soil and groundwater (tap water) and industrial/commercial risk screening levels for PFOS, PFOA, PFBS, PFHxS, and PFNA in soil (**Appendix A**). A combination of document review, internet searches, interviews with installation personnel, and an installation PA site visit were used to identify specific areas of suspected PFOS, PFOA, PFBS, PFHxS, and PFNA use, storage, and/or disposal at APG. Following the evaluation, 57 AOPIs were identified.

Forty-two AOPIs were sampled as part of the SI at APG to identify presence or absence of PFOS, PFOA, PFBS, PFHxS, and PFNA at each AOPI. Of the six PFAS compounds presented in the 06 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at APG because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS. The SI scope of work was completed in accordance with the Final PQAPP (Arcadis 2019) and the APG QAPP Addendum (Arcadis 2021). Forty AOPIs sampled as part of the SI had detections of PFOS, PFOA, PFBS, PFHxS, and PFNA in soil, groundwater, surface water, and/or sediment and 35 of the 40 AOPIs sampled as part of this SI exhibited exceedances OSD risk screening levels for tap water and soil.

One AOPI was not sampled under the Army PFAS PA/SI program, but historical data showed OSD exceedances of PFOS and PFOA. Recommendations for this AOPI are based on PFOS and PFOA data collected as part of an RI conducted in the Canal Creek area of APG (ECC 2018). The analytical results of this RI, supplemented by comparison to OSD risk screening levels in this PA/SI Report, are considered sufficient to complete SI requirements under CERCLA. Analytical data associated with this AOPI have been incorporated into the data summaries presented below:

- Sixty-nine out of 73 collected groundwater samples had detections of PFOS, PFOA, PFBS, PFHxS, and PFNA. 63 out of 73 groundwater samples collected had PFOS, PFOA, PFBS, PFHxS, and/or PFNA detections above their respective OSD risk screening levels (4 ng/L, 6 ng/L, 601 ng/L, 39 ng/L, and 6 ng/L). The maximum groundwater detection for PFOS was observed at the AA5 range (64,000 EJ ng/L for PFOS), above the OSD risk screening level. The maximum groundwater detection for PFOA was observed at the G-Street Salvage Yard (45,300 ng/L) (ECC 2018), above the OSD screening level. The maximum Army PA/SI groundwater detection for PFOA was observed at the Former Aberdeen Fire Training Area (27,000 ng/L for PFOA), above the OSD screening level. The maximum groundwater detection for PFBS was observed at the AA5 Range (5,000 ng/L for PFBS), above the OSD screening level. The maximum groundwater detection for PFHxS was observed at the AA5 Range (42,000 ng/L for PFHxS), above the OSD

screening level. The maximum groundwater detection for PFNA was observed at the Former Aberdeen Fire Training Area (6,600 ng/L for PFNA), above the OSD screening level.

- Thirty-six out of 54 collected soil samples had detections of PFOS, PFOA, PFBS, PFHxS, and PFNA. Nine out of 54 soil samples collected had PFOS, PFOA, PFBS, PFHxS, and/or PFNA detections above their respective residential OSD risk screening levels (0.013 mg/kg, 0.019 mg/kg, 1.9 mg/kg, 0.13 mg/kg, and 0.019 mg/kg). The maximum soil detection for PFOS was observed at PAAF – Airfield Station Building 1059 (0.14 mg/kg for PFOS), above the OSD risk screening level. The maximum soil detection for PFOA was observed at Building 300 – Former Aberdeen Fire Station and Building 250 Potable Supply Wells and Biosolid Application Field B (0.0023 mg/kg), below the OSD screening level. There were no soil samples above the limit of detection for PFBS. The maximum soil detection for PFHxS was observed at Air Base Range 6 (0.01 mg/kg), below the OSD screening level. The maximum soil detection for PFNA was observed at Air Base Range 6 (0.0076 mg/kg), below the OSD screening level.
- All four collected surface water samples had detections of PFOS, PFOA, PFBS, PFHxS, and PFNA. The maximum surface water detection for PFOS, PFOA, PFHxS, and PFNA was observed at Fuze Range, at concentrations of 400 ng/L, 930 ng/L, 530 ng/L, and 540 ng/L, respectively. The maximum surface water detection for PFBS was observed at Building E4081 – Army Aviation Support Facility (14 ng/L for PFBS).
- Two out of five collected sediment samples had detections of PFOS, PFOA, PFBS, PFHxS, and PFNA. Two out of five sediment samples collected had PFOS, PFOA, PFBS, PFHxS, and/or PFNA detections above their respective residential OSD risk screening levels (0.013 mg/kg, 0.019 mg/kg, 1.9 mg/kg, 0.13 mg/kg, 0.019 mg/kg). The maximum sediment detection for PFOS was observed at AA5 Range (0.067 J mg/kg for PFOS), above the OSD risk screening level. The maximum sediment detection for PFOA, PFHxS, and PFNA was observed at Fuze Range at concentrations of 0.019 mg/kg, 0.008 mg/kg, and 0.03 mg/kg, respectively. PFOA and PFNA concentrations were above their respective OSD screening levels. There were no sediment samples above the limit of detection for PFBS.

Additionally, groundwater samples collected from 12 existing monitoring wells, five existing supply wells, and the Canal Creek GWTP system effluent were sampled for PFOS, PFOA, PFBS, PFHxS, and PFNA at APG. Results indicated that:

- Ten of the 12 groundwater samples collected from existing monitoring wells had PFOS, PFOA, PFBS, PFHxS, and PFNA detections. Nine of the 12 monitoring well samples had PFOS, PFOA, PFBS, PFHxS, and PFNA detections above their respective OSD risk screening levels (4 ng/L, 6 ng/L, 601 ng/L, 39 ng/L, and 6 ng/L). The maximum groundwater detection for PFOS was observed at the Biosolid Application Field A-1 (11,000 ng/L for PFOS), above the OSD risk screening level. The maximum groundwater detection for PFOA was observed at the Former Aberdeen Fire Training Area (6,600 ng/L for PFOA), above the OSD risk screening level. The maximum groundwater detection for PFBS was observed at the Former Aberdeen Fire Training Area (160 ng/L for PFBS), below the OSD risk screening level. The maximum groundwater detection for PFHxS was observed at the Former Aberdeen Fire Training Area (3,100 ng/L for PFHxS), above the OSD risk screening level. The maximum groundwater detection for PFNA was

observed at the Former Aberdeen Fire Training Area (1,700 ng/L for PFNA), above the OSD risk screening level.

- PFOS, PFOA, PFBS, PFHxS, and PFNA were ND in all groundwater samples collected from the Building 250 supply wells.
- PFOS, PFOA, PFBS, PFHxS, and PFNA were ND in the effluent sample collected from the Canal Creek GWTP system.

Twenty-five land parcels were identified across APG-AA and APG-EA that were permitted to receive biosolid sludges generated at the Aberdeen and Edgewood Area WWTPs. Five of these Biosolid Application Field (A-1, B, D, E and S-6) AOPIs were confirmed to have received biosolids.

- Five of the 25 Biosolid Application Field AOPIs (A-1, B, D, E and S-6) were sampled in March 2021 and exhibited detections of PFOS, PFOA, PFBS, PFHxS, and PFNA at concentrations above their respective OSD risk screening levels; however, Biosolid Application Field AOPIs A-1, B, D and E are located hydraulically downgradient and cross-gradient of other identified AOPIs that exhibited detections of PFOS, PFOA, PFBS, PFHxS, and/or PFNA at concentrations many orders of magnitude higher than their respective OSD risk-screening levels.
- Six of the remaining 20 Biosolid Application Field AOPIs (ATC-1, ATC-2, S-1A, S-3, E-3, and E-4) were sampled as part of a supplemental mobilization conducted in December 2021. One of the six additional biosolid application fields (S-3) exhibited detections of PFOS, PFOA, PFBS, PFHxS, and/or PFNA at concentrations above their respective OSD risk screening levels.
- Fourteen Biosolid Application Field AOPIs were not sampled as part of the SI due to the lack of evidence indicating biosolid application. These Biosolid Application Field AOPIs may warrant further investigation to determine the presence or absence of PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA at these areas.

Following the SI sampling, 46 of the 57 AOPIs were considered to have complete or potentially complete exposure pathways. The soil exposure pathway for on-installation site workers was determined to be complete at 14 AOPIs based on detected concentrations of PFOS, PFOA, PFBS, PFHxS, and PFNA in the SI soil samples. The soil exposure pathway for on-installation site workers were determined to be potentially complete at an additional 20 AOPIs. The groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation receptors were considered to be potentially complete at 44 AOPIs. Based on the presence of PFOS, PFOA, PFBS, PFHxS, and PFNA in groundwater originating at the AOPIs, groundwater flow direction away from the AOPIs, and the absence of LUCs preventing potable use of the off-post groundwater, the groundwater exposure pathways for off-installation drinking water receptors were considered to be potentially complete at 16 AOPIs. The surface water exposure pathways for on-installation receptors were complete or potentially complete at 40 AOPIs, and sediment exposure pathways for on-installation receptors were complete or potentially complete at 39 AOPIs. For off-post recreational users, the surface water and sediment exposure pathways were considered to be potentially complete for 44 and 43 AOPIs, respectively.

Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for future study or no action at this time is based on the comparison of the SI analytical results for PFOS, PFOA, PFBS, PFHxS, and PFNA in groundwater and soil/sediment to the OSD risk

screening levels (**Table 6-2**). **Table 8-1** below summarizes the AOPIs identified at APG, PFOS, PFOA, PFBS, PFHxS, and PFNA sampling and recommendations for each AOPI; further investigation is warranted at APG. In accordance with CERCLA, site-specific risk will be assessed during a future phase to evaluate whether remedial actions are required.

AOPI Recommendations

Thirty-six of the 57 AOPIs are recommended for further study in a RI. A brief summary of the rationale detailing future recommendation decisions are presented below:

- PFOS, PFOA, PFBS, PFHxS and/or PFNA were detected in soil, groundwater, surface water and/or sediment at 40 of the 42 AOPIs sampled as part of the Army PFAS PA/SI. 35 of these 42 AOPIs had PFOS, PFOA, PFBS, PFHxS and/or PFNA present in groundwater, soil, or sediment at concentrations greater than the risk-based screening levels and are therefore recommended for further study in a RI.
- One AOPI, the G-Street Salvage Yard and Former Fire Training Area, is recommended for further study in a RI based on PFOS and PFOA data collected as part of a 2018 RI (ECC 2018). The analytical results of this historic RI, supplemented by comparison to OSD risk screening levels in this PA/SI Report, are considered sufficient to complete SI requirements under CERCLA.
- Seven of the 57 AOPIs that exhibited non-detects or concentrations of PFOS, PFOA, PFBS, PFHxS, and/or PFNA below their respective OSD risk screening values in groundwater, soil, and/or sediment are recommended for no action at this time.
- Based on a lack of sampling data and/or uncertainties surrounding source identification, fourteen biosolid application field AOPIs may warrant further investigation. Rationale for the fourteen AOPIs that may warrant further investigation is detailed below:

Biosolid Application Field – Future Investigation Determinations

As detailed in **Section 7.8**, PFAS presence or absence determinations at Biosolid Application Fields A-1, B, D and E were deemed inconclusive due to the fields' proximity to neighboring AOPIs that exhibited OSD risk screening level exceedances in groundwater. An additional six Biosolid Application Field AOPIs located hydraulically upgradient or geographically away from other AOPIs were sampled to more accurately assess PFOS, PFOA, PFBS, PFHxS, and PFNA presence or absence due to the application of biosolids at APG.

The results of the supplemental sampling effort identified one biosolid application field (S-3) that exhibited concentrations of PFOS and PFOA in exceedance of their respective OSD tap water risk screening levels. The remaining five biosolid application fields were either non-detect for PFAS, or exhibited concentrations of PFOS, PFOA, and/or PFHxS below their respective OSD tap water and residential soil risk screening levels. Uncertainty remains on the presence or absence of PFAS in the fourteen biosolid application fields across APG that were not sampled during the SI; therefore, these fourteen biosolid application fields at APG may warrant further investigation to more thoroughly evaluate the presence or absence of PFAS attributed to the application of biosolids.

Northern Cantonment Area - Aberdeen

As detailed in **Section 2.12**, samples collected from monitoring wells located within the Northern Aberdeen Cantonment Area of APG as part of the 2017 City of Aberdeen Source Water Protection Assessment in April 2017 exhibited PFOS, PFOA and PFHxS concentrations in groundwater in

exceedance of their respective OSD tap water risk screening levels. Based on groundwater flow direction, PFAS may be migrating into this area and on-post from unknown off-post sources.

Table 8-1. Summary of AOPIs Identified during the PA, PFOS, PFOA, PFBS, PFHxS, and PFNA Sampling at Aberdeen Proving Ground and Recommendations

AOPI Name	PFOS, PFOA, PFBS, PFHxS, and PFNA detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Air Base Range (ABR) 3	Yes	Yes	Further study in a remedial investigation
ABR 6	Yes	Yes	Further study in a remedial investigation
ABR 7	Yes	ND	Further study in a remedial investigation
PAAF Runways	Yes	NS	Further study in a remedial investigation
PAAF – Aircraft Boneyard	Yes	No	Further study in a remedial investigation
Former Aberdeen Fire Training Area	Yes	Yes	Further study in a remedial investigation
Building 1074 – Former Maryland Fire and Rescue Institute (MFRI) Fire Training Area	Yes	No	Further study in a remedial investigation
PAAF – Airfield Fire Station Building 1059	Yes	Yes	Further study in a remedial investigation
PAAF – Hangar 1060	Yes	Yes	Further study in a remedial investigation
PAAF – Crash Truck Storage Bay Building 1065	Yes	No	Further study in a remedial investigation
PAAF – Loading Pad	Yes	No	Further study in a remedial investigation
Michaelsville Landfill	Yes	NS	Further study in a remedial investigation
Building 300 – Former Aberdeen Fire Station and Building 250 - Potable Supply Wells	Yes	Yes	Further study in a remedial investigation
Building 2200 – Current Aberdeen Fire Station	Yes	No	Further study in a remedial investigation
Building 2308 – Fire Department Storage Building	Yes	NS	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, PFBS, PFHxS, and PFNA detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
AA5 Range	Yes	NS	Further study in a remedial investigation
Poverty Island - Minefield Range	Yes	No	Further study in a remedial investigation
Poverty Island - Range 12	Yes	No	Further study in a remedial investigation
Ford's Farm	ND	NS	No action at this time
EF-15	Yes	NS	Further study in a remedial investigation
Fuze Range	Yes	NS	Further study in a remedial investigation
Building E5005 - Edgewood Fire Department Storage	Yes	No	Further study in a remedial investigation
Building E5180 – Edgewood Fire Station	Yes	Yes	Further study in a remedial investigation
CASY Site	Yes	ND	Further study in a remedial investigation
G-Street Plane Crash Area	Yes	ND	Further study in a remedial investigation
G-Street Salvage Yard and Former Fire Training Area[1]	Yes[1]	Yes[1]	Further study in a remedial investigation
Noble Road – Former Fire Training Area	Yes	Yes	Further study in a remedial investigation
Building E4040 – Aircraft Maintenance Building	Yes	No	Further study in a remedial investigation
Building E4081 – Army Aviation Support Facility	Yes	ND	Further study in a remedial investigation
Weide Airfield – Tarmac AFFF Release Area	Yes	ND	Further study in a remedial investigation
H-Field – Helicopter Fire Response Area	Yes	ND	Further study in a remedial investigation
H-Field – Tank Fire Response Area	NS	NS	No action at this time. Sampled media is not applicable to the OSD risk screening levels for tap water/soil.
Biosolid Application Field A-1	Yes	No	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, PFBS, PFHxS, and PFNA detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Biosolid Application Field A-2	NS	NS	May warrant further investigation
Biosolid Application Field A-3	NS	NS	May warrant further investigation
Biosolid Application Field B	Yes	Yes	Further study in a remedial investigation
Biosolid Application Field D	Yes	No	Further study in a remedial investigation
Biosolid Application Field C-1	NS	NS	May warrant further investigation
Biosolid Application Field C-2	NS	NS	May warrant further investigation
Biosolid Application Field C-3	NS	NS	May warrant further investigation
Biosolid Application Field E	Yes	ND	Further study in a remedial investigation
Biosolid Application Field F	NS	NS	May warrant further investigation
Biosolid Application Field G	NS	NS	May warrant further investigation
Biosolid Application Field H	NS	NS	May warrant further investigation
Biosolid Application Field I	NS	NS	May warrant further investigation
Biosolid Application Field ATC-1	ND	ND	No action at this time
Biosolid Application Field ATC-2	No	ND	No action at this time
Biosolid Application Field S-1A	No	ND	No action at this time
Biosolid Application Field S-2	NS	NS	May warrant further investigation
Biosolid Application Field S-3	Yes	ND	Further study in a remedial investigation
Biosolid Application Field S-5	NS	NS	May warrant further investigation
Biosolid Application Field S-6	Yes	ND	Further study in a remedial investigation
Biosolid Application Field E-1	NS	NS	May warrant further investigation
Biosolid Application Field E-2	NS	NS	May warrant further investigation
Biosolid Application Field E-3	ND	No	No action at this time
Biosolid Application Field E-4	ND	ND	No action at this time
Biosolid Application Field E-6	NS	NS	May warrant further investigation

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

[1] - AOPI was not sampled under the Army PFAS PA/SI program, but historical data showed OSD exceedances of PFOS and PFOA. Recommendations are based solely on data collected separately from a 2018 RI (ECC 2018). The analytical results of this investigation supplemented by comparison to OSD risk screening levels in this PA/SI Report, are considered sufficient to complete SI requirements under CERCLA.

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, PFBS, PFHxS, and PFNA at APG are discussed below.

A comprehensive well survey was not completed as part of this PA; therefore, the information reviewed regarding off-post wells is limited to what is contained in off-post well search results (**Appendix E**) and potable supply well information provided by APG representatives. The searches for ecological receptors and off-post PFOS, PFOA, PFBS, PFHxS, and PFNA sources were not exhaustive and were limited to easily identifiable and readily available information evaluated during the relevant documents research, installation personnel interviews, and site reconnaissance.

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

Finally, the available PFOS, PFOA, PFBS, PFHxS, and PFNA analytical data is limited to historical analytical results collected from on-post drinking water supply sources, one APG-EA fire training area, on-post monitoring wells located hydraulically upgradient of off-post drinking water supply sources, and off-post drinking water supply sources. The available data is further limited to results from groundwater samples from existing monitoring wells at six of the 42 sampled AOPIs, grab-groundwater samples from 38 of the 42 sampled AOPIs, surface soil from 34 of the 42 sampled AOPIs, surface water samples from three of the 42 sampled AOPIs, and sediment samples from four of the 42 sampled AOPIs. No residential wells or private wells were sampled as part of the SI. Available data, including PFOS, PFOA, PFBS, PFHxS, and PFNA, is listed in **Appendix P**, which were analyzed per the selected analytical method. HFPO-DA was not in the suite of PFAS compounds analyzed during the SI at APG; therefore, there are no HFPO-DA SI analytical results to screen against the 2022 OSD risk screening levels.

Results from this PA/SI indicate further study through a RI is warranted at APG in accordance with the guidance provided by the OSD.

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10 ACRONYMS

%	percent
ABR	Air Base Range
AFFF	aqueous film-forming foam
AOPI	area of potential interest
APG	Aberdeen Proving Ground
APG-AA	Aberdeen Proving Ground Aberdeen Area
APG-EA	Aberdeen Proving Ground Edgewood Area
AR	Alcohol Resistant
Arcadis	Arcadis U.S., Inc.
ARL	Army Research Laboratory
Army	United States Army
ATC	Aberdeen Test Center
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
btc	below top of casing
BLCSL	Buried Legacy Chemical Sewer Lines
CAP	City of Aberdeen Production
CASY	Chemical Agent Storage Yard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	conceptual site model
DoD	Department of Defense
DPT	direct-push technology
DQO	data quality objective
DUSR	Data Usability Summary Report
EB	equipment blank
ECBC	Edgewood Chemical Biological Center
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
FCR	Field Change Report

FFS	Focused Feasibility Study
GAC	granular activated carbon
GIS	geographic information system
GW	groundwater
GWTP	groundwater treatment plant
HCP	Harford County Production
HFPO-DA	hexafluoropropylene oxide dimer acid
HHRA	Human Health and Risk Assessment
HQAES	Headquarters Army Environmental System
ID	identification
IDW	investigation-derived waste
IMCOM	Installation Management Command
installation	United States Army or Reserve installation
IRP	Installation Restoration Program
LOD	limit of detection
LOQ	limit of quantitation
LTM	long term management
LUC	land-use control
MDARNG	Maryland Army National Guard
MDE	Maryland Department of Environment
MFRI	Maryland Fire and Rescue Institute
mg/kg	milligrams per kilogram (parts per million)
MIL-SPEC	military specific
NCR	non-conformance report
ND	non-detect
ng/L	nanograms per liter (parts per trillion)
NS	not sampled
OSD	Office of the Secretary of Defense
OU	Operable Unit
OWS	oil-water separator
PA	preliminary assessment

PAAF	Phillips Army Airfield
PAH	polycyclic aromatic hydrocarbon
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexane sulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
POC	point of contact
POL	Petroleum, Oil, and Lubricant
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PQAPP	Programmatic Uniform Federal Policy-Quality Assurance Project Plan
PW	production well
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
Qt	Quaternary terrace
RAO	remedial action operation
RCRA	Resource Conservation and Recovery Act
RDX	cyclotrimethylenetrinitramine
RI	remedial investigation
ROD	Record of Decision
RSL	Regional Screening Level
SE	sediment
SI	site inspection
SO	soil
SOP	standard operating procedure
SSHP	Site Safety and Health Plan

SW	surface water
TGI	technical guidance instruction
TOC	total organic carbon
UCMR3	Unregulated Contaminant Monitoring Rule
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USAG	United States Army Garrison
USAPHC	United States Army Public Health Command
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WTP	water treatment plant
WWI	World War I
WWII	World War II
WWTP	wastewater treatment plant

TABLES

Table 2-1 On-Post Potable Water Wells
USAEC PFAS Preliminary Assessment /Site Inspection
Aberdeen Proving Ground, Maryland

ARCADIS

Potable Supply Well Owner/Operator	Well Identification	Coordinates		Screened Interval (ft bgs)	Total Depth (ft bgs)
		Latitude	Longitude		
ATC / ARL	HA-93-0750	NP	NP	267 - 277	277
	HA-94-5829	NP	NP	226 - 231	231
	HA-94-5828	NP	NP	195 - 200	200
	HA-73-5829	NP	NP	102 - 112	112
	HA-95-1246	NP	NP	149 - 159	159
	HA-93-0180	NP	NP	138 - 145	145
	HA-94-4074	NP	NP	169 - 174	174
	HA-94-4075	NP	NP	168 - 173	173
	HA-93-0914	NP	NP	170 - 175	175
	HA-81-0062	NP	NP	215 - 225	225
	HA-11-0086	NP	NP	NA	NA
	HA-73-6230	NP	NP	165 - 180	180
	EF-7	NP	NP	NA	NA
	EF-7A	NP	NP	NA	NA
	HA-94-4076	NP	NP	142 - 147	147
	HA-93-0913	NP	NP	125 - 130	130
	HA-73-5410	NP	NP	60 - 70	70
Harford County	HCP-01	NP	NP	NA	NA
	HCP-02	NP	NP	NA	NA
	HCP-04	NP	NP	NA	NA
	HCP-05	NP	NP	NA	NA
	HCP-06	NP	NP	NA	NA
	HCP-08	NP	NP	NA	NA
	HCP-09	NP	NP	NA	NA
City of Aberdeen	CAP-01	NP	NP	NA	NA
	CAP-2R	NP	NP	NA	NA
	CAP-03	NP	NP	NA	NA
	CAP-04	NP	NP	NA	NA
	CAP-05	NP	NP	NA	NA
	CAP-06	NP	NP	NA	NA
	CAP-07	NP	NP	NA	NA
	CAP-08	NP	NP	NA	NA
	CAP-09	NP	NP	NA	NA
	CAP-10	NP	NP	NA	NA
	CAP-11	NP	NP	NA	NA
	CAP-12	NP	NP	NA	NA
	CAP-13	NP	NP	NA	NA
	CAP-14	NP	NP	NA	NA
Building 250 Supply Wells	PW-1	NP	NP	281-343	343
	PW-2	NP	NP	265-342	342
	PW-3	NP	NP	228-265	268
	PW-4	NP	NP	280-311	311
	PW-5	NP	NP	187-239	342

*Denotes well where only screen length was available

Acronyms and Abbreviations:
AOPI = area of potential interest
ARL = Army Research Laboratory
ATC = Aberdeen Test Center
bgs = below ground surface
ft = feet
msl = mean sea level
NA = not available
NP = not provided

Table 2-2 Historical PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

		PFOS (ng/L)	PFOA (ng/L)	PFBS (ng/L)	PFHxS (ng/L)	PFNA (ng/L)
OSD Tapwater RiskScreening Level		4	6	601	39	6
Sample ID	Sample Date	Result	Result	Result	Result	Result
B250 PW-1	06/20/2019	ND (ND)	**2.4 (1.8)**	ND (ND)	ND (ND)	ND (ND)
B250 PW-2	06/20/2019	ND	ND	ND	ND	ND
B250 PW-3	06/20/2019	ND	ND	ND	ND	ND
B250 PW-4	06/20/2019	NS	NS	NS	NS	NS
B250 PW-5	06/20/2019	**1.4 J**	**0.50 J**	ND	ND	ND
CC-039A	03/08/2017	**71.2 J**	**36900 J**	NS	NS	NS
CC-039B	03/09/2017	**2.21 J (3.1 J)**	**365 (335)**	NS (NS)	NS	NS
CCMW46-1	03/08/2017	**33.6**	**140**	NS	NS	NS
CCMW46-2	03/06/2017	ND	**38.6**	NS	NS	NS
CCMW46-3	03/07/2017	ND	ND	NS	NS	NS
CCMW46-5	03/08/2017	**52.3**	**1110**	NS	NS	NS
CCMW46-6	03/08/2017	**125**	**2370**	NS	NS	NS
CCMW46-7	03/08/2017	ND	**94.6**	NS	NS	NS
CCMW46-8A	03/08/2017	**88.5**	**1130**	NS	NS	NS
CCMW46-8B	03/08/2017	ND (ND)	**2.15 J (2.1 J)**	NS (NS)	NS	NS
CC-INF-121219	12/12/2019	**2.39**	**9.63**	**0.804 J**	**6.96**	ND
CC-BCU-121219	12/12/2019	ND	**2.42**	**0.754 J**	**3.87**	ND
CC-EFF-121219	12/12/2019	ND	ND	ND	ND	ND
CITY-06	04/2017	**2.54**	ND	ND	ND	ND
HA-94-5830	06/04/2019	ND	ND	ND	ND	ND
HA-95-1098	06/04/2019	ND	ND	ND	ND	ND
HA-94-5829	06/04/2019	ND	ND	ND	ND	ND
HA-93-0750	07/03/2019	ND	**2.9**	**3.8**	ND	ND
HA-93-0750	12/15/2020	ND	ND	ND	ND	ND
EF-7	09/21/2016	**2.1**	ND	ND	ND	ND
EF-8	11/14/2016	ND	ND	ND	ND	ND
EF-9	12/15/2020	ND	ND	ND	ND	ND
EF-7A	09/21/2016	ND	ND	ND	ND	ND
EF-7A	11/14/2016	ND	ND	ND	ND	ND
EF-7A	12/15/2020	ND	ND	ND	ND	ND
HA-94-5829	06/04/2019	ND	ND	ND	ND	ND
HA-94-5828	06/04/2019	ND	ND	ND	ND	ND
HA-73-5829	06/04/2019	ND	ND	ND	ND	ND
HA-95-1246	06/04/2019	ND	ND	ND	ND	ND
HA-93-0180	06/04/2019	ND	ND	ND	ND	ND
HA-94-4074	06/04/2019	ND	ND	ND	ND	ND
HA-94-4075	06/04/2019	ND	ND	ND	ND	ND
HA-93-0914	06/04/2019	ND	ND	ND	ND	ND
HA-81-0062	06/04/2019	ND	ND	ND	ND	ND
HA-11-0086	06/04/2019	ND	ND	ND	ND	ND
HA-73-6230	06/04/2019	ND	ND	ND	ND	ND
HA-94-4076	06/04/2019	ND	ND	ND	ND	ND
HA-93-0913	06/04/2019	ND	ND	ND	ND	ND
HA-73-5410	06/04/2019	ND	ND	ND	ND	ND
FTA-M08	04/30/2012	**7000**	**15000**	**220**	**7000**	**2000**
HCP-01	03/22/2012	**20**	ND	ND	ND	ND
HCP-01	03/13/2013	ND	ND	ND	ND	ND
HCP-01	10/07/2016	ND	**3**	ND	NS	NS
HCP-01	07/28/2017	**11 (13)**	**2 (2)**	NS	NS	NS
HCP-01	07/29/2020	**4.3**	**1.7**	NS	NS	NS
HCP-02	03/22/2012	ND	ND	ND	ND	ND
HCP-02	10/07/2016	ND	**9**	ND	NS	NS
HCP-02	03/13/2013	ND	ND	ND	ND	ND
HCP-02	07/28/2017	**10**	**7**	NS	NS	NS
HCP-02	07/29/2020	**25**	**7.6**	NS	NS	NS
HCP-04	03/22/2012	ND	ND	ND	ND	ND
HCP-04	03/13/2013	ND	ND	ND	ND	ND
HCP-04	10/07/2016	ND	**8**	ND	NS	NS
HCP-04	07/28/2017	**3**	**6**	NS	NS	NS
HCP-04	07/31/2018	**2.9**	**5.3**	NS	NS	NS
HCP-04	07/29/2020	**3.2**	**5.5**	NS	NS	NS

Table 2-2 Historical PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

		PFOS (ng/L)	PFOA (ng/L)	PFBS (ng/L)	PFHxS (ng/L)	PFNA (ng/L)
OSD Tapwater RiskScreening Level		4	6	601	39	6
Sample ID	Sample Date	Result	Result	Result	Result	Result
HCP-05	03/22/2012	**40**	**200**	ND	**90**	NS
HCP-05	09/10/2012	**50**	**180**	ND	**110**	NS
HCP-05	01/23/2013	**50**	**160**	ND	**90**	NS
HCP-05	03/13/2013	**40 (40)**	**160 (160)**	ND (ND)	**90**	NS
HCP-05	04/18/2013	**60**	**160**	ND	**90**	NS
HCP-05	11/07/2013	**50**	**130**	ND	**80**	NS
HCP-05	09/10/2013	**40**	**130**	ND	**80**	NS
HCP-05	07/05/2016	**49**	**95**	**8**	NS	NS
HCP-05	10/07/2016	ND	**130**	ND	NS	NS
HCP-05	07/11/2017	**165**	**590**	**27**	NS	NS
HCP-05	07/28/2017	**120**	**220**	NS	NS	NS
HCP-05	02/12/2018	**1.5 J**	**37.2**	**5.2**	NS	NS
HCP-05	05/07/2018	**280**	**160**	**42**	NS	NS
HCP-05	07/31/2018	**150**	**290**	NS	NS	NS
HCP-05	09/10/2018	**120**	**210**	**14**	NS	NS
HCP-06	03/22/2012	**170**	**950**	**30**	**400**	NS
HCP-06	09/10/2012	**170**	**1000**	**30**	**400**	NS
HCP-06	01/23/2013	**190**	**660**	ND	**280**	NS
HCP-06	03/13/2013	**180**	**750**	ND	**320**	NS
HCP-06	04/18/2013	**180**	**750**	ND	**330**	NS
HCP-06	11/07/2013	**150**	**650**	ND	**280**	NS
HCP-06	09/10/2013	**170**	**720**	ND	**290**	NS
HCP-06	07/05/2016	**220**	**49**	**4**	NS	NS
HCP-06	10/07/2016	**250**	**690**	**43**	NS	NS
HCP-06	07/11/2017	**165**	**590**	**12**	NS	NS
HCP-06	07/28/2017	**0.2**	**6**	NS	NS	NS
HCP-06	02/12/2018	ND	ND	ND	NS	NS
HCP-06	05/07/2018	**200**	**650**	**45**	NS	NS
HCP-06	07/31/2018	**190 (210)**	**470 (480)**	NS	NS	NS
HCP-06	09/10/2018	**120**	**210**	**1.4**	NS	NS
HCP-06	07/29/2020	**210 (220)**	**510 (520)**	**29 (29)**	**330 (340)**	**12 (11)**
HCP-08	03/22/2012	**20**	ND	ND	30	ND
HCP-08	03/13/2013	ND	ND	ND	ND	ND
HCP-08	10/07/2016	ND	**5**	ND	NS	NS
HCP-08	07/28/2017	**18**	**6**	NS	NS	NS
HCP-08	07/31/2018	**16**	**5.1**	NS	NS	NS
HCP-08	07/29/2020	**13**	**4.5**	NS	NS	NS
HCP-09	03/13/2013	ND	ND	ND	ND	ND
HCP-09	10/07/2016	ND	ND	ND	NS	NS
HCP-09	07/28/2017	**2**	**2**	NS	NS	NS
HCP-09	07/31/2018	**1.9**	**3.1**	NS	NS	NS
HCP-09	07/29/2020	**1.1 J**	**2.3**	NS	NS	NS
PER-01A	04/2017	**2.43**	ND	ND	ND	ND
PER-01B	04/2017	**7.11 (7.01)**	**4.10 (3.99)**	ND (ND)	ND (ND)	ND (ND)
PER-02A	04/2017	ND	ND	ND	4.81	ND
PER-02B	04/2017	**3.83**	**3.90**	**2.25**	**7.71**	ND
PER-05A	04/2017	ND (ND)	ND (ND)	ND (ND)	ND (ND)	ND (ND)
PER-05B	04/2017	ND	ND	ND	ND	ND
PER-06A	04/2017	ND	**2.51**	ND	ND	ND
PER-06B	04/2017	**3.91**	**7.46**	ND	**2.77**	ND
PLP-8	04/2017	**4.42**	**9.89**	ND	**43.6**	ND
PLP-9	04/2017	ND	**4.50**	ND	ND	ND
PLP-10	04/2017	**22.0**	**3.71**	ND	**4.00**	ND
PLP-22R	04/2017	**10.3**	**4.91**	ND	**5.39**	ND
PLP-23	04/2017	**6.35**	**4.10**	ND	**3.91**	ND
WB-MW1A	05/10/2012	ND	ND	ND	ND	ND
WB-MW1A	04/19/2017	**5 J**	**2**	NS	NS	NS
WB-MW1B	05/10/2012	ND (ND)	ND (ND)	ND (ND)	ND (ND)	ND (ND)
WB-MW1B	04/20/2017	**9**	**6**	NS	NS	NS
WB-MW1B	0'05/2017	**10.1**	**5.45**	ND	**8.75**	ND
WB-MW1C	05/09/2012	ND	ND	ND	ND	ND

Table 2-2 Historical PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

		PFOS (ng/L)	PFOA (ng/L)	PFBS (ng/L)	PFHxS (ng/L)	PFNA (ng/L)
OSD Tapwater RiskScreening Level		4	6	601	39	6
Sample ID	Sample Date	Result	Result	Result	Result	Result
WB-MW1C	04/19/2017	**10**	**5**	NS	NS	NS
WB-MW1C	0'05/2017	**11.2**	**5.78**	ND	**11.7**	ND
WB-MW2B	05/09/2012	ND	ND	ND	ND	ND
WB-MW2B	05/02/2017	**12 (13)**	**10 (10)**	NS	NS	NS
WB-MW2C	05/09/2012	ND	ND	ND	ND	ND
WB-MW2C	04/25/2017	**13 B**	**10**	NS	NS	NS
WB-MW3A	05/03/2012	ND	**50**	ND	**30**	ND
WB-MW3A	05/02/2017	**6**	**11**	NS	NS	NS
WB-MW3B	05/03/2012	**30**	**160**	ND	**80**	ND
WB-MW3B	05/02/2017	**210**	**370**	NS	NS	NS
WB-MW3C	05/08/2012	**110**	**720**	**30**	**290**	ND
WB-MW3C	05/02/2017	**360**	**760**	NS	NS	NS
WB-MW4A	05/03/2012	ND	ND	ND	ND	ND
WB-MW4A	05/02/2017	**4 J**	**3**	NS	NS	NS
WB-MW4B	05/03/2012	**230**	**1000**	**30**	**470**	**30**
WB-MW4B	04/25/2017	**710 B**	**850**	NS	NS	NS
WB-MW4B	0'05/2017	**733**	**1170**	**76.8**	**773**	**47.3**
WB-MW4C	05/08/2012	**310 (270)**	**1400 (1000)**	**70 (90)**	**710 (670)**	**20 (20)**
WB-MW4C	04/25/2017	**590 B**	**760**	NS	NS	NS
WB-MW4C	05/2017	**630**	**883**	**58.1**	**652**	**36.7**
WB-MW-5B	05/2017	ND	ND	ND	**3.73**	ND
WB-MW-5F	05/2017	ND	ND	ND	ND	ND
WB-MW-5C	05/2017	ND	ND	ND	ND	ND
WB-MW6A	05/01/2012	ND	ND	ND	ND	ND
WB-MW6A	04/20/2017	**3 J**	**4**	NS	NS	NS
WB-MW6B	05/01/2012	**50**	**1000**	**50**	**510**	ND
WB-MW6B	04/20/2017	**74**	**430**	NS	NS	NS
WB-MW6B	05/2017	**105**	**639**	**37.6**	**359**	**6.19**
WB-MW6C	04/26/2012	**710**	**7000**	**190**	**3000**	**70**
WB-MW6C	04/20/2017	**1800**	**4800**	NS	NS	NS
WB-MW6C	05/2017	**2190 (2450)**	**6340 (7070)**	**331 (363)**	**2820 (3130)**	**173 (177)**
WB-MW7A	05/07/2012	ND	ND	ND	ND	ND
WB-MW7A	04/20/2017	ND	**2 J**	NS	NS	NS
WB-MW7B	05/01/2012	**20**	ND	ND	**20**	ND
WB-MW7B	04/20/2017	**24 (25)**	**8 (8)**	NS	NS	NS
WB-MW7B	05/2017	**26.7**	**8.46**	**2.28**	**16.8**	ND
WB-MW7C	05/07/2012	**20 (20)**	ND (ND)	ND (ND)	**30 (30)**	ND (ND)
WB-MW7C	04/20/2017	**23**	**9**	NS	NS	NS
WB-MW7C	05/2017	**24.8**	**9.29**	**2.11**	**21.1**	ND
WB-MW8B	04/18/2012	**750**	**3000**	**60**	**1000**	**30**
WB-MW8B	04/24/2017	**840 B**	**1000**	NS	NS	NS
WB-MW8C	04/18/2012	**100**	**4000**	**60**	**950**	ND
WB-MW8C	04/24/2017	**330 B**	**1300**	NS	NS	NS
WB-MW9A	04/19/2012	ND	ND	ND	ND	ND
WB-MW9A	04/21/2017	ND	**3 B**	NS	NS	NS
WB-MW9B	04/19/2012	**1100**	**2000**	**60**	**2000**	**100**
WB-MW9B	04/21/2017	**2700**	**2000 B**	NS	NS	NS
WB-MW9C	04/25/2012	**2000**	**8000**	**180**	**3000**	**180**
WB-MW9C	04/21/2017	**1300**	**2200 B**	NS	NS	NS
WB-MW10A	05/02/2012	ND	ND	ND	ND	ND
WB-MW10A	04/20/2017	**16**	**8**	NS	NS	NS
WB-MW10B	05/02/2012	**20**	**20**	ND	**40**	ND
WB-MW10B	04/20/2017	**7**	**8**	NS	NS	NS
WB-MW10C	05/02/2012	**20**	ND	ND	**40**	ND
WB-MW10C	04/20/2017	**27**	**16**	NS	NS	NS
WB-MW11A	04/30/2012	ND (ND)	ND (ND)	ND (ND)	ND (ND)	ND (ND)
WB-MW11A	04/25/2017	**17 B**	**20**	NS	NS	NS
WB-MW11B	04/30/2012	**20**	ND	ND	ND	ND
WB-MW11B	04/25/2017	**39 (41)**	**24 (24)**	NS	NS	NS
WB-MW11C	04/30/2012	**60**	ND	ND	**110**	ND
WB-MW11C	04/25/2017	**180**	**25**	NS	NS	NS

		PFOS (ng/L)	PFOA (ng/L)	PFBS (ng/L)	PFHxS (ng/L)	PFNA (ng/L)
OSD Tapwater RiskScreening Level		4	6	601	39	6
Sample ID	Sample Date	Result	Result	Result	Result	Result
WB-MW14A	04/25/2012	ND	**50**	ND	**30**	ND
WB-MW14A	04/21/2017	ND	**70**	NS	NS	NS
WB-MW14B	04/26/2012	ND	**80**	ND	120	ND
WB-MW14B	04/21/2017	**33**	**62**	NS	NS	NS
WB-MW14C	04/25/2012	ND	ND	ND	ND	ND
WB-MW14C	04/21/2017	**20**	**9**	NS	NS	NS
WB-MW15A	04/24/2012	ND	**30**	ND	ND	ND
WB-MW15A	04/25/2017	**12**	**8**	NS	NS	NS
WB-MW15B	04/25/2012	ND	**690**	ND	**60**	ND
WB-MW15B	04/25/2017	**8**	**650**	NS	NS	NS
WB-MW15C	04/24/2012	ND (ND)	**280 (310)**	ND (ND)	**110 (110)**	ND (ND)
WB-MW15C	04/25/2017	**66 B**	**180**	NS	NS	NS
WB-MW19B	05/10/2012	ND	ND	ND	ND	ND
WB-MW19B	04/19/2017	ND	**4**	NS	NS	NS
WB-MW19B	05/2017	ND	**4.38**	ND	NS	NS
WB-MW19C	05/10/2012	ND	ND	ND	ND	ND
WB-MW19C	04/20/2017	**22**	**10**	NS	NS	NS
WB-MW19C	05/2017	**57.4**	**20.5**	**2.34**	**35.1**	ND
WB-MW20B	05/03/2012	**40**	**220**	ND	**80**	ND
WB-MW20B	04/24/2017	**4 J**	**2**	NS	NS	NS
WB-MW20C	05/03/2012	ND	ND	ND	ND	ND
WB-MW20C	04/24/2017	**3 J**	**0.8 J**	NS	NS	NS
WB-MW23B	05/10/2012	ND	ND	ND	ND	ND
WB-MW23B	04/19/2017	**11 (9)**	**9 (8)**	NS	NS	NS
WB-MW23B	05/2017	**11.2**	**9.44**	ND	**13.5**	ND
WB-MW23C	05/10/2012	ND	ND	ND	ND	ND
WB-MW23C	04/19/2017	ND	ND	NS	NS	NS
WB-MW23C	05/2017	ND	ND	ND	ND	ND
WB-P-10A	05/2017	**19.9**	**8.42**	**2.38**	NS	NS
WB-P-10B	05/2017	**9.24**	**9.55**	ND	NS	NS
WB-WP-01	05/2017	ND	**11**	ND	NS	NS
WHP-01A	04/2017	**3.30**	**5.13**	**3.88**	**2.26**	ND
WHP-01B	04/2017	**10.2**	**3.79**	ND	**6.18**	ND
WHP-02A	04/2017	**240**	**8.23**	**10.1**	**56.4**	ND
WHP-03A	04/2017	ND	**3.08**	ND	ND	ND
WHP-03B	04/2017	**2.24**	**4.16**	ND	ND	ND

Notes and Acronyms:
Units are provided in nanograms per liter (ng/L)
1. Bolded values indicate the result was greater than the limit of detection.
Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July 06).
ID = identification
ND = non-detect
NS = not sampled
OSD = Office of the Secretary of Defense
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

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

Table 6-1
Monitoring Well Construction Details
USAEC PFAS Preliminary Inspection/Site Inspection
Aberdeen Proving Ground, Maryland

Associated AOPI	Well Identification	Coordinates		Screened Interval (ft bgs)	Total Depth (ft bgs)
		Latitude	Longitude		
Biosolid Application Area A-1	FTA-M09	39°28'22.45"N	76°10'18.24"W	22.5 - 32.5	33.5
Biosolid Application Area B	FTA-M10	39°28'25.01"N	76°10'6.28"W	27 - 37	37.5
Former Aberdeen Fire Training Area	FTA-M08	39°28'23.53"N	76°10'16.27"W	22.5 - 32.5	34
Michaelsville Landfill	WES-M09	39°27'32.92"N	76° 8'36.95"W	5.5 - 10.5	10.5
	WES-M14	39°27'36.42"N	76° 8'25.42"W	5.5 - 17	17
	WES-M17	39°27'38.16"N	76° 8'22.12"W	5.5 - 15.5	15.5
	WES-M18	39°27'41.24"N	76° 8'18.09"W	5.5 -15.5	15.5
	WES-M21	39°27'44.22"N	76° 8'19.55"W	5.5 - 15.5	15.5
Ford's Farm	FF-2	39°24'32.81"N	76°11'37.53"W	NA	32
	FF-3	39°24'37.78"N	76°11'33.40"W	NA	35
Phillips Army Airfield (PAAF) Runways	WB-MW-11A	39°28'11.91"N	76°10'39.40"W	NA	31
	WB-MW-14A	39°27'45.83"N	76°10'27.38"W	NA	35.5
G-Street Salvage Yard and Former Fire Training Area	CC-039A	39°24'17.61"N	76°18'4.94"W	20 - 25	28
	CC-039B	39°24'17.55"N	76°18'4.92"W	35 - 40	43
	CCMW46-1	39°24'16.71"N	76°18'5.46"W	14 - 24	26
	CCMW46-2	39°24'12.17"N	76°18'9.03"W	35 - 40	42
	CCMW46-3	39°24'13.65"N	76°18'10.72"W	9 - 19	21
	CCMW46-5	39°24'14.82"N	76°18'6.69"W	32.5 - 42.5	55
	CCMW46-6	39°24'11.89"N	76°18'9.17"W	55 - 65	65
	CCMW46-7	39°24'12.18"N	76°18'14.69"W	51 - 61	63
	CCMW46-8A	39°24'7.36"N	76°18'13.64"W	35 - 45	47
	CCMW46-8B	39°24'7.36"N	76°18'13.64"W	50 - 60	62

Acronyms and Abbreviations:
AOPI = area of potential interest
bgs = below ground surface
ft = feet
msl = mean sea level
NA = not available

Table 7-1 - Groundwater PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

					Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)		PFHxS (ng/L)		PFNA (ng/L)	
					OSD Tapwater RiskScreening Level	4		6		601		39		6	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Biosolid Application Field A-1	Grab Groundwater	APG-BAF-A1-1	APG-BAF-A1-1-GW-030221	03/02/2021	N	**330**	J	**120**		**14**		**71**		**4.7**	
Biosolid Application Field A-1	Grab Groundwater	APG-BAF-A1-2	APG-BAF-A1-2-GW-030221	03/02/2021	N	**3900**		**700**		**37**		**1100**		**99**	
Biosolid Application Field A-1	Monitoring Well	APG-FTA-M09	APG-FTA-M09-030221	03/02/2021	N	**11000**		**1100**		**55**		**1700**		**210**	
Biosolid Application Field ATC-1	Grab Groundwater	APG-ATC1-1	APG-ATC1-1-GW-121521	12/15/2021	N	1.7	UJ	1.7	UJ	1.7	UJ	**0.96**	J	1.7	UJ
Biosolid Application Field ATC-2	Grab Groundwater	APG-ATC2-1	APG-FD-1-GW-121521 / APG-ATC2-1-GW-121521	12/15/2021	FD	1.7	UJ	**1.0**	J	1.7	UJ	1.7	UJ	1.7	UJ
			APG-ATC2-1-GW-121521	12/15/2021	N	1.7	UJ	**1.0**	J	1.7	UJ	1.7	UJ	1.7	UJ
Biosolid Application Field E-3	Grab Groundwater	APG-E3-1	APG-E3-1-GW-121621	12/16/2021	N	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ
Biosolid Application Field E-4	Grab Groundwater	APG-E4-1	APG-E4-1-GW-121621	12/16/2021	N	1.8	UJ	1.8	UJ	1.8	UJ	**0.95**	J	1.8	UJ
Biosolid Application Field S-1A	Grab Groundwater	APG-S1A-1	APG-S1A-1-GW-121521	12/15/2021	N	1.7	UJ	**1.1**	J	1.7	UJ	1.7	UJ	1.7	UJ
Biosolid Application Field S-3	Grab Groundwater	APG-S3-1	APG-S3-1-GW-121521	12/15/2021	N	**220**	J	**28**	J	**2.2**	J	**6.0**	J	1.8	UJ
Former Aberdeen Fire Training Area	Monitoring Well	APG-FTA-M08	APG-DUP-04-031121 / APG-FTA-M08-031121	03/11/2021	FD	**8500**		**6600**		**150**		**3100**		**1600**	
			APG-FTA-M08-031121	03/11/2021	N	**9000**		**6500**		**160**		**2900**		**1700**	
Former Aberdeen Fire Training Area	Grab Groundwater	APG-OLD-FTA-1	APG-OLD-FTA-1-GW-031121	03/11/2021	N	**7000**		**720**		**130**		**1200**		**220**	
Former Aberdeen Fire Training Area	Grab Groundwater	APG-OLD-FTA-2	APG-OLD-FTA-2-GW-031121	03/11/2021	N	**22000**	J-	**27000**		**680**		**11000**		**6600**	
Building 1074 - Former MFRI Fire Training Area	Grab Groundwater	APG-MFRI-1	APG-MFR1-1-GW-030421	03/04/2021	N	**250**		**28**		**63**		**250**		**17**	
Building 1074 - Former MFRI Fire Training Area	Grab Groundwater	APG-MFRI-2	APG-MFR1-2-GW-030421	03/04/2021	N	**41**		**8.9**		**15**		**150**		2.2	U
PAAF – Airfield Fire Station Building 1059	Grab Groundwater	APG-BLDG-1059-1	APG-BLDG-1059-1-GW-030321	03/03/2021	N	**42000**	J-	**3600**		**230**		**15000**		**990**	
PAAF- Hangar 1060	Grab Groundwater	APG-HANGAR-1060-1	APG-HANGER-1060-1-GW-030421	03/04/2021	N	**1200**		**110**		**27**		**540**		**33**	
PAAF – Crash Truck Storage Bay Building 1065	Grab Groundwater	APG-BLDG-1065-1	APG-BLDG-1065-1-GW-030321	03/03/2021	N	**19000**	J-	**2300**		**410**		**12000**		**690**	
PAAF – Loading Pad	Grab Groundwater	APG-LOADING-PAD-1	APG-LOADING-PAD-1-GW-030421	03/04/2021	N	**5.7**		1.8	U	1.8	U	1.8	U	1.8	U
Michaelsville Landfill	Monitoring Well	APG-WES-M09	APG-WES-M09-032021	03/20/2021	N	**34**		**52**		**8.9**		**16**		**3.8**	
Michaelsville Landfill	Monitoring Well	APG-WES-M14	APG-WES-M14-032021	03/20/2021	N	**36**		**29**		**5.6**		**21**		1.7	U
Michaelsville Landfill	Monitoring Well	APG-WES-M17	APG-WES-M17-032021	03/20/2021	N	**5.8**		**54**		**4.9**		**11**		1.8	U
Michaelsville Landfill	Monitoring Well	APG-WES-M18	APG-WES-M18-032021	03/20/2021	N	**1.0**	J	**2.5**		1.9	U	**3.6**		1.9	U
Michaelsville Landfill	Monitoring Well	APG-WES-M21	APG-WES-M21-032021	03/20/2021	N	**2.9**		**8.6**		**2.5**		**5.9**		2.0	U
Bldg 300-Former Fire Station_Bdlg 250 Supply Wells	Potable Supply Well	APG-BLDG-250-1	APG-BLDG-250-PW-1-1-GW-030921	03/09/2021	N	1.8	U	1.8	U	1.8	U	1.7	U	1.7	U
			APG-DUP-02-030921 / APG-BLDG-250-PW-1-1-GW-030921	03/09/2021	FD	1.7	U	1.7	U	1.7	U	1.8	U	1.8	U

Table 7-1 - Groundwater PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

					Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)		PFHxS (ng/L)		PFNA (ng/L)	
					OSD Tapwater RiskScreening Level	4		6		601		39		6	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Bldg 300-Former Fire Station_Bdlg 250 Supply Wells	Potable Supply Well	APG-BLDG-250-2	APG-BLDG-250-PW-2-1-GW-030921	03/09/2021	N	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
Bldg 300-Former Fire Station_Bdlg 250 Supply Wells	Potable Supply Well	APG-BLDG-250-3	APG-BLDG-250-PW-3-1-GW-030921	03/09/2021	N	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
Bldg 300-Former Fire Station_Bdlg 250 Supply Wells	Potable Supply Well	APG-BLDG-250-4	APG-BLDG-250-PW-4-1-GW-030921	03/09/2021	N	1.6	U	1.6	U	1.6	U	1.6	U	1.6	U
Bldg 300-Former Fire Station_Bdlg 250 Supply Wells	Potable Supply Well	APG-BLDG-250-5	APG-BLDG-250-PW-5-1-GW-030921	03/09/2021	N	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
Bldg 300-Former Fire Station_Bdlg 250 Supply Wells	Grab Groundwater	APG-BLDG-300-1	APG-BLDG-300-1-GW-031521	03/15/2021	N	**170**		**9.7**		**1.6**	J	**27**		**3.5**	
Bldg 300-Former Fire Station_Bdlg 250 Supply Wells	Grab Groundwater	APG-BLDG-300-2	APG-BLDG-300-2-GW-031521	03/15/2021	N	**220**		**83**		**54**		**350**		**5.5**	
Building 2200 – Current Aberdeen Fire Station	Grab Groundwater	APG-BLDG-2200-1	APG-BLDG-2200-1-GW-031821	03/18/2021	N	**180**		**66**		**41**		**340**		**15**	
Building 2308 – Fire Department Storage Building	Grab Groundwater	APG-BLDG-2308-1	APG-BLDG-2308-1-GW-031221	03/12/2021	N	**210**		**190**		**43**		**990**		**24**	
Biosolid Application Field B	Monitoring Well	APG-FTA-M10	APG-FTA-M10-030221	03/02/2021	N	**14**		**49**		**41**		**2500**		1.7	U
AA5 Range	Grab Groundwater	APG-AA5-1	APG-AA5-1-GW-031621	03/16/2021	N	**64000**	EJ	**4200**		**5000**		**42000**	EJ	**650**	
Poverty Island Minefield Range	Grab Groundwater	APG-MINEFIELD-1	APG-PI-MINEFIELD-1-GW-031521	03/15/2021	N	**260**		**160**		**7.6**		**53**		**82**	
Poverty Island Range 12	Grab Groundwater	APG-PI-12-1	APG-PI-12-1-GW-031521	03/15/2021	N	**3000**		**330**		**47**		**610**		**120**	
Poverty Island Range 12	Grab Groundwater	APG-PI-12-2	APG-P1-12-2-GW-031821	03/18/2021	N	**4800**		**1200**		**480**		**2800**		**180**	
			APG-DUP-08-031821 / APG-P1-12-2-GW-031821	03/18/2021	FD	**5100**		**1100**		**420**		**3100**		**190**	
Ford's Farm	Grab Groundwater	APG-FF2-1	APG-FF2-1-GW-013122	01/31/2022	N	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U
Ford's Farm	Grab Groundwater	APG-FF3-1	APG-FF3-1-GW-013122	01/31/2022	N	1.8	U	1.8	U	1.8	U	1.8	U	1.8	U
EF-15	Grab Groundwater	APG-EF15-1	APG-EF15-1-GW-031621	03/16/2021	N	**1300**		**170**		**440**		**220**		**48**	
Fuze Range	Grab Groundwater	APG-FUZE-1	APG-FUZE-1-GW-031621	03/16/2021	N	**4300**		**7800**		**91**		**4400**		**2300**	
Biosolid Application Field S-6	Grab Groundwater	APG-BAF-S6-1	APG-BAF-S6-1-GW-031621	03/16/2021	N	**34**		**22**		**1.6**	J	**9.7**		**4.3**	
Building E5005 - Edgewood Fire Training Area	Grab Groundwater	APG-BLDG-E5005-1	APG-BLDG-E5005-1-GW-042221	04/22/2021	N	**67**		**15**		2.7	U	**22**		**5.6**	
Building E5180 - Edgewood Fire Station	Grab Groundwater	APG-BLDG-E5180-1	APG-BLDG-E5180-1-GW-031721	03/17/2021	N	**530**		**2700**		**830**		**4300**		**49**	
Building E5180 - Edgewood Fire Station	Grab Groundwater	APG-BLDG-E5180-2	APG-BLDG-E5180-2-GW-031721	03/17/2021	N	**9300**		**6500**		**220**		**10000**		**1100**	
Biosolid Application Field D	Grab Groundwater	APG-BAF-D-1	APG-BAF-D-1-GW-030321	03/03/2021	N	**86**		**23**		**27**		**760**		**3.7**	
CASY Site	Grab Groundwater	APG-CASEY-YARD-1	APG-CASEY-YARD-1-GW-031921	03/19/2021	N	**130**		**9.5**		**18**		**120**		2.0	U
G-Street Plane Crash	Grab Groundwater	APG-G-STREET-1	APG-G-STREET-1-GW-031921	03/19/2021	N	**5.0**		**58**		**20**		**110**		2.2	U

Table 7-1 - Groundwater PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

						Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)		PFHxS (ng/L)		PFNA (ng/L)	
						OSD Tapwater RiskScreening Level	4		6		601		39		6	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type		Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Noble Road - Former Fire Training Area	Grab Groundwater	APG-NOBLE-ROAD-1	APG-NOBLE-ROAD-1-GW-031721	03/17/2021	N		**740**		**170**		**30**		**580**		**14**	
			APG-DUP-07-031721 / APG-NOBLE-ROAD-1-GW-031721	03/17/2021	FD		**700**		**170**		**29**		**540**		**15**	
Weide Airfield Building E4040	Grab Groundwater	APG-BLDG-E4040-1	APG-BLDG-E4040-1-GW-031921	03/19/2021	N		**5.0**		**15**		**2.0**	J	**7.5**		2.1	U
Weide Airfield – Building E4081	Grab Groundwater	APG-BLDG-E4081-1	APG-BLDG-E4081-1-GW-031721	03/17/2021	N		**33**		**5.1**		2.3	U	**4.6**		**2.0**	J
Weide Airfield - Tarmac Area	Grab Groundwater	APG-WEIDE-1	APG-WEIDE-1-GW-031721	03/17/2021	N		**35**		**17**		**3.1**		**16**		**4.9**	
H-Field - Helicopter Fire Response Area	Grab Groundwater	APG-HELIFIRE-1	APG-HELI-FIRE-1-GW-031221	03/12/2021	N		**200**		**8.1**		**4.8**		**84**		**1.3**	J
Biosolid Application Field E	Grab Groundwater	APG-BAF-E-1	APG-BAF-E-1-GW-030321	03/03/2021	N		**11**		**2.3**		1.9	U	**5.6**		1.9	U
ABR-3	Grab Groundwater	APG-ABR3-1	APG-ABR3-1-GW-030821	03/08/2021	N		**17000**		**1700**		**140**		**5900**		**320**	
ABR-6	Grab Groundwater	APG-ABR6-1	APG-ABR6-1-GW-030521	03/05/2021	N		**14000**		**110**		**7.7**		**190**		**45**	
ABR-7	Grab Groundwater	APG-ABR7-1	APG-ABR7-1-GW-030521	03/05/2021	N		**24**		**60**		**4.2**		**92**		2.2	U
PAAF Runways	Monitoring Well	APG-WB-MW-11A	APG-WB-MW-11A-030921	03/09/2021	N		**21**	J	**8.1**		**1.3**	J	**7.4**		1.7	U
PAAF Runways	Monitoring Well	APG-WB-MW-14A	APG-WB-MW-14A-030921	03/09/2021	N		**1.4**	J	**43**		**2.5**		**39**		1.7	U
PAAF - Airfield Boneyard	Grab Groundwater	APG-BONEYARD-1	APG-BONEYARD-1-GW-031121	03/11/2021	N		**23**		**19**		**1.9**	J	**27**		**10**	
PAAF - Airfield Boneyard	Grab Groundwater	APG-BONEYARD-2	APG-BONEYARD-2-GW-030821	03/08/2021	N		**110**		**84**		**6.1**		**250**		**1.4**	J
PAAF - Airfield Boneyard	Grab Groundwater	APG-BONEYARD-3	APG-BONEYAD-3-GW-030821	03/08/2021	N		**48**		**23**		**2.9**		**59**		2.0	U
PAAF - Airfield Boneyard	Grab Groundwater	APG-BONEYARD-4	APG-BONEYARD-4-GW-030821	03/08/2021	N		**18**		**6.2**		2.1	U	**13**		2.1	U
PAAF - Airfield Boneyard	Grab Groundwater	APG-BONEYARD-5	APG-BONEYARD-5-GW-030821	03/08/2021	N		**92**		**35**		**3.5**		**100**		**1.4**	J
PAAF - Airfield Boneyard	Grab Groundwater	APG-BONEYARD-6	APG-BONEYARD-6-GW-031121	03/11/2021	N		**17**		**13**		**1.6**	J	**26**		**1.5**	J
PAAF - Airfield Boneyard	Grab Groundwater	APG-BONEYARD-7	APG-BONEYARD-7-GW-031121	03/11/2021	N		**1.7**	J	**6.9**		2.0	U	**25**		**2.0**	J
Canal Creek GWTP System	Grab Groundwater	APG-GWTP-1	APG-GWTP-1-GW-031021	03/10/2021	N		1.6	U	1.6	U	1.6	U	1.6	U	1.6	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than the Office of the Secretary of Defense (OSD) risk screening levels for tap water (OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July 06).

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
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

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

Table 7-2 - Soil PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

					Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)		PFHxS (mg/kg)		PFNA (mg/kg)	
					OSD Industrial/Commercial Risk Screening Level	0.16		0.25		25		1.6		0.25	
					OSD Residential RiskScreening Levels	0.013		0.019		1.9		0.13		0.019	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Biosolid Application Field A-1	Soil	APG-BAF-A1-1	APG-BAF-A1-1-SO-(0-2)-030221	03/02/2021	N	**0.0018**		**0.0008**		0.0024	U	0.00071	U	0.00071	U
Biosolid Application Field A-1	Soil	APG-BAF-A1-2	APG-BAF-A1-2-SO-(0-2)-030221	03/02/2021	N	**0.0036**		**0.0012**		0.0024	U	0.00071	U	0.00071	U
Biosolid Application Field ATC-1	Soil	APG-ATC1-1	APG-ATC1-1-SO-(0.5-2)-121621	12/16/2021	N	0.00077	UJ	0.00077	UJ	0.0026	UJ	0.00077	UJ	0.00077	UJ
Biosolid Application Field ATC-2	Soil	APG-ATC2-1	APG-ATC2-1-SO-(0.5-2)-121621	12/16/2021	N	0.001	UJ	0.001	UJ	0.0034	UJ	0.001	UJ	0.001	UJ
Biosolid Application Field E-3	Soil	APG-E3-1	APG-E3-1-SO-(0.5-2)-121621	12/16/2021	N	**0.0011**	J	**0.00047**	J	0.0022	UJ	0.00066	UJ	0.00066	UJ
Biosolid Application Field E-4	Soil	APG-E4-1	APG-E4-1-SO-(0.5-2)-121621	12/16/2021	N	0.00068	UJ	0.00068	UJ	0.0023	UJ	0.00068	UJ	0.00068	UJ
Biosolid Application Field S-1A	Soil	APG-S1A-1	APG-FD-1-SO-(0.5-2)-121621 / APG-S1A-1-SO-(0.5-2)-121621	12/16/2021	FD	0.00089	UJ	0.00089	UJ	0.003	UJ	0.00089	UJ	0.00089	UJ
			APG-S1A-1-SO-(0.5-2)-121621	12/16/2021	N	0.00077	UJ	0.00077	UJ	0.0026	UJ	0.00077	UJ	0.00077	UJ
Biosolid Application Field S-3	Soil	APG-S3-1	APG-S3-1-SO-(0.5-2)-121621	12/16/2021	N	0.00076	UJ	0.00076	UJ	0.0025	UJ	0.00076	UJ	0.00076	UJ
Former Aberdeen Fire Training Area	Soil	APG-OLD-FTA-1	APG-OLD-FTA-1-SO-(0-2)-031121	03/11/2021	N	**0.0052**		**0.00095**		0.0024	U	**0.00086**		0.00072	U
Former Aberdeen Fire Training Area	Soil	APG-OLD-FTA-2	APG-OLD-FTA-2-SO-(0-2)-031121	03/11/2021	N	**0.019**		0.00067	U	0.0022	U	**0.0005**	J	0.00067	U
Building 1074 - Former MFRI Fire Training Area	Soil	APG-MFRI-1	APG-DUP-01-030421 / APG-MFR1-1-SO-(8-10)-030421	03/04/2021	FD	**0.00067**	J	0.00072	U	0.0024	U	0.00072	U	0.00072	U
			APG-MFR1-1-SO-(8-10)-030421	03/04/2021	N	0.00068	U	0.00068	U	0.0023	U	0.00068	U	0.00068	U
Building 1074 - Former MFRI Fire Training Area	Soil	APG-MFRI-2	APG-MFR1-2-SO-(8-10)-030421	03/04/2021	N	0.0007	U	0.0007	U	0.0023	U	0.0007	U	0.0007	U
PAAF – Airfield Fire Station Building 1059	Soil	APG-BLDG-1059-1	APG-BLDG-1059-1-SO-(0-2)-030321	03/03/2021	N	**0.14**		**0.0012**		0.0024	U	**0.0037**		**0.0016**	
PAAF- Hangar 1060	Soil	APG-HANGAR-1060-1	APG-HANGER-1060-1-SO-(0-2)-030421	03/04/2021	N	**0.013**		**0.0006**	J	0.0022	U	**0.00049**	J	**0.00062**	J
PAAF – Crash Truck Storage Bay Building 1065	Soil	APG-BLDG-1065-1	APG-BLDG-1065-1-SO-(0-2)-030321	03/03/2021	N	**0.0042**		0.00067	U	0.0022	U	0.00067	U	0.00067	U
PAAF – Loading Pad	Soil	APG-LOADING-PAD-1	APG-LOADING-PAD-1-SO-(0-2)-030421	03/04/2021	N	**0.0022**		**0.00062**	J	0.0022	U	**0.002**		0.00066	U
Bldg 300-Former Fire Station_Bdlg 250 Supply Wells	Soil	APG-BLDG-300-1	APG-BLDG-300-1-SO-(0-2)-031521	03/15/2021	N	**0.0063**		0.00071	U	0.0024	U	**0.00065**	J	0.00071	U
Bldg 300-Former Fire Station_Bdlg 250 Supply Wells	Soil	APG-BLDG-300-2	APG-BLDG-300-2-SO-(0-2)-031521	03/15/2021	N	**0.017**		**0.0023**		0.0023	U	**0.0051**		0.00069	U
Building 2200 – Current Aberdeen Fire Station	Soil	APG-BLDG-2200-1	APG-BLDG-2200-1-SO-(0-2)-031221	03/12/2021	N	**0.0012**		**0.00078**		0.0023	U	0.00069	U	**0.0012**	
Building 2200 – Current Aberdeen Fire Station	Soil	APG-BLDG-2200-2	APG-BLDG-2200-2-SO-(0-2)-031221	03/12/2021	N	**0.0033**		**0.00094**		0.0023	U	0.00069	U	**0.002**	
Biosolid Application Field B	Soil	APG-BAF-B-1	APG-BAF-B-1-SO-(0-2)-030221	03/02/2021	N	**0.03**		**0.0023**		0.0023	U	**0.0019**		**0.0026**	
Poverty Island Minefield Range	Soil	APG-MINEFIELD-1	APG-PI-MINEFIELD-1-SO-(0-2)-031521	03/15/2021	N	**0.00093**		**0.0011**		0.0021	U	0.00062	U	**0.00077**	
Poverty Island Minefield Range	Soil	APG-MINEFIELD-2	APG-PI-MINEFIELD-2-SO-(0-2)-031521	03/15/2021	N	**0.002**		0.00063	U	0.0021	U	0.00063	U	0.00063	U
Poverty Island Range 12	Soil	APG-PI-12-1	APG-PI-12-1-SO-(0-2)-031521	03/15/2021	N	**0.003**		0.00063	U	0.0021	U	0.00063	U	0.00063	U
Poverty Island Range 12	Soil	APG-PI-12-2	APG-PI-12-2-SO-(0-2)-031521	03/15/2021	N	**0.0077**		0.00061	U	0.002	U	0.00061	U	**0.0011**	
Biosolid Application Field S-6	Soil	APG-BAF-S6-1	APG-BAF-S6-1-SO-(0-2)-031621	03/16/2021	N	0.00069	U	0.00069	U	0.0023	U	0.00069	U	0.00069	U
Building E5005 - Edgewood Fire Training Area	Soil	APG-BLDG-E5005-1	APG-BLDG-E5005-1-SO-042221	04/22/2021	N	**0.0028**		**0.00044**	J	0.002	U	0.00061	U	0.00061	U
Building E5005 - Edgewood Fire Training Area	Soil	APG-BLDG-E5005-2	APG-BLDG-E5005-2-SO-042221	04/22/2021	N	**0.01**		**0.0021**		0.0026	U	**0.0012**		**0.0029**	
Building E5005 - Edgewood Fire Training Area	Soil	APG-BLDG-E5005-3	APG-BLDG-E5005-3-SO-042221	04/22/2021	N	**0.0093**		**0.00052**	J	0.0022	U	**0.0018**		**0.00048**	J
Building E5180 - Edgewood Fire Station	Soil	APG-BLDG-E5180-1	APG-BLDG-E5180-1-SO-(0-2)-031721	03/17/2021	N	**0.019**		**0.0016**		0.0023	U	0.00068	U	**0.0046**	
Biosolid Application Field D	Soil	APG-BAF-D-1	APG-BAF-D-1-SO-(0-2)-030321	03/03/2021	N	**0.0025**		**0.00079**		0.0023	U	0.00068	U	0.00068	U
CASY Site	Soil	APG-CASEY-YARD-1	APG-CASEY-YARD-1-SO-(0-2)-031021	03/10/2021	N	0.00068	U	0.00068	U	0.0023	U	0.00068	U	0.00068	U
G-Street Plane Crash	Soil	APG-G-STREET-1	APG-G-STREET-1-SO-(0-2)-031921	03/19/2021	N	0.00066	U	0.00066	U	0.0022	U	0.00066	U	0.00066	U
Noble Road - Former Fire Training Area	Soil	APG-NOBLE-ROAD-1	APG-NOBLE-ROAD-1-SO-(0-2)-031021	03/10/2021	N	**0.014**		0.00069	U	0.0023	U	**0.0015**		0.00069	U
Noble Road - Former Fire Training Area	Soil	APG-NOBLE-ROAD-2	APG-NOBLE-ROAD-2-SO-(0-2)-031021	03/10/2021	N	**0.0099**		**0.00095**		0.0022	U	**0.0023**		**0.00053**	J
Weide Airfield Building E4040	Soil	APG-BLDG-E4040-1	APG-BLDG-E4040-1-SO-(0-2)-031921	03/19/2021	N	**0.00051**	J	0.00064	U	0.0021	U	0.00064	U	0.00064	U
Weide Airfield – Building E4081	Soil	APG-BLDG-E4081-1	APG-BLDG-E4081-1-SO-(0-2)-031021	03/10/2021	N	0.00079	U	0.00079	U	0.0026	U	0.00079	U	0.00079	U
Weide Airfield – Building E4081	Soil	APG-BLDG-E4081-2	APG-BLDG-E4081-2-SO-(0-2)-031021	03/10/2021	N	0.00069	U	0.00069	U	0.0023	U	0.00069	U	0.00069	U
			APG-DUP-03-031021 / APG-BLDG-E4081-2-SO-(0-2)-031021	03/10/2021	FD	0.00064	U	0.00064	U	0.0021	U	0.00064	U	0.00064	U
Weide Airfield - Tarmac Area	Soil	APG-WEIDE-1	APG-WEIDE-1-SO-(0-2)-031721	03/17/2021	N	0.00066	U	0.00066	U	0.0022	U	0.00066	U	0.00066	U
H-Field - Helicopter Fire Response Area	Soil	APG-HELIFIRE-1	APG-HELI-FIRE-1-SO-(0-2)-031221	03/12/2021	N	0.00064	U	0.00064	U	0.0021	U	0.00064	U	0.00064	U

Table 7-2 - Soil PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

					Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)		PFHxS (mg/kg)		PFNA (mg/kg)	
					OSD Industrial/Commercial Risk Screening Level	0.16		0.25		25		1.6		0.25	
					OSD Residential RiskScreening Levels	0.013		0.019		1.9		0.13		0.019	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Biosolid Application Field E	Soil	APG-BAF-E-1	APG-BAF-E-1-SO-(0-2)-030321	03/03/2021	N	0.00069	U	0.00069	U	0.0023	U	0.00069	U	0.00069	U
ABR-3	Soil	APG-ABR3-1	APG-ABR3-1-(0-2)-030821	03/08/2021	N	**0.1**		**0.0012**		0.0024	U	**0.0056**		**0.0012**	
ABR-6	Soil	APG-ABR6-1	APG-ABR6-1-SO-(0-2)-030521	03/05/2021	N	**0.061**		**0.006**		0.0025	U	**0.01**		**0.0076**	
ABR-6	Soil	APG-ABR6-2	APG-ABR6-2-SO-(0-2)-030521	03/05/2021	N	**0.0028**		**0.00056**	J	0.0022	U	0.00065	U	**0.001**	
ABR-7	Soil	APG-ABR7-1	APG-ABR7-1-SO-(0-2)-030521	03/05/2021	N	0.00063	U	0.00063	U	0.0021	U	0.00063	U	0.00063	U
PAAF - Airfield Boneyard	Soil	APG-BONEYARD-1	APG-BONEYARD-1-SO-(0-2)-031121	03/11/2021	N	0.00066	U	**0.00048**	J	0.0022	U	0.00066	U	0.00066	U
PAAF - Airfield Boneyard	Soil	APG-BONEYARD-2	APG-BONEYARD-2-SO-(0-2)-030821	03/08/2021	N	**0.0023**		**0.00074**		0.0023	U	0.00069	U	0.00069	U
PAAF - Airfield Boneyard	Soil	APG-BONEYARD-3	APG-BONEYARD-3-SO-(0-2)-030821	03/08/2021	N	**0.0006**	J	0.00067	U	0.0022	U	0.00067	U	0.00067	U
PAAF - Airfield Boneyard	Soil	APG-BONEYARD-4	APG-BONEYARD-4-SO-(0-2)-030821	03/08/2021	N	0.00067	U	0.00067	U	0.0022	U	0.00067	U	0.00067	U
PAAF - Airfield Boneyard	Soil	APG-BONEYARD-5	APG-BONEYARD-5-SO-(0-2)-030821	03/08/2021	N	**0.0052**		**0.00064**	J	0.0024	U	0.00072	U	0.00072	U
PAAF - Airfield Boneyard	Soil	APG-BONEYARD-6	APG-BONEYARD-6-SO-(0-2)-031121	03/11/2021	N	0.00073	U	**0.00056**	J	0.0024	U	0.00073	U	0.00073	U
PAAF - Airfield Boneyard	Soil	APG-BONEYARD-7	APG-BONEYARD-7-SO-(0-2)-031121	03/11/2021	N	0.0007	U	0.0007	U	0.0023	U	0.0007	U	0.0007	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the 2022 Office of the Secretary of Defense (OSD) risk screening levels for both the residential as well as the industrial/commercial scenarios (OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July 06.).
3. Grey shaded values indicate the result was detected greater than the residential scenario risk screening levels (OSD 2022).

Acronyms/Abbreviations:
AOPI = area of potential interest
DPT = Direct-Push Technology
FD = field duplicate sample
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

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

Table 7-3 - Surface Water PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

					Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)		PFHxS (ng/L)		PFNA (ng/L)	
Associated AOPI	**Location Type**	**Location**	**Sample ID / Parent Sample ID**	**Sample Date**	**Sample Type**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Fuze Range	Surface Water/Seep	APG-FUZE-1	APG-FUZE-1-SW-031621	03/16/2021	N	**400**		**880**		**6.3**		**530**		**520**	
			APG-DUP-06-031621 / APG-FUZE-1-SW-031621	03/16/2021	FD	**400**		**930**		19	U	**530**		**540**	
Weide Airfield – Building E4081	Surface Water/Seep	APG-BLDG-E4081-1	APG-BLDG-E4081-1-SW-031021	03/10/2021	N	**2.4**		**6.3**		**13**		**2.1**	J	**2.1**	
Weide Airfield – Building E4081	Surface Water/Seep	APG-BLDG-E4081-2	APG-BLDG-E4081-2-SW-031021	03/10/2021	N	1.9	U	**1.2**	J	**14**		1.9	U	1.9	U
H-Field - Tank Fire Response Area	Surface Water/Seep	APG-TANKFIRE-1	APG-TANK-FIRE-1-SW-031021	03/10/2021	N	**4.3**		**2.6**		**0.97**	J	**1.3**	J	**1.3**	J

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

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
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

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

Table 7-4 - Sediment PFOS, PFOA, PFBS, PFHxS, and PFNA Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Aberdeen Proving Ground, Maryland

					Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)		PFHxS (mg/kg)		PFNA (mg/kg)	
					OSD Industrial/Commercial Risk Screening Level	0.16		0.25		25		1.6		0.25	
					OSD Residential Risk Screening Levels	0.013		0.019		1.9		0.13		0.019	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
AA5 Range	Sediment	APG-AA5-1	APG-AA5-1-SE-031621	03/16/2021	N	**0.031**	J+	**0.0036**	J	0.0025	U	**0.0022**		**0.0014**	
			APG-DUP-05-031621 / APG-AA5-1-SE-031621	03/16/2021	FD	**0.067**	J	**0.0075**	J	0.0027	U	**0.0037**		**0.0027**	
Fuze Range	Sediment	APG-FUZE-1	APG-FUZE-1-SE-031621	03/16/2021	N	**0.061**		**0.019**		0.006	U	**0.008**		**0.03**	
Weide Airfield – Building E4081	Sediment	APG-BLDG-E4081-1	APG-BLDG-E4081-1-SE-031021	03/10/2021	N	0.0008	U	0.0008	U	0.0027	U	0.0008	U	0.0008	U
Weide Airfield – Building E4081	Sediment	APG-BLDG-E4081-2	APG-BLDG-E4081-2-SE-031021	03/10/2021	N	0.00089	U	0.00089	U	0.003	U	0.00089	U	0.00089	U
H-Field - Tank Fire Response Area	Sediment	APG-TANKFIRE-1	APG-TANK-FIRE-1-SE-031021	03/10/2021	N	0.0034	U	0.0034	U	0.011	U	0.0034	U	0.0034	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the Office of the Secretary of Defense (OSD) risk screening levels for both the residential as well as the industrial/commerical scenarios (OSD. 2022. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. July 06.).
3. Gray shaded values indicate the result was detected greater than the resediential scenario risk screening levels (OSD 2022).

Acronyms/Abbreviations:
AOPI = area of potential interest
DPT = Direct-Push Technology
FD = field duplicate sample
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

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

FIGURES

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

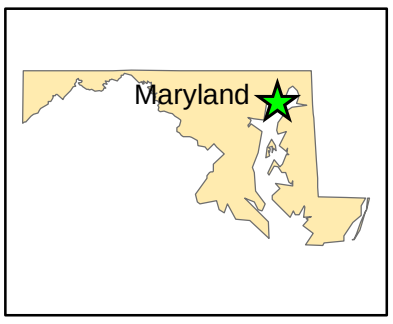
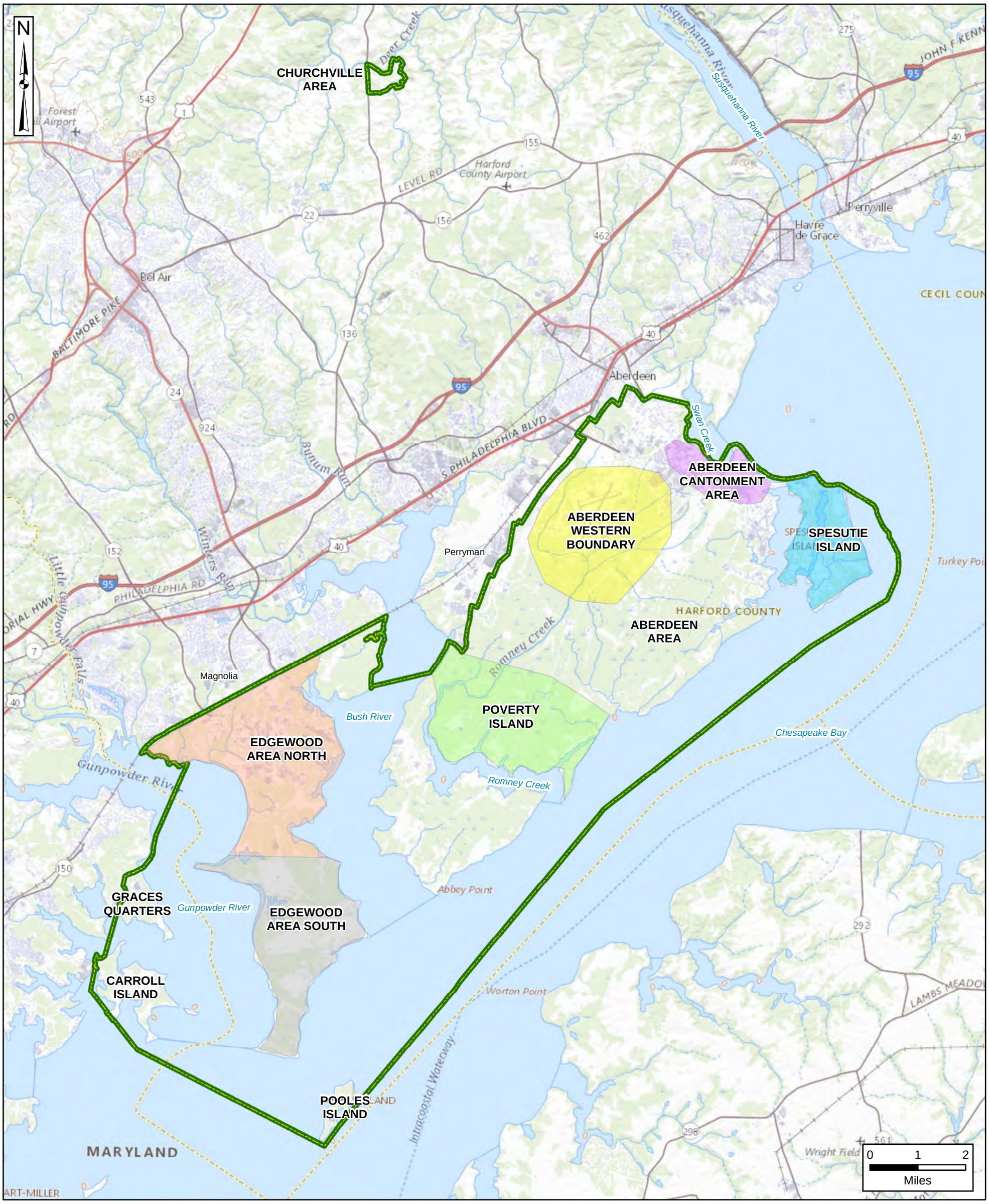


Figure 2-1
Site Location



Installation Boundary

Aberdeen Cantonment Area

Aberdeen Western Boundary

Edgewood Area North

Edgewood Area South

Poverty Island

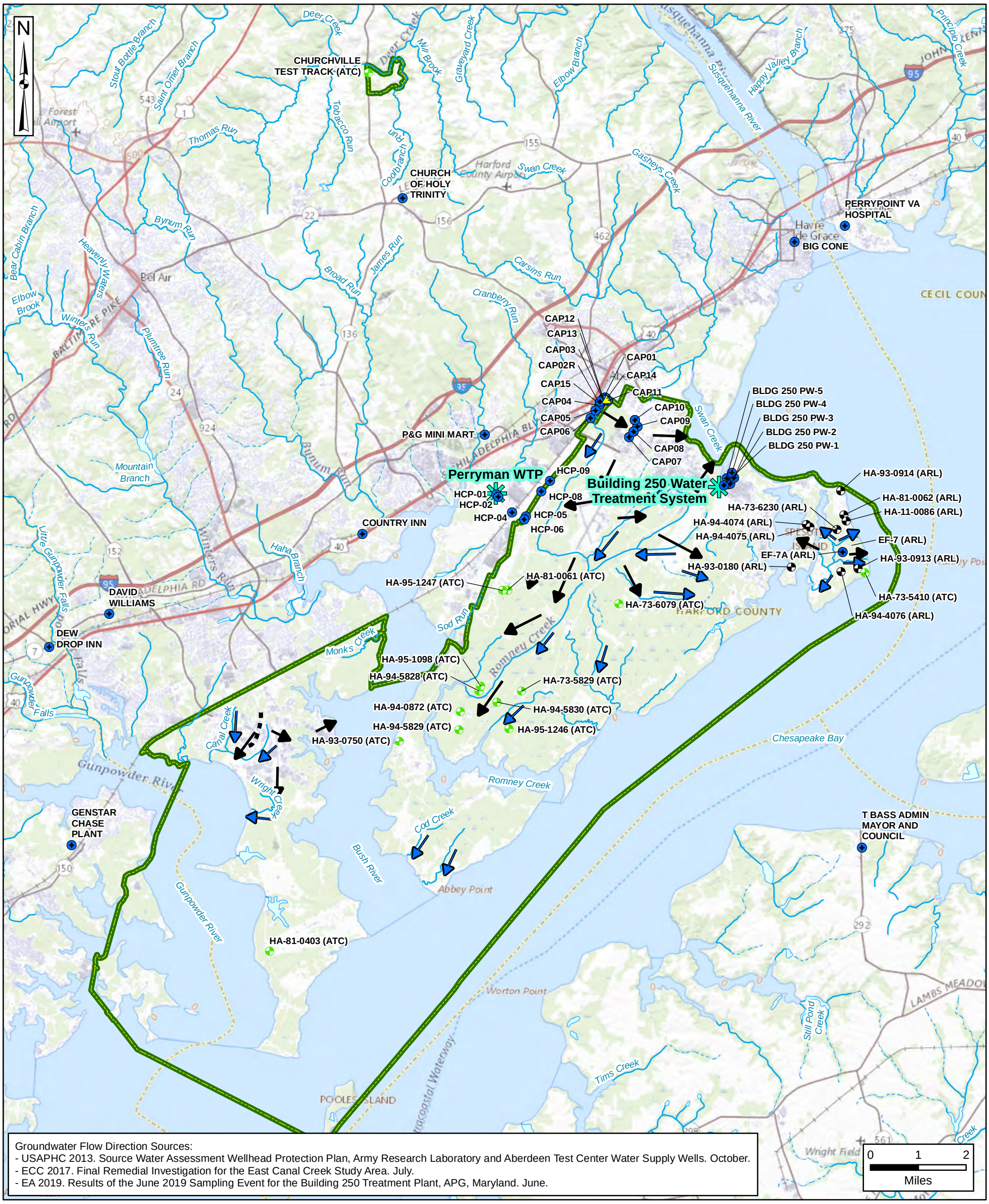
Spesutie Island

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 2-2
Site Layout



Installation Boundary
River/Stream (Perennial)
Stream (Intermittent)
Water Body
Surface Water Flow Direction
Groundwater Flow Direction
Hydraulic Groundwater Divide
City of Aberdeen Water Treatment Plant
ARL Potable Supply Well
ATC Potable Supply Well
Public Supply Well
UCMR3 Sampling Location

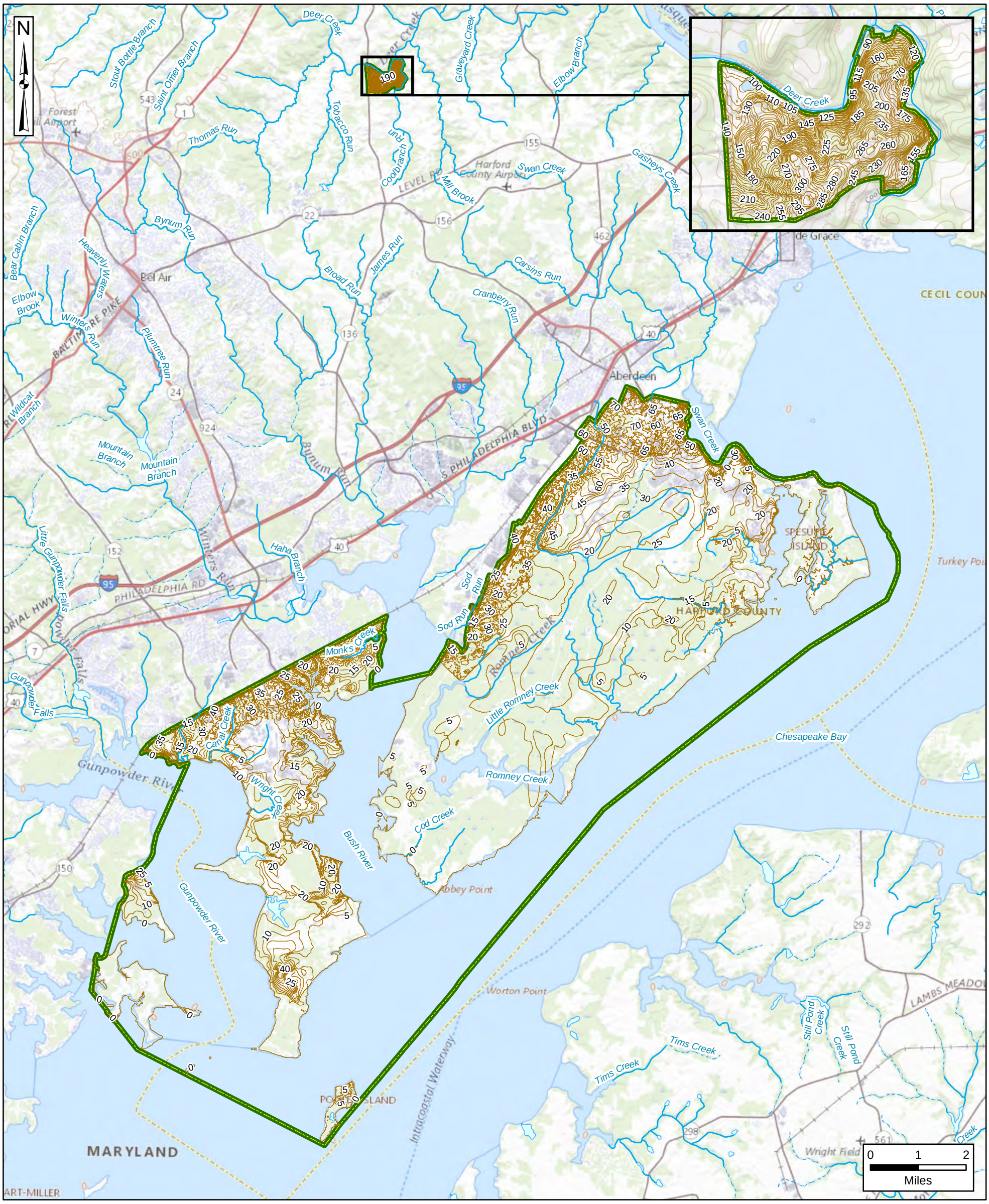
ARL = Army Research Laboratory
ATC = Aberdeen Test Center
UCMR3 = Unregulated Contaminant Monitoring Rule
USAPHC = United States Army Public Health Center
WTP = Water Treatment Plant

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 2-3
Site Topography



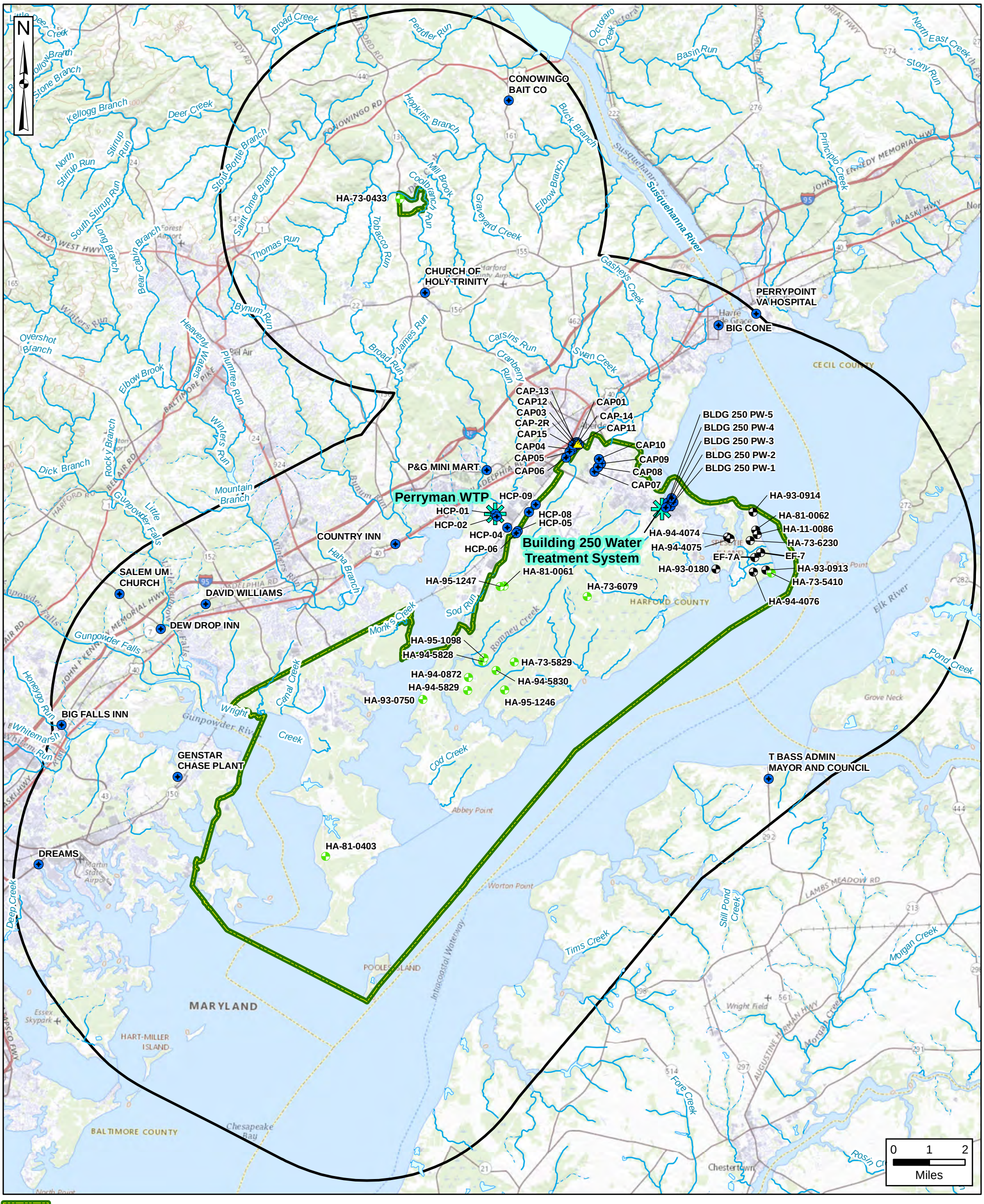
Installation Boundary
River/Stream (Perennial)
Stream (Intermittent)
Water Body
Elevation Contour (5 feet)

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 2-4
Potable Water Supply Wells



Installation Boundary
5-Mile Radius
River/Stream (Perennial)
Stream (Intermittent)
Water Body
City of Aberdeen Water Treatment Plant
ARL Potable Supply Well
ATC Potable Supply Well
Public Supply Well
UCMR3 Sampling Location

ARL = Army Research Laboratory
ATC = Aberdeen Test Center
BLDG = Building
UCMR3 = Unregulated Contaminant Monitoring Rule
WTP = Water Treatment Plant

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection Aberdeen Proving Ground, MD

ARCADIS

Figure 2-5a
Historical PFOS, PFOA, PFBS, PFHxS, and PFNA Data for the Western Boundary Area

Legend

- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Surface Water Flow Direction
- Shallow Groundwater Flow Direction
- Deep Groundwater Flow Direction
- AOPI Location
- Biosolids Application Field AOPI
- UCMR3 Sampling Location
- Public Supply Well
- Monitoring Well

Notes:
1) All text boxes are labeled with well identification (ID) followed by screen interval in feet below ground surface (bgs) in parenthesis.
2) All groundwater concentrations reported are in nanograms per liter (ng/L).
3) Yellow shaded values indicate exceedance of the 70 ng/L USEPA Health Advisory Limit in drinking water for PFOS and PFOA (USEPA 2016)
4) Gray shaded values indicate the result was detected greater than the 2022 Office of the Secretary of Defense (OSD) risk screening levels (OSD 2022).

0 500 1,000
Feet

Data Sources:
ESRI ArcGIS Online, World Topographic Map

Coordinate System:
WGS 1984, UTM Zone 18 North

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HCP-06 (60.0 - 89.0)					
3/22/2012	170	950	30	400	NS
10/9/2012	170	1000	30	400	NS
1/23/2013	190	660	NR	290	NS
3/13/2013	180	750	ND	320	NS
4/18/2013	180	750	NR	330	NS
7/11/2013	150	650	NR	280	NS
10/9/2013	170	720	NR	290	NS
7/5/2016	220	49	4	NS	NS
10/7/2016	250	690	43	NS	NS
7/11/2017	165	590	12	NS	NS
7/28/2017	0.2	6	NS	NS	NS
2/12/2018	ND	ND	ND	NS	NS
5/7/2018	200	650	45	NS	NS
7/31/2018	190 (210)	470 (480)	NS	NS	NS
9/10/2018	120	210	1.4	NS	NS
7/29/2020	210 (220)	510 (520)	29 (29)	330 (340)	12 (11)

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HCP-05 (60.0 - 66.0; 77.0 - 107.0)					
3/22/2012	40	200	ND	90	NS
10/9/2012	50	180	ND	110	NS
1/23/2013	50	160	NR	90	NS
3/13/2013	40 (40)	160 (160)	ND (ND)	90	NS
4/18/2013	60	160	NR	90	NS
7/11/2013	50	130	NR	80	NS
10/9/2013	40	130	NR	80	NS
7/5/2016	49	95	8	NS	NS
10/7/2016	ND	130	ND	NS	NS
7/11/2017	165	590	27	NS	NS
7/28/2017	120	220	NS	NS	NS
2/12/2018	1.5 J	37.2	5.2	NS	NS
5/7/2018	280	160	42	NS	NS
7/31/2018	150	290	NS	NS	NS
9/10/2018	120	210	14	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW1A (27.0 - 42.5)					
5/10/2012	ND	ND	ND	ND	ND
4/19/2017	5 J	2	NS	NS	NS
WB-MW1B (62.0 - 77.0)					
5/10/2012	ND (ND)	ND (ND)	ND (ND)	ND (ND)	ND (ND)
4/20/2017	9	6	NS	NS	NS
5/2017	10.1	5.45	ND	8.75	NS
WB-MW1C (83.0 - 98.5)					
5/9/2012	ND	ND	ND	ND	ND
4/19/2017	10	5	NS	NS	NS
5/2017	11.2	5.78	NS	11.7	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HCP-09 (55.0 - 79.0; 84.0 - 91.5)					
3/13/2013	ND	ND	ND	ND	ND
10/7/2016	ND	ND	ND	NS	NS
7/28/2017	2	2	NS	NS	NS
7/31/2018	1.9	3.1	NS	NS	NS
7/29/2020	1.1 J	2.3	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-P-10A (19 - 24)					
5/2017	19.9	8.42	2.38	NS	NS
WB-P-10B (109.5 - 114.5)					
5/2017	9.24	9.55	ND	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HCP-01 (94.0 - 103.3)					
3/22/2012	20	ND	ND	ND	ND
3/13/2013	ND	ND	ND	ND	ND
10/7/2016	ND	3	ND	NS	NS
7/28/2017	11 (13)	2 (2)	NS	NS	NS
7/29/2020	4.3	1.7	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HCP-08 (112.0 - 137.0)					
3/22/2012	20	ND	ND	30	ND
3/13/2013	ND	ND	ND	ND	ND
10/7/2016	ND	5	ND	NS	NS
7/28/2017	18	6	NS	NS	NS
7/31/2018	16	5.1	NS	NS	NS
7/29/2020	13	4.5	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
FTA - M08 (22 - 33)					
4/30/2012	7000	15000	220	7000	2000

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW7A (14.5 - 29.5)					
5/7/2012	ND	ND	ND	ND	ND
4/20/2017	ND	2 J	NS	NS	NS
WB-MW7B (54.5 - 64.5)					
5/1/2012	20	ND	ND	20	ND
4/20/2017	24 (25)	8 (8)	NS	NS	NS
5/2017	26.7	8.46	2.28	16.8	ND
WB-MW7C (99.6 - 109.6)					
5/7/2012	20 (20)	ND (ND)	ND (ND)	30 (30)	ND (ND)
4/20/2017	23	9	NS	NS	NS
5/2017	24.8	9.29	2.11	21.1	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW11A (14.5 - 29.5)					
4/30/2012	ND (ND)	ND (ND)	ND (ND)	ND (ND)	ND (ND)
4/25/2017	17 B	20	NS	NS	NS
WB-MW11B (69.5 - 79.5)					
4/30/2012	20	ND	ND	ND	ND
4/25/2017	39 B (41 B)	24 (24)	NS	NS	NS
WB-MW11C (107.3 - 117.3)					
4/30/2012	60	ND	ND	110	ND
4/25/2017	180 B	25	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HCP-02 (113.0 - 133.0)					
3/22/2012	ND	ND	ND	ND	ND
3/13/2013	ND	ND	ND	ND	ND
10/7/2016	ND	9	ND	NS	NS
7/28/2017	10	7	NS	NS	NS
7/29/2020	25	7.6	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW23B (84.5 - 94.5)					
5/10/2012	ND	ND	ND	ND	ND
4/19/2017	11 (9)	9 (8)	NS	NS	NS
5/2017	11.2	9.44	ND	13.5	ND
WB-MW23C (99.6 - 109.6)					
5/10/2012	ND	ND	ND	ND	ND
4/19/2017	ND	ND	NS	NS	NS
5/2017	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HCP-04 (96.0 - 144.0)					
3/22/2012	ND	ND	ND	ND	ND
3/13/2013	ND	ND	ND	ND	ND
10/7/2016	ND	8	ND	NS	NS
7/28/2017	3	6	NS	NS	NS
7/31/2018	2.9	5.3	NS	NS	NS
7/29/2020	3.2	5.5	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW2B (73.5 - 88.5)					
5/9/2012	ND	ND	ND	ND	ND
5/2/2017	12 (13)	10 (10)	NS	NS	NS
WB-MW2C (93.0 - 108.0)					
5/9/2012	ND	ND	ND	ND	ND
4/25/2017	13 B	10	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW10A (9.5 - 24.5)					
5/2/2012	ND	ND	ND	ND	ND
4/20/2017	16	8	NS	NS	NS
WB-MW10B (76.5 - 86.5)					
5/2/2012	20	20	ND	40	ND
4/20/2017	7	8	NS	NS	NS
WB-MW10C (109 - 119)					
5/2/2012	20	ND	ND	ND	ND
4/20/2017	27	16	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW20B (78.5 - 88.5)					
5/3/2012	40	220	ND	80	ND
4/24/2017	4 JB	2	NS	NS	NS
WB-MW20C (136 - 146)					
5/3/2012	ND	ND	ND	ND	ND
4/24/2017	3 JB	0.8 J	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW3A (27.0 - 42.0)					
5/3/2012	ND	50	ND	30	ND
5/2/2017	6	11	NS	NS	NS
WB-MW3B (73.5 - 88.5)					
5/3/2012	30	160	ND	80	ND
5/2/2017	210	370	NS	NS	NS
WB-MW3C (93.0 - 108.0)					
5/8/2012	110	720	30	290	ND
5/2/2017	360	760	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW14A (13.5 - 28.5)					
4/25/2012	ND	50	ND	30	ND
4/21/2017	ND	70 B	NS	NS	NS
WB-MW14B (79.1 - 89.1)					
4/26/2012	ND	80	ND	120	ND
4/21/2017	33	62 B	NS	NS	NS
WB-MW14C (109.5 - 119.5)					
4/25/2012	ND	ND	ND	ND	ND
4/21/2017	20 B	9	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW19B (49 - 59)					
5/10/2012	ND	ND	ND	ND	ND
4/19/2017	ND	4	NS	NS	NS
5/2017	ND	4.38	ND	NS	NS
WB-MW19C (128.5 - 138.5)					
5/10/2012	ND	ND	ND	ND	ND
4/20/2017	22	10	NS	NS	NS
5/2017	57.4	20.5	2.34	35.1	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW9A (11.5 - 26.5)					
4/19/2012	ND	ND	ND	ND	ND
4/21/2017	ND	3 B	NS	NS	NS
WB-MW9B (79.1 - 89.1)					
4/19/2012	1100	2000	60	2000	100
4/21/2017	2700	2000 B	NS	NS	NS
WB-MW9C (109.5 - 119.5)					
4/25/2012	2000	8000	180	3000	180
4/21/2017	1300	2200 B	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW15A (9.5 - 24.5)					
4/24/2012	ND	30	ND	ND	ND
4/25/2017	12 B	8	NS	NS	NS
WB-MW15B (111 - 121)					
4/24/2012	ND	690	ND	60	ND
4/25/2017	8 B	650	NS	NS	NS
WB-MW15C (161.5 - 171.5)					
4/24/2012	ND (ND)	280 (310)	ND (ND)	110 (110)	ND (ND)
4/25/2017	66 B	180	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW5B (79.5 - 86.5)					
5/2017	ND	ND	ND	3.73	ND
WB-MW5C (136.5 - 146.5)					
5/2017	ND	ND	ND	ND	ND
WB-MW5F (Not Available)					
5/2017	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW8B (64.5 - 74.5)					
4/18/2012	750	3000	60	1000	30
4/24/2017	840 B	1000	NS	NS	NS
WB-MW8C (133 - 143)					
4/18/2012	100	4000	60	950	ND
4/24/2017	330 B	1300	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW4A (27.5 - 42.5)					
5/3/2012	ND	ND	ND	ND	ND
5/2/2017	4 J	3	NS	NS	NS
WB-MW4B (65.0 - 80.0)					
5/3/2012	230	1000	30	470	30
4/25/2017	710 B	850	NS	NS	NS
5/2017	733	1170	76.8	773	47.3
WB-MW4C (84.5 - 99.5)					
5/8/2012	310 (270)	1400 (1000)	70 (90)	710 (670)	20 (20)
4/25/2017	590 B	760	NS	NS	NS
5/2017	630	883	58.1	652	36.7

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-MW6A (19.5 - 34.5)					
5/3/2012	ND	ND	ND	ND	ND
4/20/2017	3 J	4	NS	NS	NS
WB-MW6B (59.5 - 69.5)					
5/1/2012	50	1000	50	510	ND
4/20/2017	74	430	NS	NS	NS
5/2017	105	639	37.6	359	6.19
WB-MW6C (97 - 107)					
4/26/2012	710	7000	190	3000	70
4/20/2017	1800	4800	NS	NS	NS
5/2017	2190 (2450)	6340 (7070)	331 (363)	2820 (3130)	173 (177)

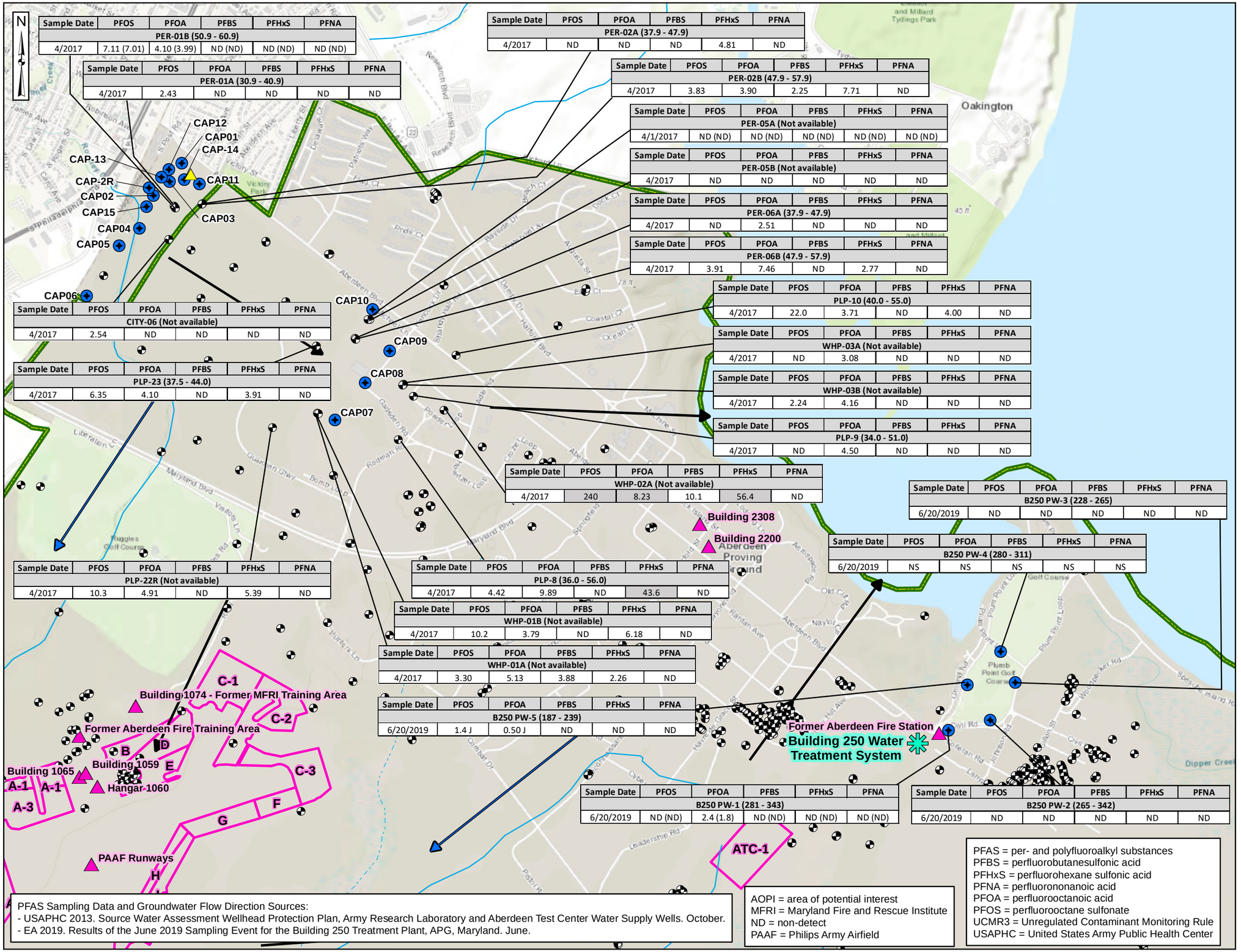
Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WB-WP-01 (Not Available)					
5/2017	ND	11	ND	NS	NS

Building 1074 - Former MFRI Training Area
Former Aberdeen Fire Training Area
Building 1059
Building 1065
Building 1060
PAAF Runways
Aircraft Boneyard
ABR7
ABR3
PAAF - Loading Pad
Perryman WTP
A-1
A-2
A-3
B
D
E
I

PFAS Sampling Data and Groundwater Flow Direction Sources:
- USAPHC 2013. Source Water Assessment Wellhead Protection Plan, Army Research Laboratory and Aberdeen Test Center Water Supply Wells. October.
- USAG APG 2015. Emerging Contaminants Study: PFOA and PFOS at Western Boundary Study Area, Operable Unit 1. November.
- USAPHC 2017. Groundwater Consultation No. S.0049485-17 Source Water Protection Areas. 24 April – 4 May.
- EA 2017. Summary of PFOA/PFOS Analytical Results for Groundwater Samples, Harford County Source Water Protection Area, APG, Maryland. May and July.
- EA 2020. Results of the July 2020 Sampling Event – Perryman Treatment Plant, Perryman, Maryland. 17 September

ABR = Air Base Range
AOPI = area of potential interest
MFRI = Maryland Fire and Rescue Institute
ND = non-detect
NS = not sampled

PAAF = Philips Army Airfield
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
UCMR3 = Unregulated Contaminant Monitoring Rule
USAPHC = United States Army Public Health Center
WTP = Water Treatment Plant



Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PER-01B (50.9 - 60.9)					
4/2017	7.11 (7.01)	4.10 (3.99)	ND (ND)	ND (ND)	ND (ND)

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PER-01A (30.9 - 40.9)					
4/2017	2.43	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PER-02A (37.9 - 47.9)					
4/2017	ND	ND	ND	4.81	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PER-02B (47.9 - 57.9)					
4/2017	3.83	3.90	2.25	7.71	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PER-05A (Not available)					
4/1/2017	ND (ND)	ND (ND)	ND (ND)	ND (ND)	ND (ND)

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PER-05B (Not available)					
4/2017	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PER-06A (37.9 - 47.9)					
4/2017	ND	2.51	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PER-06B (47.9 - 57.9)					
4/2017	3.91	7.46	ND	2.77	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
CITY-06 (Not available)					
4/2017	2.54	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PLP-23 (37.5 - 44.0)					
4/2017	6.35	4.10	ND	3.91	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PLP-10 (40.0 - 55.0)					
4/2017	22.0	3.71	ND	4.00	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WHP-03A (Not available)					
4/2017	ND	3.08	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WHP-03B (Not available)					
4/2017	2.24	4.16	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PLP-9 (34.0 - 51.0)					
4/2017	ND	4.50	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WHP-02A (Not available)					
4/2017	240	8.23	10.1	56.4	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
B250 PW-3 (228 - 265)					
6/20/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
B250 PW-4 (280 - 311)					
6/20/2019	NS	NS	NS	NS	NS

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PLP-22R (Not available)					
4/2017	10.3	4.91	ND	5.39	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
PLP-8 (36.0 - 56.0)					
4/2017	4.42	9.89	ND	43.6	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WHP-01B (Not available)					
4/2017	10.2	3.79	ND	6.18	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
WHP-01A (Not available)					
4/2017	3.30	5.13	3.88	2.26	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
B250 PW-5 (187 - 239)					
6/20/2019	1.4 J	0.50 J	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
B250 PW-1 (281 - 343)					
6/20/2019	ND (ND)	2.4 (1.8)	ND (ND)	ND (ND)	ND (ND)

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
B250 PW-2 (265 - 342)					
6/20/2019	ND	ND	ND	ND	ND

PFAS Sampling Data and Groundwater Flow Direction Sources:
- USAPHC 2013. Source Water Assessment Wellhead Protection Plan, Army Research Laboratory and Aberdeen Test Center Water Supply Wells. October.
- EA 2019. Results of the June 2019 Sampling Event for the Building 250 Treatment Plant, APG, Maryland. June.

AOPI = area of potential interest
MFRI = Maryland Fire and Rescue Institute
ND = non-detect
PAAF = Philips Army Airfield

PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
UCMR3 = Unregulated Contaminant Monitoring Rule
USAPHC = United States Army Public Health Center

USAEC PFAS Preliminary Assessment / Site Inspection Aberdeen Proving Ground, MD

ARCADIS

Figure 2-5b
Historical PFOS, PFOA, PFBS, PFHxS, and PFNA Data for the Aberdeen Cantonment Area

Legend

- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Surface Water Flow Direction
- Groundwater Flow Direction
- AOPI Location
- Biosolids Application Field AOPI
- City of Aberdeen Water Treatment Plant
- UCMR3 Sampling Location
- Public Supply Well
- Monitoring Well

Notes:
1) All text boxes are labeled with well identification (ID) followed by screen interval in feet below ground surface (bgs) in parenthesis.
2) All groundwater concentrations reported are in nanograms per liter (ng/L).
3) Gray shaded values indicate the result was detected greater than the 2022 Office of the Secretary of Defense (OSD) risk screening levels (OSD 2022).

0 500 1,000
Feet

Data Sources:
ESRI ArcGIS Online, World Topographic Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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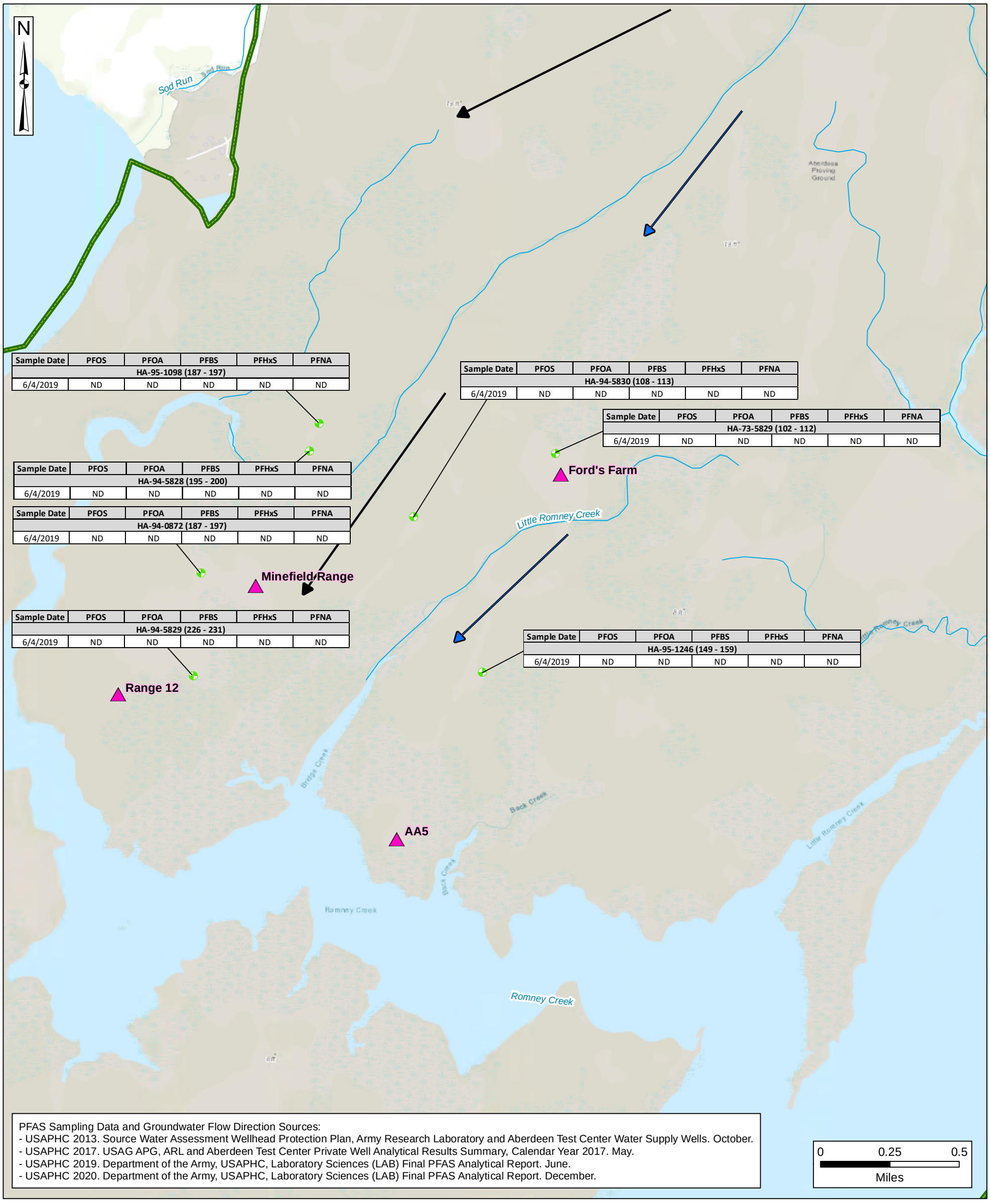
Aberdeen Proving Ground, MD

Figure 2-5c
Historical PFOS, PFOA, PFBS, PFHxS, and PFNA Data for the Poverty Island Area



Installation Boundary
River/Stream (Perennial)
Surface Water Flow Direction
Groundwater Flow Direction
AOPI
ATC Potable Supply Well

Notes:
1) All text boxes are labeled with well identification (ID) followed by screen interval in feet below ground surface (bgs) in parenthesis.
2) All groundwater concentrations reported are in nanograms per liter (ng/L).

AOPI = area of potential interest
ATC = Aberdeen Test Center
ND = non-detect
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
USAPHC = United States Army Public Health Center

Data Sources:
ESRI ArcGIS Online,
World Topographic Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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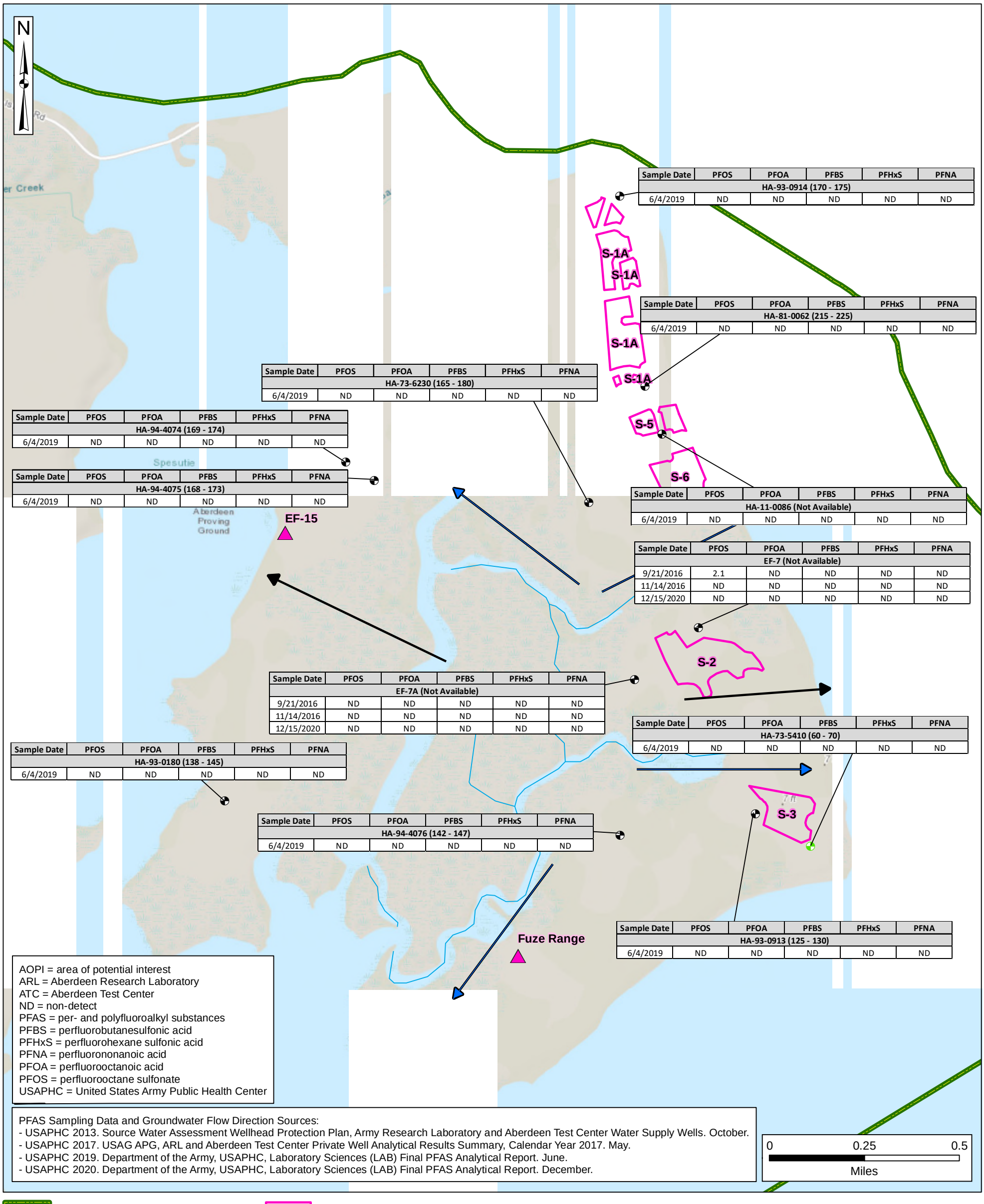
Aberdeen Proving Ground, MD

Figure 2-5d
Historical PFOS, PFOA, PFBS, PFHxS, and PFNA Data for the Spesutie Island Area



Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-93-0914 (170 - 175)					
6/4/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-81-0062 (215 - 225)					
6/4/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-73-6230 (165 - 180)					
6/4/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-94-4074 (169 - 174)					
6/4/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-94-4075 (168 - 173)					
6/4/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-11-0086 (Not Available)					
6/4/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
EF-7 (Not Available)					
9/21/2016	2.1	ND	ND	ND	ND
11/14/2016	ND	ND	ND	ND	ND
12/15/2020	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
EF-7A (Not Available)					
9/21/2016	ND	ND	ND	ND	ND
11/14/2016	ND	ND	ND	ND	ND
12/15/2020	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-73-5410 (60 - 70)					
6/4/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-93-0180 (138 - 145)					
6/4/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-94-4076 (142 - 147)					
6/4/2019	ND	ND	ND	ND	ND

Sample Date	PFOS	PFOA	PFBS	PFHxS	PFNA
HA-93-0913 (125 - 130)					
6/4/2019	ND	ND	ND	ND	ND

AOPI = area of potential interest
ARL = Aberdeen Research Laboratory
ATC = Aberdeen Test Center
ND = non-detect
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
USAPHC = United States Army Public Health Center

PFAS Sampling Data and Groundwater Flow Direction Sources:
- USAPHC 2013. Source Water Assessment Wellhead Protection Plan, Army Research Laboratory and Aberdeen Test Center Water Supply Wells. October.
- USAPHC 2017. USAG APG, ARL and Aberdeen Test Center Private Well Analytical Results Summary, Calendar Year 2017. May.
- USAPHC 2019. Department of the Army, USAPHC, Laboratory Sciences (LAB) Final PFAS Analytical Report. June.
- USAPHC 2020. Department of the Army, USAPHC, Laboratory Sciences (LAB) Final PFAS Analytical Report. December.

Installation Boundary
River/Stream (Perennial)
Surface Water Flow Direction
Groundwater Flow Direction
Biosolids Application Field AOPI
AOPI
ARL Potable Supply Well
ATC Potable Supply Well

Notes:
1) All text boxes are labeled with well identification (ID) followed by screen interval in feet below ground surface (bgs) in parenthesis.
2) All groundwater concentrations reported are in nanograms per liter (ng/L).

Data Sources:
ESRI ArcGIS Online,
World Topographic Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 2-5e
Historical PFOS, PFOA, PFBS, PFHxS, and PFNA Data for the Edgewood Area

Sample Date	PFOS	PFOA
CCMW46-1 (14 - 24)		
3/8/2017	33.6	140

Sample Date	PFOS	PFOA
CCMW46-5 (32.5 - 42.5)		
3/8/2017	52.3	1,110

Sample Date	PFOS	PFOA
CCMW46-3 (9 - 19)		
3/7/2017	3.2 U	3.2 U

Sample Date	PFOS	PFOA
CC-039A (20 - 25)		
3/8/2017	71.2 J	36,900 J
Sample Date	**PFOS**	**PFOA**
CC-039B (35 - 40)		
3/9/2017	2.21 J (3.1 UJ)	365 (335)

Sample Date	PFOS	PFOA
MIP-01 (12-12.5)		
2/3/2015	ND	ND
Sample Date	**PFOS**	**PFOA**
MIP-01 (15-20)		
2/3/2015	0.006	ND

Sample Date	PFOS	PFOA
MIP-01 (15-20)		
2/3/2015	10,700	45,300
Sample Date	**PFOS**	**PFOA**
MIP-01 (35-40)		
2/3/2015	14 (14)	394 (388)

Sample Date	PFOS	PFOA
CCMW46-7 (51 - 61)		
3/8/2017	33.1 U	94.6

Sample Date	PFOS	PFOA
CCMW46-8A (35 - 45)		
3/8/2017	88.5	1,130
Sample Date	**PFOS**	**PFOA**
CCMW46-8B (50 - 60)		
3/8/2017	3.1 U (3.2 U)	2.15 J (2.1 J)

Sample Date	PFOS	PFOA
CCMW46-2 (35 - 40)		
3/6/2017	3.2 U	38.6

Sample Date	PFOS	PFOA
CCMW46-6 (55 - 65)		
3/8/2017	125	2,370

G-Street Plane Crash
G-Street Salvage Yard FFTA
Building E5180
Building E5005 Fire Training Area
Casey Yard Site
GWTP
Weide Airfield – Building E4040
Noble Road Fire Training Area
CCEW-01
CCEW-02
CCEW-03
CCEW-04
CCEW-05
CCEW-06
CCEW-07
CCEW-08
Weide Airfield – Tarmac Area
Weide Airfield – Building E4081
E-1
E-2
E-3

AOPI = area of potential interest
FFTA = Former Fire Training Area
GWTP = groundwater treatment plant
ND = non-detect
NS = not sampled
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonic acid
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

PFAS Sampling Data and Groundwater Flow Direction Sources:
- ECC 2017. Final Remedial Investigation for the East Canal Creek Study Area. July.
- ECC 2019. Final PFAS Analytical Report for Canal Creek Groundwater Treatment Plant. December.

Notes:
1) All text boxes are labeled with well or boring identification (ID) followed by screen interval (in feet below ground surface (bgs) in parenthesis.
2) Groundwater results (gray headers) are in nanograms per liter (ng/L).
3) Soil results (yellow headers) are in micrograms per kilogram (mg/kg).
4) Gray shaded values indicate the result was detected greater than the 2022 Office of the Secretary of Defense (OSD) risk screening levels (OSD 2022).
4) PFBS, PFHxS, and PFNA were not analyzed in any of the samples collected in these investigations.

0 0.25 0.5
Miles

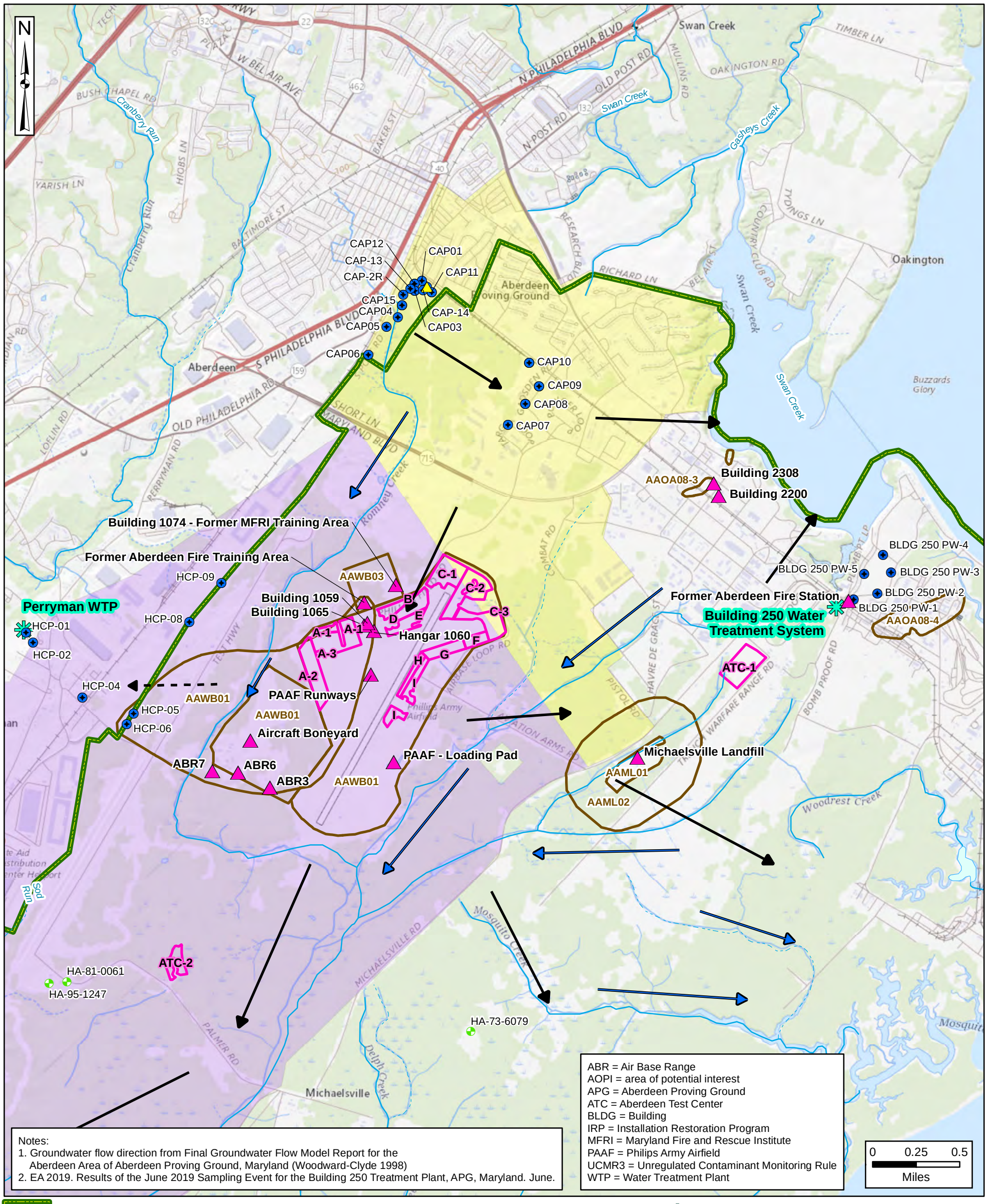
Installation Boundary
River/Stream (Perennial)
Surface Water Flow Direction
Groundwater Flow Direction
Hydraulic Groundwater Divide
Biosolids Application Field AOPI
AOPI
Non-AOPI
Extraction Well
Monitoring Well
Historical Soil/Groundwater Sample Location

Data Sources:
ESRI ArcGIS Online,
World Topographic Map

Coordinate System:
WGS 1984, UTM Zone 18 North

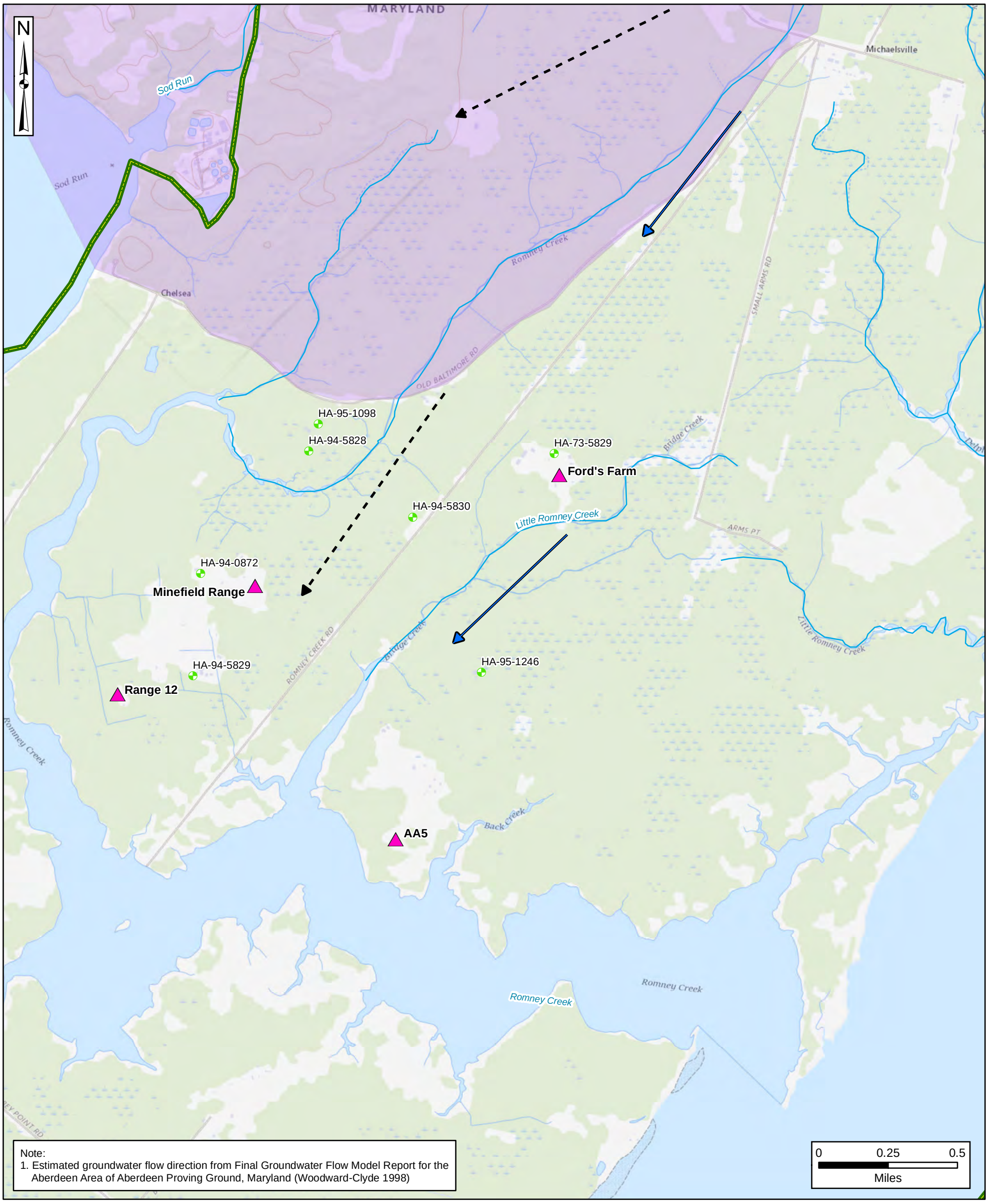
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-2a
Aberdeen Western Boundary and Cantonment Area AOPI Locations



USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-2b
Poverty Island AOPI Locations



Installation Boundary
River/Stream (Perennial)
Surface Water Flow Direction
Estimated Groundwater Flow Direction
AOPI
ATC Potable Supply Well
AAWB04

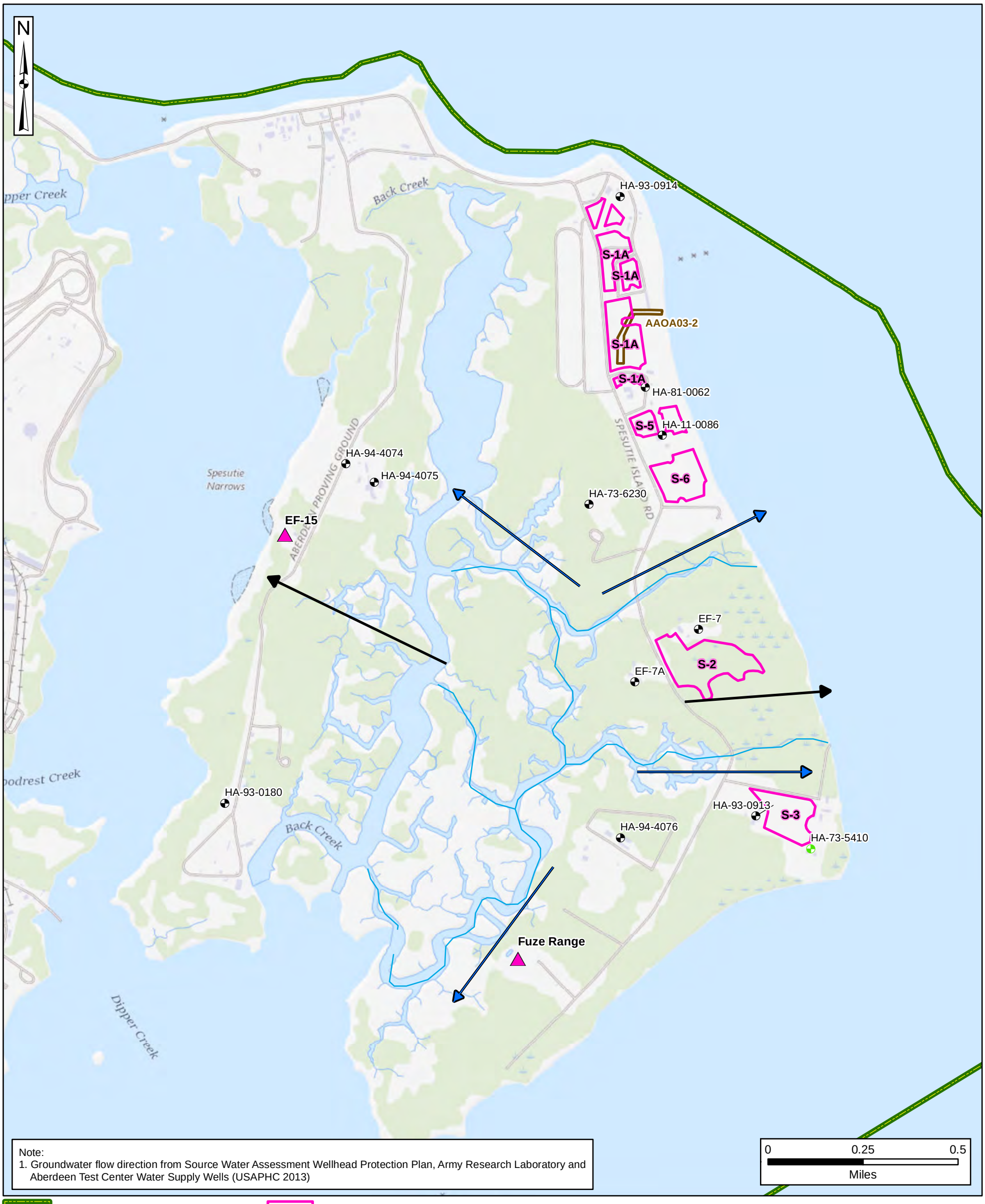
AOPI = area of potential interest
ATC = Aberdeen Test Center
IRP = Installation Restoration Program

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-2c
Spesutie Island AOPI Locations



Note:
1. Groundwater flow direction from Source Water Assessment Wellhead Protection Plan, Army Research Laboratory and Aberdeen Test Center Water Supply Wells (USAPHC 2013)

Installation Boundary
River/Stream (Perennial)
Surface Water Flow Direction
Groundwater Flow Direction
Biosolids Application Field AOPI
AOPI
ARL Potable Supply Well
ATC Potable Supply Well
APG IRP Site

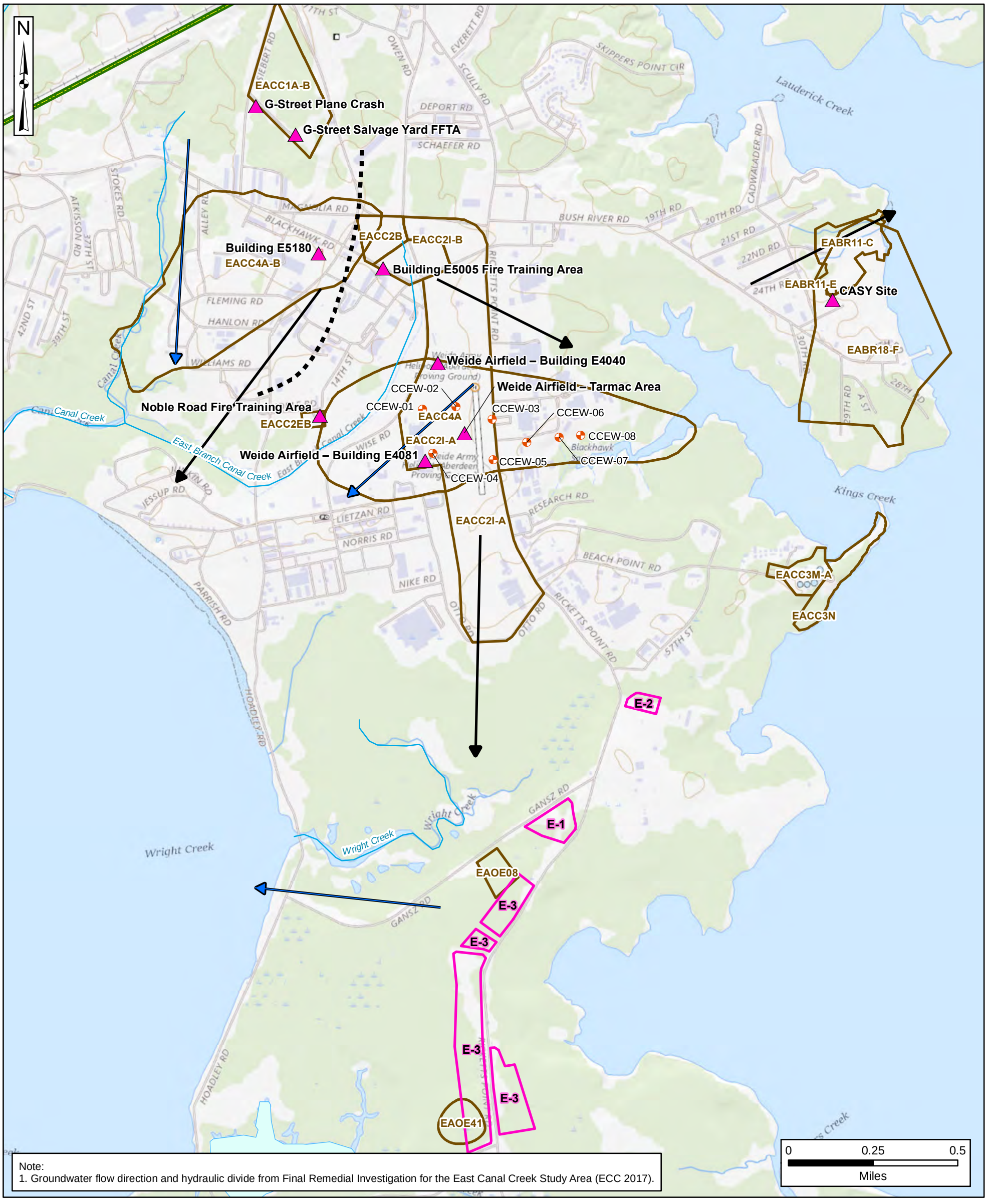
AOPI = area of potential interest
APG = Aberdeen Proving Ground
ARL = Army Research Laboratory
ATC = Aberdeen Test Center
IRP = Installation Restoration Program
USAPHC = United States Army Public Health Center

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-2d
Edgewood North AOPI Locations



Note:
1. Groundwater flow direction and hydraulic divide from Final Remedial Investigation for the East Canal Creek Study Area (ECC 2017).

- Installation Boundary
- River/Stream (Perennial)
- Water Body
- Surface Water Flow Direction
- Groundwater Flow Direction
- Hydraulic Groundwater Divide
- Biosolids Application Field AOPI
- AOPI
- Extraction Well
- APG IRP Site

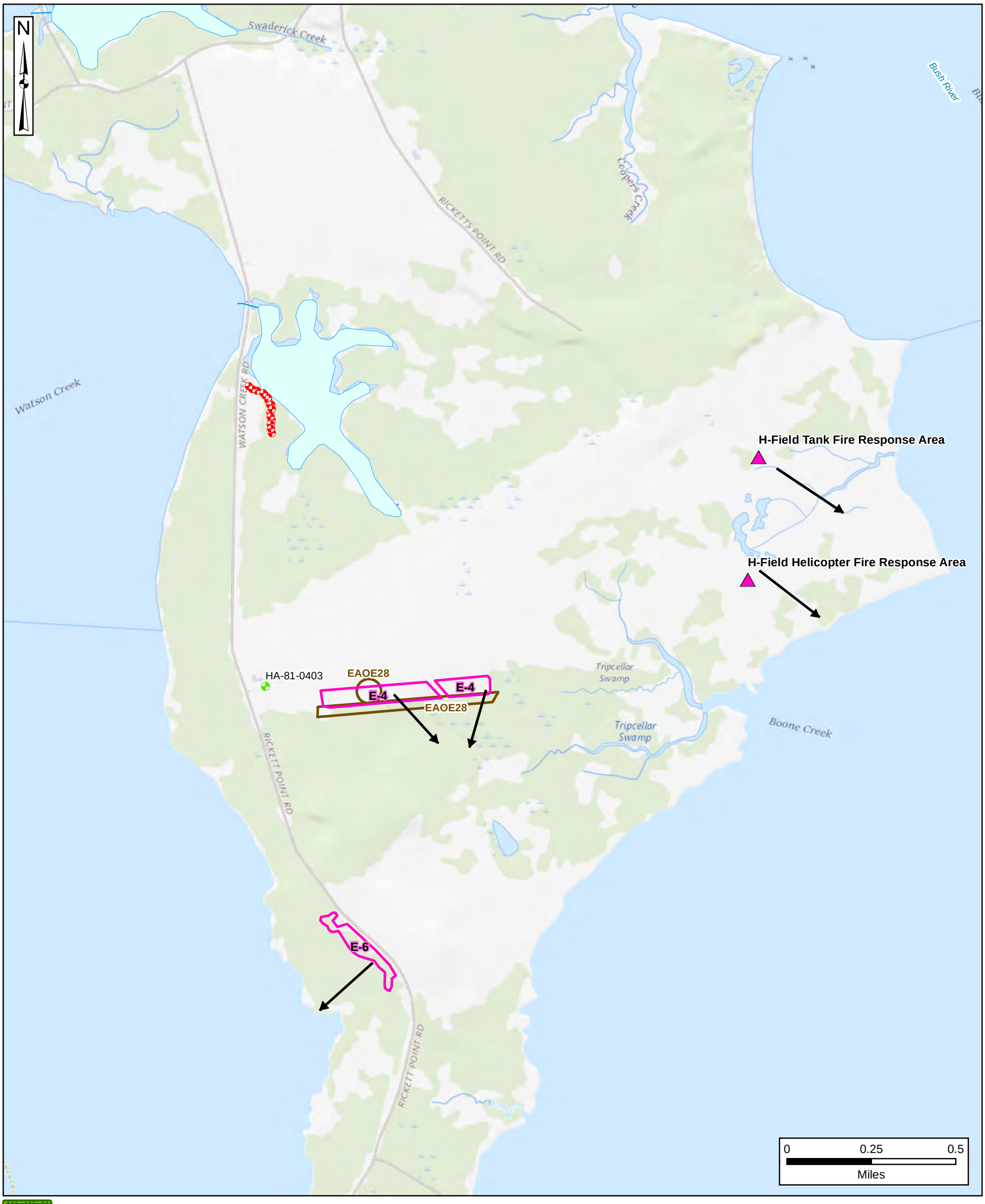
AOPI = area of potential interest
APG = Aberdeen Proving Ground
CASY = Chemical Agent Storage Yard
FFTA = Former Fire Training Area
IRP = Installation Restoration Program

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-2e
Edgewood South AOPI Locations



Installation Boundary
River/Stream (Perennial)
Water Body
Biosolids Application Field AOPI
Inferred Groundwater Flow Direction Based on Topography
AOPI
ATC Potable Supply Well
Extraction Well
APG IRP Site

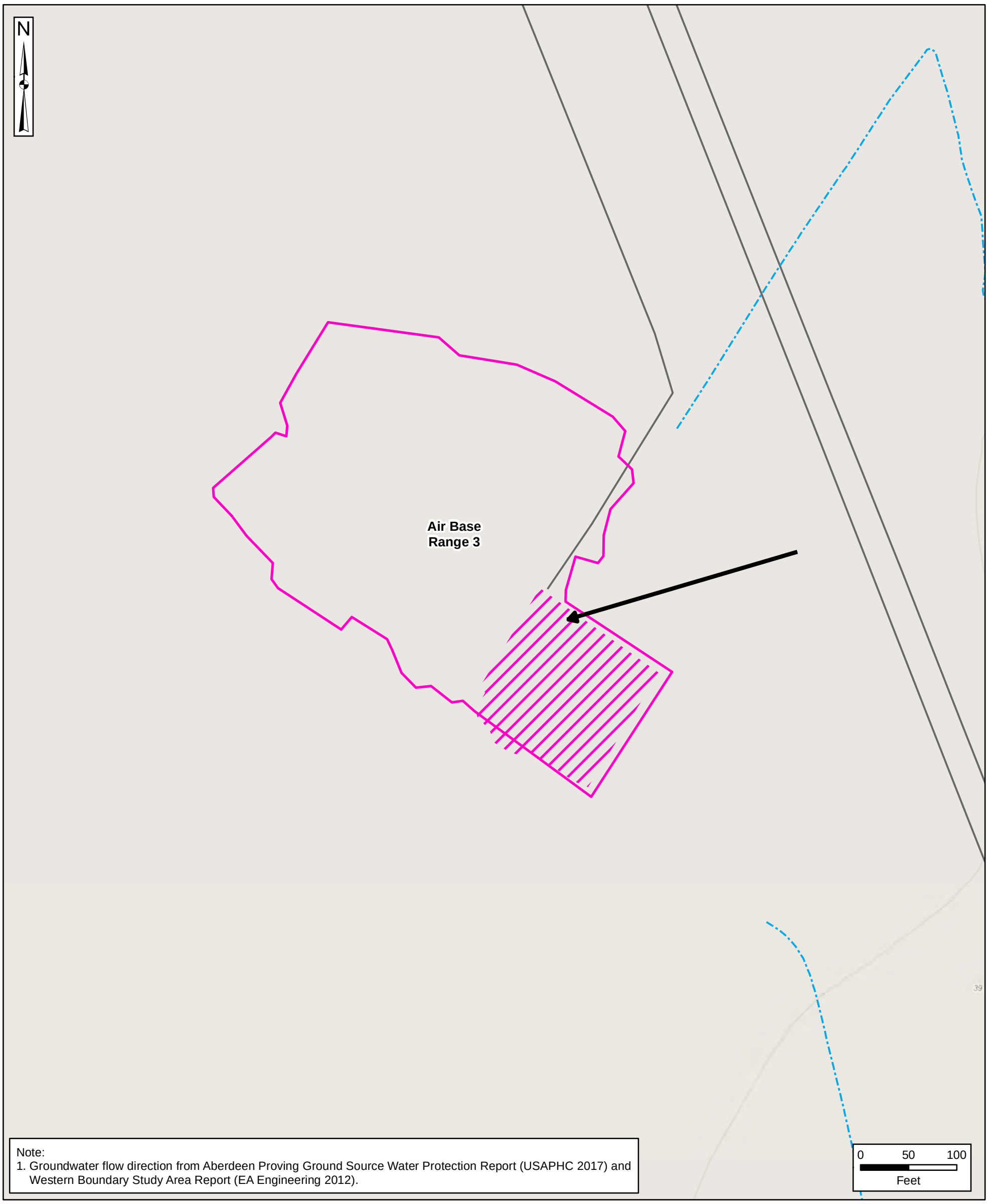
AOPI = area of potential interest
APG = Aberdeen Proving Ground
ATC = Aberdeen Test Center
IRP = Installation Restoration Program

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-3
Air Base Range 3 AOPI



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

Installation Boundary
Road Centerline
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area

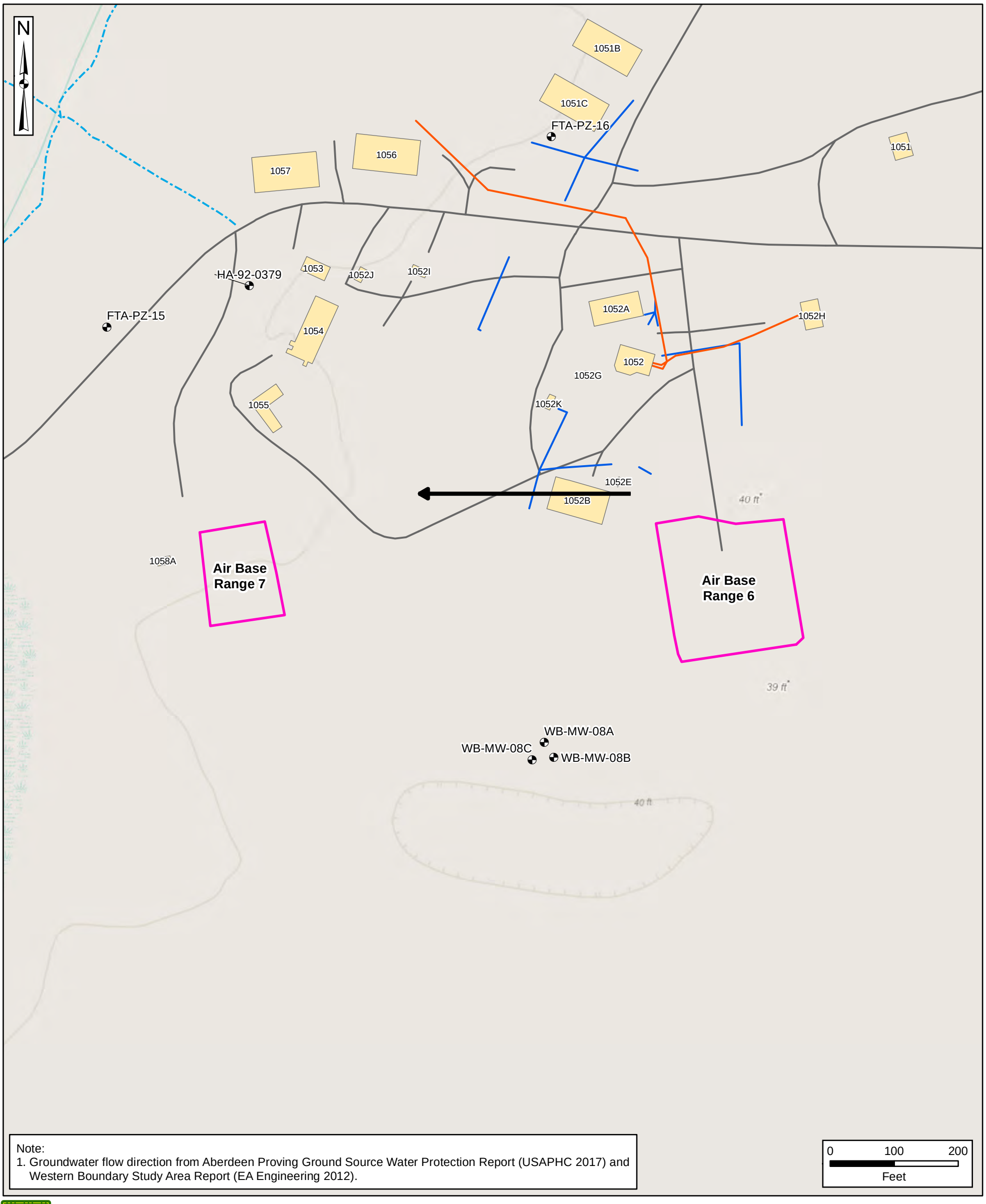
AFFF = aqueous film-forming foam
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-4
Air Base Ranges 6 and 7 AOPIs



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
AOPI
Monitoring Well

AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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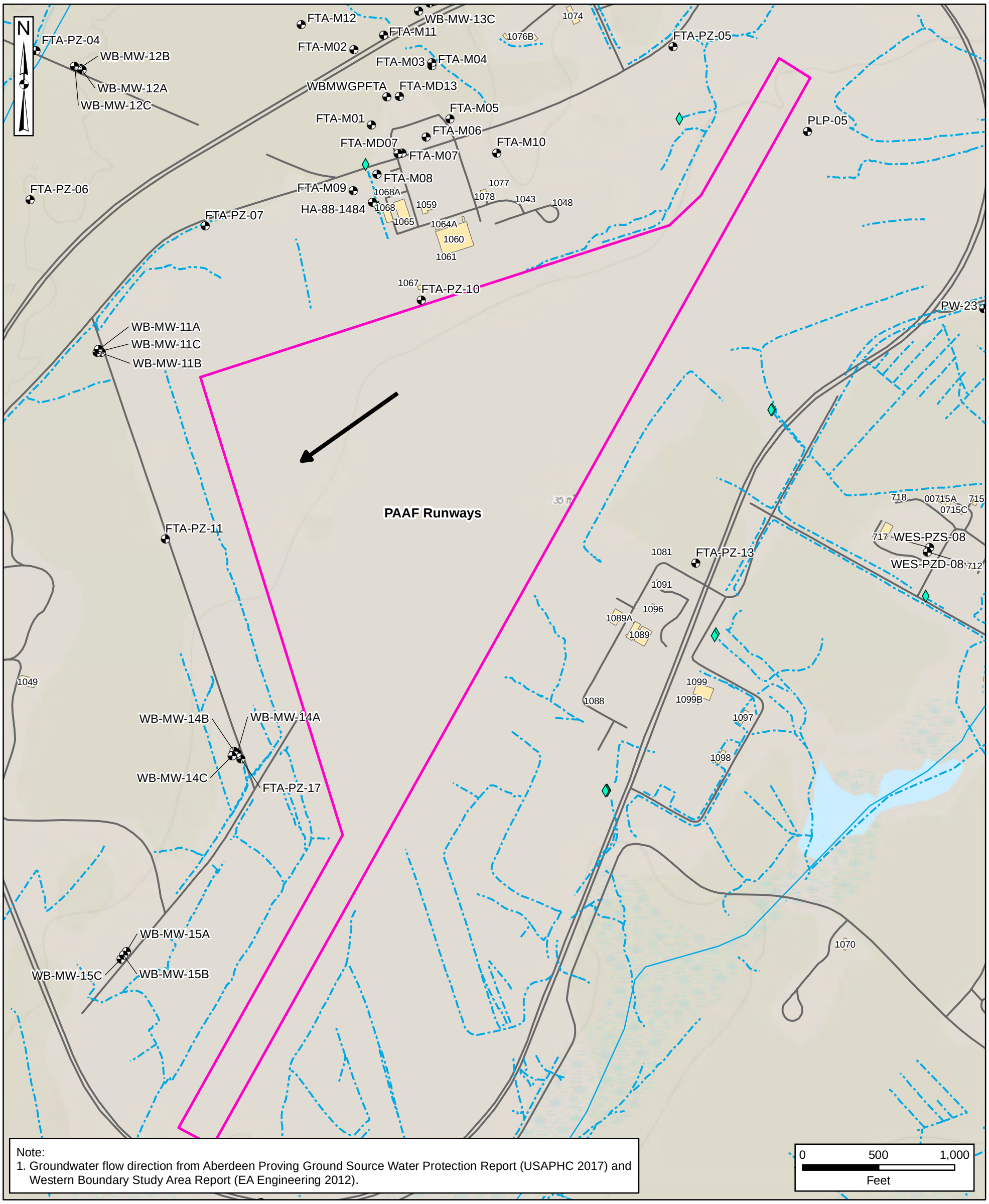
Aberdeen Proving Ground, MD

Figure 5-5
PAAF - Runways AOPI



Installation Boundary
Building
Road Centerline
River/Stream (Perennial)
Stream (Intermittent)
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
Monitoring Well

AOPI = area of potential interest
PAAF = Philips Army Airfield
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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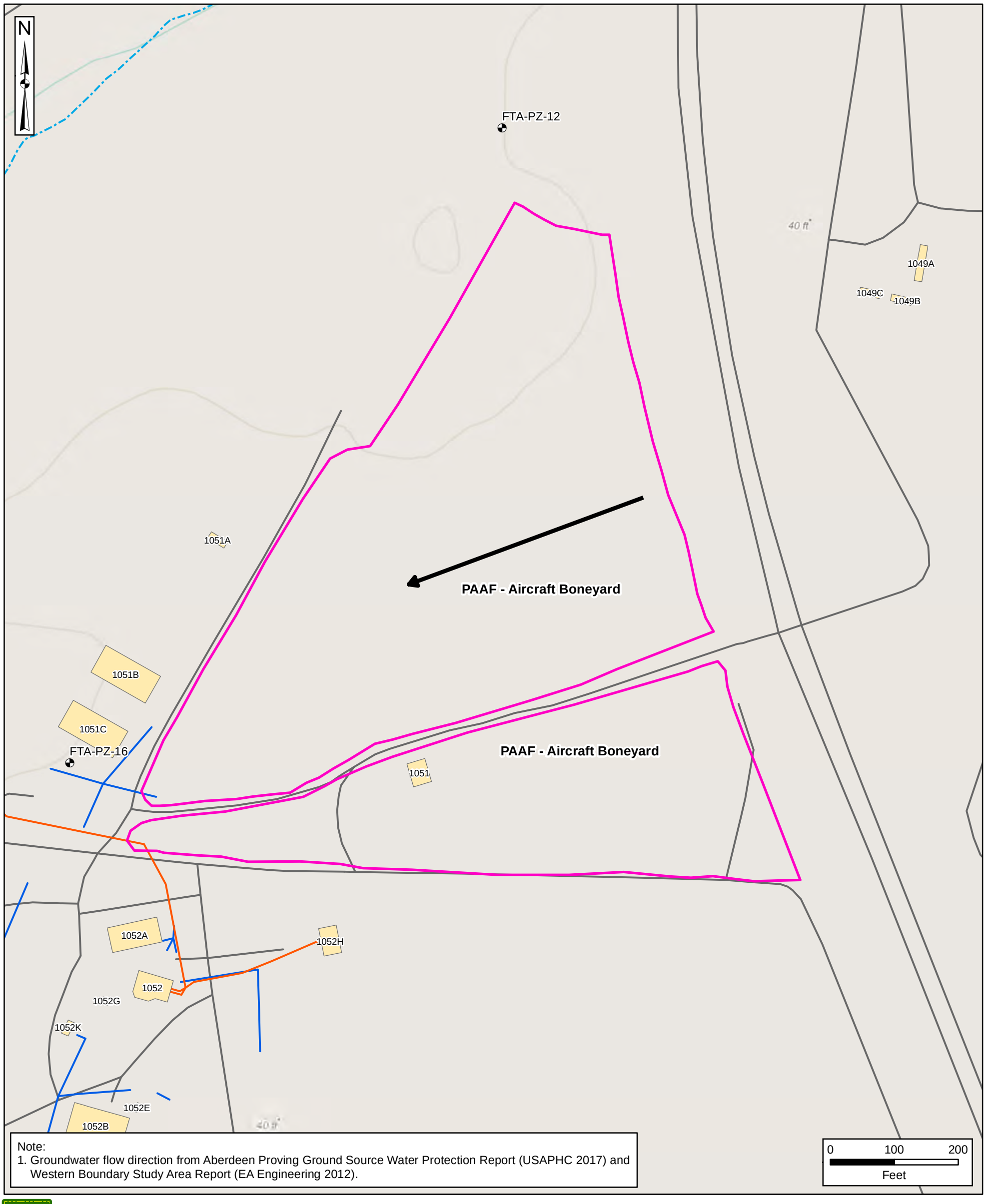
Aberdeen Proving Ground, MD

Figure 5-6
PAAF - Aircraft Boneyard AOPI



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
AOPI
Monitoring Well

AOPI = area of potential interest
PAAF = Philips Army Airfield
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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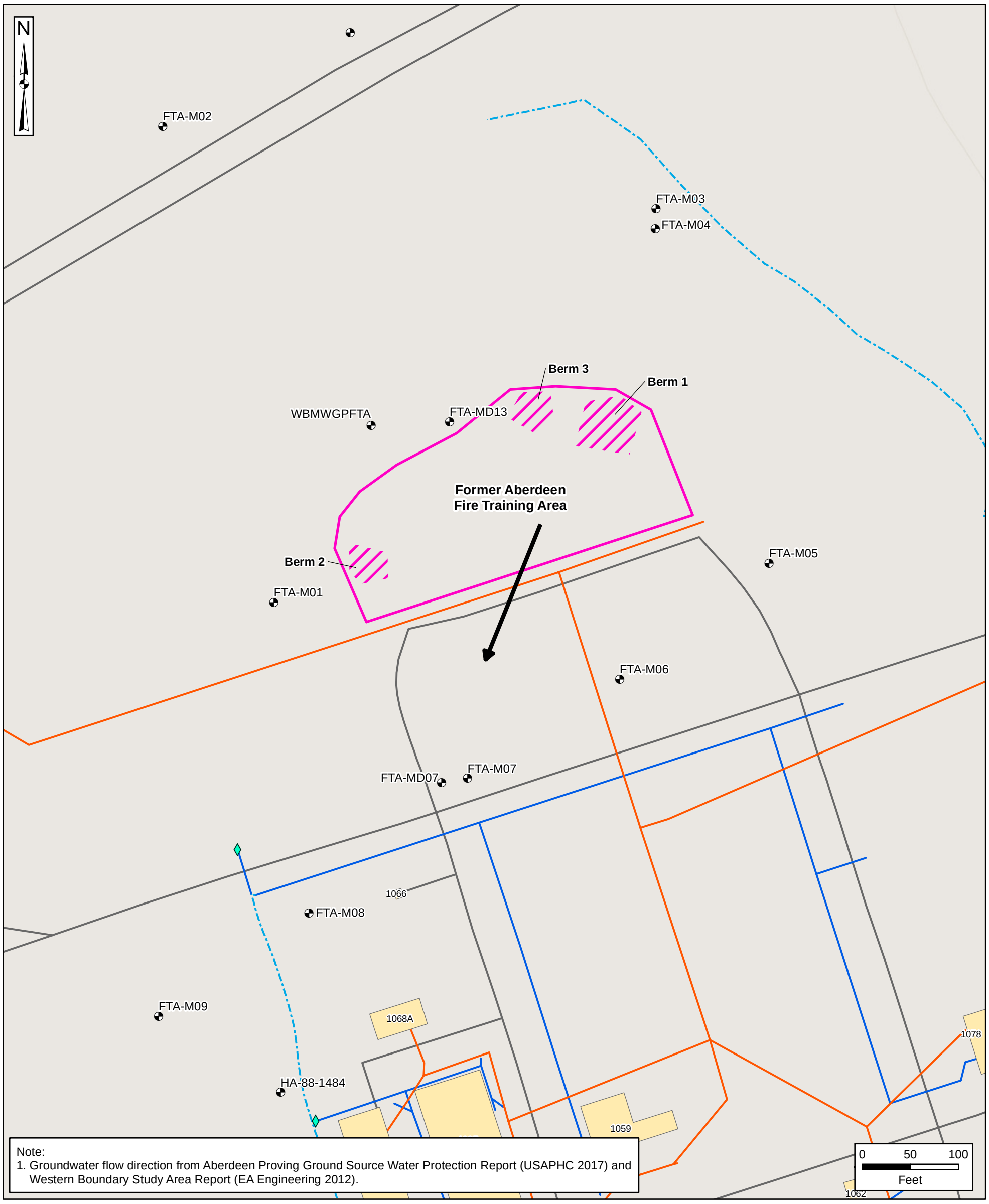
Aberdeen Proving Ground, MD

Figure 5-7
Former Aberdeen Fire Training Area AOPI



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
AFFF Release Area
Monitoring Well

AFFF = aqueous film-forming foam
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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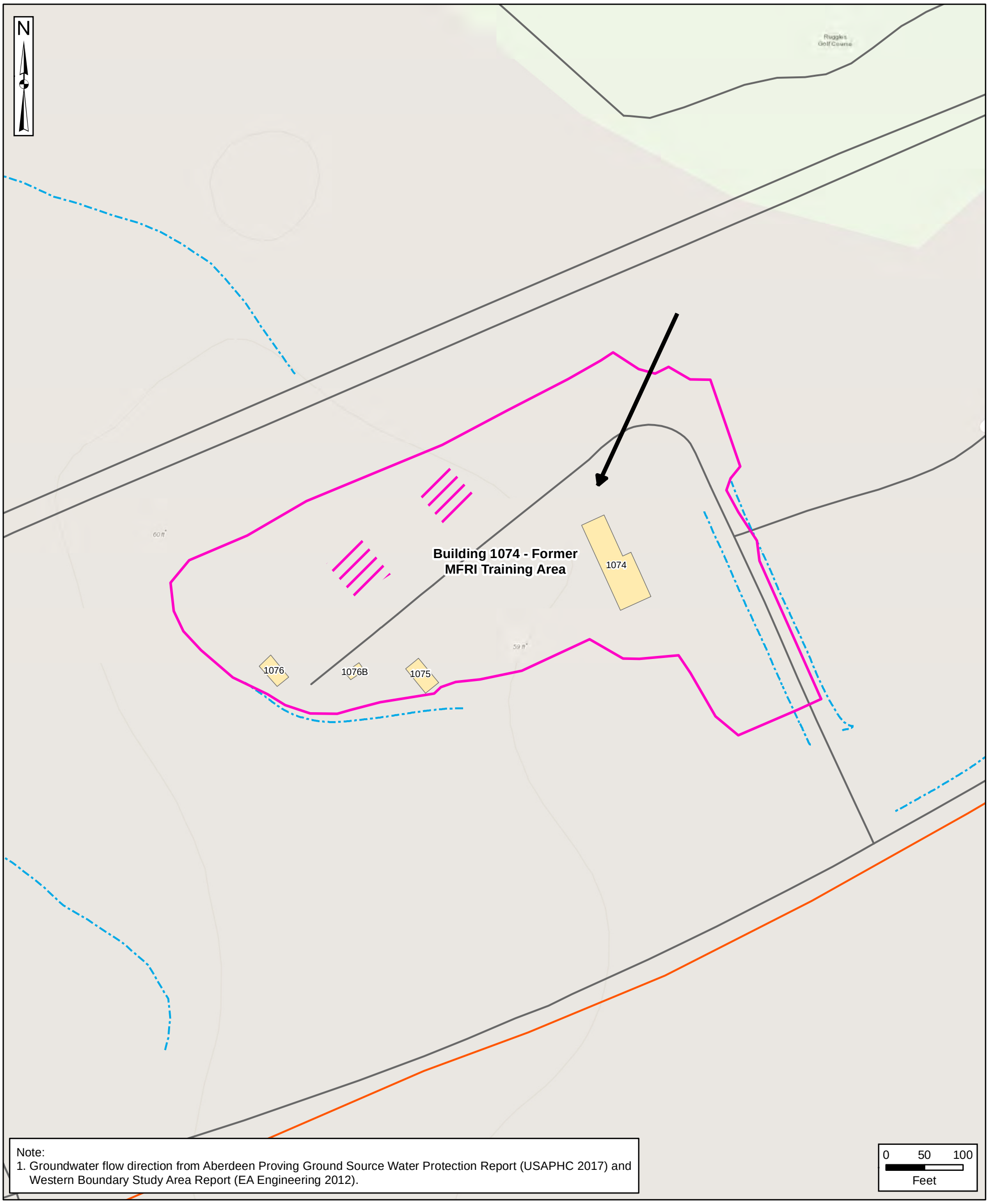
Aberdeen Proving Ground, MD

Figure 5-8
Building 1074 - Former MFRI Training Area AOPI



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

0 50 100
Feet

Installation Boundary
Building
Road Centerline
Drainage Ditch
Wastewater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area

AFFF = aqueous film-forming foam
AOPI = area of potential interest
MFRI = Maryland Fire and Rescue Institute
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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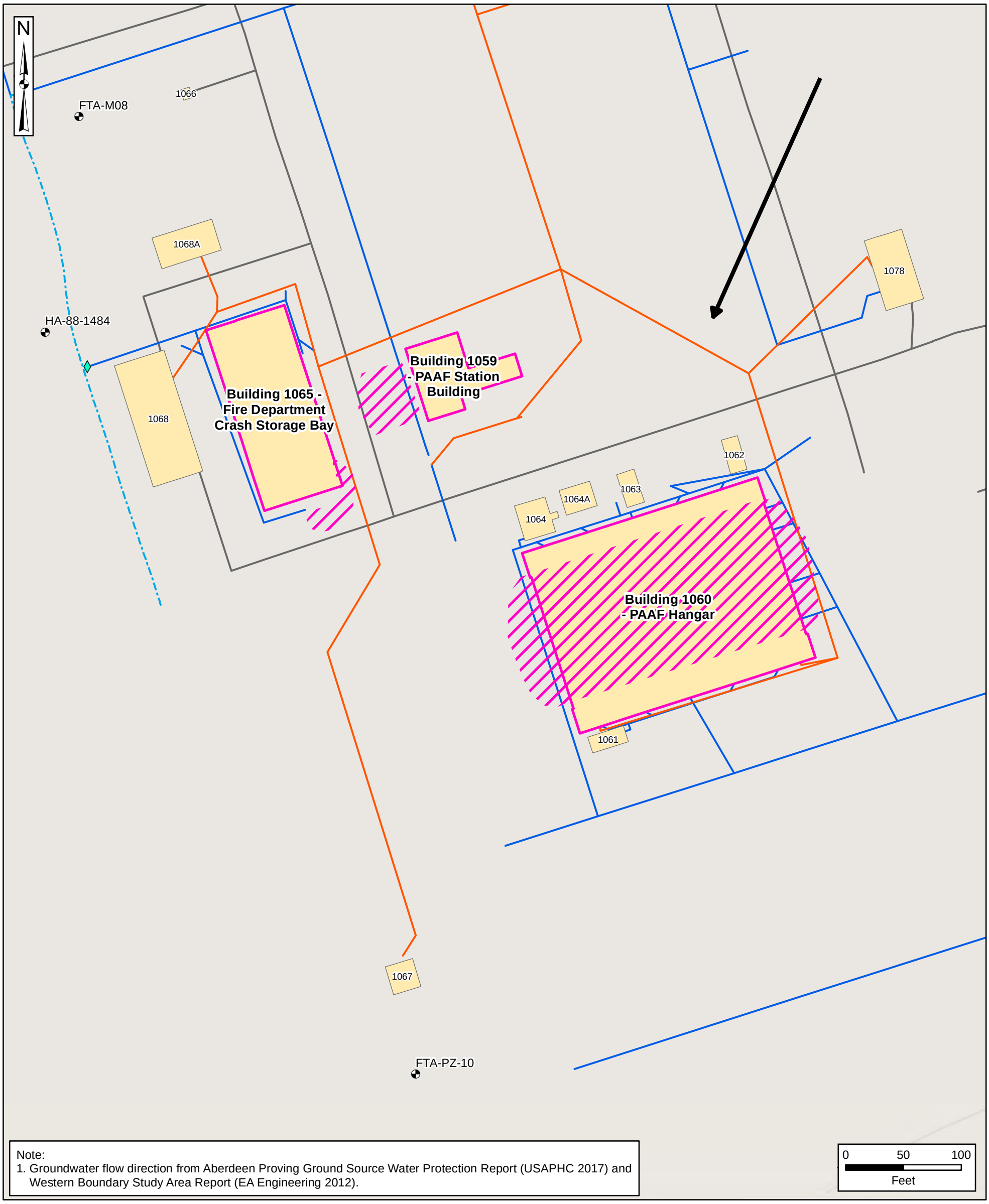
Aberdeen Proving Ground, MD

Figure 5-9
Building 1059, Hangar 1060, and Crash Truck Bay Building 1065 AOPIs



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
AFFF Release Area
Monitoring Well

AFFF = aqueous film-forming foam
AOPI = area of potential interest
PAAF = Philips Army Airfield
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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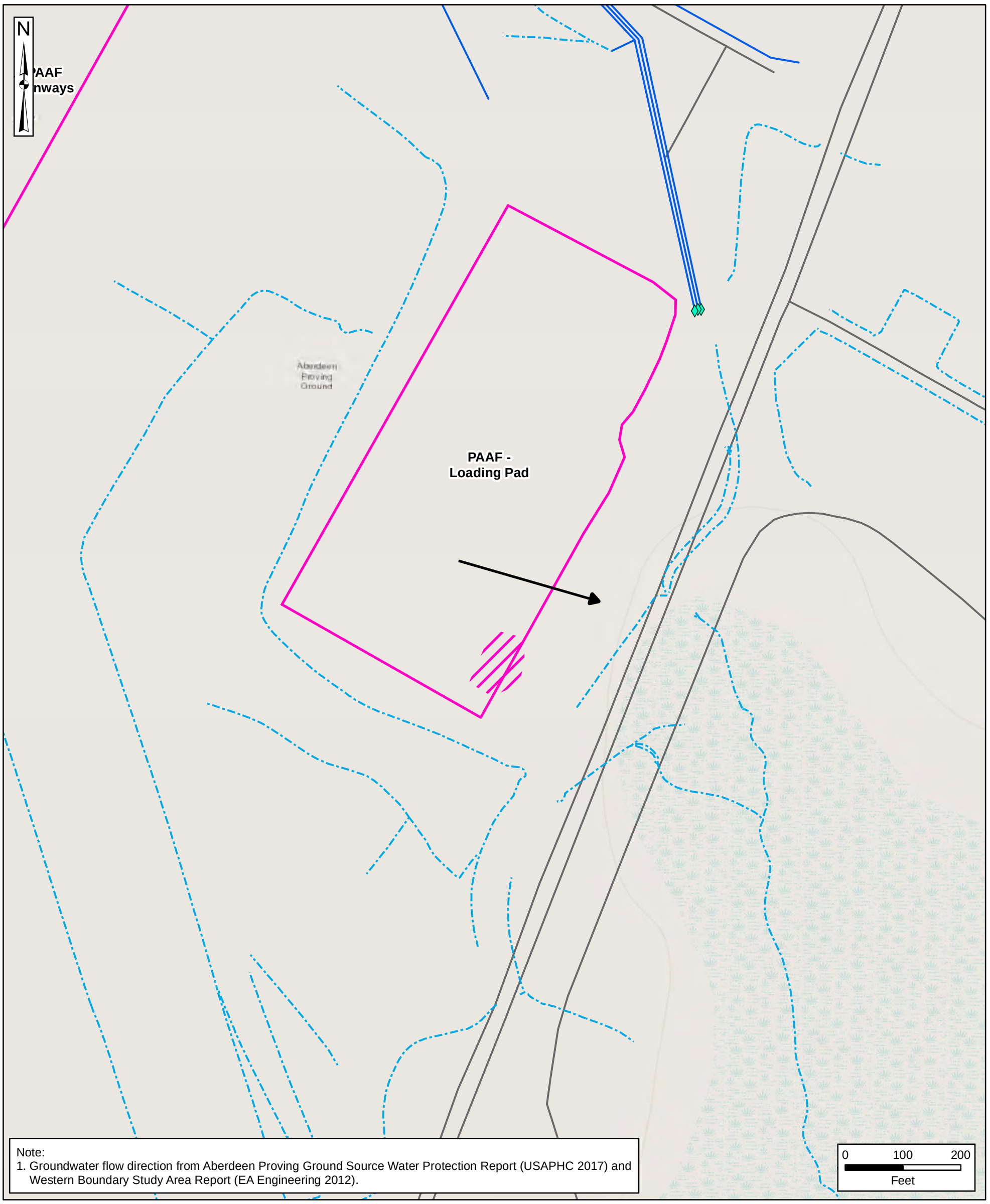
Aberdeen Proving Ground, MD

Figure 5-10
PAAF - Loading Pad AOPI



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

Installation Boundary
Road Centerline
Stormwater Utility Line
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
AFFF Release Area

AFFF = aqueous film-forming foam
AOPI = area of potential interest
PAAF = Philips Army Airfield
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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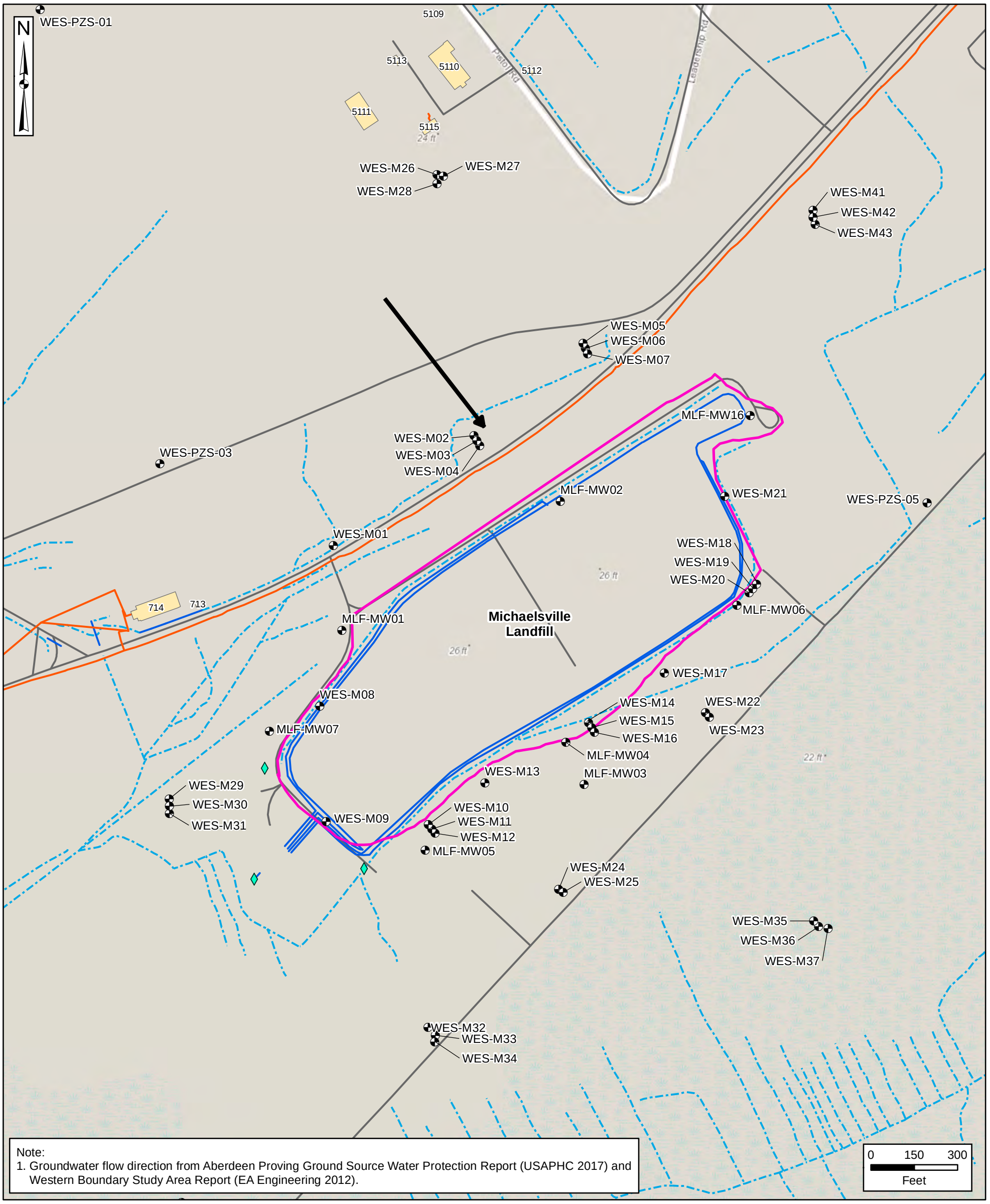
Aberdeen Proving Ground, MD

Figure 5-11
Michaelsville Landfill AOPI



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
AOPI
Outfall Location
Monitoring Well

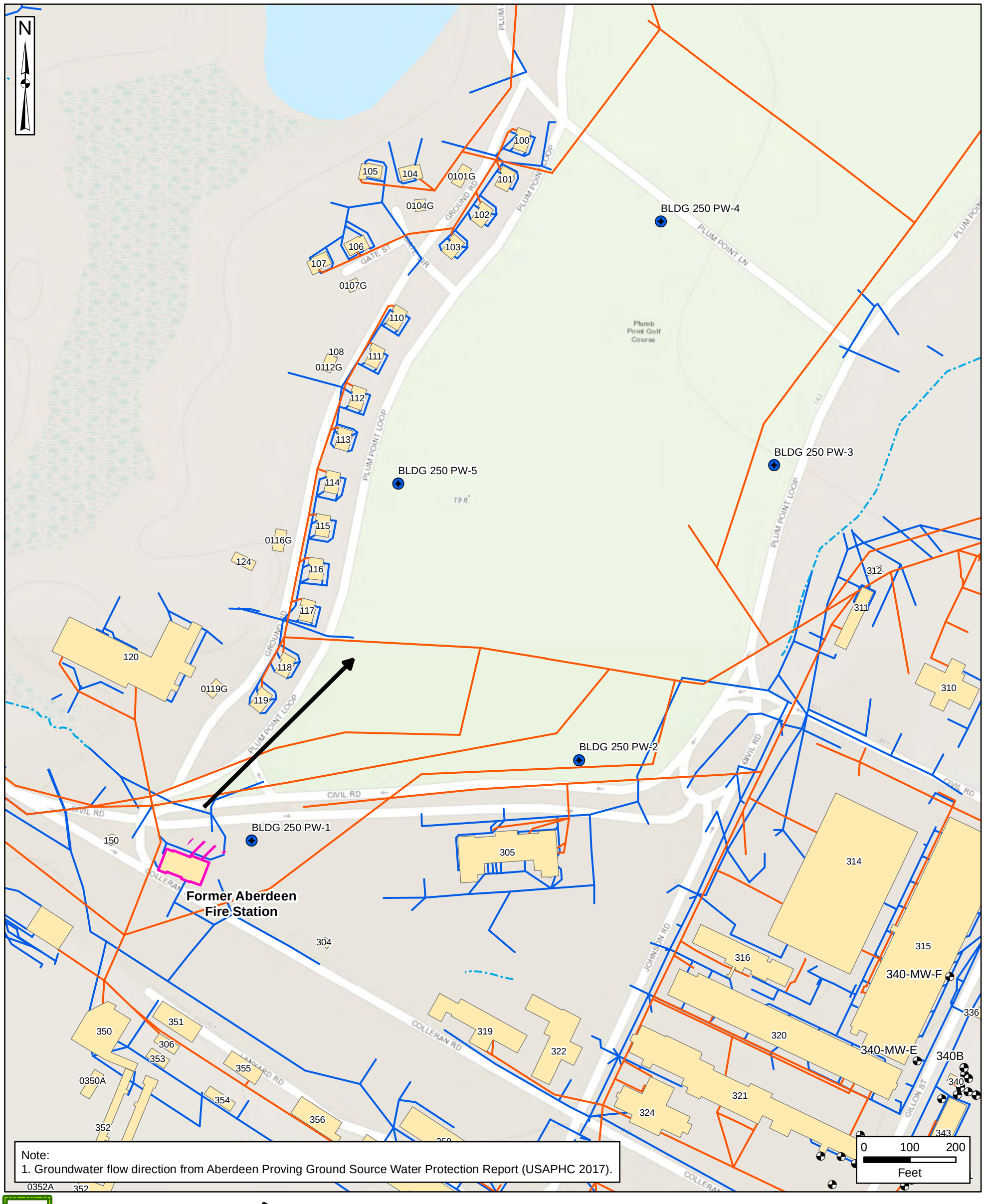
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-12
Building 300 - Former Aberdeen Fire Station AOPI and Building 250 - Potable Supply Wells



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017).

Installation Boundary
Building
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area
Public Supply Well
Monitoring Well

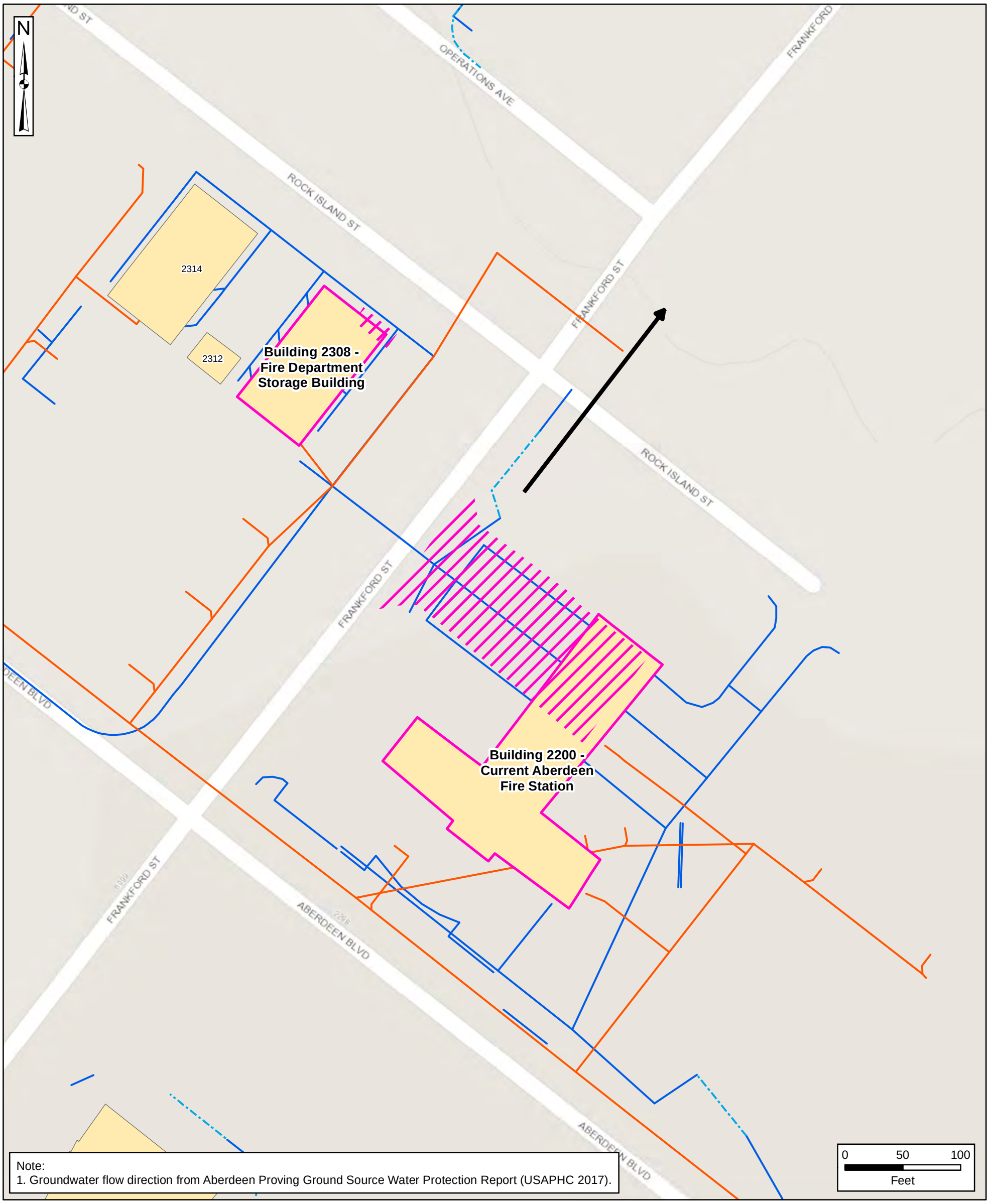
AFFF = aqueous film-forming foam
AOPI = area of potential interest
BLDG = Building
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-13
Building 2200 - Current Aberdeen Fire Station and Building 2308 - Fire Department Storage Building AOPIs



Note:
1. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017).

- Installation Boundary
- Building
- Stormwater Utility Line
- Wastewater Utility Line
- Drainage Ditch
- Groundwater Flow Direction
- AOPI
- AFFF Release Area

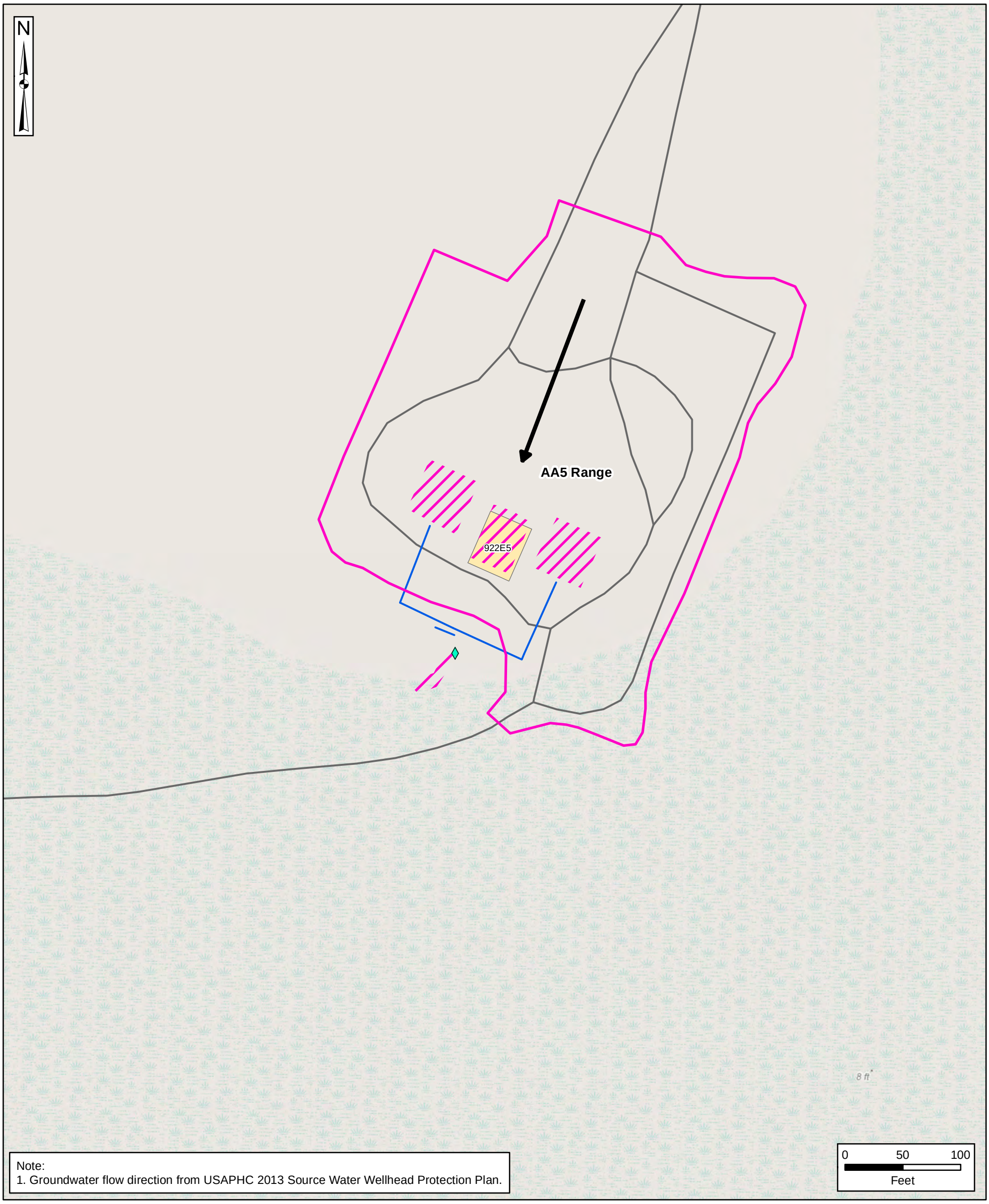
AFFF = aqueous film-forming foam
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-14
AA5 Range AOPI



Note:
1. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Non-Test Waste Outfall Location

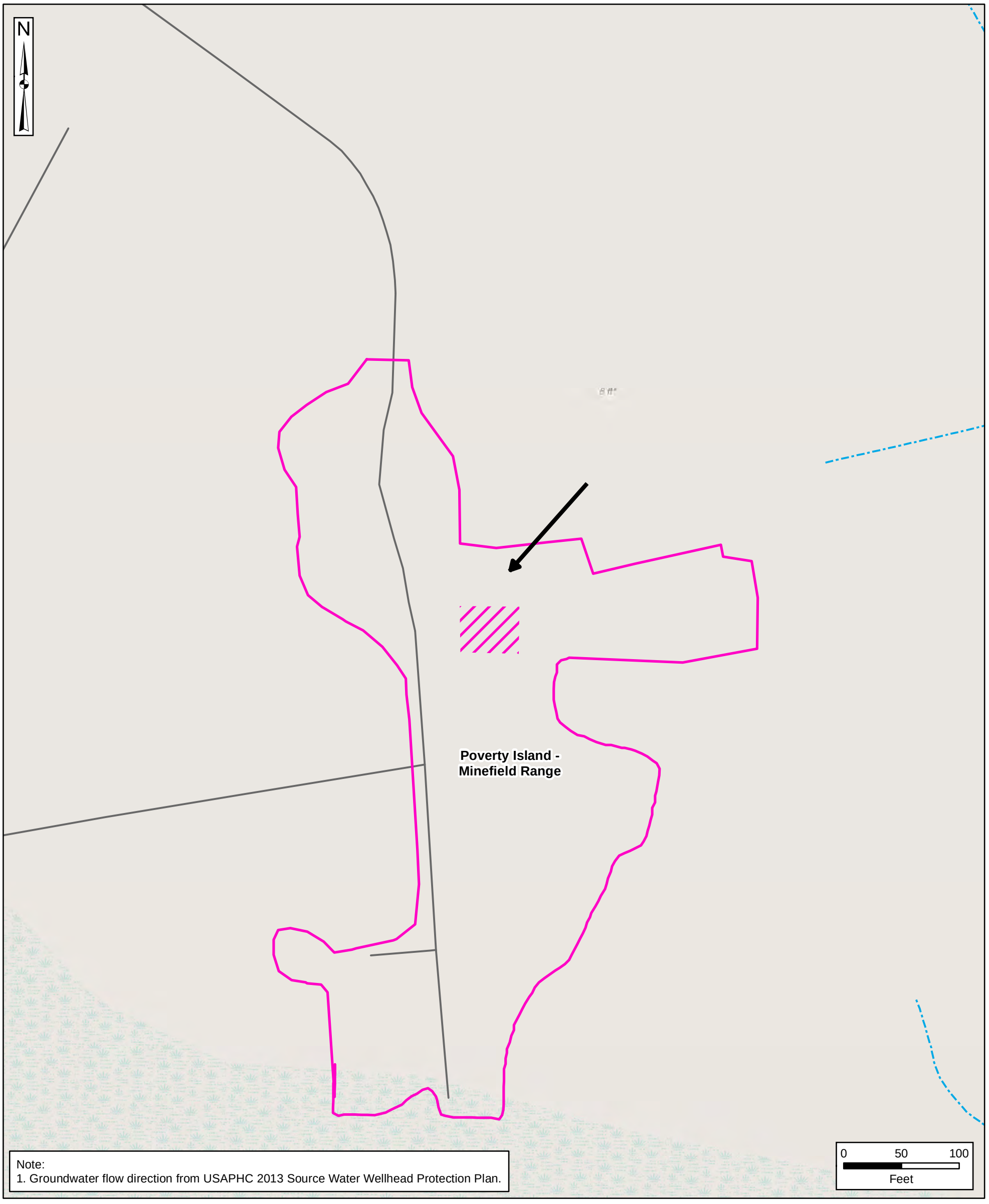
AFFF = aqueous film-forming foam
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-15
Poverty Island - Minefield Range AOPI



Note:
1. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.

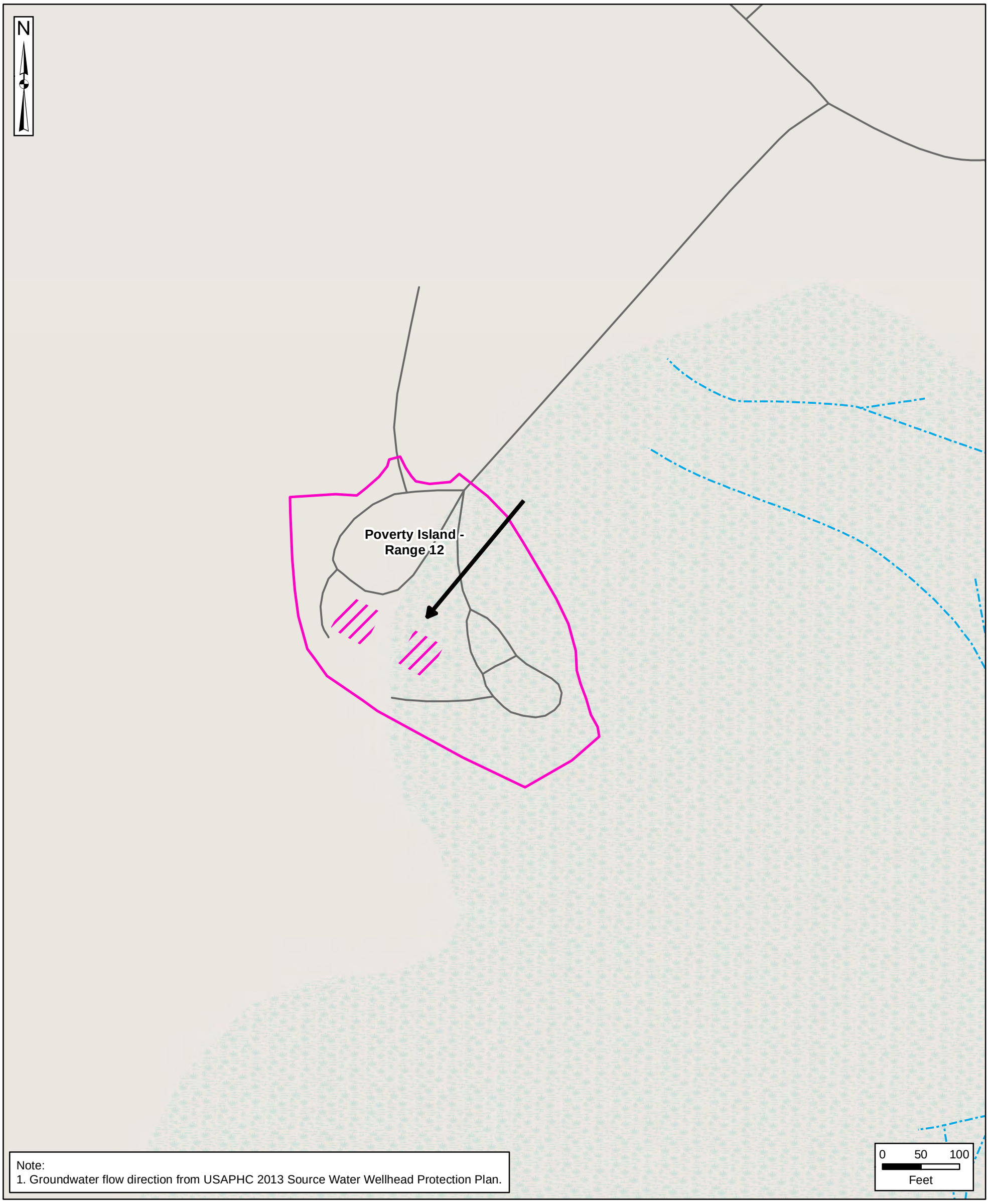
Installation Boundary
Road Centerline
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area

AFFF = aqueous film-forming foam
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-16
Poverty Island - Range 12 AOPI



Note:
1. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.

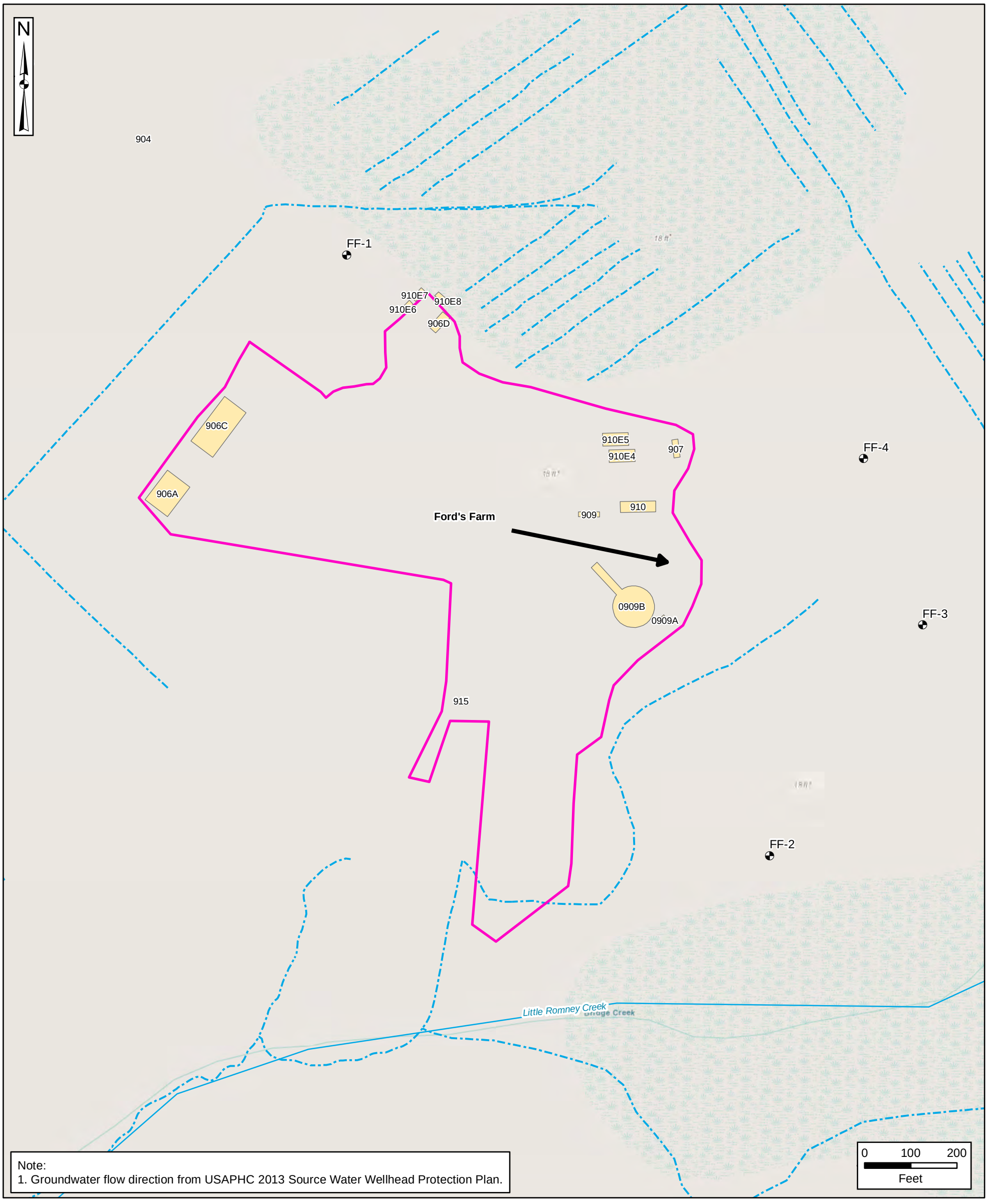
Installation Boundary
Road Centerline
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area

AFFF = aqueous film-forming foam
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-17
Ford's Farm AOPI



Note:
1. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.

Installation Boundary
AOPI
Building
Monitoring Well
Drainage Ditch
River/Stream (Perennial)
Groundwater Flow Direction

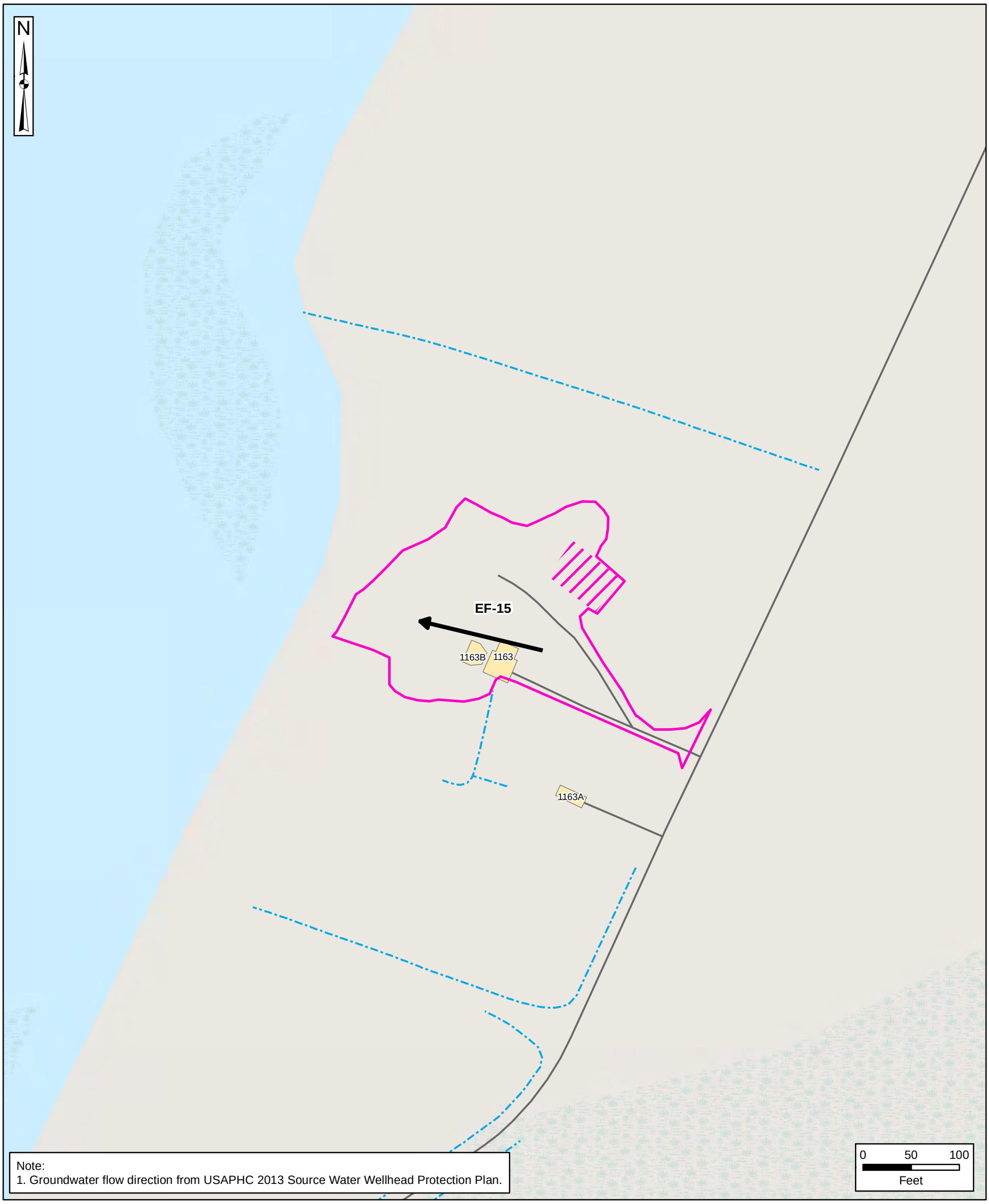
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-18
EF-15 AOPI



Installation Boundary
Building
Road Centerline
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area

AFFF = aqueous film-forming foam
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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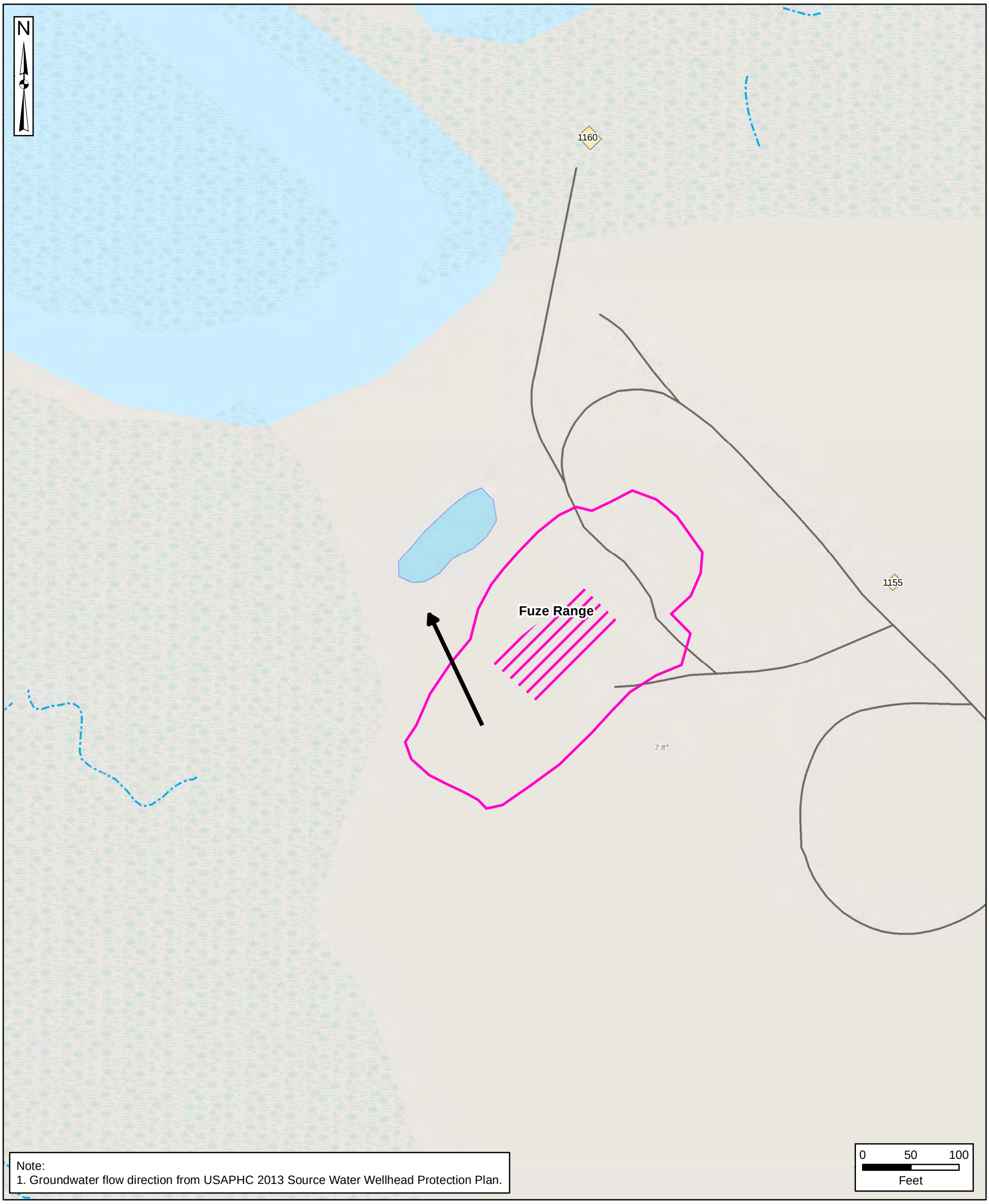
Aberdeen Proving Ground, MD

Figure 5-19
Fuze Range AOPI



Installation Boundary
Building
Road Centerline
Drainage Ditch
Retention Pond
Groundwater Flow Direction
AOPI
AFFF Release Area

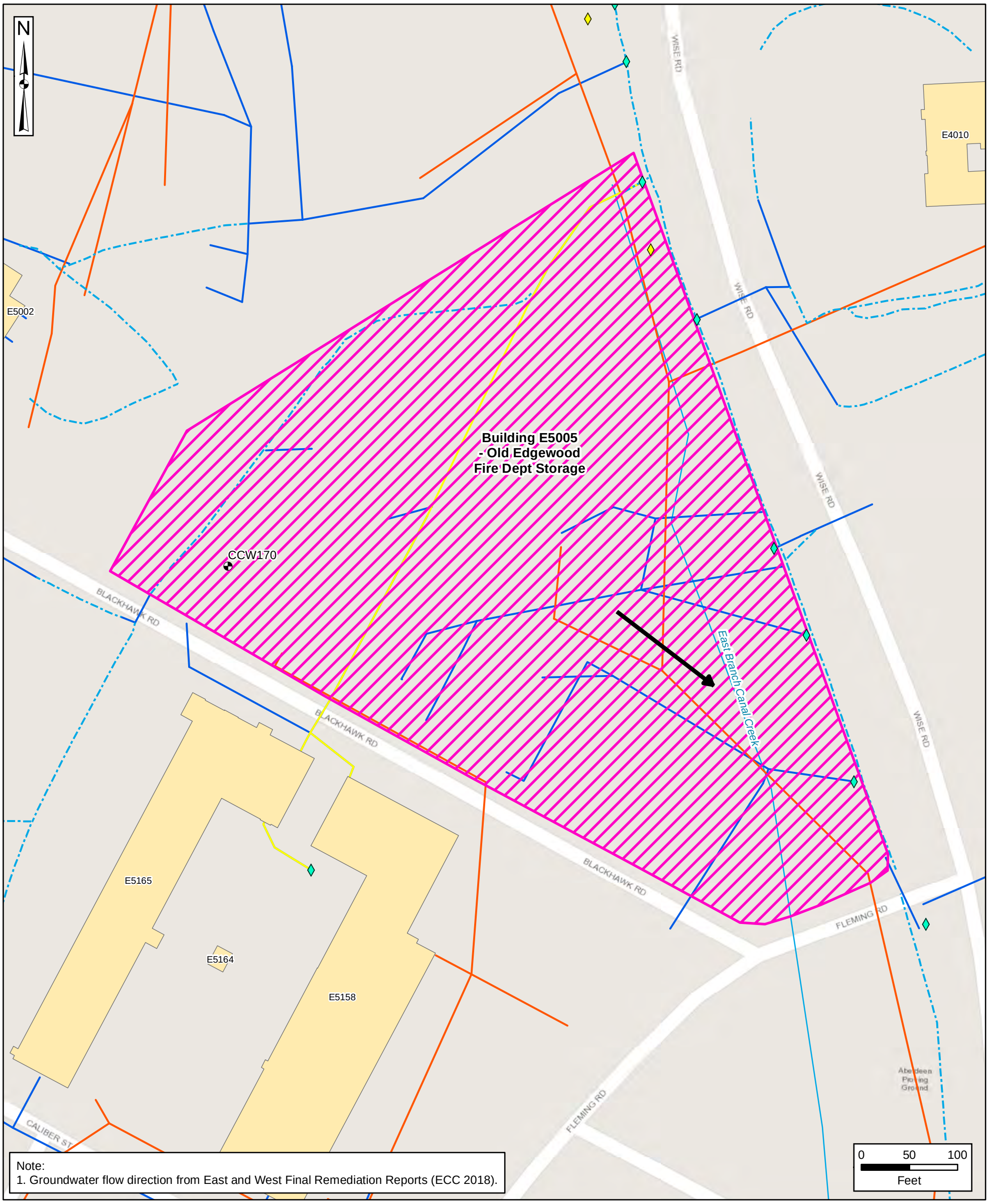
AFFF = aqueous film-forming foam
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-20
Building E5005 - Edgewood Fire Training Area AOPI



Note:
1. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

- Installation Boundary
- Building
- River/Stream (Perennial)
- Drainage Ditch
- Stormwater Utility Line
- Wastewater Utility Line
- Groundwater Flow Direction
- Outfall Location
- Suspected Buried Legacy Chemical Sewer Line Outfall
- Suspected Location of Buried Legacy Sewer Line
- AOPI
- AFFF Release Area
- Monitoring Well

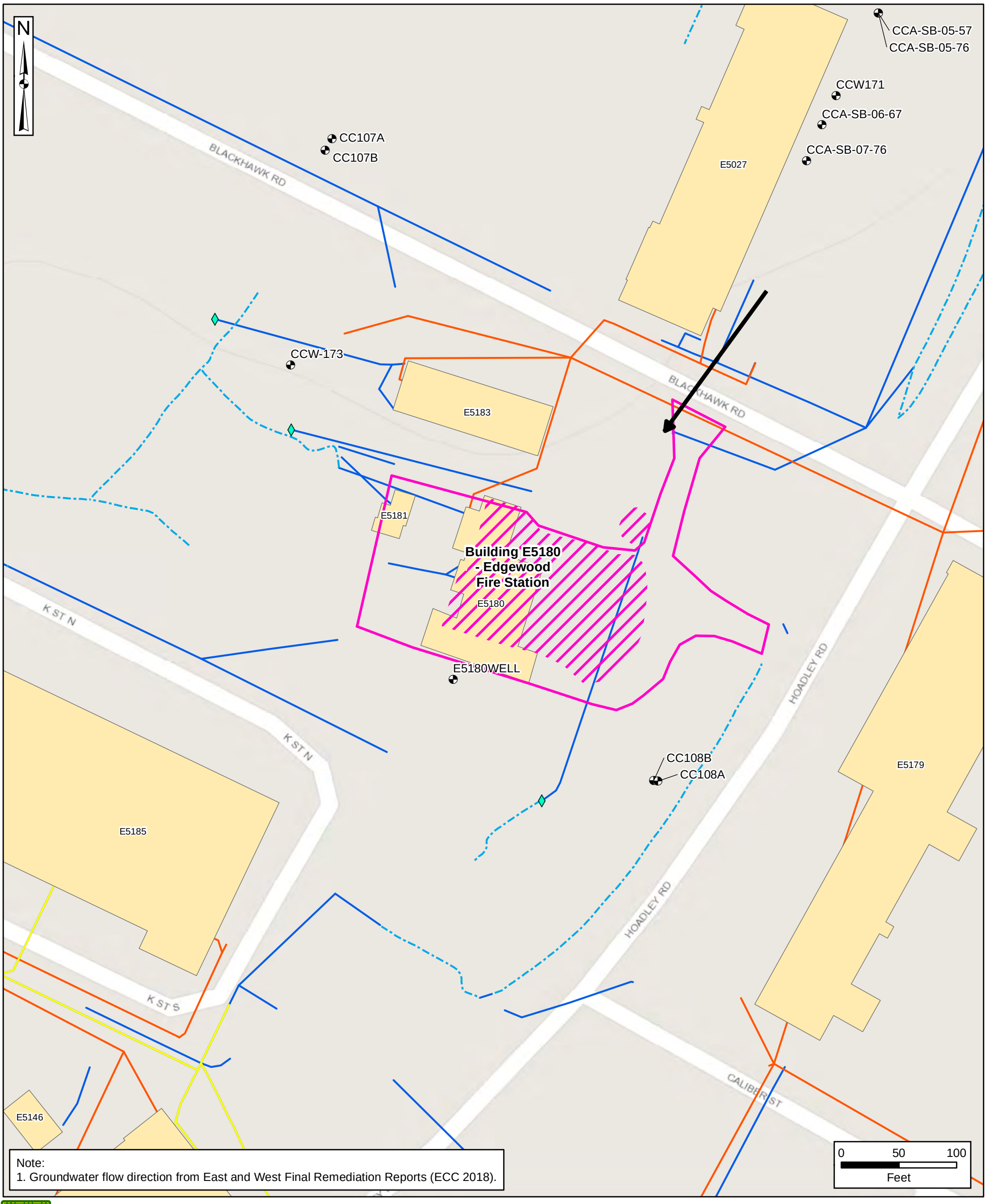
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-21
Building E5180 - Edgewood Fire Station AOPI



Note:
1. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

- Installation Boundary
- Building
- Drainage Ditch
- Stormwater Utility Line
- Wastewater Utility Line
- Buried Legacy Chemical Sewer Line
- Groundwater Flow Direction
- AOPI
- AFFF Release Area
- Outfall Location
- Monitoring Well

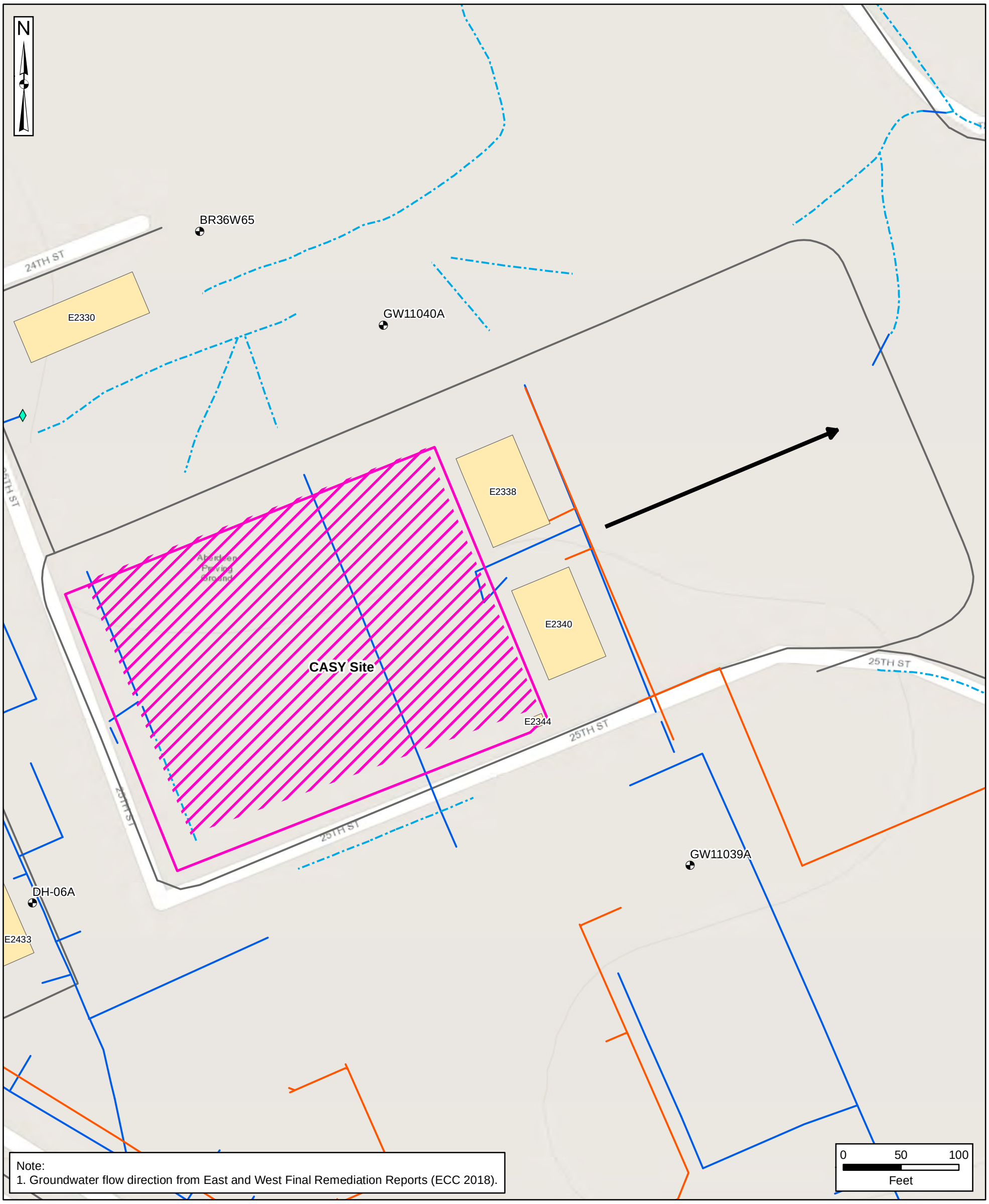
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-22
CASY Site AOPI



Installation Boundary
Building
Road Centerline
Drainage Ditch
Stormwater Utility Line
Wastewater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Monitoring Well
Outfall Location

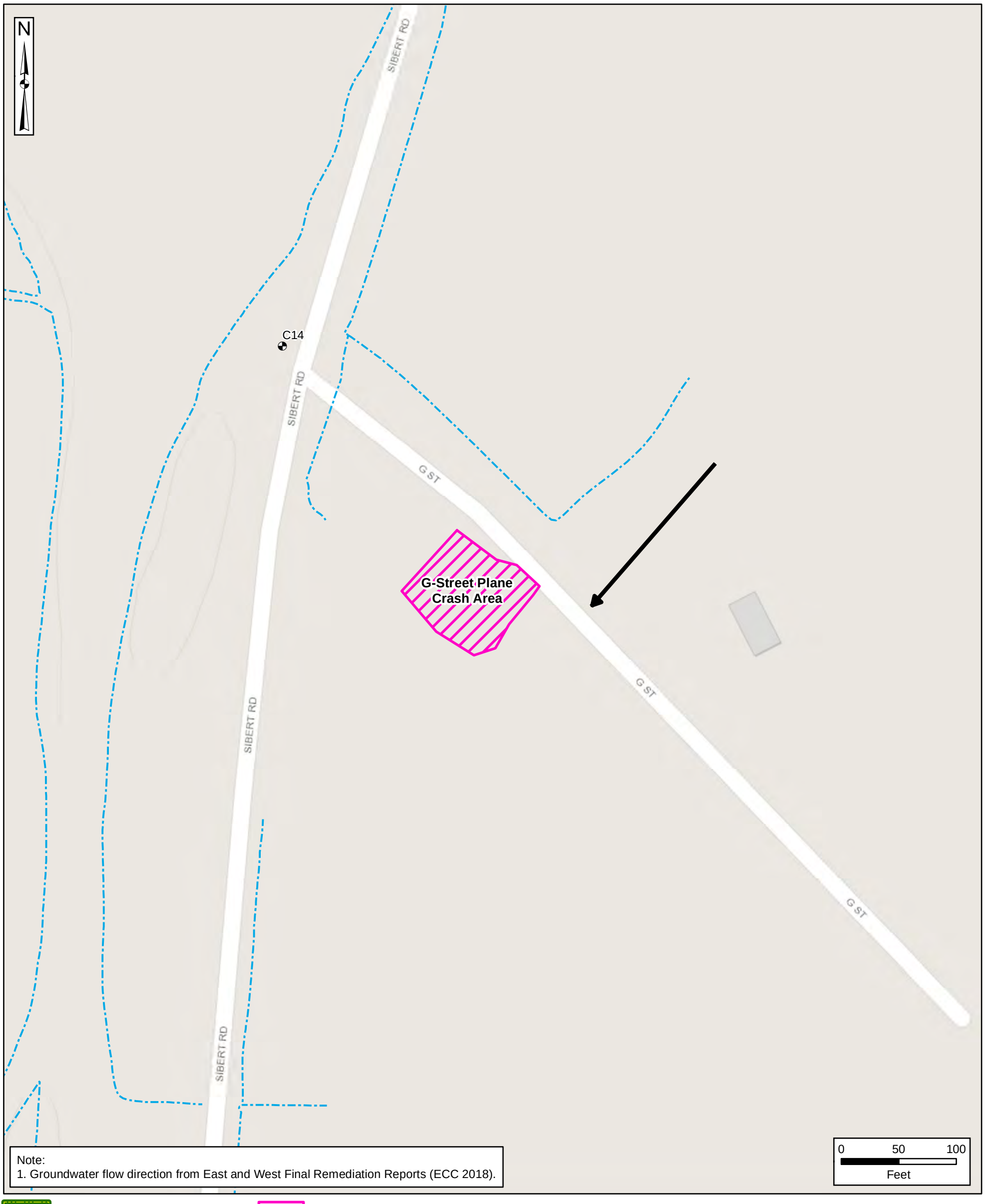
AFFF = aqueous film-forming foam
AOPI = area of potential interest
CASY = Chemical Agent Storage Yard

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-23
G-Street Plane Crash Area AOPI



Note:
1. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

Installation Boundary
Drainage Ditch
Groundwater Flow Direction
AOPI
Suspected AFFF Release Area
Monitoring Well

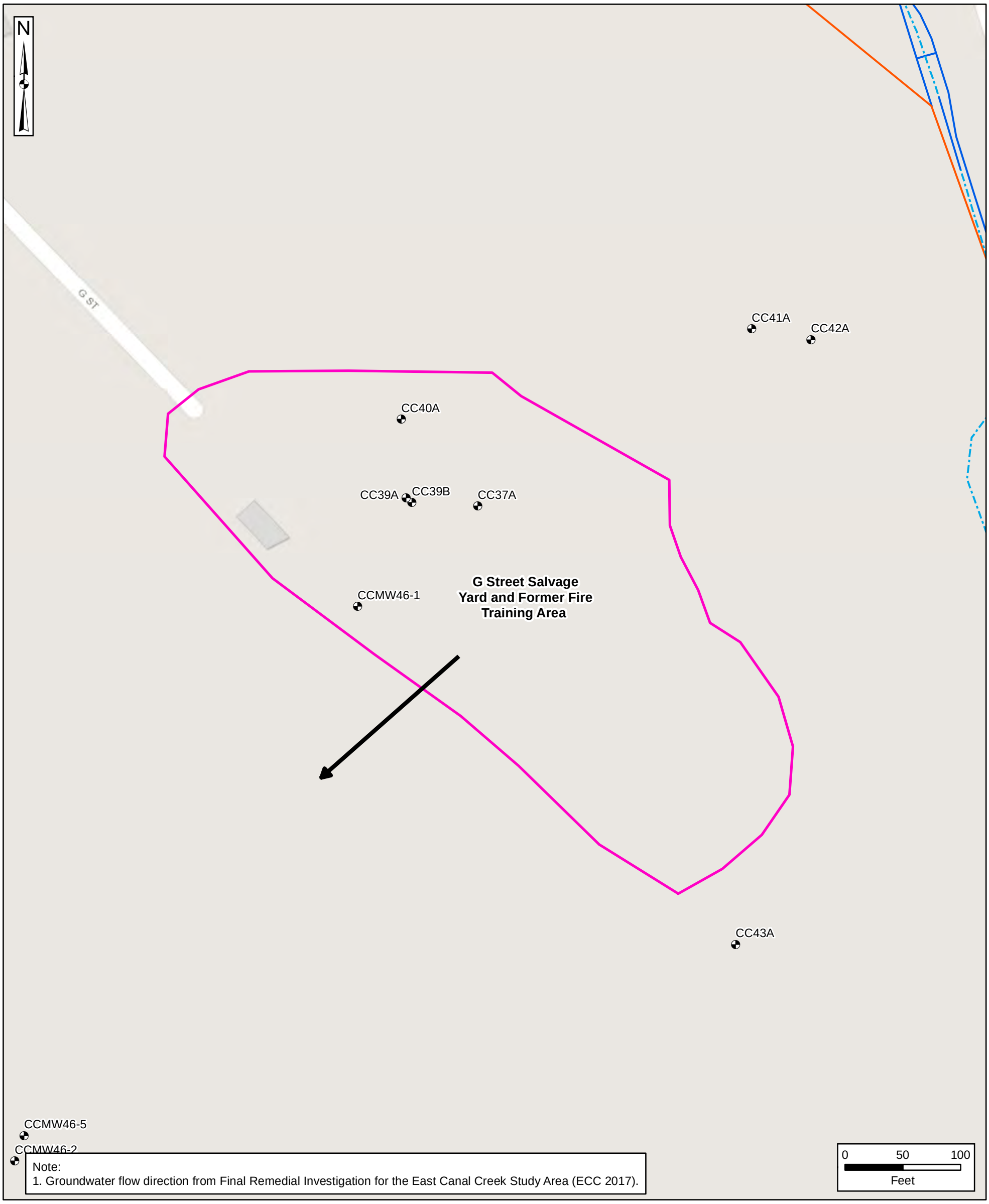
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-24
G-Street Salvage Yard and
Former Fire Training Area AOPI



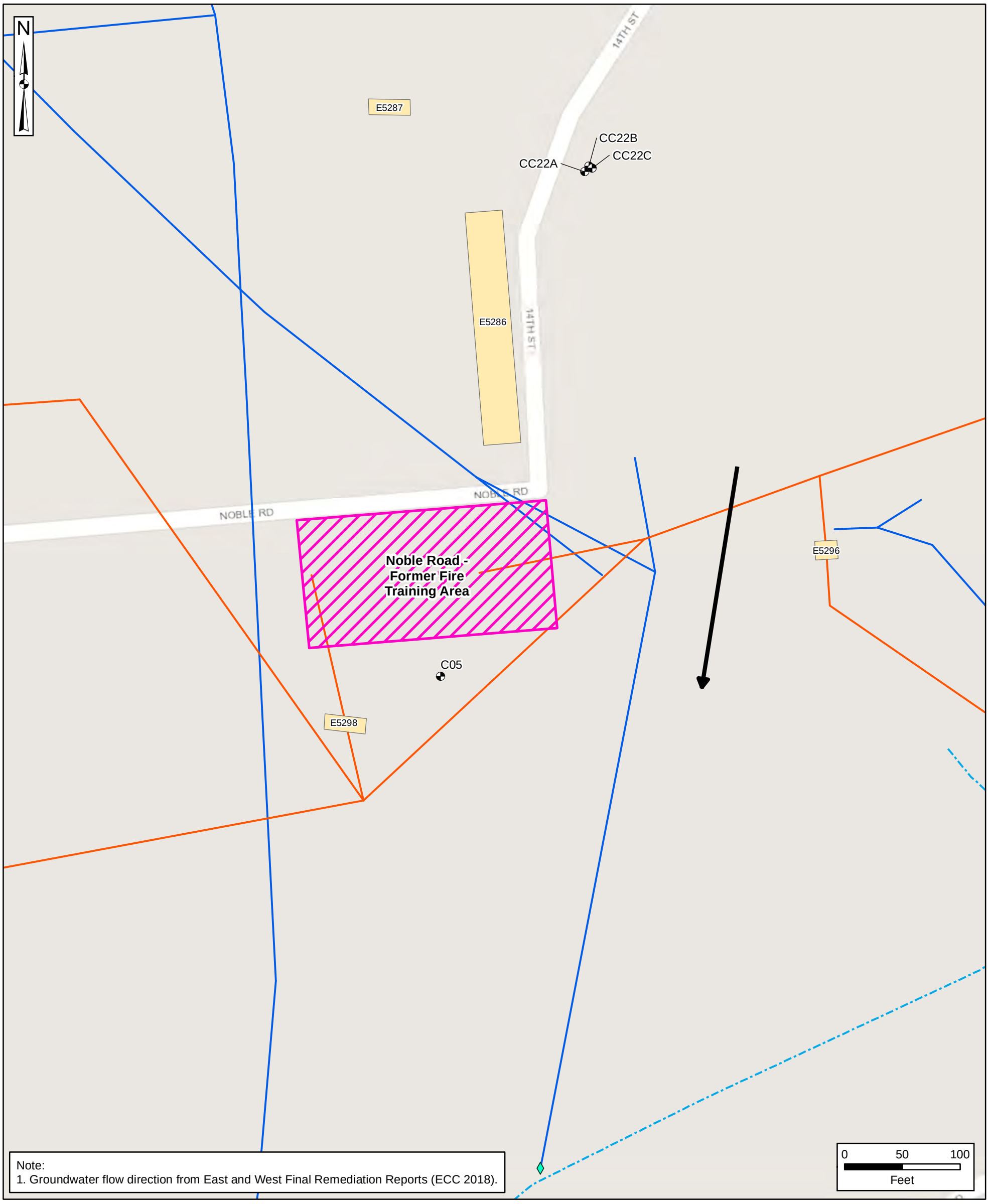
Installation Boundary
AOPI
AOPI = area of potential interest
Drainage Ditch
Monitoring Well
Stormwater Utility Line
Wastewater Utility Line
Groundwater Flow Direction

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-25
Noble Road - Former Fire Training Area AOPI



Installation Boundary
Building
Drainage Ditch
Stormwater Utility Line
Wastewater Utility Line
Groundwater Flow Direction
AOPI
Approximated AFFF Release Area
Outfall Location
Monitoring Well

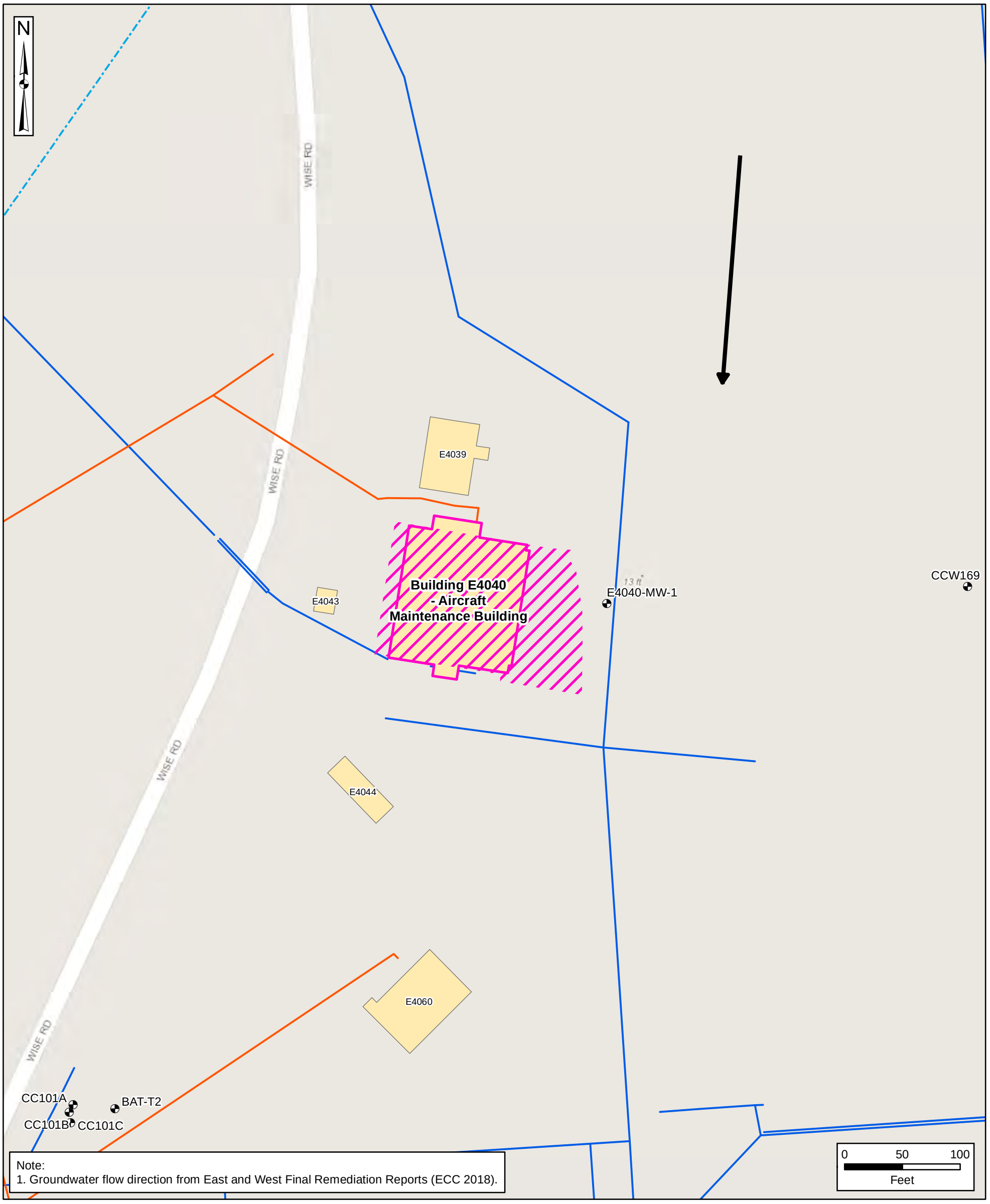
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-26
Building E4040 - Aircraft Maintenance Building AOPI



Installation Boundary
Building
Drainage Ditch
Stormwater Utility Line
Wastewater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Monitoring Well

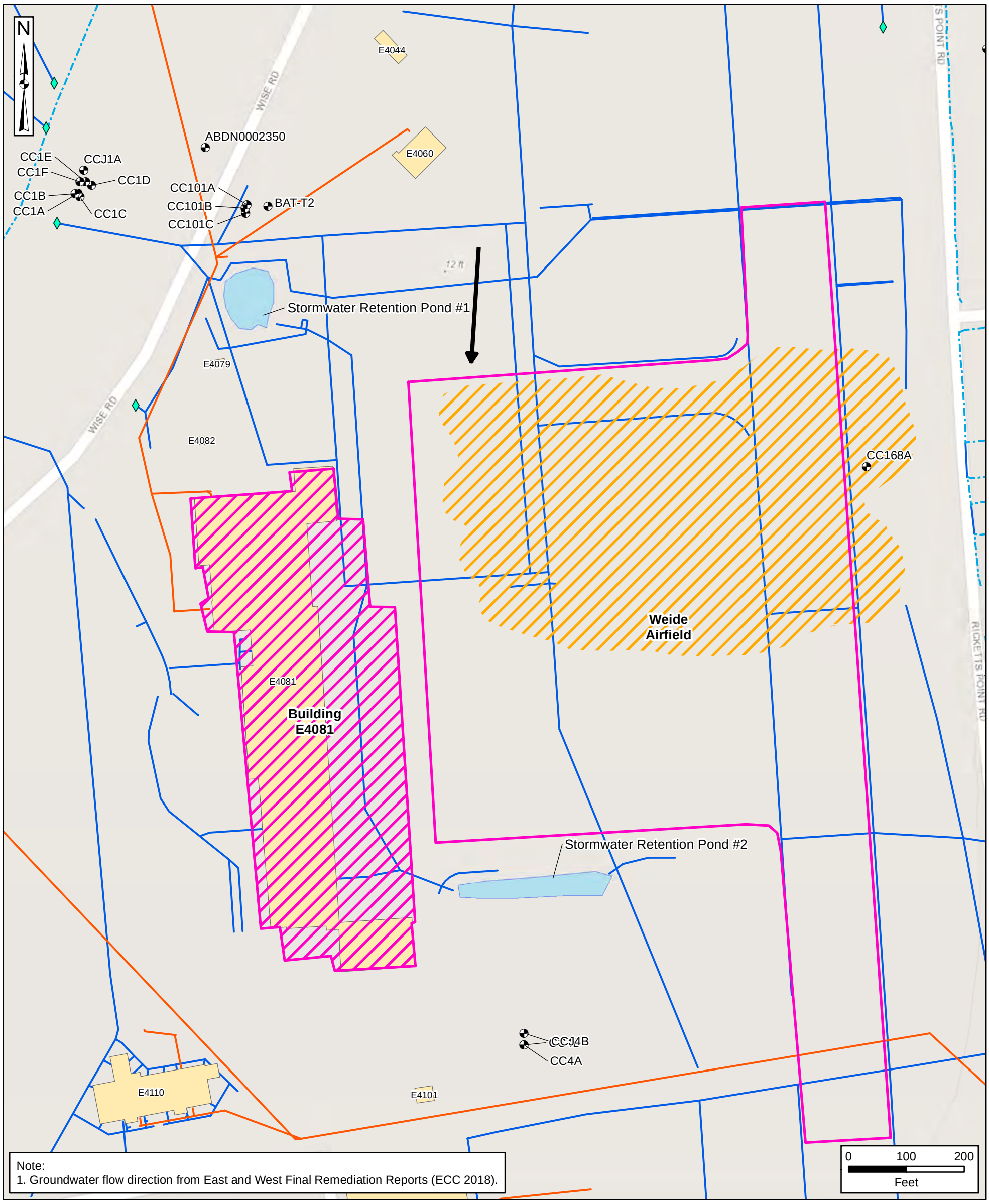
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-27
Building E4081 - Army Aviation Support Facility and Weide Airfield - Tarmac AFFF Release Area AOPIs



Note:
1. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

Installation Boundary
Building
Drainage Ditch
Stormwater Utility Line
Wastewater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Approximated AFFF Release Area
Monitoring Well
Outfall Location
Retention Pond

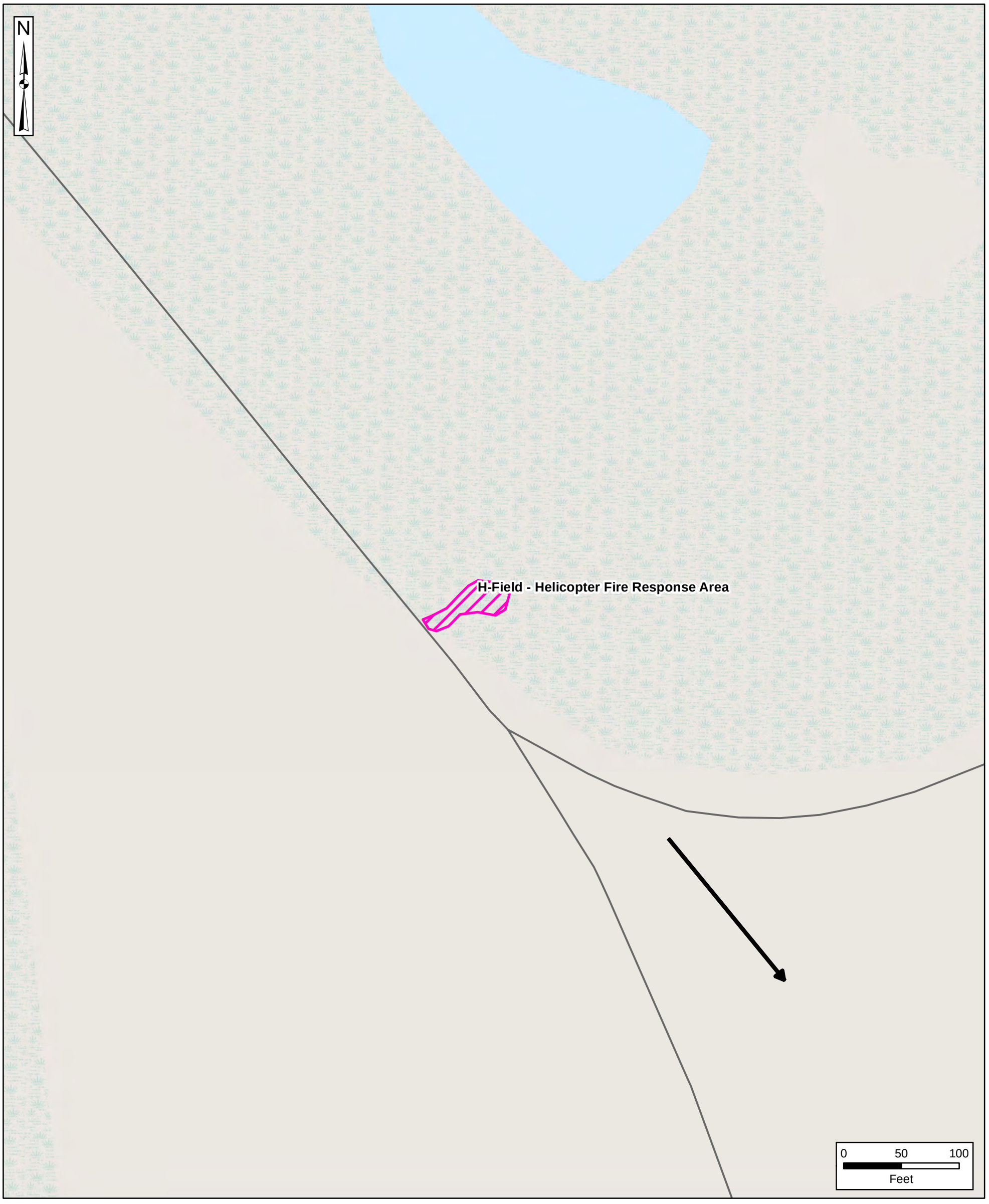
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-28
H-Field - Helicopter Fire Response Area AOPI



Installation Boundary
Road Centerline
AOPI
AFFF Release Area
Inferred Groundwater Flow Direction Based on Topography

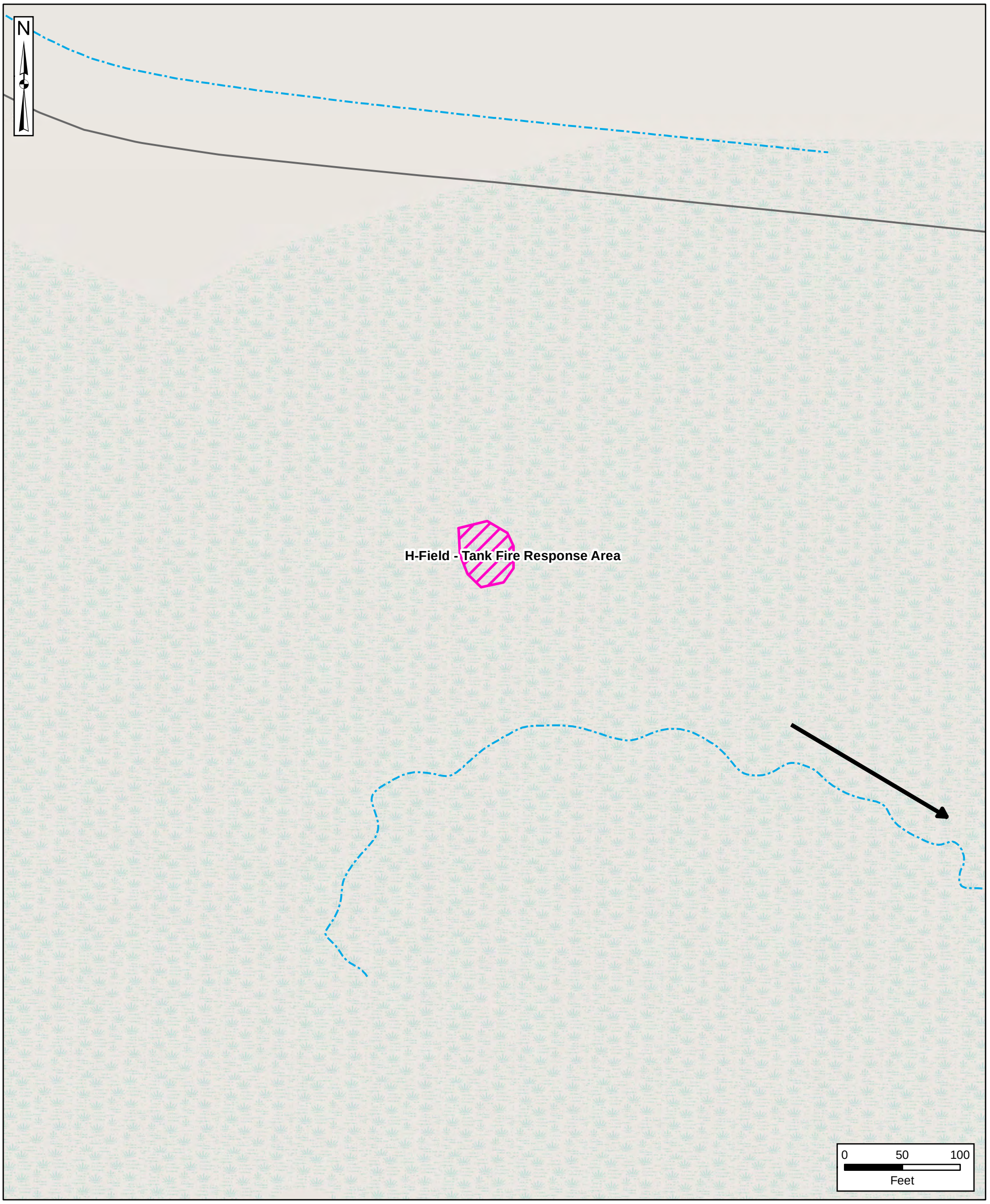
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-29
H-Field - Tank Fire Response Area AOPI



Installation Boundary
Road Centerline
Drainage Ditch
AOPI
AFFF Release Area
Inferred Groundwater Flow Direction Based on Topography

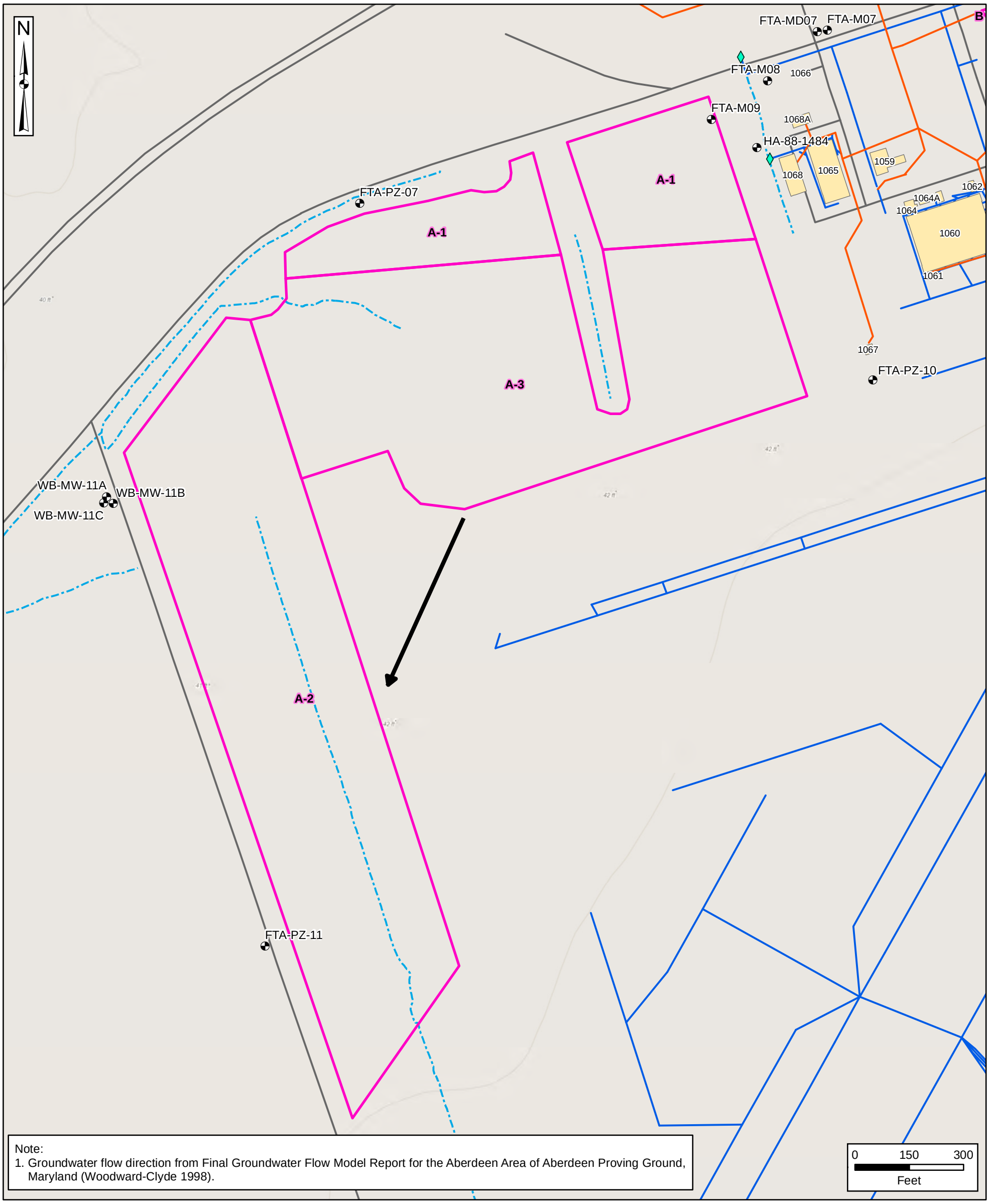
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-30
Biosolid Application Fields: A-1, A-2, and A-3 AOPIs



Note:
1. Groundwater flow direction from Final Groundwater Flow Model Report for the Aberdeen Area of Aberdeen Proving Ground, Maryland (Woodward-Clyde 1998).

Installation Boundary
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Outfall Location
Monitoring Well

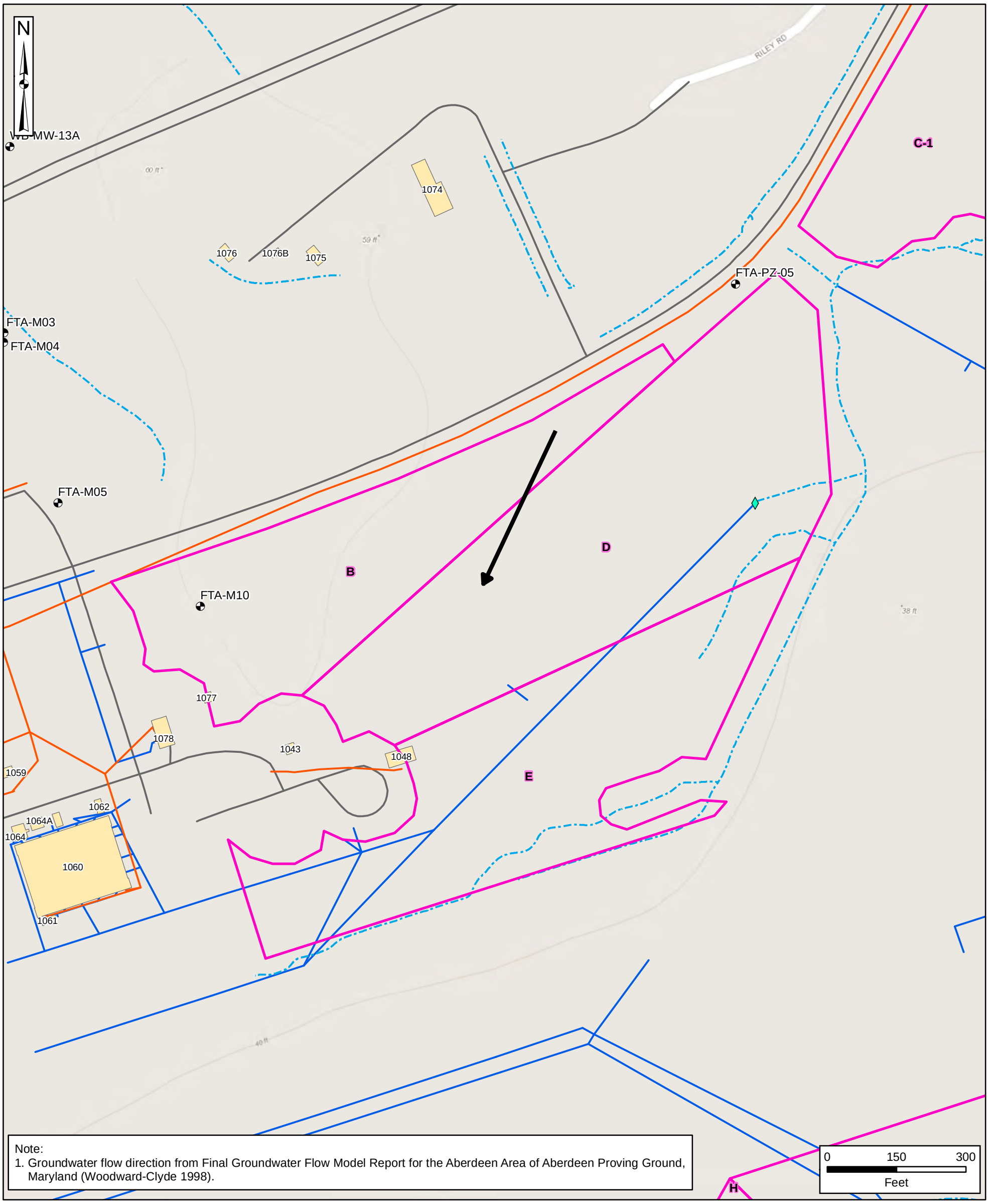
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-31
Biosolid Application Fields: B, D and E AOPIs



Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Outfall Location
Monitoring Well

AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

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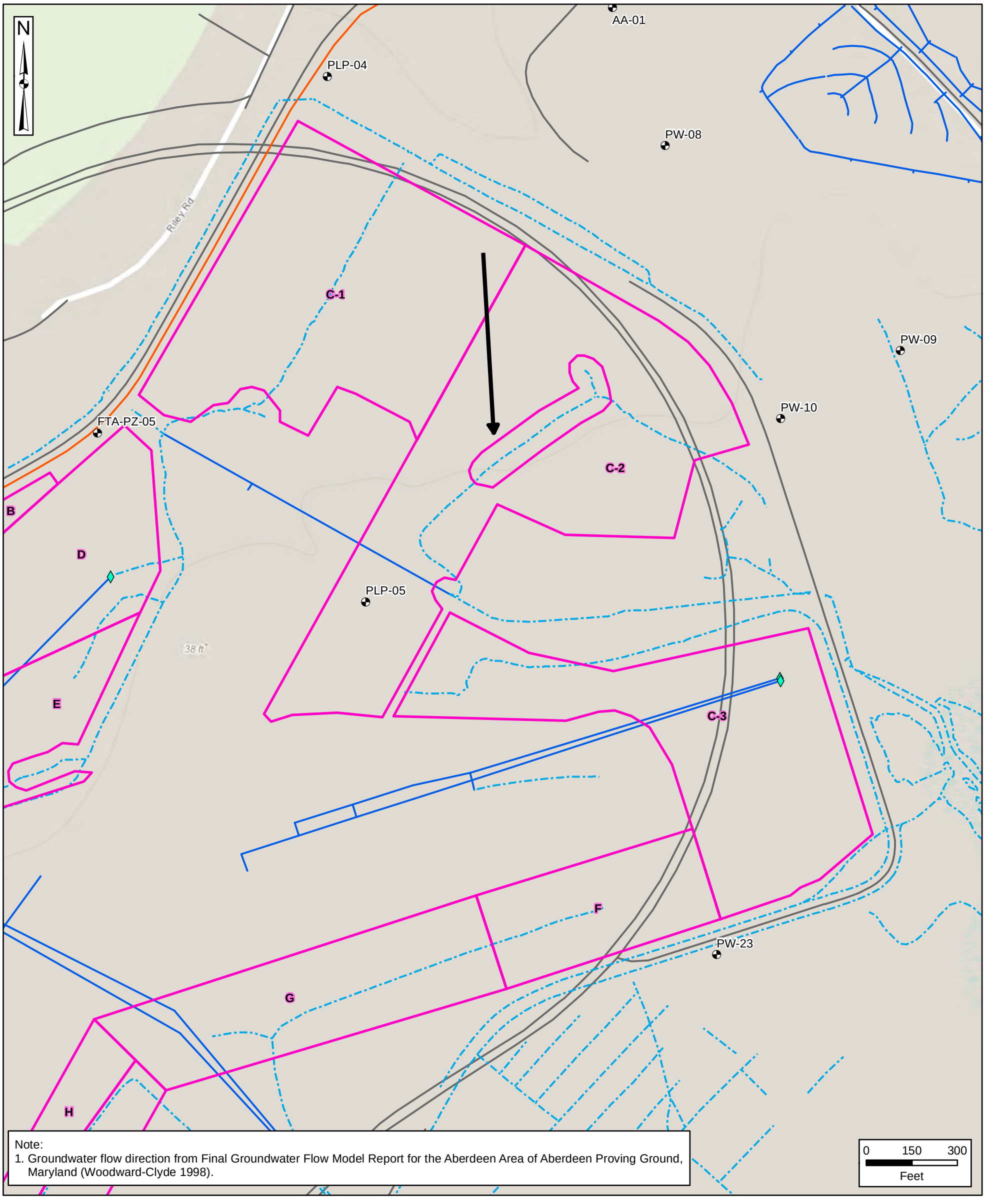
Aberdeen Proving Ground, MD

Figure 5-32
Biosolid Application Fields: C-1, C-2, C-3, F and G AOPIs



Installation Boundary
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Outfall Location
Monitoring Well

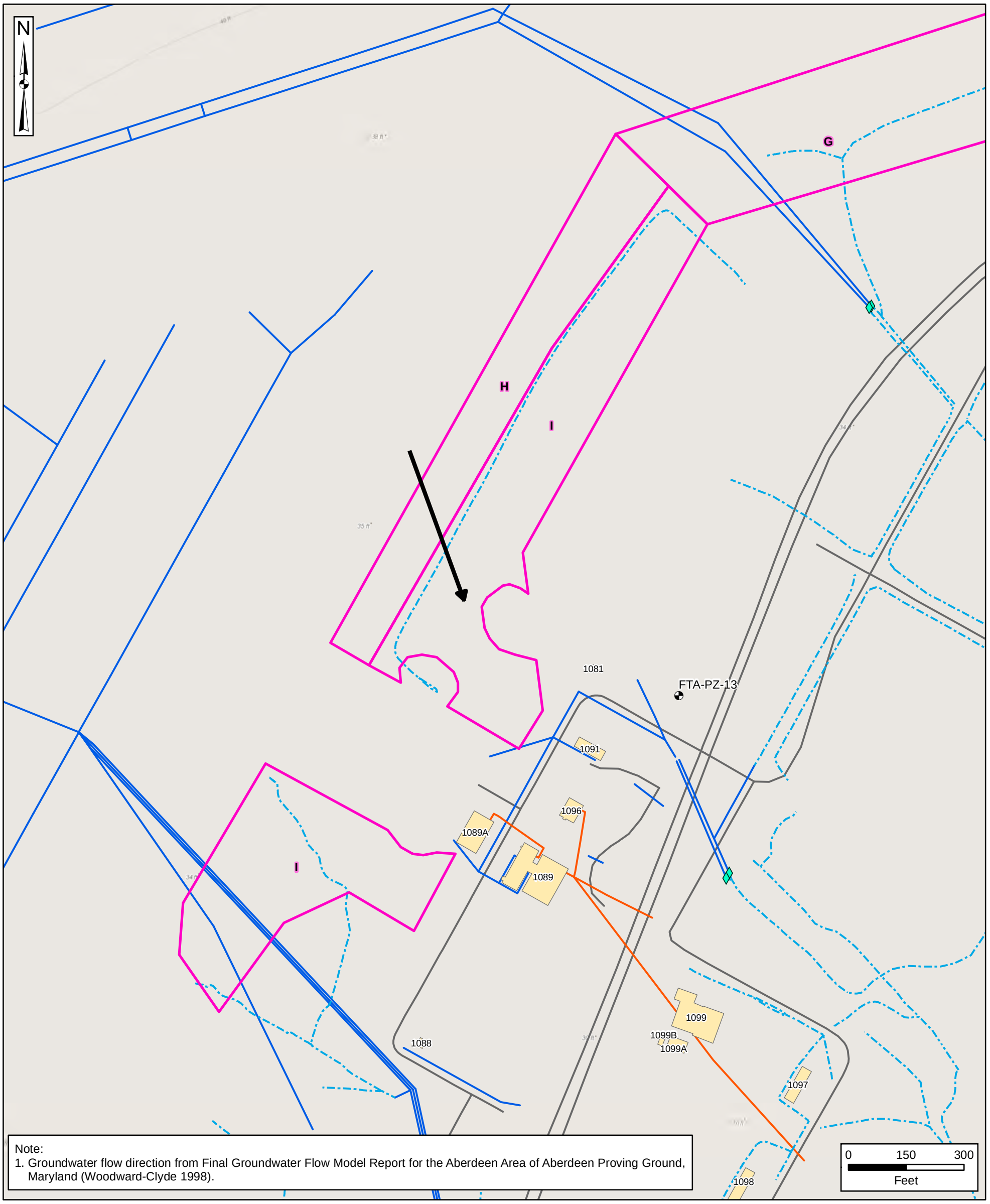
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-33
Biosolid Application Fields: H and I AOPIs



Note:
1. Groundwater flow direction from Final Groundwater Flow Model Report for the Aberdeen Area of Aberdeen Proving Ground, Maryland (Woodward-Clyde 1998).

AOPI = area of potential interest

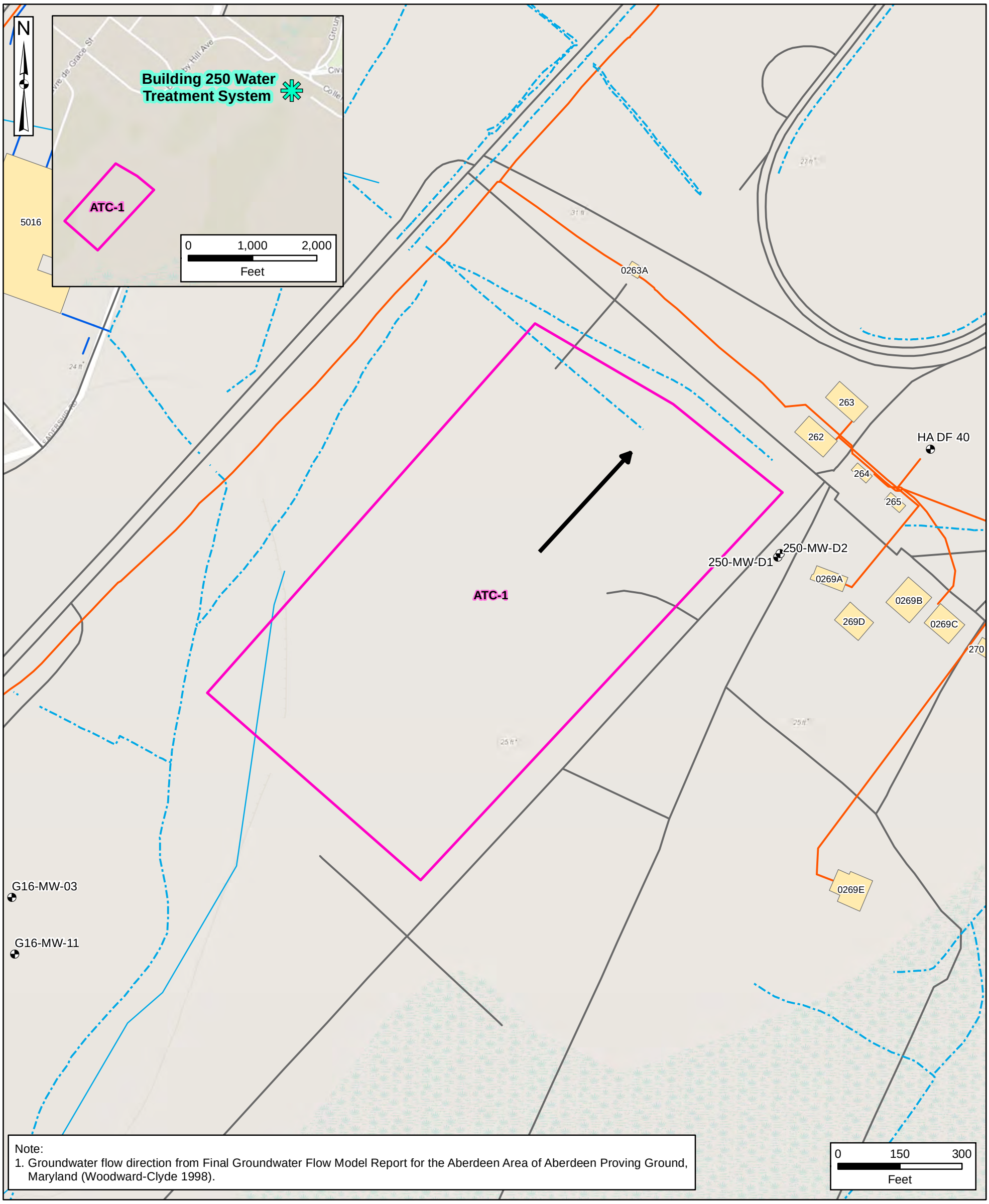
- Installation Boundary
- Building
- Road Centerline
- Stormwater Utility Line
- Wastewater Utility Line
- Drainage Ditch
- Groundwater Flow Direction
- Biosolids Application Field AOPI
- Outfall Location
- Monitoring Well

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-34
Biosolid Application Field: ATC-1 AOPI



Installation Boundary
Building
Road Centerline
River/Stream (Perennial)
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Monitoring Well
UCMR3 Sampling Location

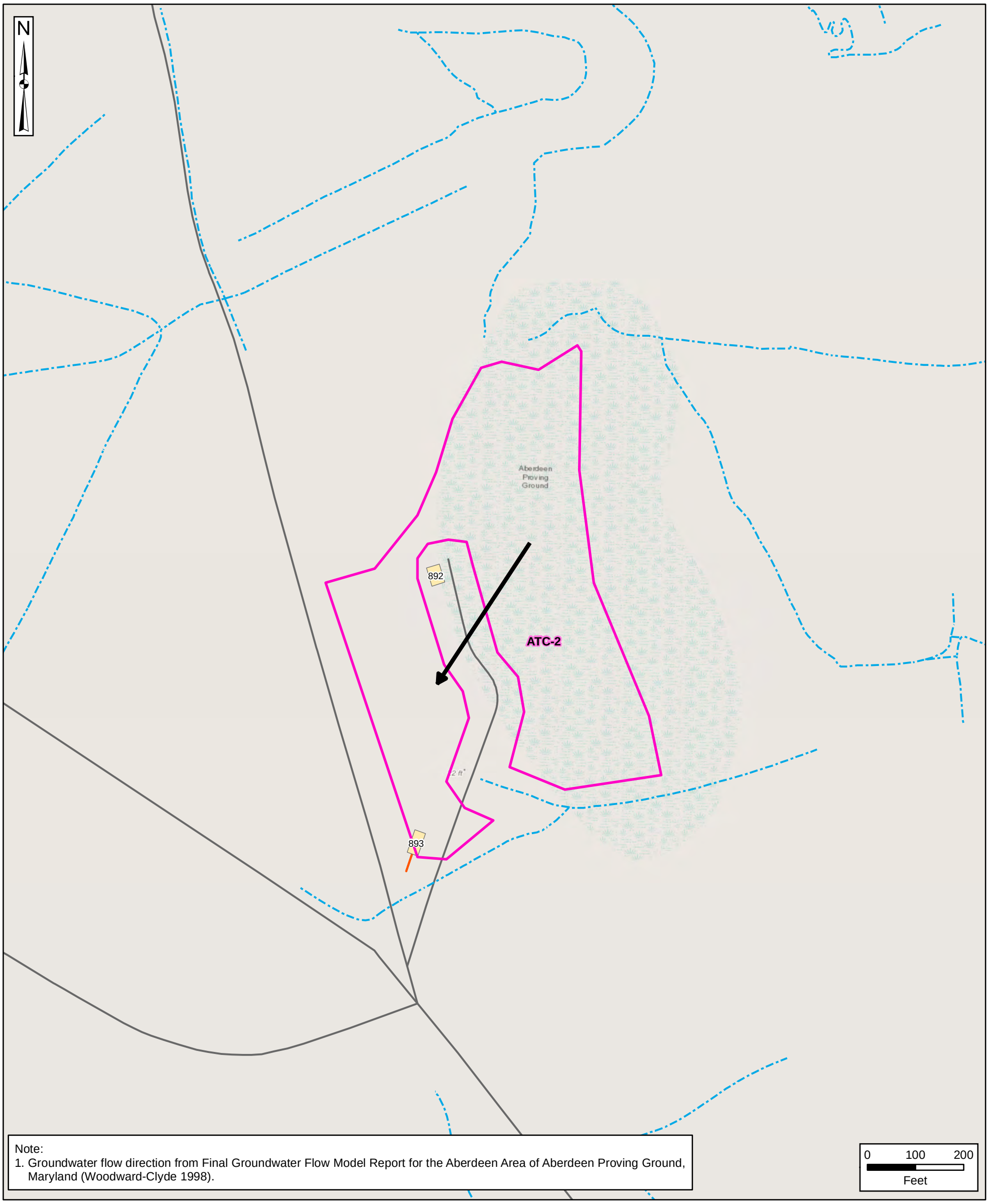
AOPI = area of potential interest
ATC = Aberdeen Test Center
UCMR3 = Unregulated Contaminant Monitoring Rule

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-35
Biosolid Application Field: ATC-2 AOPI



Installation Boundary
Building
Road Centerline
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI

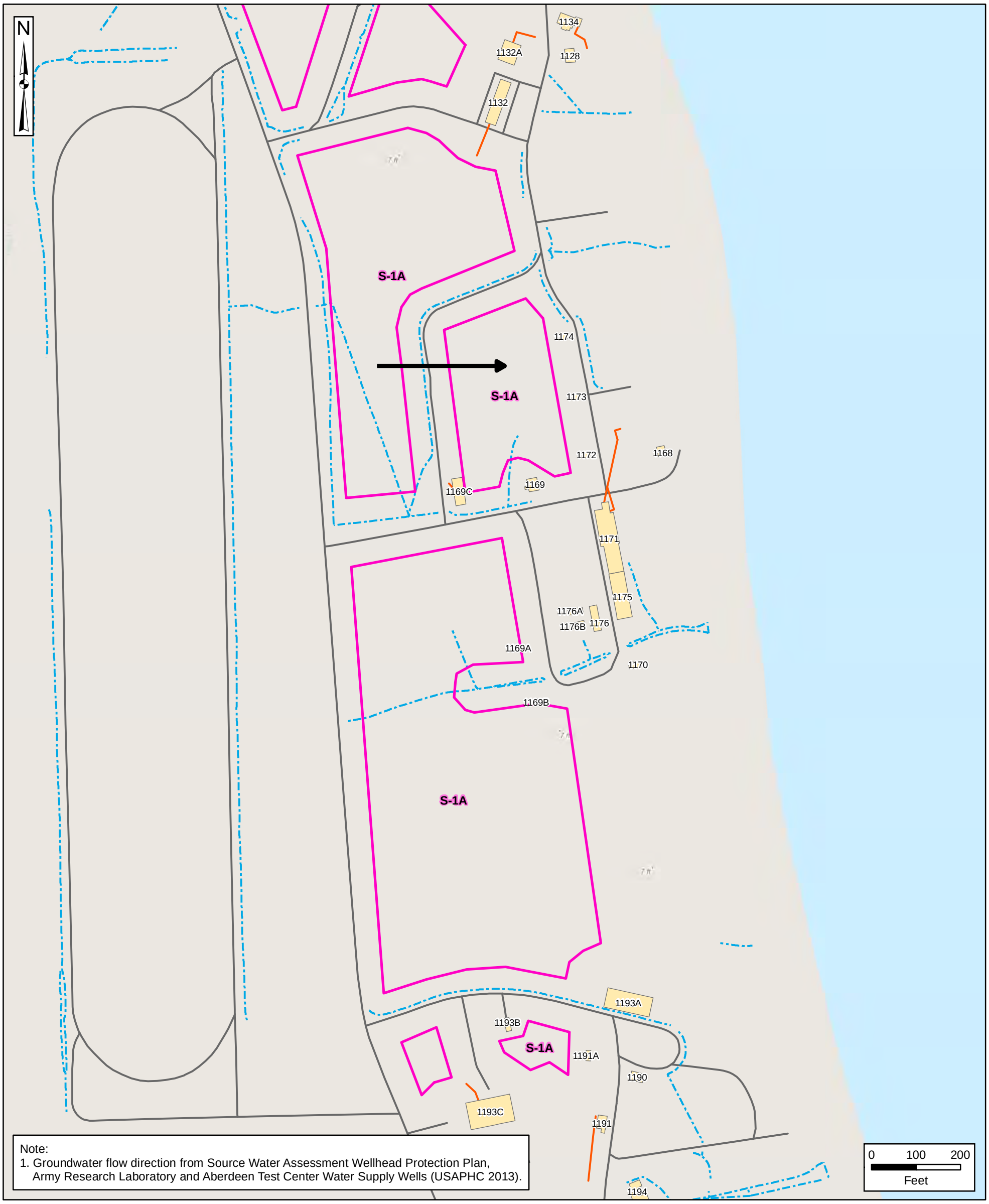
AOPI = area of potential interest
ATC = Aberdeen Test Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-36
Biosolid Application Field: S-1A AOPI



Note:
1. Groundwater flow direction from Source Water Assessment Wellhead Protection Plan, Army Research Laboratory and Aberdeen Test Center Water Supply Wells (USAPHC 2013).

Installation Boundary
Building
Road Centerline
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI

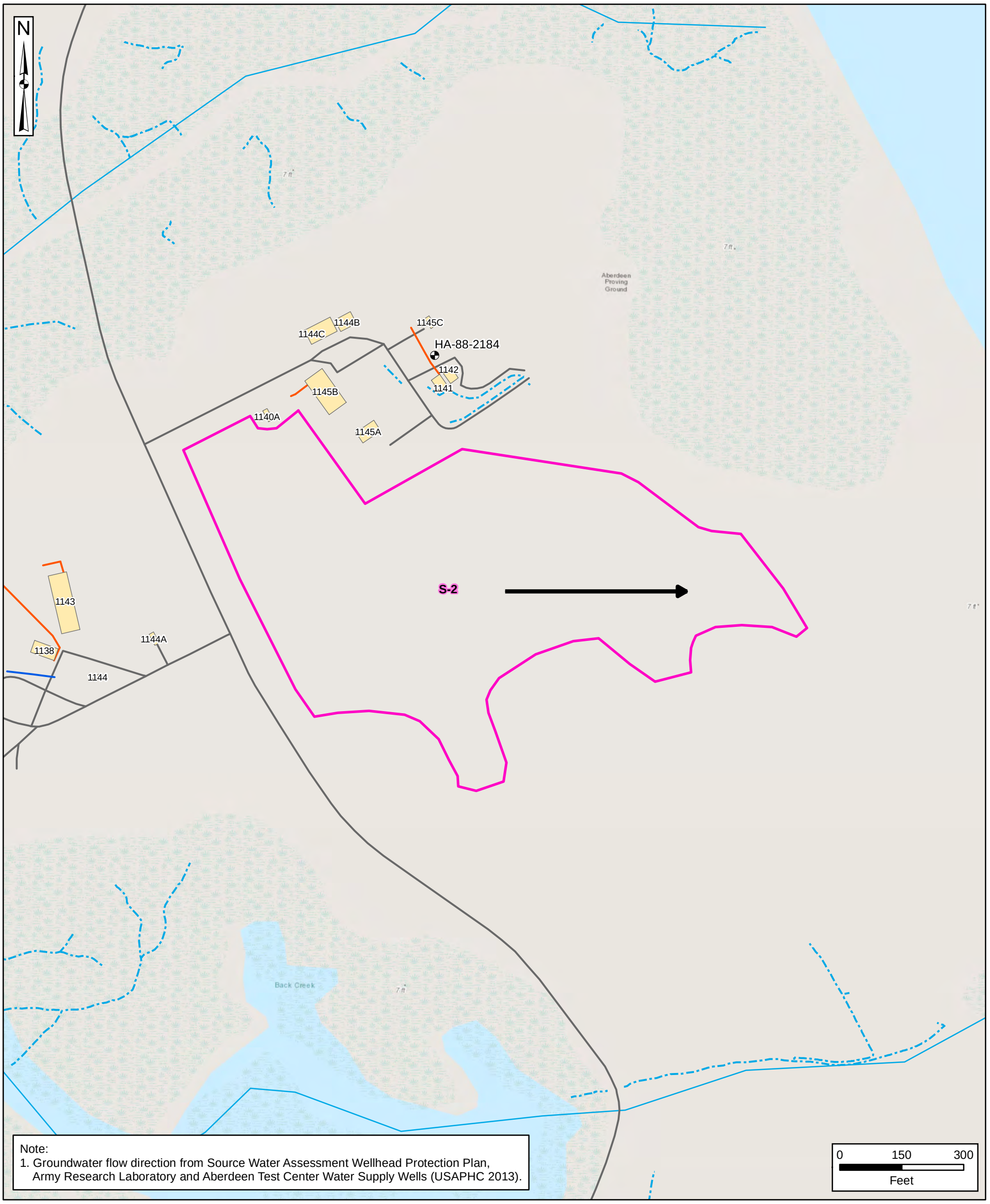
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-37
Biosolid Application Field: S-2 AOPI



Installation Boundary
Building
Road Centerline
River/Stream (Perennial)
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Monitoring Well

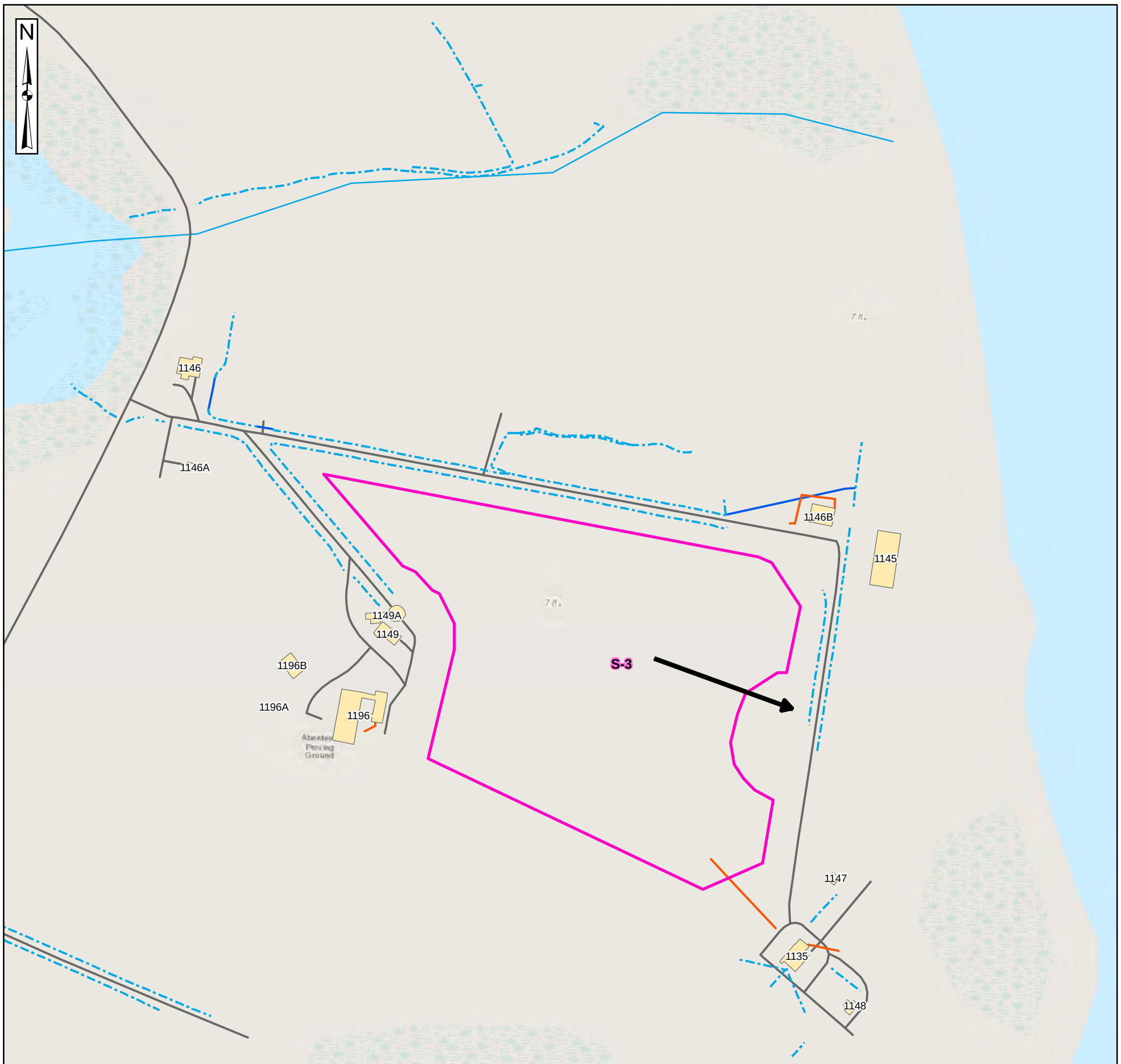
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

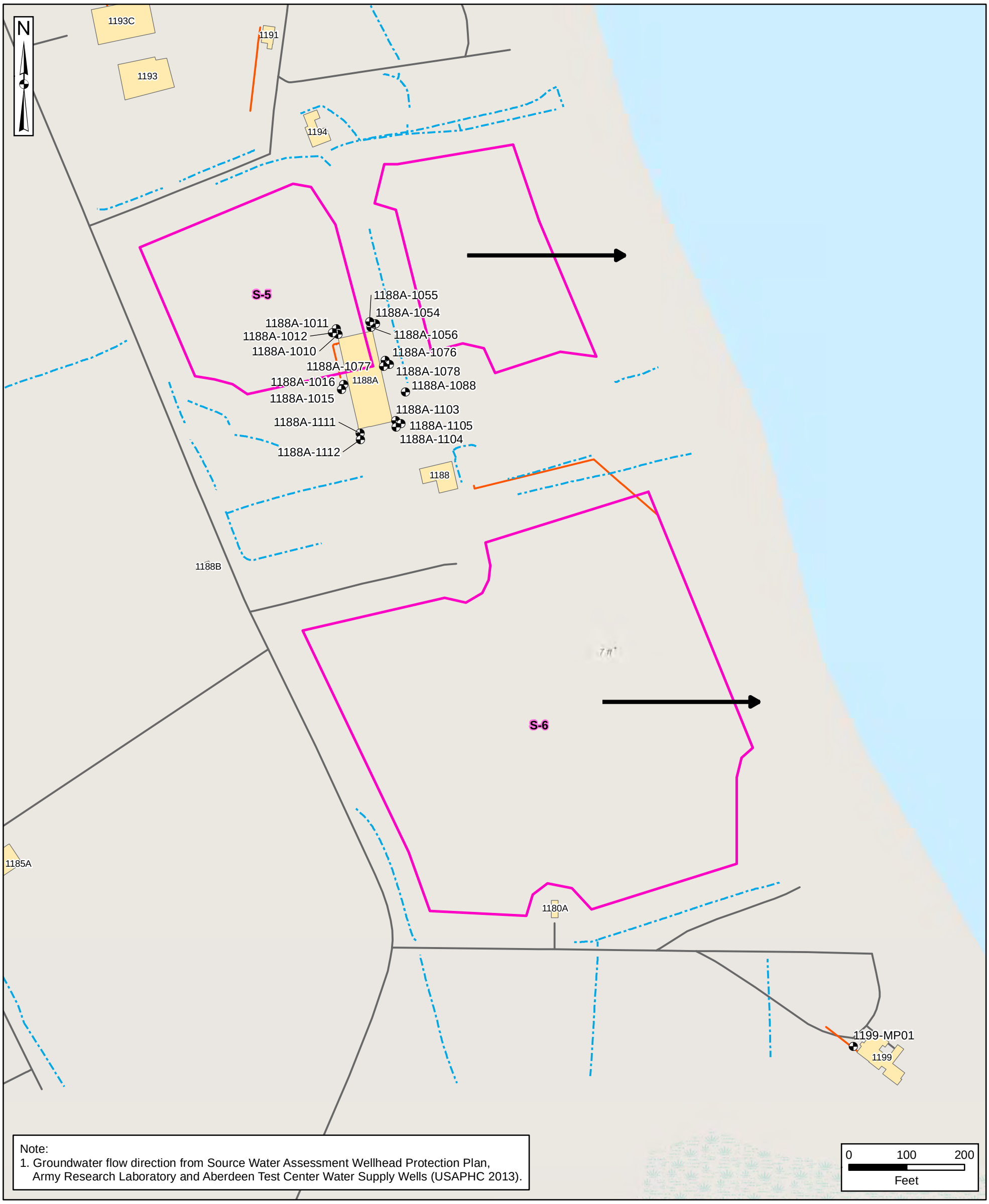
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-38
Biosolid Application Field: S-3 AOPI



USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-39
Biosolid Application Fields: S-5 and S-6 AOPIs



Installation Boundary
Building
Road Centerline
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Monitoring Well

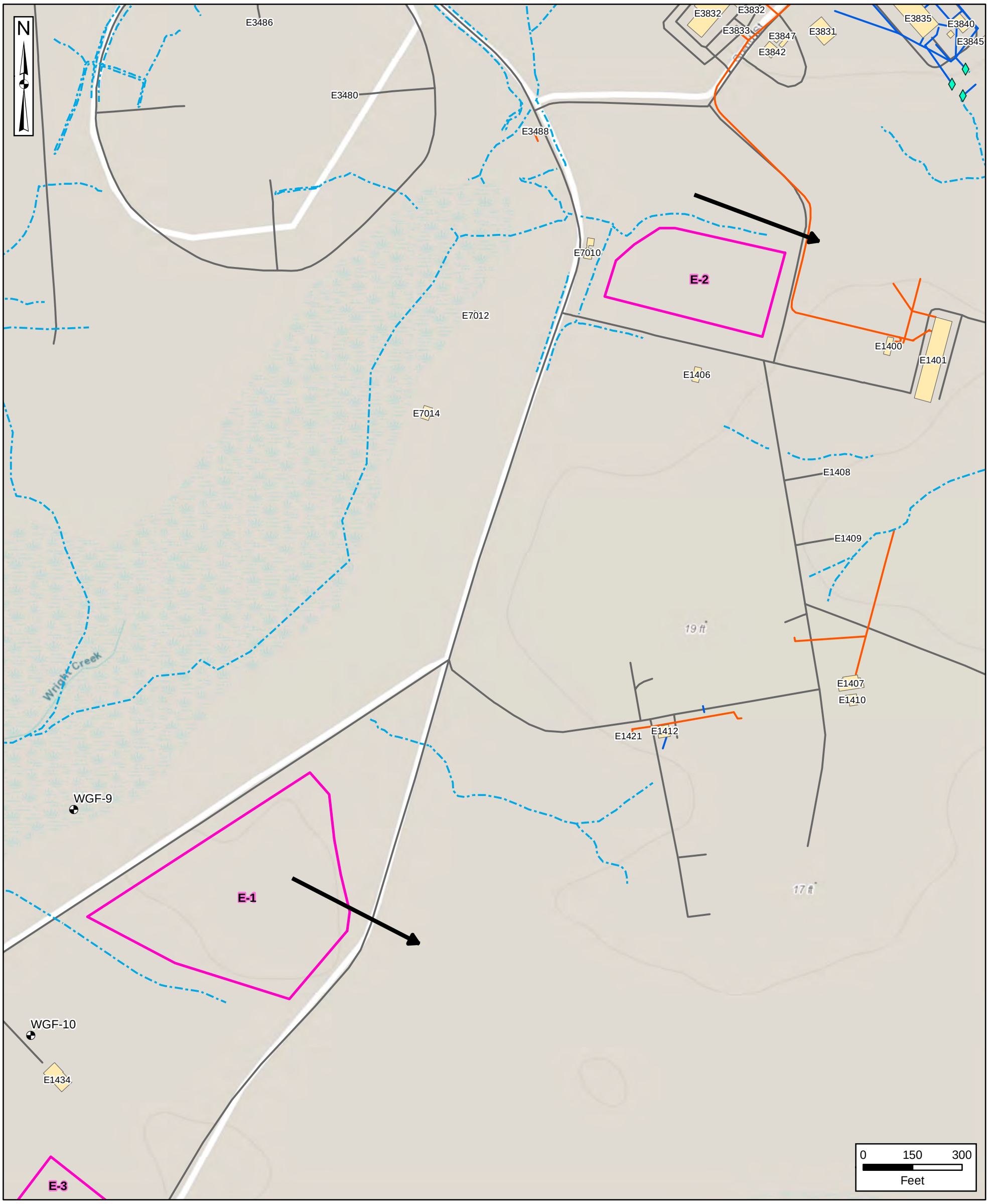
AOPI = area of potential interest
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-40
Biosolid Application Fields: E-1 and E-2 AOPIs



Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Inferred Groundwater Flow Direction Based on Topography
Biosolids Application Field AOPI
Outfall Location
Monitoring Well

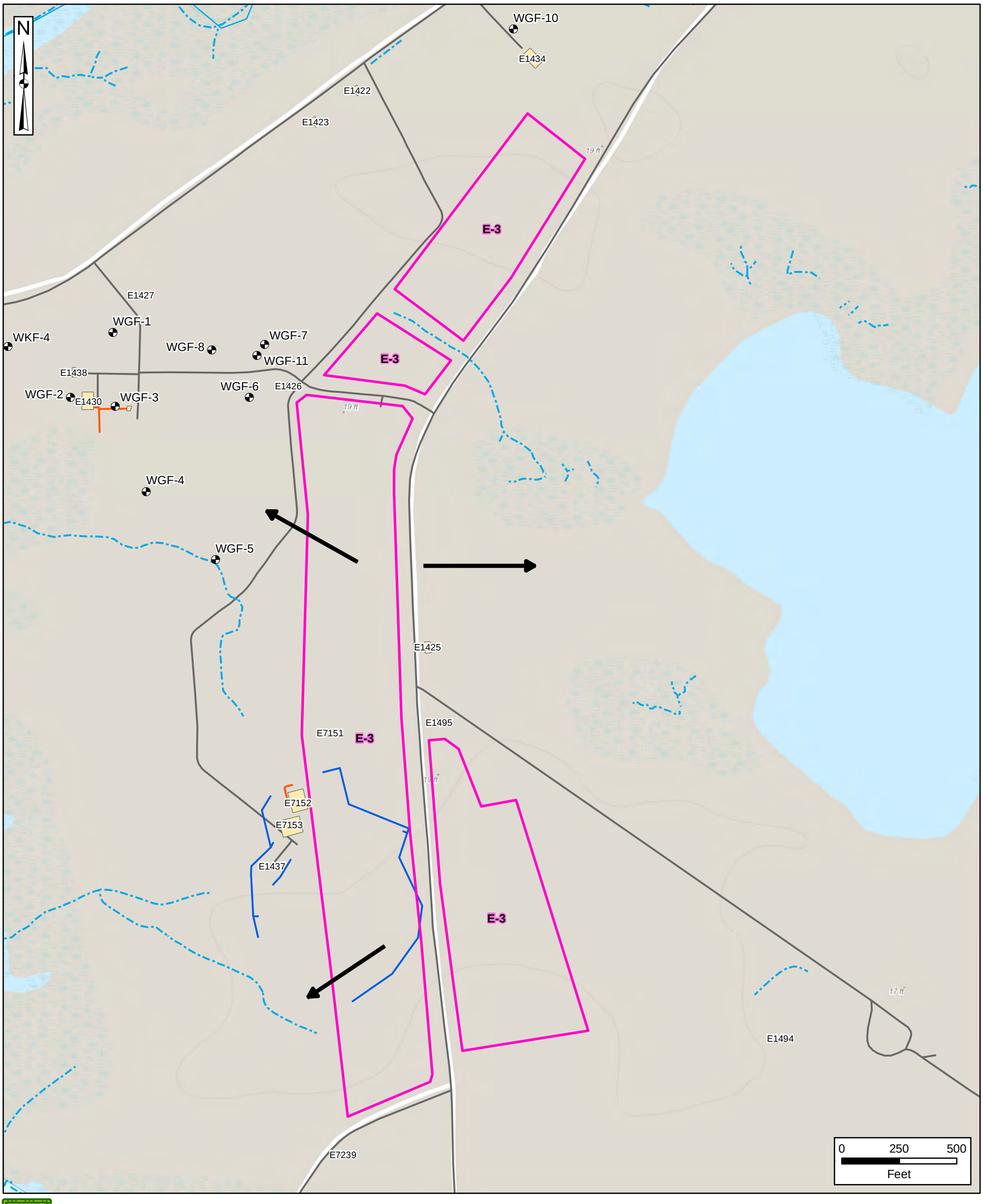
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-41
Biosolid Application Field: E-3 AOPI



Installation Boundary
Building
Road Centerline
River/Stream (Perennial)
Water Body
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Inferred Groundwater Flow Direction Based on Topography
Biosolids Application Field AOPI
Monitoring Well

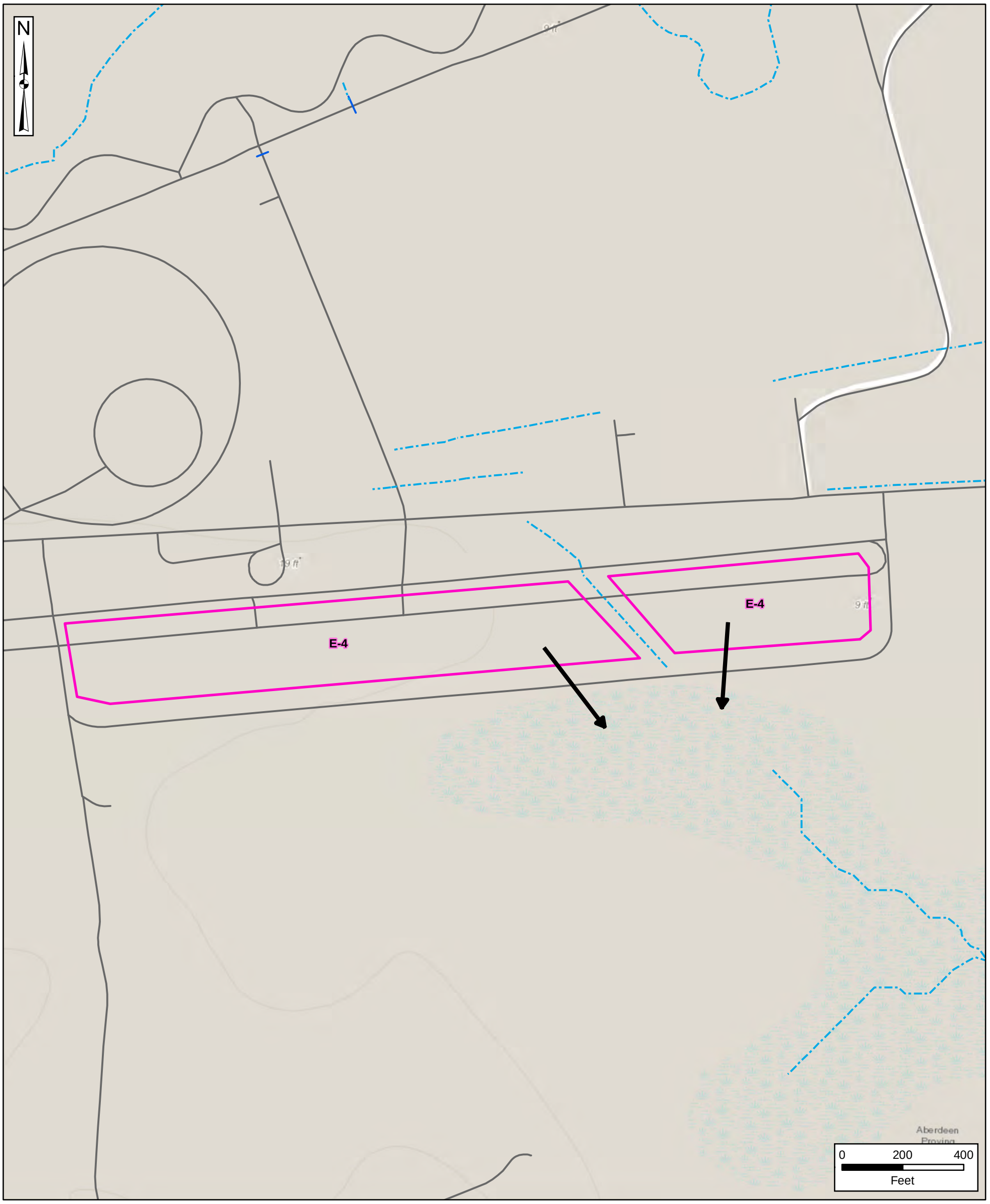
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-42
Biosolid Application Field: E-4 AOPI



Installation Boundary

Road Centerline

Stormwater Utility Line

Drainage Ditch

Inferred Groundwater Flow Direction
Based on Topography

Biosolids Application Field AOPI

AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 5-43
Biosolid Application Field: E-6 AOPI

Installation Boundary
Building
Road Centerline
Drainage Ditch
Inferred Groundwater Flow Direction Based on Topography
Biosolids Application Field AOPI

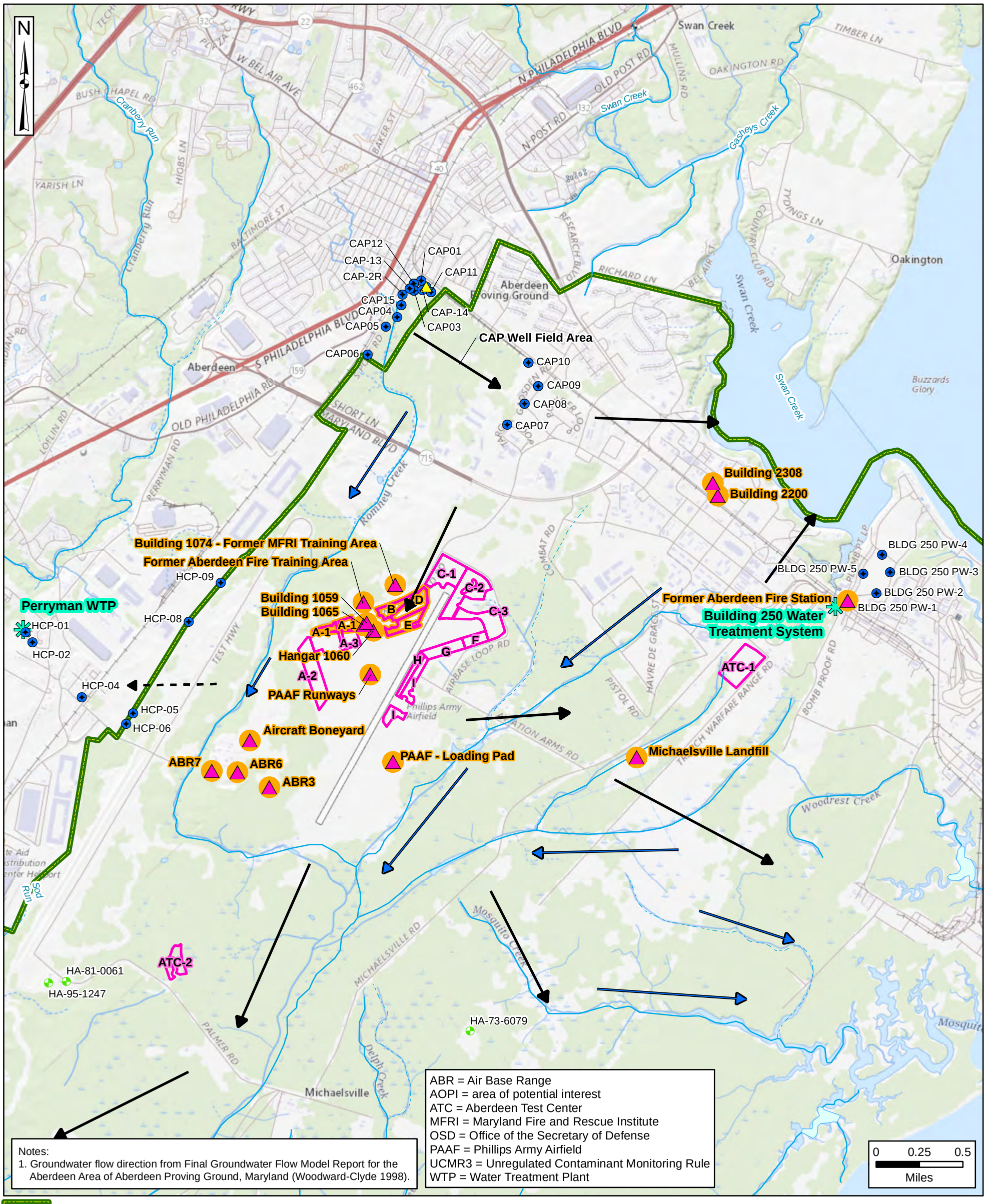
AOPI = area of potential interest

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-1a
Aberdeen Western Boundary and Cantonment Area AOPI Locations and OSD Risk Screening Level Exceedances



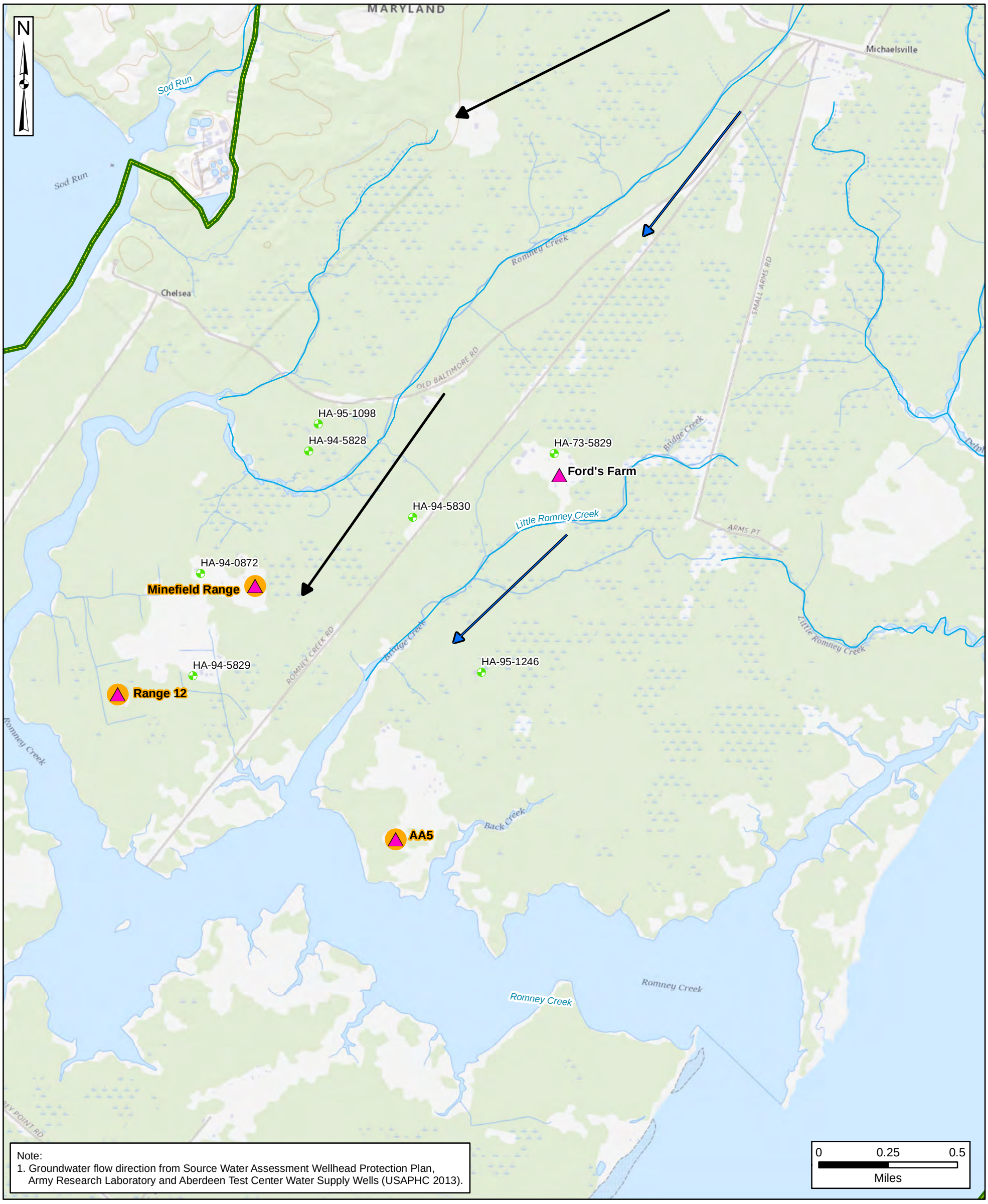
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Surface Water Flow Direction
- Natural Groundwater Flow Direction
- Groundwater Flow Direction due to well pumping
- Biosolids Application Field AOPI
- AOPI
- AOPI with OSD Risk Screening Level Exceedance
- Biosolids Application Field with OSD Risk Screening Level Exceedance
- ATC Potable Supply Well
- Public Supply Well
- City of Aberdeen Water Treatment Plant
- UCMR3 Sampling Location

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-1b
Poverty Island Area AOPI Locations and
OSD Risk Screening Level Exceedances



Note:
1. Groundwater flow direction from Source Water Assessment Wellhead Protection Plan, Army Research Laboratory and Aberdeen Test Center Water Supply Wells (USAPHC 2013).

Installation Boundary
River/Stream (Perennial)
Surface Water Flow Direction
Groundwater Flow Direction
AOPI
AOPI with OSD Risk Screening Level Exceedance
ATC Potable Supply Well

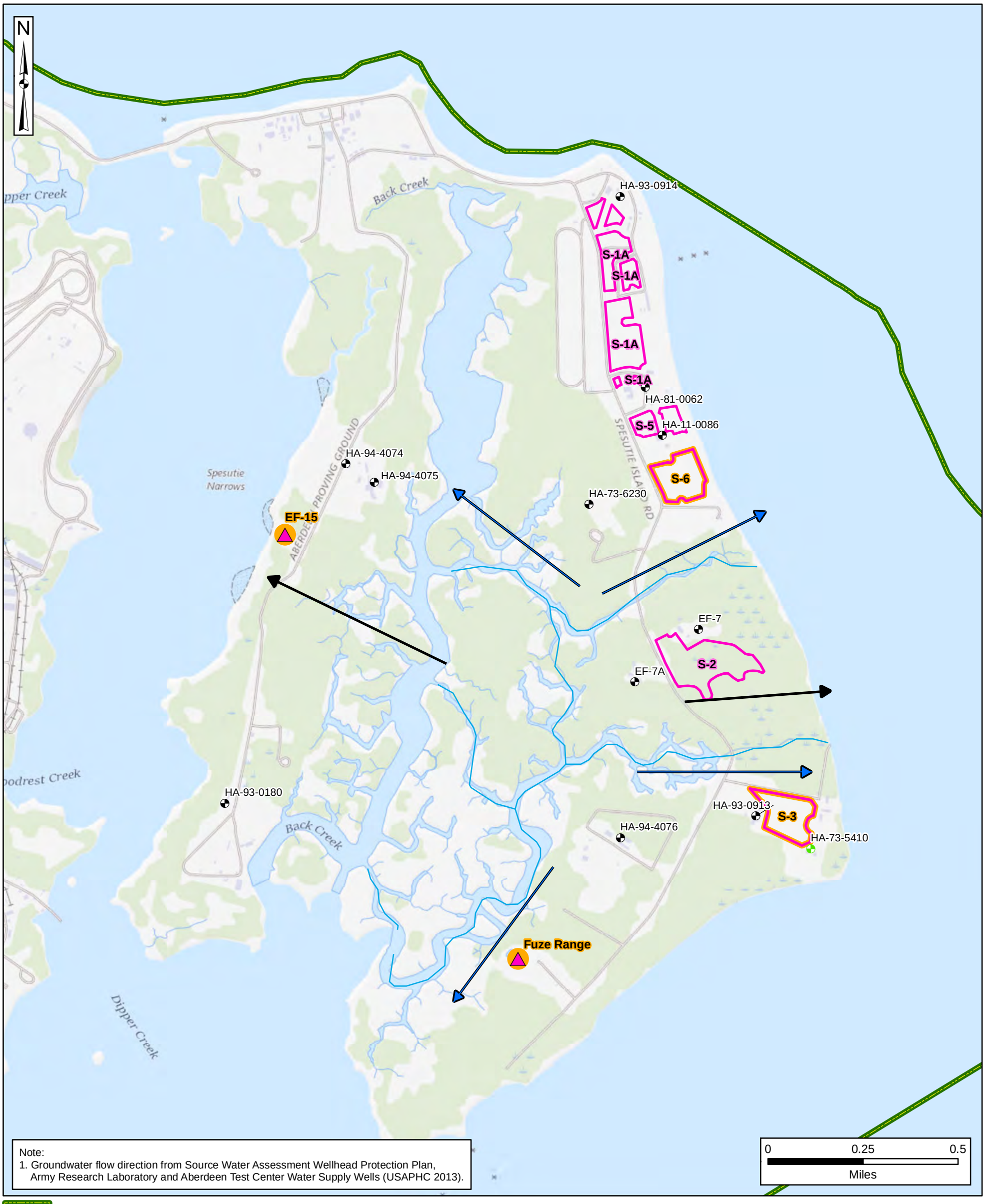
AOPI = area of potential interest
ATC = Aberdeen Test Center
OSD = Office of the Secretary of Defense
USAPHC = United States Army Public Health Center

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-1c
Spesutie Island Area AOPI Locations and
OSD Risk Screening Level Exceedances



Note:
1. Groundwater flow direction from Source Water Assessment Wellhead Protection Plan, Army Research Laboratory and Aberdeen Test Center Water Supply Wells (USAPHC 2013).

- Installation Boundary
- River/Stream (Perennial)
- Surface Water Flow Direction
- Groundwater Flow Direction
- Biosolids Application Field AOPI
- AOPI
- AOPI with OSD Risk Screening Level Exceedance
- Biosolids Application Field with OSD Risk Screening Level Exceedance
- ARL Potable Supply Well
- ATC Potable Supply Well

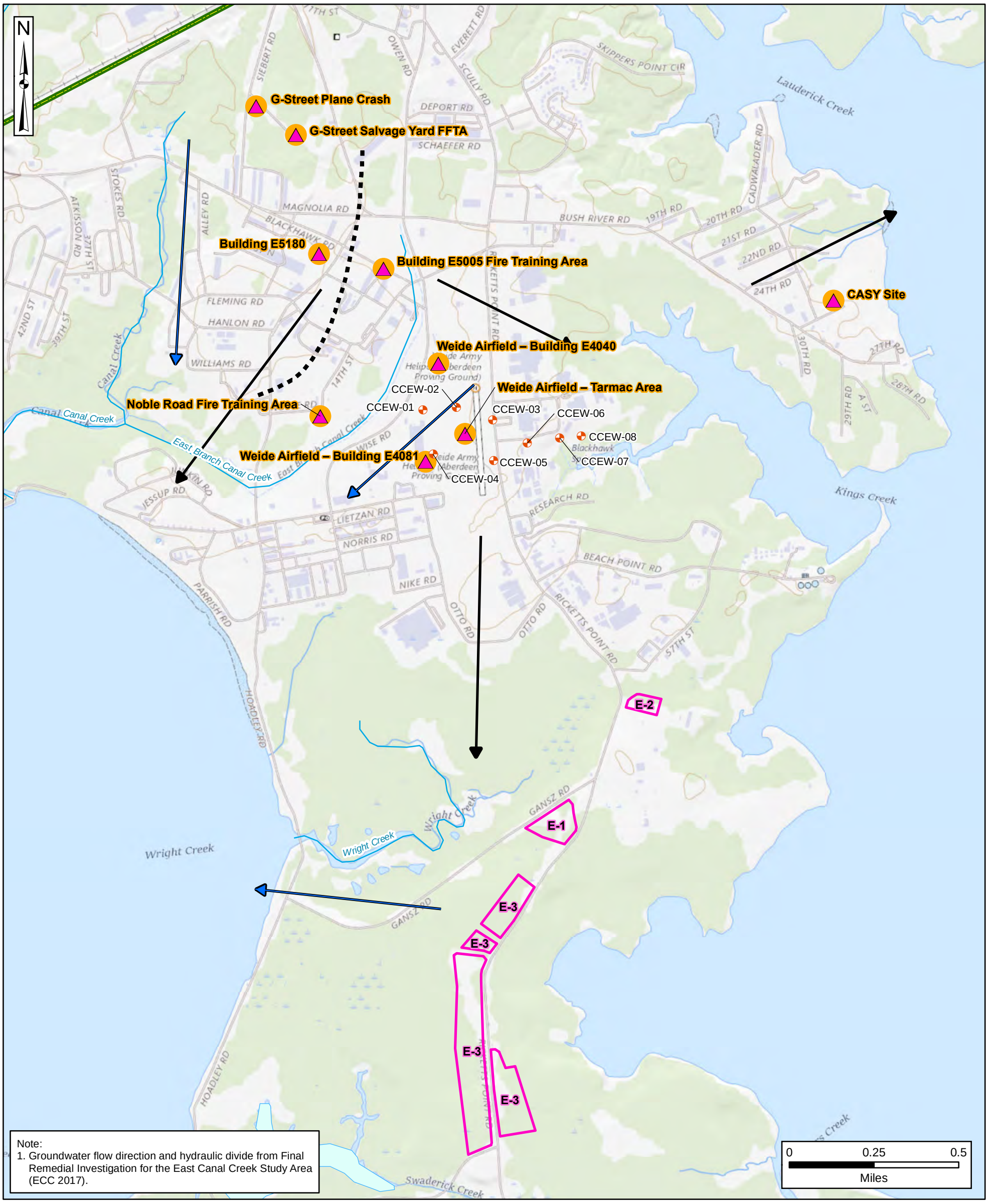
AOPI = area of potential interest
ARL = Army Research Laboratory
ATC = Aberdeen Test Center
OSD = Office of the Secretary of Defense
USAPHC = United States Army Public Health Center

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

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



Installation Boundary
River/Stream (Perennial)
Water Body
Surface Water Flow Direction
Groundwater Flow Direction
Hydraulic Groundwater Divide
Biosolids Application Field AOPI
AOPI
AOPI with OSD Risk Screening Level Exceedance
Extraction Well

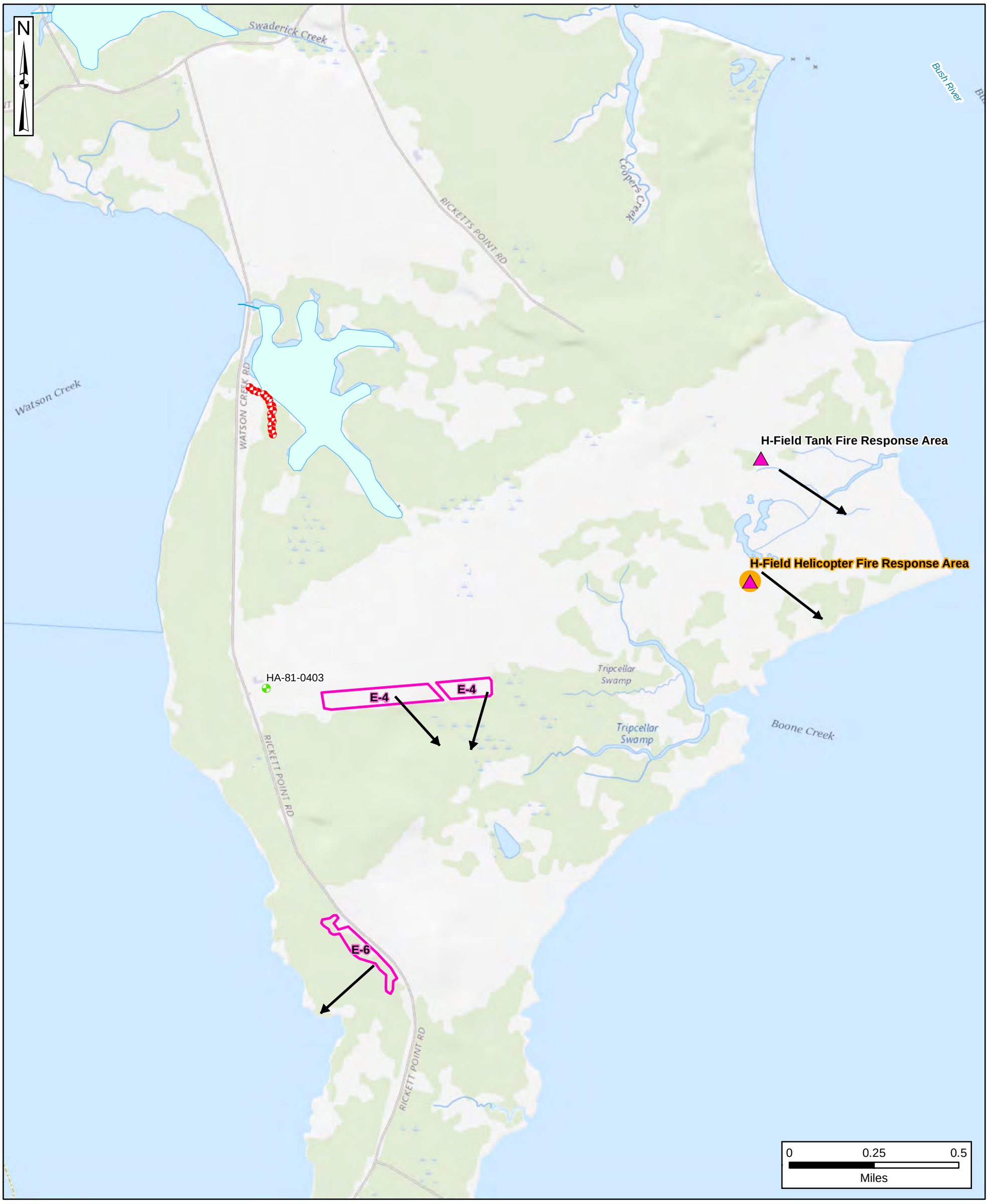
AOPI = area of potential interest
CASY = Chemical Agent Storage Yard
FFTA = Former Fire Training Area
OSD = Office of the Secretary of Defense

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

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



Installation Boundary
River/Stream (Perennial)
Water Body
Biosolids Application Field AOPI
Inferred Groundwater Flow Direction Based on Topography

AOPI
AOPI with OSD Risk Screening Level Exceedance
ATC Potable Supply Well
Extraction Well

AOPI = area of potential interest
ATC = Aberdeen Test Center
OSD = Office of the Secretary of Defense

Data Sources:
ESRI ArcGIS Online, USGS Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-2
Air Base Range 3
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

Air Base
Range 3

APG-ABR3-1-GW	
Date	3/8/2021
PFOS	**17,000**
PFOA	**1,700**
PFBS	**140**
PFNA	**320**
PFHxS	**5,900**

APG-ABR3-1-SO	
Date	3/8/2021
Depth	0-2 ft bgs
PFOS	**0.10**
PFOA	**0.0012**
PFBS	0.0024 U
PFNA	**0.0012**
PFHxS	**0.0056**

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012)

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

0 50 100
Feet

Installation Boundary
Road Centerline
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area
Soil and Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
GW = groundwater
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-3
Air Base Ranges 6 and 7
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-ABR7-1-GW	
Date	3/5/2021
PFOS	**24**
PFOA	**60**
PFBS	**4.2**
PFNA	2.2 U
PFHxS	**92**

APG-ABR7-1-SO	
Date	3/5/2021
Depth	0-2 ft bgs
PFOS	0.00063 U
PFOA	0.00063 U
PFBS	0.0021 U
PFNA	0.00063 U
PFHxS	0.00063 U

APG-ABR6-1-SO	
Date	3/5/2021
Depth	0-2 ft bgs
PFOS	**0.061**
PFOA	**0.0060**
PFBS	0.0025 U
PFNA	**0.0075**
PFHxS	**0.010**

APG-ABR6-1-GW	
Date	3/5/2021
PFOS	**14,000**
PFOA	**110**
PFBS	**7.7**
PFNA	**45**
PFHxS	**190**

APG-ABR6-2-SO	
Date	3/5/2021
Depth	0-2 ft bgs
PFOS	**0.0028**
PFOA	**0.00056 J**
PFBS	0.0022 U
PFNA	**0.0010**
PFHxS	0.00065 U

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012)

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

0 100 200
Feet

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
AOPI
Monitoring Well
Groundwater Sampling Location
Soil and Groundwater Sampling Location
Soil Sampling Location

AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-4
PAAF - Runways
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level Tap Water (ng/L)
PFOS	4
PFOA	6
PFBS	601
PFNA	6
PFHxS	39

APG-WB-MW-11A	
Date	3/9/2021
PFOS	**21 J**
PFOA	**8.1**
PFBS	**1.3 J**
PFNA	1.7 U
PFHxS	**7.4**

APG-WB-MW-14A	
Date	3/9/2021
PFOS	**1.4 J**
PFOA	**43**
PFBS	**2.5**
PFNA	1.7 U
PFHxS	**39**

PAAF Runways

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Bolded values indicate detections.
3. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
4. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

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

0 500 1,000
Feet

Installation Boundary
Building
Road Centerline
River/Stream (Perennial)
Stream (Intermittent)
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
Monitoring Well
Sampling Location - Existing Well

AOPI = area of potential interest
PAAF = Phillips Army Airfield
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-5
PAAF - Aircraft Boneyard
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-BONEYARD-6-GW	
Date	3/11/2021
PFOS	**17**
PFOA	**13**
PFBS	**1.6 J**
PFNA	**1.5 J**
PFHxS	**26**

APG-BONEYARD-6-SO	
Date	3/11/2021
Depth	0-2 ft bgs
PFOS	0.00073 U
PFOA	**0.00056 J**
PFBS	0.0024 U
PFNA	0.00073 U
PFHxS	0.00073 U

APG-BONEYARD-7-GW	
Date	3/11/2021
PFOS	**1.7 J**
PFOA	**6.9**
PFBS	2.0 U
PFNA	2.0 U
PFHxS	**25**

APG-BONEYARD-7-SO	
Date	3/11/2021
Depth	0-2 ft bgs
PFOS	0.00070 U
PFOA	0.00070 U
PFBS	0.0023 U
PFNA	0.00070 U
PFHxS	0.00070 U

APG-BONEYARD-5-GW	
Date	3/8/2021
PFOS	**92**
PFOA	**35**
PFBS	**3.5**
PFNA	**1.4 J**
PFHxS	**100**

APG-BONEYARD-5-SO	
Date	3/8/2021
Depth	0-2 ft bgs
PFOS	**0.0052**
PFOA	**0.00064 J**
PFBS	0.0024 U
PFNA	0.00072 U
PFHxS	0.00072 U

APG-BONEYARD-1-GW	
Date	3/11/2021
PFOS	**23**
PFOA	**19**
PFBS	**1.9 J**
PFNA	**10**
PFHxS	**27**

APG-BONEYARD-1-SO	
Date	3/11/2021
Depth	0-2 ft bgs
PFOS	0.00066 U
PFOA	**0.00048 J**
PFBS	0.0022 U
PFNA	0.00066 U
PFHxS	0.00066 U

APG-BONEYARD-2-GW	
Date	3/8/2021
PFOS	**110**
PFOA	**84**
PFBS	**6.1**
PFNA	**1.4 J**
PFHxS	**250**

APG-BONEYARD-2-SO	
Date	3/8/2021
Depth	0-2 ft bgs
PFOS	**0.0023**
PFOA	**0.00074**
PFBS	0.0023 U
PFNA	0.00069 U
PFHxS	0.00069 U

APG-BONEYARD-3-GW	
Date	3/8/2021
PFOS	**48**
PFOA	**23**
PFBS	**2.9**
PFNA	2.0 U
PFHxS	**59**

APG-BONEYARD-3-SO	
Date	3/8/2021
Depth	0-2 ft bgs
PFOS	**0.00060 J**
PFOA	0.00067 U
PFBS	0.0022 U
PFNA	0.00067 U
PFHxS	0.00067 U

APG-BONEYARD-4-GW	
Date	3/8/2021
PFOS	**18**
PFOA	**6.2**
PFBS	2.1 U
PFNA	2.1 U
PFHxS	**13**

APG-BONEYARD-4-SO	
Date	3/8/2021
Depth	0-2 ft bgs
PFOS	0.00067 U
PFOA	0.00067 U
PFBS	0.0022 U
PFNA	0.00067 U
PFHxS	0.00067 U

FTA-PZ-12

PAAF - Aircraft Boneyard

PAAF - Aircraft Boneyard

1049A
1049C
1049B
1051A
1051B
1052

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate the result was detected greater than the limit of detection.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

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

0 100 200
Feet

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
AOPI
Monitoring Well
Soil and Groundwater Sampling Location

AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PAAF = Phillips Army Airfield
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-6
Former Aberdeen Fire Training Area
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-OLD-FTA-2-GW	
Date	3/11/2021
PFOS	**22,000 J-**
PFOA	**27,000**
PFBS	**680**
PFNA	**6,600**
PFHxS	**11,000**

APG-OLD-FTA-2-SO	
Date	3/11/2021
Depth	0-2 ft bgs
PFOS	**0.019**
PFOA	0.00067 U
PFBS	0.0022 U
PFNA	0.00067 U
PFHxS	**0.00050 J**

APG-FTA-M08	
Date	3/11/2021
PFOS	**9,000 [8,500]**
PFOA	**6,500 [6,600]**
PFBS	**160 [150]**
PFNA	**1,700 [1,600]**
PFHxS	**2,900 [3,100]**

APG-OLD-FTA-1-GW	
Date	3/11/2021
PFOS	**7,000**
PFOA	**720**
PFBS	**130**
PFNA	**220**
PFHxS	**1,200**

APG-OLD-FTA-1-SO	
Date	3/11/2021
Depth	0-2 ft bgs
PFOS	**0.0052**
PFOA	**0.00095**
PFBS	0.0024 U
PFNA	0.00072 U
PFHxS	**0.00086**

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
6. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

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

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
AFFF Release Area
Monitoring Well
Sampling Location - Existing Well
Soil and Groundwater Sampling Location

SO = soil
USAPHC = United States Army Public Health Center

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-7
Building 1074 - Former MFRI Training Area
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-MFRI-1-GW	
Date	3/4/2021
PFOS	**250**
PFOA	**28**
PFBS	**63**
PFNA	**17**
PFHxS	**250**

APG-MFRI-1-SO	
Date	3/4/2021
Depth	8-10 ft bgs
PFOS	0.00068 U **[0.00067 J]**
PFOA	0.00068 U [0.00072 U]
PFBS	0.0023 U [0.0024 U]
PFNA	0.00068 U [0.00072 U]
PFHxS	0.00068 U [0.00072 U]

APG-MFRI-2-GW	
Date	3/4/2021
PFOS	**41**
PFOA	**8.9**
PFBS	**15**
PFNA	2.2 U
PFHxS	**150**

APG-MFRI-2-SO	
Date	3/4/2021
Depth	8-10 ft bgs
PFOS	0.00070 U
PFOA	0.00070 U
PFBS	0.0023 U
PFNA	0.00070 U
PFHxS	0.00070 U

Building 1074 - Former MFRI Training Area

1074 1076 1076B 1075

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
6. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

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

0 50 100
Feet

Installation Boundary
Building
Road Centerline
Drainage Ditch
Wastewater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Soil and Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
MFRI = Maryland Fire and Rescue Institute
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-8
Building 1059, Hangar 1060, and Crash Truck Bay Building 1065
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-BLDG-1059-1-GW	
Date	3/3/2021
PFOS	**42,000 J-**
PFOA	**3,600**
PFBS	**230**
PFNA	**990**
PFHxS	**15,000**
APG-BLDG-1059-1-SO	
Date	3/3/2021
Depth	0-2 ft bgs
PFOS	**0.14**
PFOA	**0.0012**
PFBS	0.0024 U
PFNA	**0.0016**
PFHxS	**0.0037**

APG-BLDG-1065-1-GW	
Date	3/3/2021
PFOS	**19,000 J-**
PFOA	**2,300**
PFBS	**410**
PFNA	**690**
PFHxS	**12,000**
APG-BLDG-1065-1-SO	
Date	3/3/2021
Depth	0-2 ft bgs
PFOS	**0.0042**
PFOA	0.00067 U
PFBS	0.0022 U
PFNA	0.00067 U
PFHxS	0.00067 U

APG-HANGER-1060-1-GW	
Date	3/4/2021
PFOS	**1,200**
PFOA	**110**
PFBS	**27**
PFNA	**33**
PFHxS	**540**
APG-HANGAR-1060-1-SO	
Date	3/4/2021
Depth	0-2 ft bgs
PFOS	**0.013**
PFOA	**0.00060 J**
PFBS	0.0022 U
PFNA	**0.00062 J**
PFHxS	**0.00049 J**

HA-88-1484
1068A
1068
1067
1078
1062
1063
1064A
1064
1061
Building 1065 - Fire Department Crash Storage Bay
Building 1059 - PAAF Station Building
Building 1060 - PAAF Hangar

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

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

0 50 100
Feet

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
AFFF Release Area
Monitoring Well
Soil and Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PAAF = Phillips Army Airfield
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-9
PAAF - Loading Pad
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-LOADING-PAD-1-GW	
Date	3/4/2021
PFOS	**5.7**
PFOA	1.8 U
PFBS	1.8 U
PFNA	1.8 U
PFHxS	1.8 U

APG-LOADING-PAD-1-SO	
Date	3/4/2021
Depth	0-2 ft bgs
PFOS	**0.0022**
PFOA	**0.00062 J**
PFBS	0.0022 U
PFNA	0.00066 U
PFHxS	**0.0020**

PAAF - Loading Pad

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

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

0 100 200
Feet

Installation Boundary
Road Centerline
Stormwater Utility Line
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
AFFF Release Area
Soil and Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PAAF = Phillips Army Airfield
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-10
Michaelsville Landfill
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level Tap Water (ng/L)
PFOS	4
PFOA	6
PFBS	601
PFNA	6
PFHxS	39

APG-WES-M21	
Date	3/20/2021
PFOS	**2.9**
PFOA	**8.6**
PFBS	**2.5**
PFNA	2.0 U
PFHxS	**5.9**

APG-WES-M18	
Date	3/20/2021
PFOS	**1.0 J**
PFOA	**2.5**
PFBS	1.9 U
PFNA	1.9 U
PFHxS	**3.6**

APG-WES-M09	
Date	3/20/2021
PFOS	**34**
PFOA	**52**
PFBS	**8.9**
PFNA	**3.8**
PFHxS	**16**

APG-WES-M14	
Date	3/20/2021
PFOS	**36**
PFOA	**29**
PFBS	**5.6**
PFNA	1.7 U
PFHxS	**21**

APG-WES-M17	
Date	3/20/2021
PFOS	**5.8**
PFOA	**54**
PFBS	**4.9**
PFNA	1.8 U
PFHxS	**11**

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Bolded values indicate the result was detected greater than the limit of detection.
3. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
4. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

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

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
AOPI
Monitoring Well
Sampling Location - Existing Well
Outfall Location

AOPI = area of potential interest
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-11
Building 300 - Former Aberdeen Fire Station and Building 250 - Potable Supply Wells
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
6. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017).

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

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-BLDG-250-4-PW	
Date	3/9/2021
PFOS	1.6 U
PFOA	1.6 U
PFBS	1.6 U
PFNA	1.6 U
PFHxS	1.6 U

APG-BLDG-300-2-GW	
Date	3/15/2021
PFOS	**220**
PFOA	**83**
PFBS	**54**
PFNA	**5.5**
PFHxS	**350**

APG-BLDG-250-5-PW	
Date	3/9/2021
PFOS	1.7 U
PFOA	1.7 U
PFBS	1.7 U
PFNA	1.7 U
PFHxS	1.7 U

APG-BLDG-250-3-PW	
Date	3/9/2021
PFOS	1.7 U
PFOA	1.7 U
PFBS	1.7 U
PFNA	1.7 U
PFHxS	1.7 U

APG-BLDG-300-1-GW	
Date	3/15/2021
PFOS	**170**
PFOA	**9.7**
PFBS	**1.6 J**
PFNA	**3.5**
PFHxS	**27**

APG-BLDG-250-1-PW	
Date	3/9/2021
PFOS	1.8 U [1.7 U]
PFOA	1.8 U [1.7 U]
PFBS	1.8 U [1.7 U]
PFNA	1.8 U [1.7 U]
PFHxS	1.8 U [1.7 U]

APG-BLDG-250-2-PW	
Date	3/9/2021
PFOS	1.7 U
PFOA	1.7 U
PFBS	1.7 U
PFNA	1.7 U
PFHxS	1.7 U

APG-BLDG-300-2-SO	
Date	3/15/2021
Depth	0-2 ft bgs
PFOS	**0.017**
PFOA	**0.0023**
PFBS	0.0023 U
PFNA	0.00069 U
PFHxS	**0.0051**

APG-BLDG-300-1-SO	
Date	3/15/2021
Depth	0-2 ft bgs
PFOS	**0.0063**
PFOA	0.00071 U
PFBS	0.0024 U
PFNA	0.00071 U
PFHxS	**0.00065 J**

Former Aberdeen Fire Station

Installation Boundary
Building
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area
Public Supply Well
Monitoring Well
Sampling Location - Existing Well
Groundwater Sampling Location
Soil Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-12
Building 2200 - Current Aberdeen Fire Station and Building 2308 - Fire Department Storage Building
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-BLDG-2308-1-GW	
Date	3/12/2021
PFOS	**210**
PFOA	**190**
PFBS	**43**
PFNA	**24**
PFHxS	**990**

APG-BLDG-2200-1-GW	
Date	3/18/2021
PFOS	**180**
PFOA	**66**
PFBS	**41**
PFNA	**15**
PFHxS	**340**

APG-BLDG-2200-1-SO	
Date	3/12/2021
Depth	0-2 ft bgs
PFOS	**0.0012**
PFOA	**0.00078**
PFBS	0.0023 U
PFNA	**0.0012**
PFHxS	0.00069 U

APG-BLDG-2200-2-SO	
Date	3/12/2021
Depth	0-2 ft bgs
PFOS	**0.0033**
PFOA	**0.00094**
PFBS	0.0023 U
PFNA	**0.0020**
PFHxS	0.00069 U

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017).

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

Installation Boundary
Building
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area
Groundwater Sampling Location
Soil and Groundwater Sampling Location
Soil Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

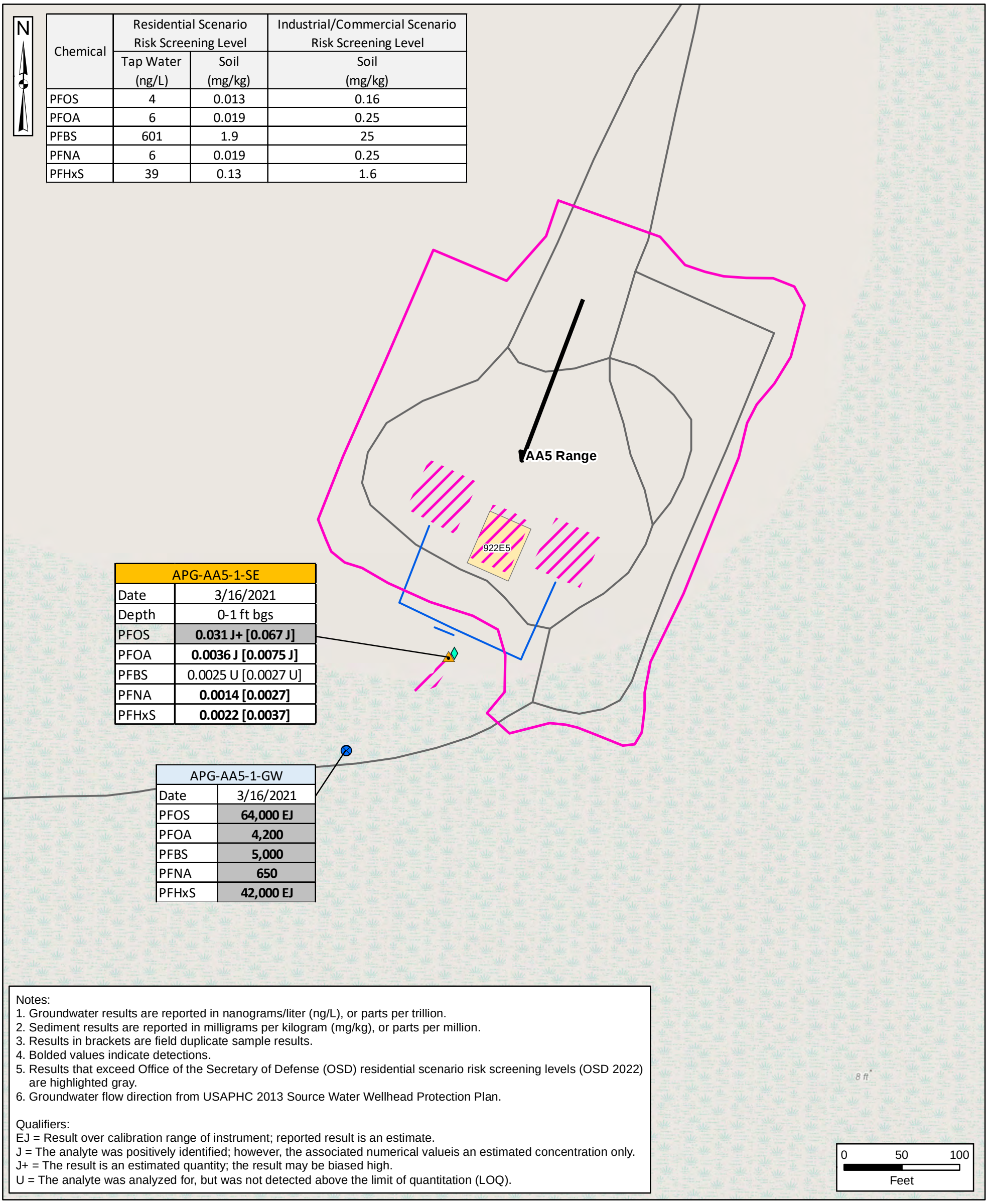
Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-13
AA5 Range
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6



Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Sediment results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
6. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.

Qualifiers:
EJ = Result over calibration range of instrument; reported result is an estimate.
J = The analyte was positively identified; however, the associated numerical valueis an estimated concentration only.
J+ = The result is an estimated quantity; the result may be biased high.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Non-Test Waste Outfall Location
Groundwater Sampling Location
Sediment Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SE = sediment
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-14
Poverty Island - Minefield Range
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-PI-MINEFIELD-2-SO	
Date	3/15/2021
Depth	0-2 ft bgs
PFOS	**0.0020**
PFOA	0.00063 U
PFBS	0.0021 U
PFNA	0.00063 U
PFHxS	0.00063 U

APG-PI-MINEFIELD-1-SO	
Date	3/15/2021
Depth	0-2 ft bgs
PFOS	**0.00093**
PFOA	**0.0011**
PFBS	0.0021 U
PFNA	**0.00077**
PFHxS	0.00062 U

APG-PI-MINEFIELD-1-GW	
Date	3/15/2021
PFOS	**260**
PFOA	**160**
PFBS	**7.6**
PFNA	**82**
PFHxS	**53**

Poverty Island - Minefield Range

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.

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

0 50 100
Feet

Installation Boundary
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area
Groundwater Sampling Location
Soil Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-15
Poverty Island - Range 12
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-PI-12-1-GW	
Date	3/15/2021
PFOS	**3,000**
PFOA	**330**
PFBS	**47**
PFNA	**120**
PFHxS	**610**
APG-PI-12-1-SO	
Date	3/15/2021
Depth	0-2 ft bgs
PFOS	**0.0030**
PFOA	0.00063 U
PFBS	0.0021 U
PFNA	0.00063 U
PFHxS	0.00063 U

APG-P1-12-2-GW	
Date	3/18/2021
PFOS	**4,800 [5,100]**
PFOA	**1,200 [1,100]**
PFBS	**480 [420]**
PFNA	**190 [180]**
PFHxS	**3,100 [2,800]**
APG-PI-12-2-SO	
Date	3/15/2021
Depth	0-2 ft bgs
PFOS	**0.0077**
PFOA	0.00061 U
PFBS	0.0020 U
PFNA	**0.0011**
PFHxS	0.00061 U

Poverty Island - Range 12

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
6. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.

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

0 50 100
Feet

Installation Boundary
Road Centerline
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area
Soil and Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-16
Ford's Farm
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level Tap Water (ng/L)
PFOS	4
PFOA	6
PFBS	601
PFNA	6
PFHxS	39

FF-1
910E7
910E8
910E6
906D
906C
910E5
907
910E4
FF-4
906A
910
Ford's Farm
909
0909B
0909A
915

APG-FF2-1-GW	
Date	1/31/2022
PFOS	1.8 U
PFOA	1.8 U
PFBS	1.8 U
PFNA	1.8 U
PFHxS	1.8 U

APG-FF3-1-GW	
Date	1/31/2022
PFOS	1.8 U
PFOA	1.8 U
PFBS	1.8 U
PFNA	1.8 U
PFHxS	1.8 U

Little Romney Creek

Notes:
1. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.
2. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.

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

0 100 200
Feet

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

AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-17
EF-15
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level
	Tap Water (ng/L)
PFOS	4
PFOA	6
PFBS	601
PFNA	6
PFHxS	39

APG-EF15-1-GW	
Date	3/16/2021
PFOS	**1,300**
PFOA	**170**
PFBS	**440**
PFNA	**48**
PFHxS	**220**

EF-15

1163B
1163
1163A

0 50 100
Feet

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Bolded values indicate detections.
3. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
4. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.

Installation Boundary
Building
Road Centerline
Drainage Ditch
Groundwater Flow Direction
AOPI
AFFF Release Area
Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

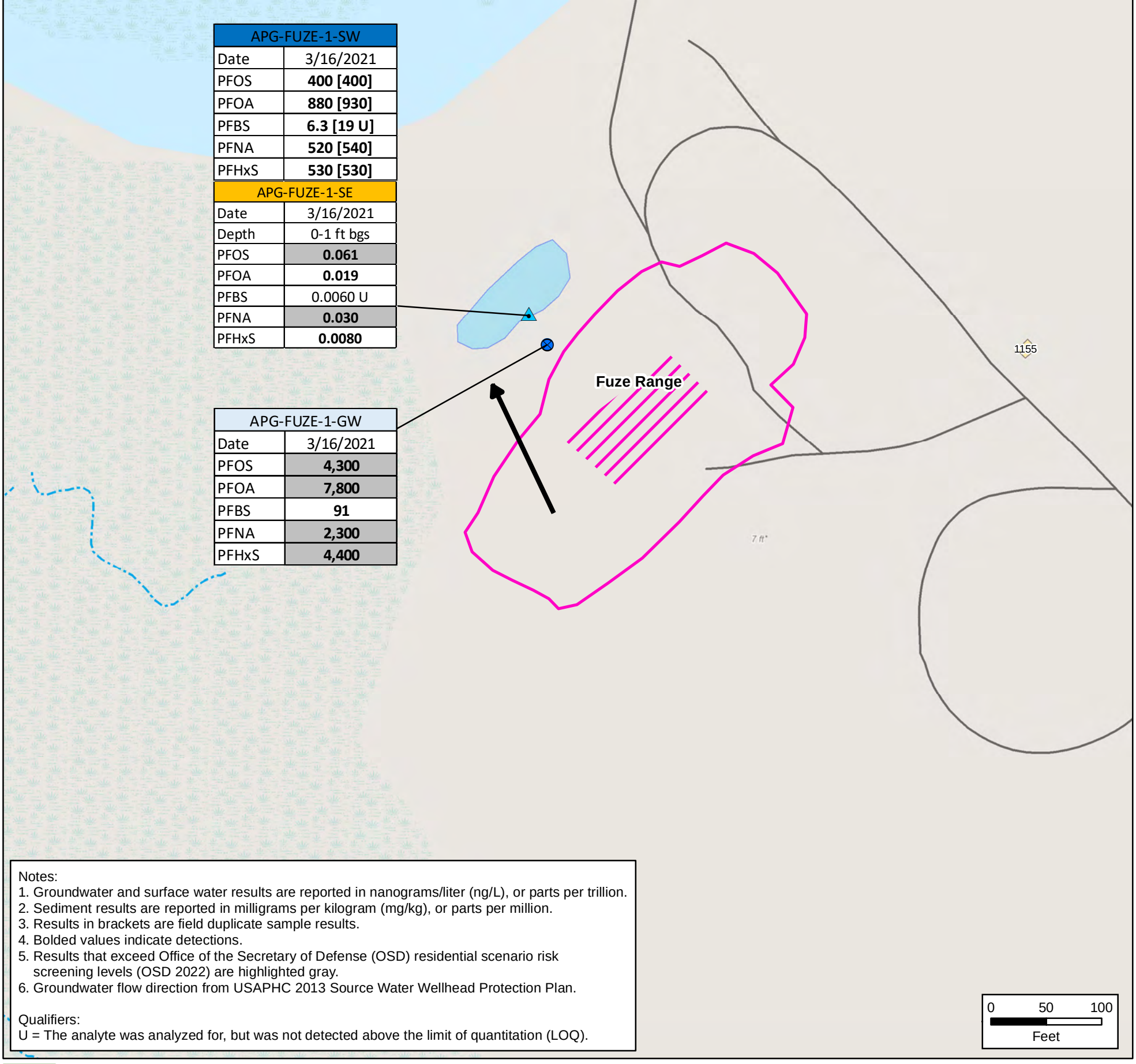
Figure 7-18
Fuze Range
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-FUZE-1-SW	
Date	3/16/2021
PFOS	**400 [400]**
PFOA	**880 [930]**
PFBS	**6.3 [19 U]**
PFNA	**520 [540]**
PFHxS	**530 [530]**

APG-FUZE-1-SE	
Date	3/16/2021
Depth	0-1 ft bgs
PFOS	**0.061**
PFOA	**0.019**
PFBS	0.0060 U
PFNA	**0.030**
PFHxS	**0.0080**

APG-FUZE-1-GW	
Date	3/16/2021
PFOS	**4,300**
PFOA	**7,800**
PFBS	**91**
PFNA	**2,300**
PFHxS	**4,400**



Notes:
1. Groundwater and surface water results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Sediment results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
6. Groundwater flow direction from USAPHC 2013 Source Water Wellhead Protection Plan.

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

Installation Boundary
Building
Road Centerline
Drainage Ditch
Retention Pond
Groundwater Flow Direction
AOPI
AFFF Release Area
Groundwater Sampling Location
Surface Water/Sediment Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SE = sediment
SW = surface Water
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-19
Building E5005 - Edgewood Fire Training Area
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-BLDG-E5005-3-SO	
Date	4/22/2021
Depth	0-2 ft bgs
PFOS	**0.0093**
PFOA	**0.00052 J**
PFBS	0.0022 U
PFNA	**0.00048 J**
PFHxS	**0.0018**

APG-BLDG-E5005-2-SO	
Date	4/22/2021
Depth	0-2 ft bgs
PFOS	**0.010**
PFOA	**0.0021**
PFBS	0.0026 U
PFNA	**0.0029**
PFHxS	**0.0012**

APG-BLDG-E5005-1-GW	
Date	4/22/2021
PFOS	**67**
PFOA	**15**
PFBS	2.7 U
PFNA	**5.6**
PFHxS	**22**

APG-BLDG-E5005-1-SO	
Date	4/22/2021
Depth	0-2 ft bgs
PFOS	**0.0028**
PFOA	**0.00044 J**
PFBS	0.0020 U
PFNA	0.00061 U
PFHxS	0.00061 U

Building E5005 - Edgewood Fire Training Area

WISE RD
BLACKHAWK RD
FLEMING RD
East Branch Canal Creek
CCW170
E4010
E5002
E5164
E5158
Aberdeen Proving Ground

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

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

0 50 100
Feet

Installation Boundary
Building
River/Stream (Perennial)
Drainage Ditch
Stormwater Utility Line
Wastewater Utility Line
Groundwater Flow Direction
Outfall Location
Suspected Buried Legacy Chemical Sewer Line Outfall
Suspected Location of Buried Legacy Sewer Line
AOPI
AFFF Release Area
Soil and Groundwater Sampling Location
Soil Sampling Location
Monitoring Well

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface

GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-20
Building E5180 - Edgewood Fire Station
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-BLDG-E5180-1-GW	
Date	3/17/2021
PFOS	**530**
PFOA	**2,700**
PFBS	**830**
PFNA	**49**
PFHxS	**4,300**
APG-BLDG-E5180-1-SO	
Date	3/17/2021
Depth	0-2 ft bgs
PFOS	**0.019**
PFOA	**0.0016**
PFBS	0.0023 U
PFNA	**0.0046**
PFHxS	0.00068 U

APG-BLDG-E5180-2-GW	
Date	3/17/2021
PFOS	**9,300**
PFOA	**6,500**
PFBS	**220**
PFNA	**1,100**
PFHxS	**10,000**

CCA-SB-05-57
CCA-SB-05-76
CCW171
CCA-SB-06-67
CCA-SB-07-76
CCW-173
CC108B
CC108A
E5027
E5183
E5181
E5180
E5180WELL
E5185
E5179
BLACKHAWK RD
K ST N
K ST S
HOADLEY RD
CALIBER ST
Building E5180 - Edgewood Fire Station

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

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

0 50 100
Feet

Installation Boundary
Building
Drainage Ditch
Stormwater Utility Line
Wastewater Utility Line
Buried Legacy Chemical Sewer Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Outfall Location
Monitoring Well
Groundwater Sampling Location
Soil and Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

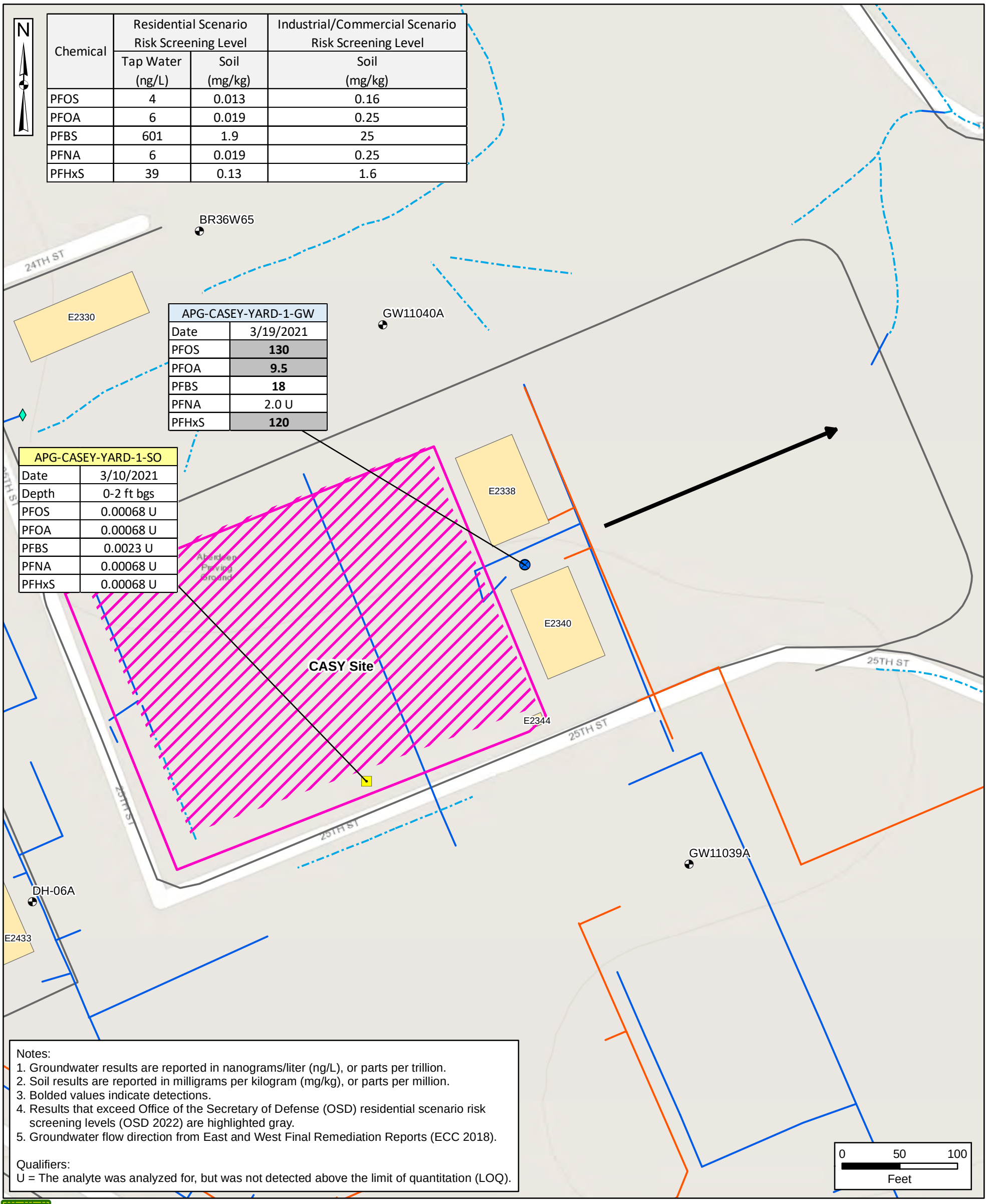
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-21
CASY Site
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-CASEY-YARD-1-GW	
Date	3/19/2021
PFOS	**130**
PFOA	**9.5**
PFBS	**18**
PFNA	2.0 U
PFHxS	**120**

APG-CASEY-YARD-1-SO	
Date	3/10/2021
Depth	0-2 ft bgs
PFOS	0.00068 U
PFOA	0.00068 U
PFBS	0.0023 U
PFNA	0.00068 U
PFHxS	0.00068 U



Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

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

Installation Boundary
Building
Road Centerline
Drainage Ditch
Stormwater Utility Line
Wastewater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Monitoring Well
Groundwater Sampling Location
Soil Sampling Location
Outfall Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
CASY = Chemical Agent Storage Yard
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

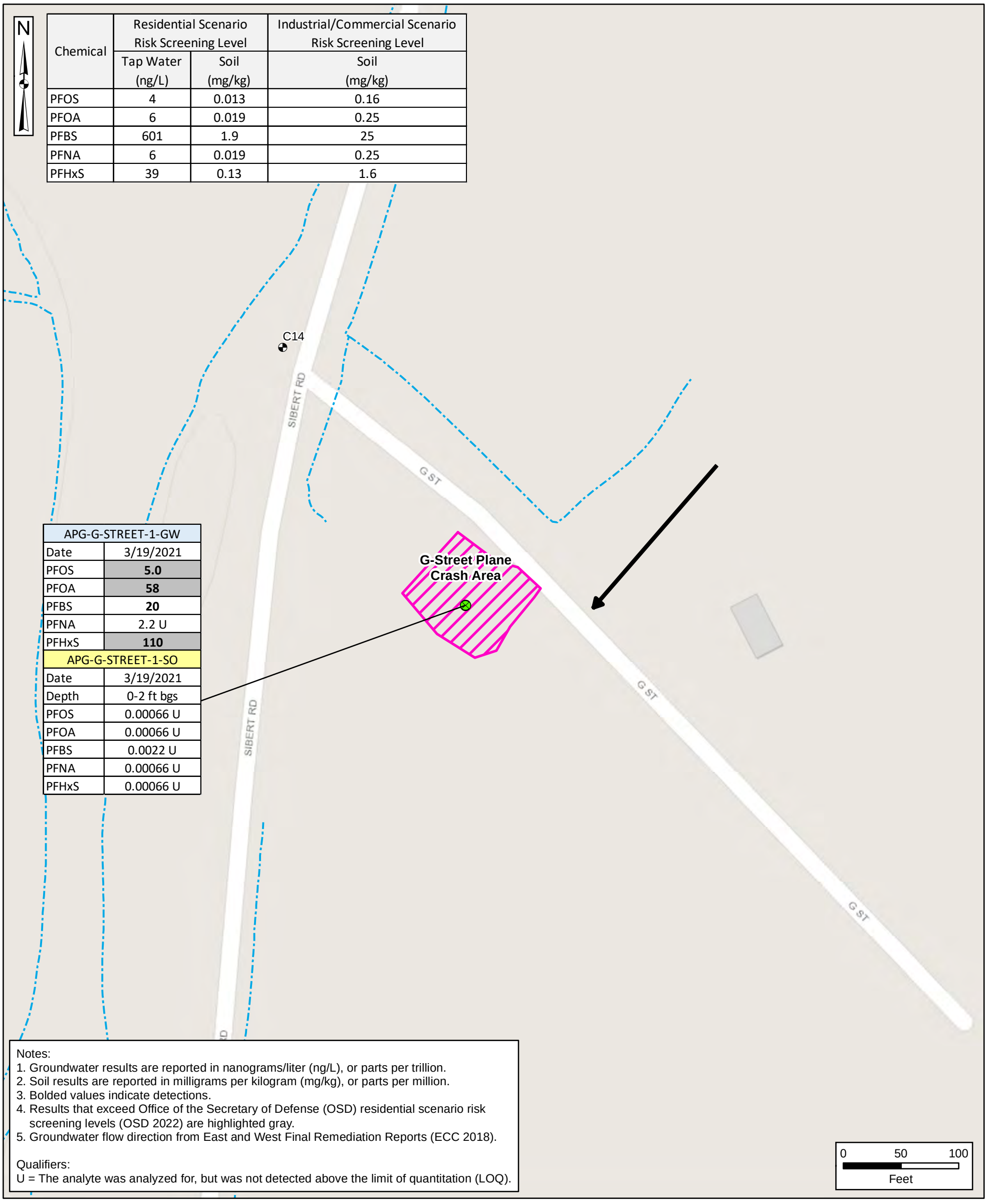
Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-22
G-Street Plane Crash Area
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-G-STREET-1-GW	
Date	3/19/2021
PFOS	**5.0**
PFOA	**58**
PFBS	**20**
PFNA	2.2 U
PFHxS	**110**
APG-G-STREET-1-SO	
Date	3/19/2021
Depth	0-2 ft bgs
PFOS	0.00066 U
PFOA	0.00066 U
PFBS	0.0022 U
PFNA	0.00066 U
PFHxS	0.00066 U



Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

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

Installation Boundary
Drainage Ditch
Groundwater Flow Direction
AOPI
Suspected AFFF Release Area
Monitoring Well
Soil and Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

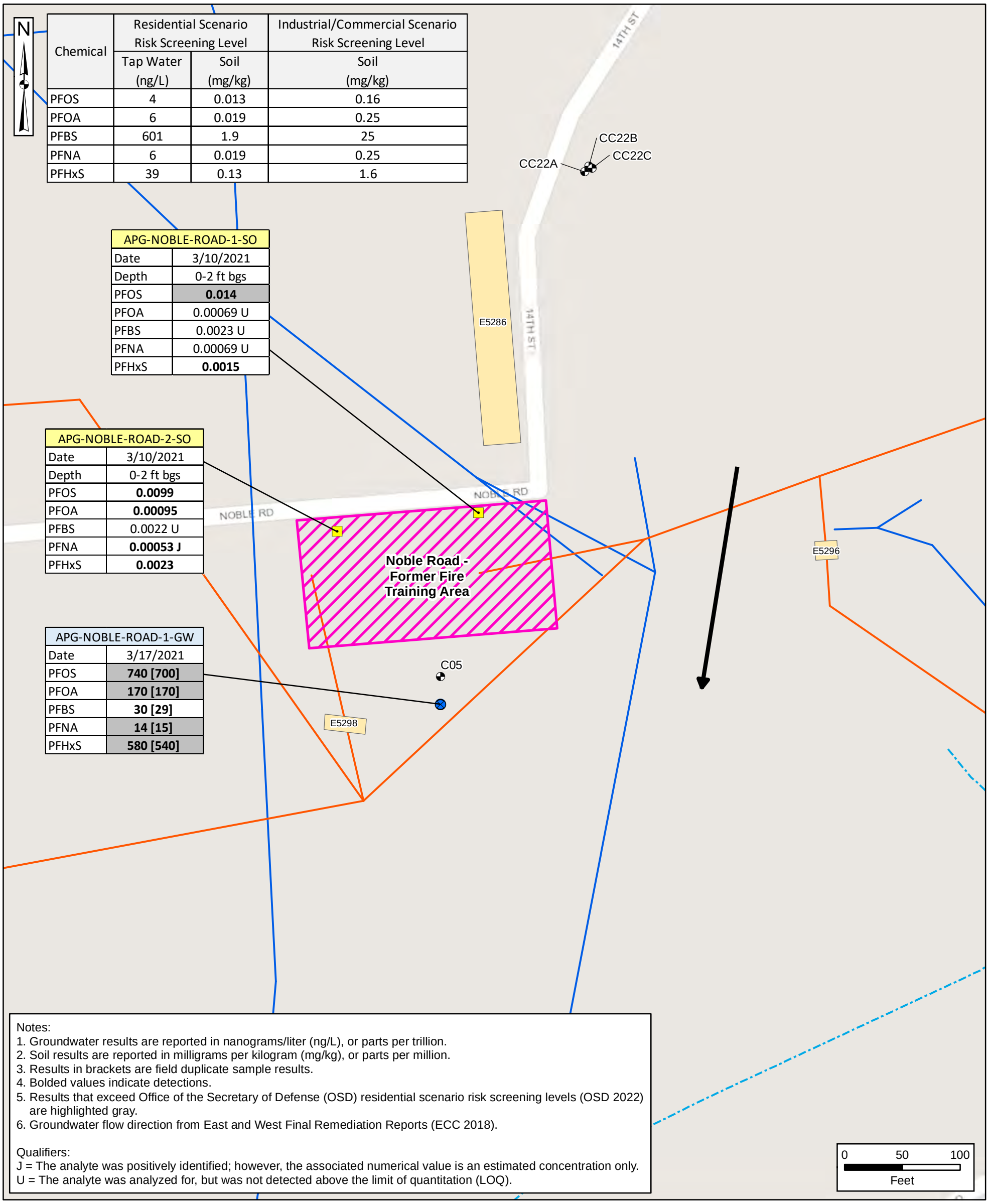
Figure 7-23
Noble Road - Former Fire Training Area
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-NOBLE-ROAD-1-SO	
Date	3/10/2021
Depth	0-2 ft bgs
PFOS	**0.014**
PFOA	0.00069 U
PFBS	0.0023 U
PFNA	0.00069 U
PFHxS	**0.0015**

APG-NOBLE-ROAD-2-SO	
Date	3/10/2021
Depth	0-2 ft bgs
PFOS	**0.0099**
PFOA	**0.00095**
PFBS	0.0022 U
PFNA	**0.00053 J**
PFHxS	**0.0023**

APG-NOBLE-ROAD-1-GW	
Date	3/17/2021
PFOS	**740 [700]**
PFOA	**170 [170]**
PFBS	**30 [29]**
PFNA	**14 [15]**
PFHxS	**580 [540]**



Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
6. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

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

- Installation Boundary
- Building
- Drainage Ditch
- Stormwater Utility Line
- Wastewater Utility Line
- Groundwater Flow Direction
- AOPI
- Approximated AFFF Release Area
- Outfall Location
- Monitoring Well
- Groundwater Sampling Location
- Soil Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

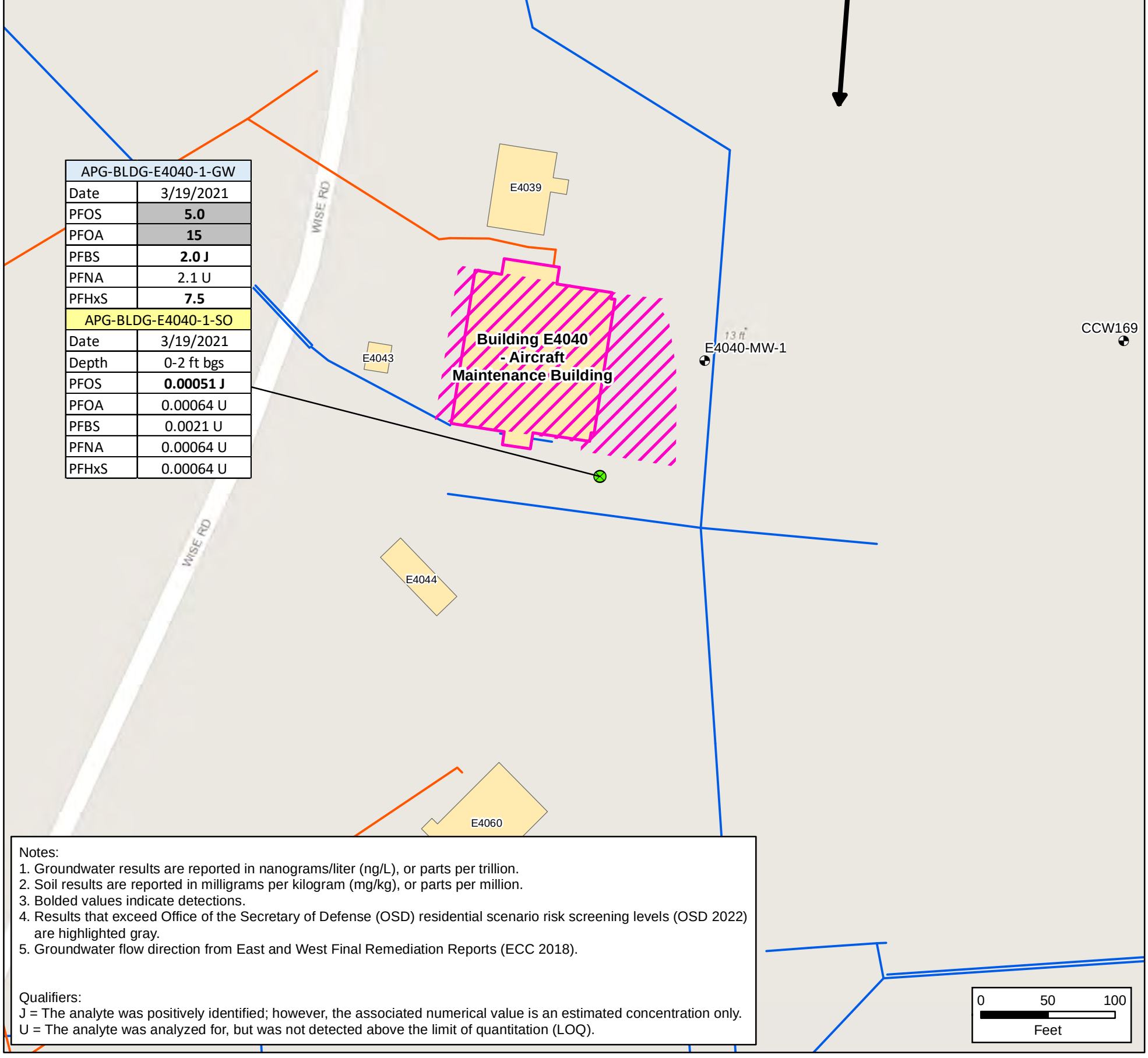
Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-24
Building E4040 - Aircraft Maintenance Building
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-BLDG-E4040-1-GW	
Date	3/19/2021
PFOS	**5.0**
PFOA	**15**
PFBS	**2.0 J**
PFNA	2.1 U
PFHxS	**7.5**
APG-BLDG-E4040-1-SO	
Date	3/19/2021
Depth	0-2 ft bgs
PFOS	**0.00051 J**
PFOA	0.00064 U
PFBS	0.0021 U
PFNA	0.00064 U
PFHxS	0.00064 U



Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

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

Installation Boundary
Building
Drainage Ditch
Stormwater Utility Line
Wastewater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Monitoring Well
Soil and Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-25
Building E4081 - Army Aviation Support Facility and Weide Airfield - Tarmac AFFF Release Area
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-BLDG-E4081-1-SW	
Date	3/10/2021
PFOS	**2.4**
PFOA	**6.3**
PFBS	**13**
PFNA	**2.2**
PFHxS	**2.1 J**

APG-BLDG-E4081-1-SE	
Date	3/10/2021
Depth	0-1 ft bgs
PFOS	0.00080 U
PFOA	0.00080 U
PFBS	0.0027 U
PFNA	0.00080 U
PFHxS	0.00080 U

APG-BLDG-E4081-2-SO	
Date	3/10/2021
Depth	0-2 ft bgs
PFOS	0.00069 U [0.00064 U]
PFOA	0.00069 U [0.00064 U]
PFBS	0.0023 U [0.0021 U]
PFNA	0.00069 U [0.00064 U]
PFHxS	0.00069 U [0.00064 U]

APG-BLDG-E4081-1-GW	
Date	3/17/2021
PFOS	**33**
PFOA	**5.1**
PFBS	2.3 U
PFNA	**2.0 J**
PFHxS	**4.6**

APG-WEIDE-1-GW	
Date	3/17/2021
PFOS	**35**
PFOA	**17**
PFBS	**3.1**
PFNA	**4.9**
PFHxS	**16**

APG-WEIDE-1-SO	
Date	3/17/2021
Depth	0-2 ft bgs
PFOS	0.00066 U
PFOA	0.00066 U
PFBS	0.0022 U
PFNA	0.00066 U
PFHxS	0.00066 U

APG-BLDG-E4081-1-SO	
Date	3/10/2021
Depth	0-2 ft bgs
PFOS	0.00079 U
PFOA	0.00079 U
PFBS	0.0026 U
PFNA	0.00079 U
PFHxS	0.00079 U

APG-BLDG-E4081-2-SW	
Date	3/10/2021
PFOS	1.9 U
PFOA	**1.2 J**
PFBS	**14**
PFNA	1.9 U
PFHxS	1.9 U

APG-BLDG-E4081-2-SE	
Date	3/10/2021
Depth	0-1 ft bgs
PFOS	0.00089 U
PFOA	0.00089 U
PFBS	0.0030 U
PFNA	0.00089 U
PFHxS	0.00089 U

Notes:
1. Groundwater and surface water results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil and sediment results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.
5. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).
6. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.

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

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SE = sediment
SO = soil
SW = surface Water

Installation Boundary
Building
Drainage Ditch
Stormwater Utility Line
Wastewater Utility Line
Groundwater Flow Direction
AOPI
AFFF Release Area
Approximated AFFF Release Area
Monitoring Well
Outfall Location
Retention Pond
Groundwater Sampling Location
Soil and Groundwater Sampling Location
Soil Sampling Location
Surface Water/Sediment Sampling Location

0 100 200
Feet

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-26
H-Field - Helicopter Fire Response Area
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-HELI-FIRE-1-GW	
Date	3/12/2021
PFOS	**200**
PFOA	**8.1**
PFBS	**4.8**
PFNA	**1.3 J**
PFHxS	**84**
APG-HELI-FIRE-1-SO	
Date	3/12/2021
Depth	0-2 ft bgs
PFOS	0.00064 U
PFOA	0.00064 U
PFBS	0.0021 U
PFNA	0.00064 U
PFHxS	0.00064 U

H-Field - Helicopter Fire Response Area

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.

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

0 50 100
Feet

Installation Boundary
Road Centerline
AOPI
AFFF Release Area
Inferred Groundwater Flow Direction Based on Topography
Soil and Groundwater Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-27
H-Field - Tank Fire Response Area
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-TANK-FIRE-1-SW	
Date	3/10/2021
PFOS	**4.3**
PFOA	**2.6**
PFBS	**0.97 J**
PFNA	**1.9**
PFHxS	**1.3 J**

APG-TANK-FIRE-1-SE	
Date	3/10/2021
Depth	0-1 ft bgs
PFOS	0.0034 U
PFOA	0.0034 U
PFBS	0.011 U
PFNA	0.0034 U
PFHxS	0.0034 U

H-Field - Tank Fire Response Area

Notes:
1. Surface water results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Sediment results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.

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

0 50 100
Feet

Installation Boundary
Road Centerline
Drainage Ditch
AOPI
AFFF Release Area
Inferred Groundwater Flow Direction Based on Topography
Surface Water/Sediment Sampling Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SE = sediment
SW = surface Water

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-28
Biosolid Application Field: A-1
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-BAF-A1-2-GW	
Date	3/2/2021
PFOS	**3,900**
PFOA	**700**
PFBS	**37**
PFNA	**99**
PFHxS	**1,100**
APG-BAF-A1-2-SO	
Date	3/2/2021
Depth	0-2 ft bgs
PFOS	**0.0036**
PFOA	**0.0012**
PFBS	0.0024 U
PFNA	0.00071 U
PFHxS	0.00071 U

APG-FTA-M09	
Date	3/2/2021
PFOS	**11,000**
PFOA	**1,100**
PFBS	**55**
PFNA	**210**
PFHxS	**1,700**

APG-BAF-A1-1-GW	
Date	3/2/2021
PFOS	**330 J**
PFOA	**120**
PFBS	**14**
PFNA	**4.7**
PFHxS	**71**
APG-BAF-A1-1-SO	
Date	3/2/2021
Depth	0-2 ft bgs
PFOS	**0.0018**
PFOA	**0.00080**
PFBS	0.0024 U
PFNA	0.00071 U
PFHxS	0.00071 U

WBMWGPFTA
FTA-MD13
FTA-M01
FTA-MD07
FTA-M07
FTA-M08
1066
1068A
HA-88-1484
1068
1065
FTA-PZ-07
Biosolid Application Field A-1
Biosolid Application Field A-1

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

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

0 100 200
Feet

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
Monitoring Well
Sampling Location - Existing Well
Soil and Groundwater Sampling Location

AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-29
Biosolid Application Fields: B, D and E
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-FTA-M10	
Date	3/2/2021
PFOS	**14**
PFOA	**49**
PFBS	**41**
PFNA	1.7 U
PFHxS	**2,500**

APG-BAF-B-1-SO	
Date	3/2/2021
Depth	0-2 ft bgs
PFOS	**0.030**
PFOA	**0.0023**
PFBS	0.0023 U
PFNA	**0.0026**
PFHxS	**0.0019**

APG-BAF-D-1-GW	
Date	3/3/2021
PFOS	**86**
PFOA	**23**
PFBS	**27**
PFNA	**3.7**
PFHxS	**760**

APG-BAF-D-1-SO	
Date	3/3/2021
Depth	0-2 ft bgs
PFOS	**0.0025**
PFOA	**0.00079**
PFBS	0.0023 U
PFNA	0.00068 U
PFHxS	0.00068 U

APG-BAF-E-1-GW	
Date	3/3/2021
PFOS	**11**
PFOA	**2.3**
PFBS	1.9 U
PFNA	1.9 U
PFHxS	**5.6**

APG-BAF-E-1-SO	
Date	3/3/2021
Depth	0-2 ft bgs
PFOS	0.00069 U
PFOA	0.00069 U
PFBS	0.0023 U
PFNA	0.00069 U
PFHxS	0.00069 U

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.
5. Groundwater flow direction from Aberdeen Proving Ground Source Water Protection Report (USAPHC 2017) and Western Boundary Study Area Report (EA Engineering 2012).

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

Installation Boundary
Building
Road Centerline
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Outfall Location
AOPI
Monitoring Well
Soil and Groundwater Sampling Location
Soil Sampling Location
Sampling Location - Existing Well

AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil
USAPHC = United States Army Public Health Center

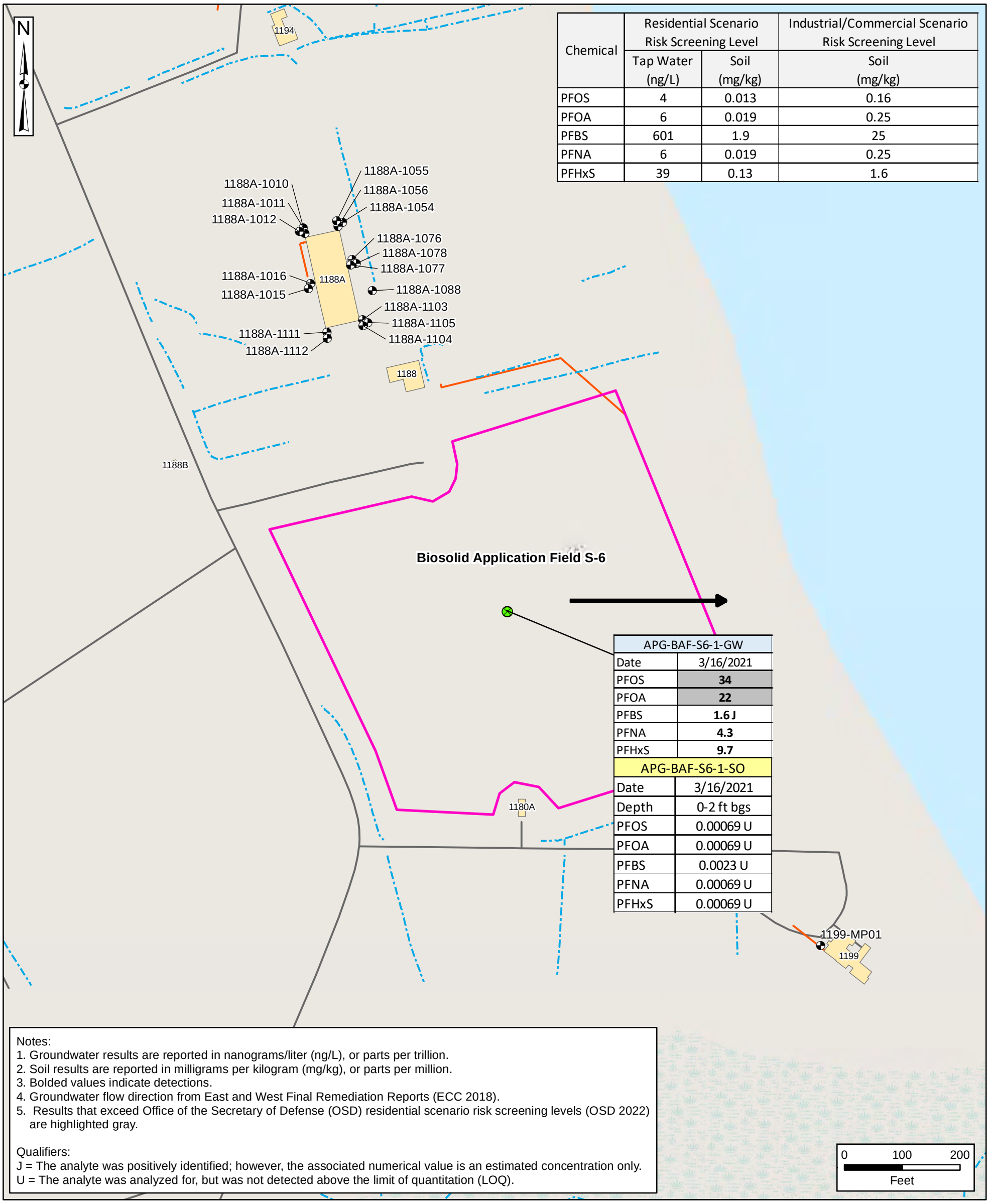
Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-30
Biosolid Application Field: S-6
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6



APG-BAF-S6-1-GW	
Date	3/16/2021
PFOS	**34**
PFOA	**22**
PFBS	**1.6 J**
PFNA	**4.3**
PFHxS	**9.7**
APG-BAF-S6-1-SO	
Date	3/16/2021
Depth	0-2 ft bgs
PFOS	0.00069 U
PFOA	0.00069 U
PFBS	0.0023 U
PFNA	0.00069 U
PFHxS	0.00069 U

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).
5. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.

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

Installation Boundary
Building
Road Centerline
Drainage Ditch
Wastewater Utility Line
Groundwater Flow Direction
AOPI
Monitoring Well
Soil and Groundwater Sampling Location

AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-31
Biosolid Application Field: ATC-1
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-ATC1-1-SO	
Date	12/16/2021
Depth	0.5-2 ft bgs
PFOS	0.00077 UJ
PFOA	0.00077 UJ
PFBS	0.0026 UJ
PFNA	0.00077 UJ
PFHxS	0.00077 UJ

APG-ATC1-1-GW	
Date	12/15/2021
PFOS	1.7 UJ
PFOA	1.7 UJ
PFBS	1.7 UJ
PFNA	1.7 UJ
PFHxS	**0.96 J**

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.

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

Installation Boundary
Building
Road Centerline
River/Stream (Perennial)
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Monitoring Well
Groundwater Sampling Location
Soil Sampling Location
Building 250 Water Treatment System

AOPI = area of potential interest
ATC = Aberdeen Test Center
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

UCMR3 = Unregulated Contaminant Monitoring Rule

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-32
Biosolid Application Field: ATC-2
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-ATC2-1-SO	
Date	12/16/2021
Depth	0.5-2 ft bgs
PFOS	0.0010 UJ
PFOA	0.0010 UJ
PFBS	0.0034 UJ
PFNA	0.0010 UJ
PFHxS	0.0010 UJ

APG-ATC2-1-GW	
Date	12/15/2021
PFOS	1.7 UJ [1.7 UJ]
PFOA	**1.0 J [1.0 J]**
PFBS	1.7 UJ [1.7 UJ]
PFNA	1.7 UJ [1.7 UJ]
PFHxS	1.7 UJ [1.7 UJ]

Aberdeen
Proving
Ground

892

893

ATC-2

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.

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

0 100 200
Feet

Installation Boundary
Building
Road Centerline
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Groundwater Sampling Location
Soil Sampling Location

AOPI = area of potential interest
ATC = Aberdeen Test Center
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

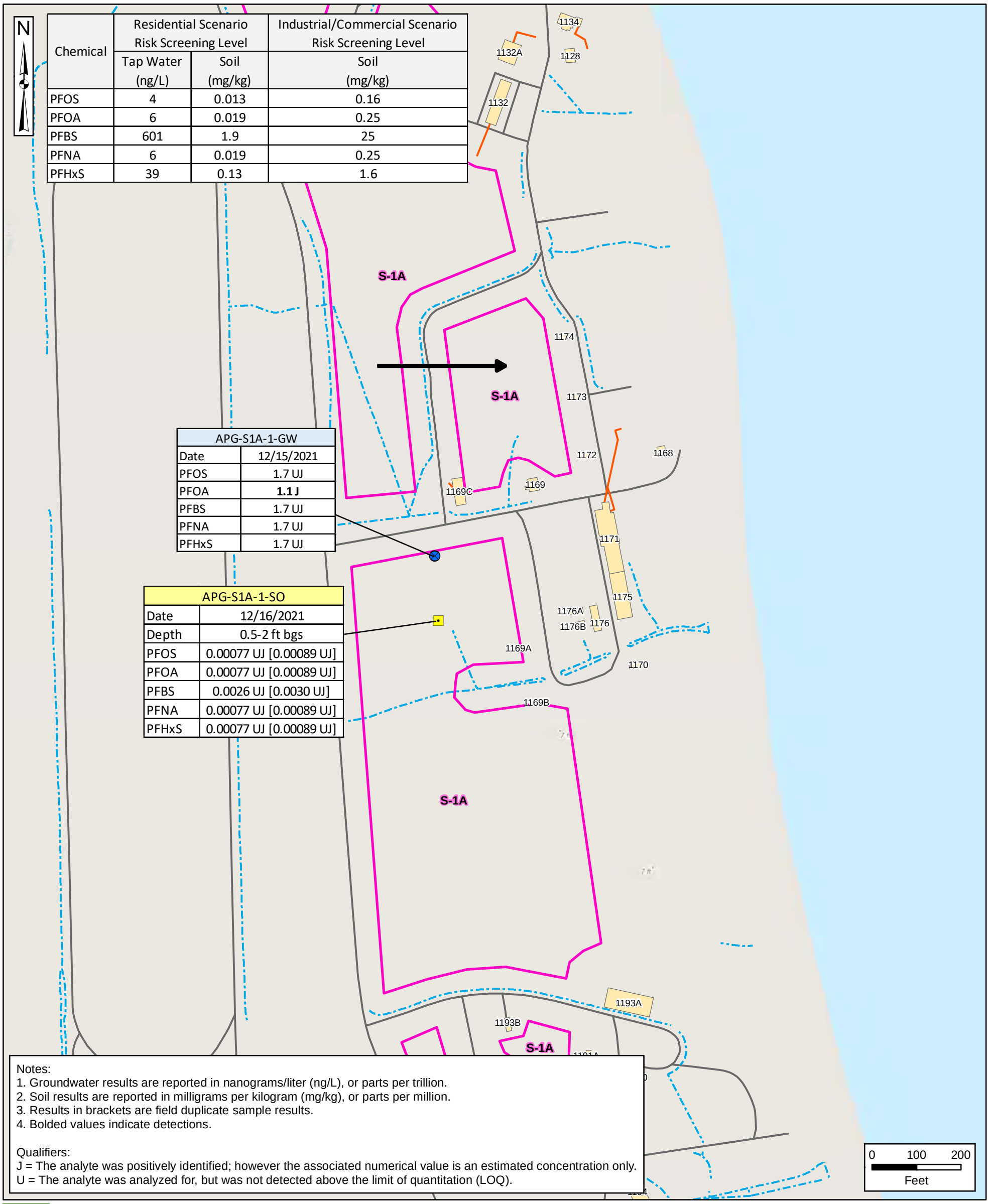
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-33
Biosolid Application Field: S-1A
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-S1A-1-GW	
Date	12/15/2021
PFOS	1.7 UJ
PFOA	**1.1 J**
PFBS	1.7 UJ
PFNA	1.7 UJ
PFHxS	1.7 UJ

APG-S1A-1-SO	
Date	12/16/2021
Depth	0.5-2 ft bgs
PFOS	0.00077 UJ [0.00089 UJ]
PFOA	0.00077 UJ [0.00089 UJ]
PFBS	0.0026 UJ [0.0030 UJ]
PFNA	0.00077 UJ [0.00089 UJ]
PFHxS	0.00077 UJ [0.00089 UJ]



Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Results in brackets are field duplicate sample results.
4. Bolded values indicate detections.

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

Installation Boundary
Building
Road Centerline
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Groundwater Sampling Location
Soil Sampling Location

AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-34
Biosolid Application Field: S-3
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-S3-1-GW	
Date	12/15/2021
PFOS	**220 J**
PFOA	**28 J**
PFBS	**2.2 J**
PFNA	1.8 UJ
PFHxS	**6.0 J**

APG-S3-1-SO	
Date	12/16/2021
Depth	0.5-2 ft bgs
PFOS	0.00076 UJ
PFOA	0.00076 UJ
PFBS	0.0025 UJ
PFNA	0.00076 UJ
PFHxS	0.00076 UJ

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.
3. Bolded values indicate detections.
4. Results that exceed Office of the Secretary of Defense (OSD) residential scenario risk screening levels (OSD 2022) are highlighted gray.

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

0 150 300
Feet

Installation Boundary
Building
Road Centerline
River/Stream (Perennial)
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Groundwater Sampling Location
Soil Sampling Location

AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-35
Biosolid Application Field: E-3
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-E3-1-SO	
Date	12/16/2021
Depth	0.5-2 ft bgs
PFOS	**0.0011 J**
PFOA	**0.00047 J**
PFBS	0.0022 UJ
PFNA	0.00066 UJ
PFHxS	0.00066 UJ

APG-E3-1-GW	
Date	12/16/2021
PFOS	1.8 UJ
PFOA	1.8 UJ
PFBS	1.8 UJ
PFNA	1.8 UJ
PFHxS	1.8 UJ

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

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

0 250 500
Feet

Installation Boundary
Road Centerline
River/Stream (Perennial)
Water Body
Stormwater Utility Line
Wastewater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Building
Groundwater Sampling Location
Soil Sampling Location
Monitoring Well

AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-36
Biosolid Application Field: E-4
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level		Industrial/Commercial Scenario Risk Screening Level
	Tap Water (ng/L)	Soil (mg/kg)	Soil (mg/kg)
PFOS	4	0.013	0.16
PFOA	6	0.019	0.25
PFBS	601	1.9	25
PFNA	6	0.019	0.25
PFHxS	39	0.13	1.6

APG-E4-1-SO	
Date	12/16/2021
Depth	0.5-2 ft bgs
PFOS	0.00068 UJ
PFOA	0.00068 UJ
PFBS	0.0023 UJ
PFNA	0.00068 UJ
PFHxS	0.00068 UJ

APG-E4-1-GW	
Date	12/16/2021
PFOS	1.8 UJ
PFOA	1.8 UJ
PFBS	1.8 UJ
PFNA	1.8 UJ
PFHxS	**0.95 J**

E-4

E-4

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Soil results are reported in milligrams per kilogram (mg/kg), or parts per million.

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

0 200 400
Feet

Installation Boundary
Road Centerline
Stormwater Utility Line
Drainage Ditch
Groundwater Flow Direction
Biosolids Application Field AOPI
Groundwater Sampling Location
Soil Sampling Location

AOPI = area of potential interest
ft bgs = feet below ground surface
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, MD

Figure 7-37
Canal Creek Groundwater Treatment System
PFOS, PFOA, PFBS, PFNA, and PFHxS Analytical Results

Chemical	Residential Scenario Risk Screening Level Tap Water (ng/L)
PFOS	4
PFOA	6
PFBS	601
PFNA	6
PFHxS	39

APG-GWTP-1-GW	
Date	3/10/2021
PFOS	1.6 U
PFOA	1.6 U
PFBS	1.6 U
PFNA	1.6 U
PFHxS	1.6 U

Notes:
1. Groundwater results are reported in nanograms/liter (ng/L), or parts per trillion.
2. Groundwater flow direction from East and West Final Remediation Reports (ECC 2018).

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

Installation Boundary
Drainage Ditch
River/Stream (Perennial)
Approximate Influent Pipe Line
Approximate Effluent Pipe Line
Non-AOPI
Groundwater Flow Direction
Extraction Well
Monitoring Well
Effluent Groundwater Sampling Location

AOPI = area of potential interest
GW = groundwater
GWTP = groundwater treatment plant
PFBS = perfluorobutanesulfonic acid
PFHxS = perfluorohexane sulfonate
PFNA = perfluorononanoic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Source:
Esri ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

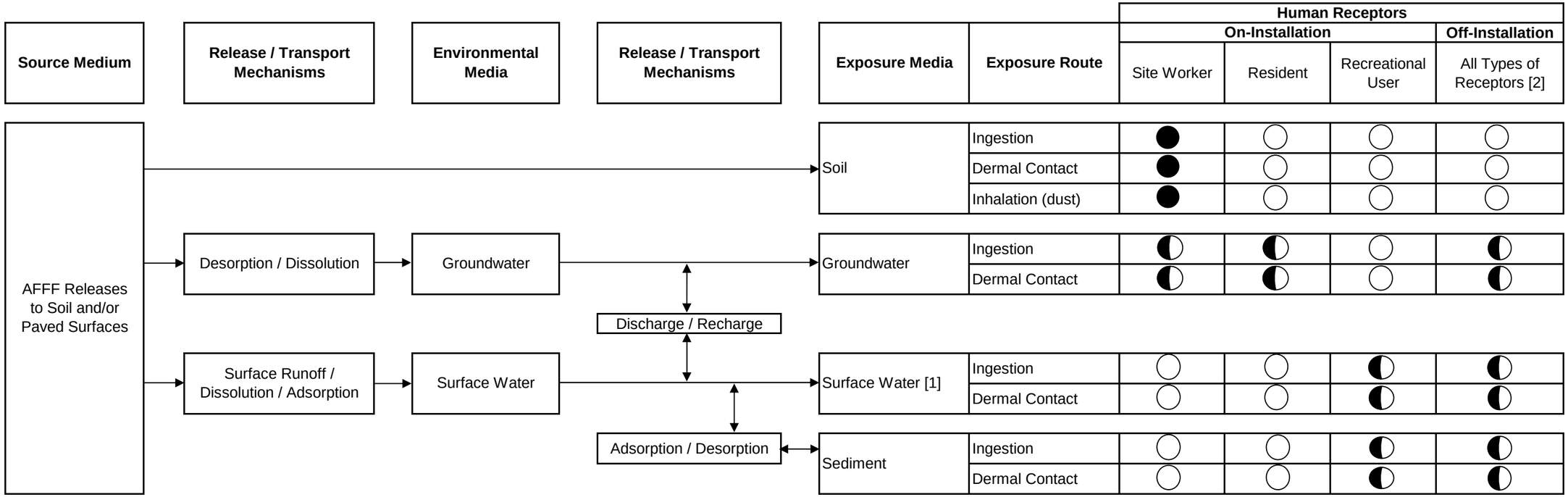
Legend:

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

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

Conceptual Site Model for the Air Base Range 3 AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-38



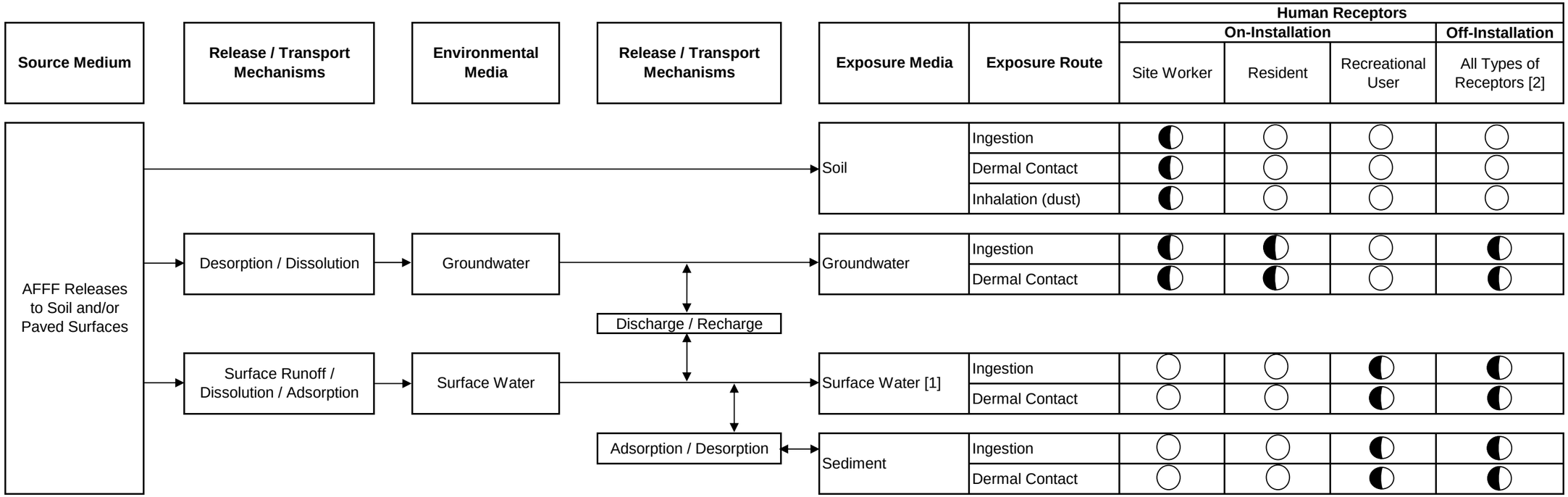
Legend:

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

Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during outdoor maintenance activities and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AFFF = aqueous film-forming foam
AOPI = area of potential interest
PAAF = Phillips Army Airfield

Conceptual Site Model for the Hangar 1060 and the PAAF - Loading Pad AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-39



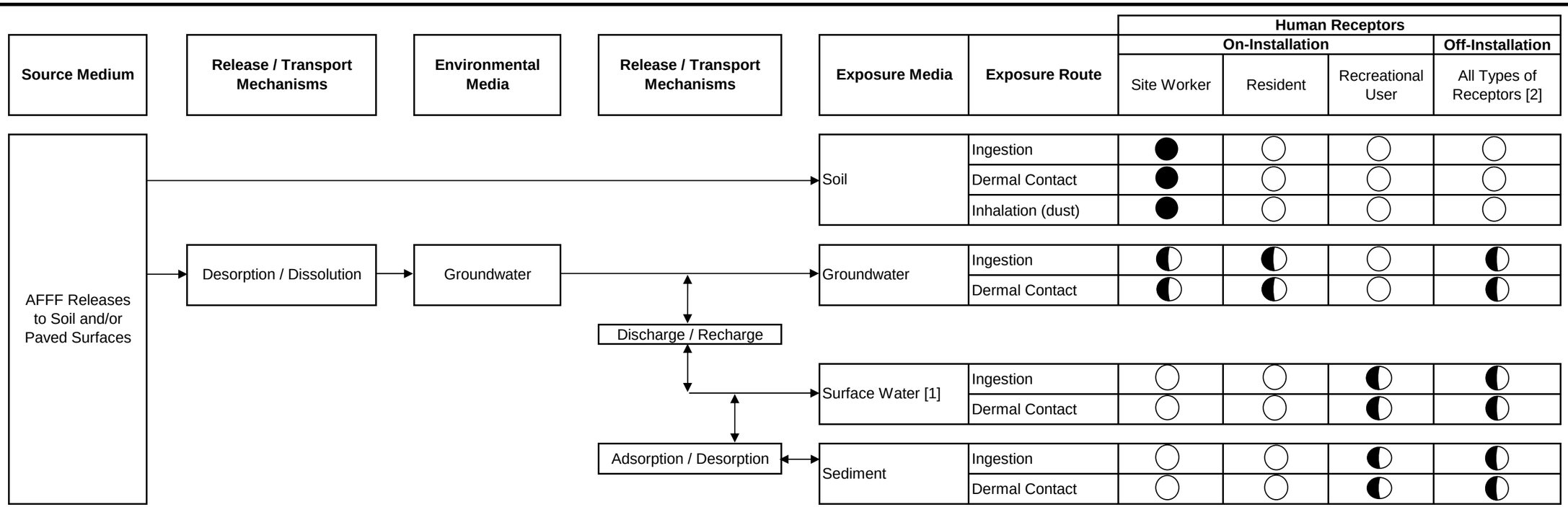
Legend:

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

Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during outdoor maintenance activities and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AFFF = aqueous film-forming foam
AOPI = area of potential interest
PAAF = Phillips Army Airfield

Conceptual Site Model for the PAAF - Runways AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-40



Legend:

● = Complete Exposure Pathway

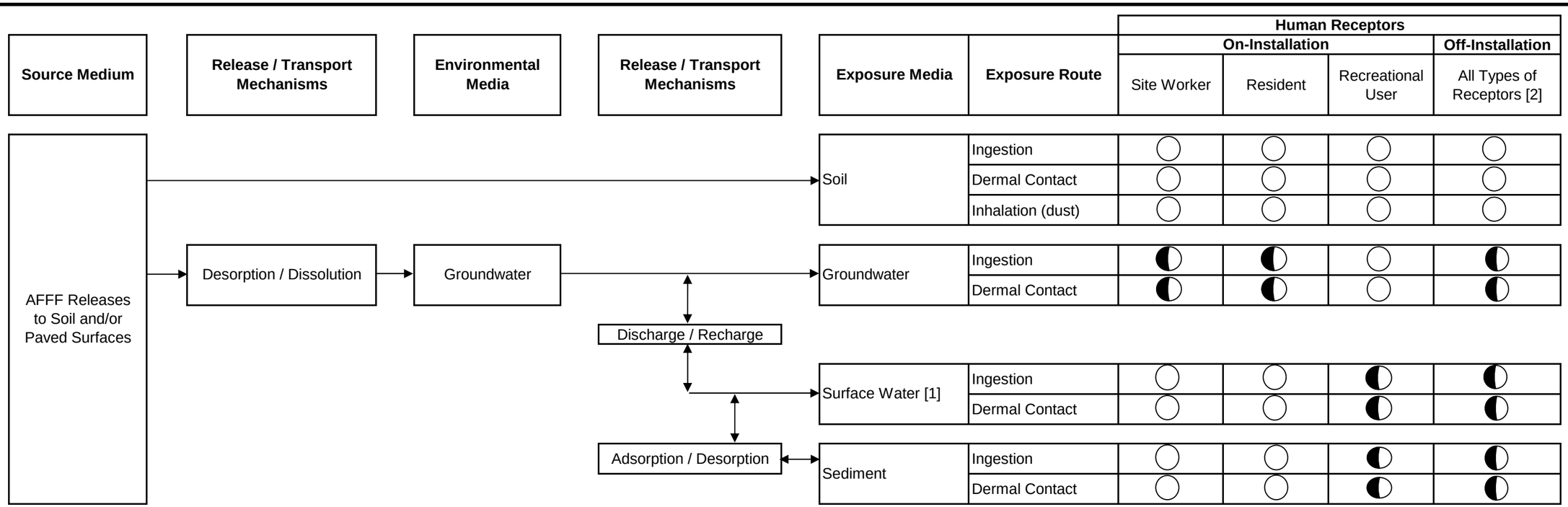
◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

Notes:
AOPIs include: Air Base Range 6, Biosolid Application Field A-1, B, and D, Building 1074 – Former Maryland Fire and Rescue Institute (MFRI) Fire Training Area, Former Aberdeen Fire Training Area, PAAF – Aircraft Boneyard, PAAF – Airfield Fire Station Building 1059, and PAAF - Crash Truck Storage Bay Building 1065.
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during outdoor maintenance activities and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AFFF = aqueous film-forming foam
AOPI = area of potential interest
HCP = Harford County Production

Conceptual Site Model for AOPIs with Groundwater Exposure at the HCP Well Field
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-41



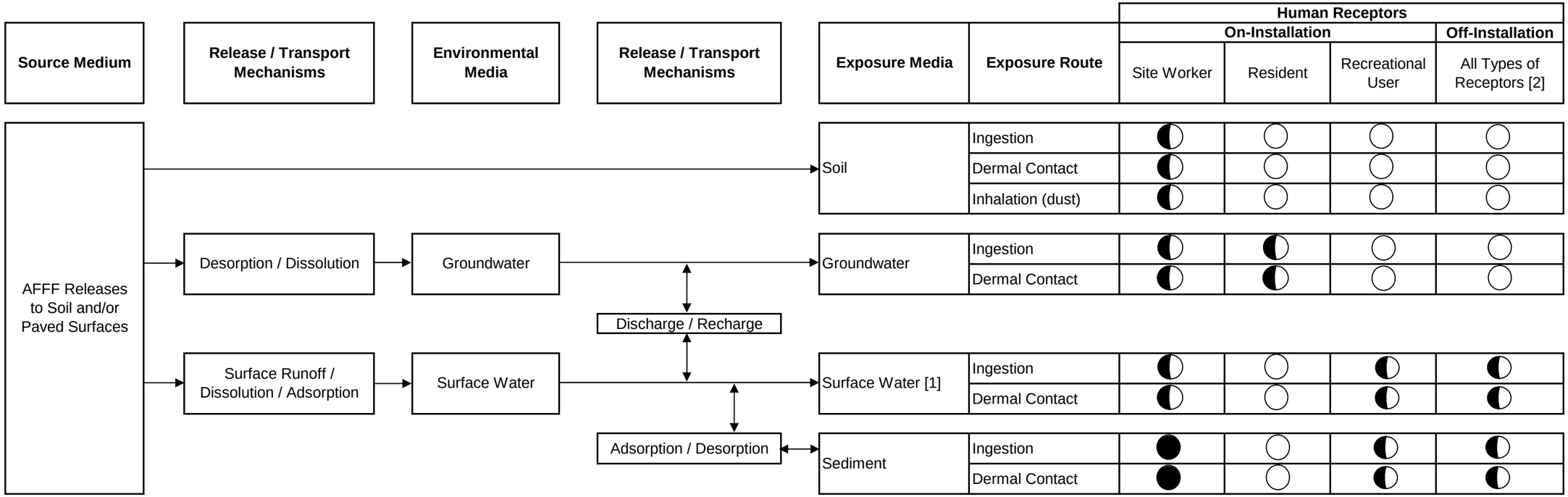
Legend:

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

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

Conceptual Site Model for the Air Base Range 7 and Biosolid Application Field E AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-42



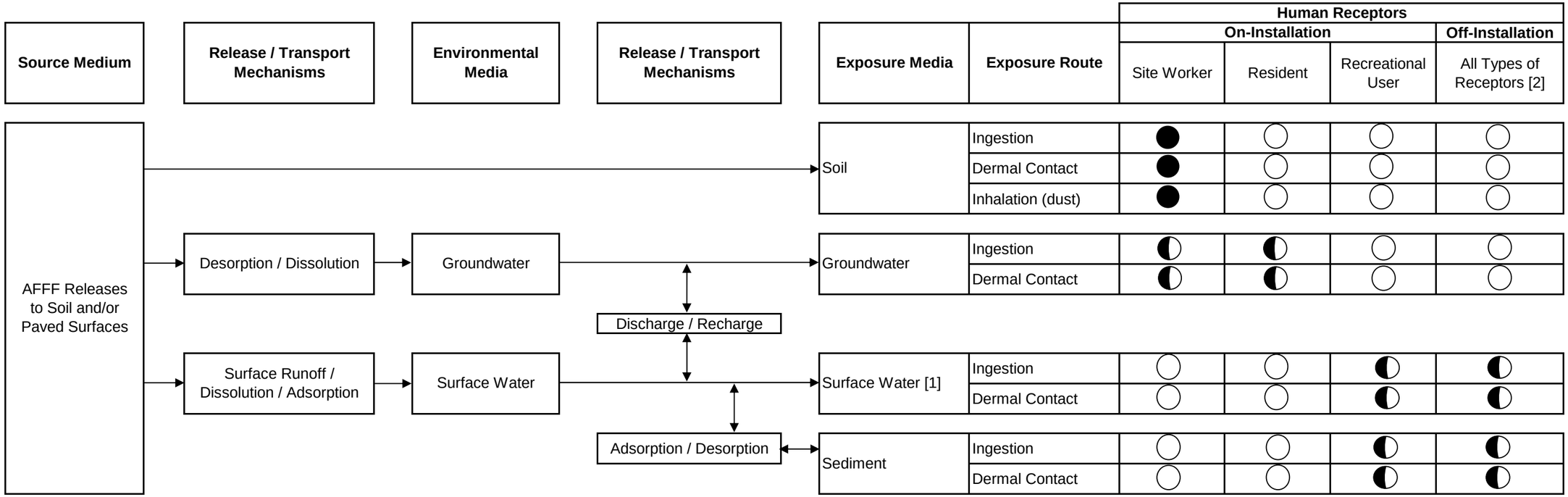
Legend:

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

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

Conceptual Site Model for the AA5 Range AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-43



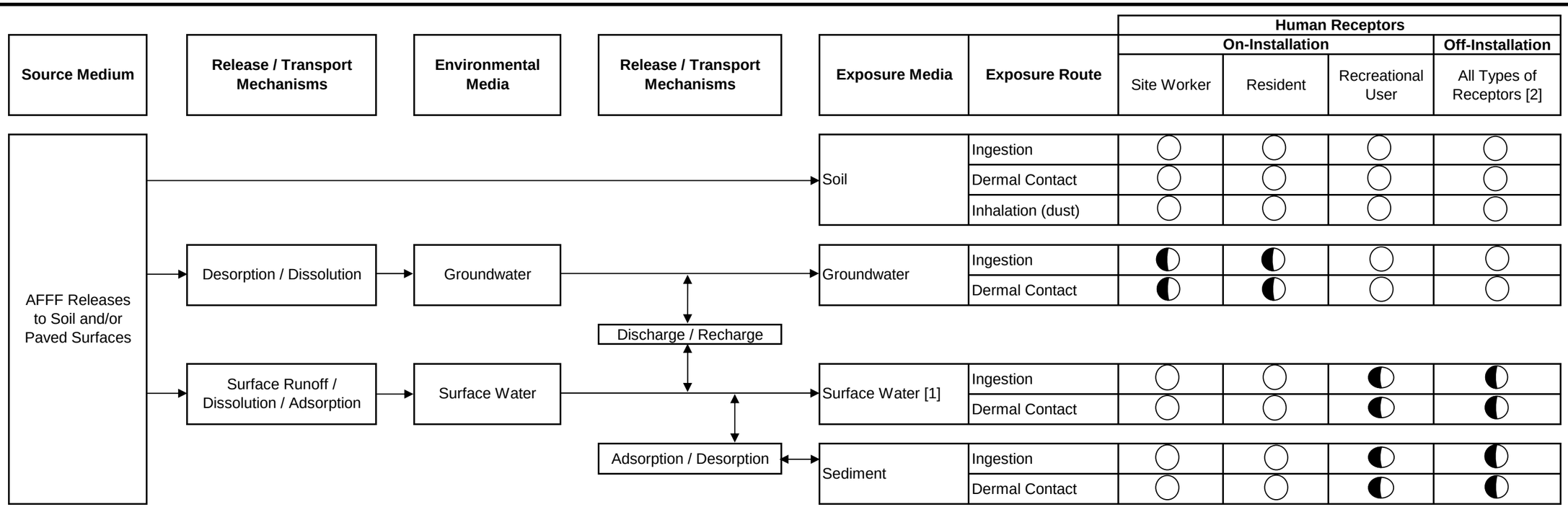
Legend:

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

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

Conceptual Site Model for the Poverty Island - Range 12 and Building E4040 - Aircraft Maintenance Building AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-44



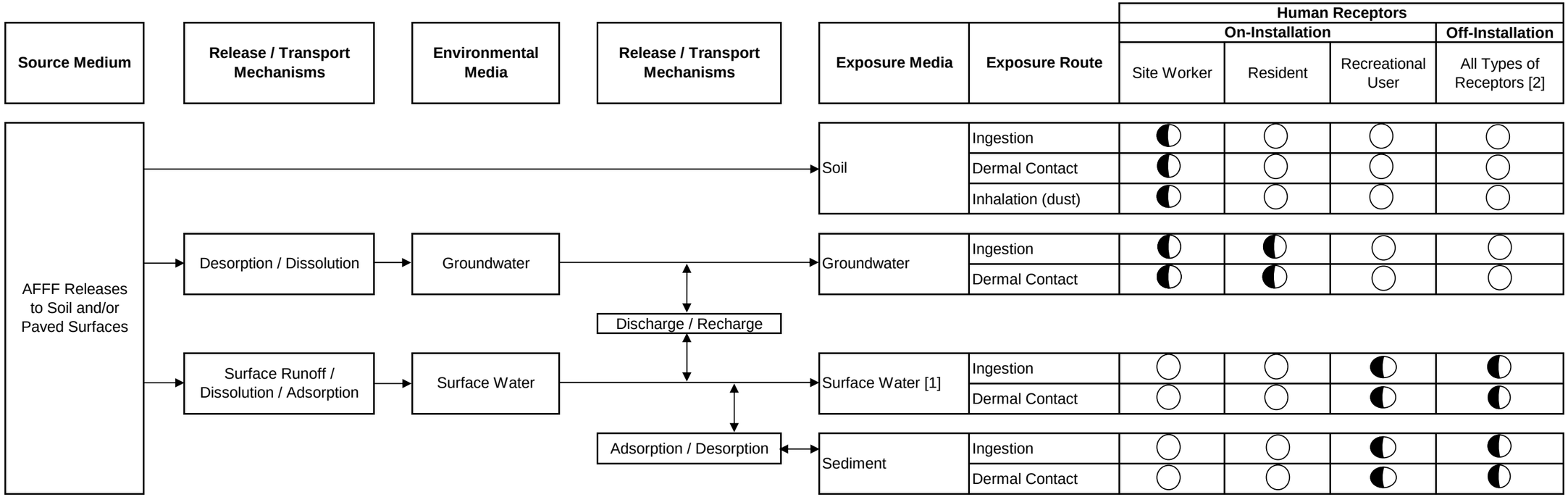
Legend:

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

Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during outdoor maintenance activities and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AFFF = aqueous film-forming foam
AOPI = area of potential interest
CASY = Chemical Agent Storage Yard

Conceptual Site Model for the CASY Site and H-Field Helicopter Fire Response Area AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-45



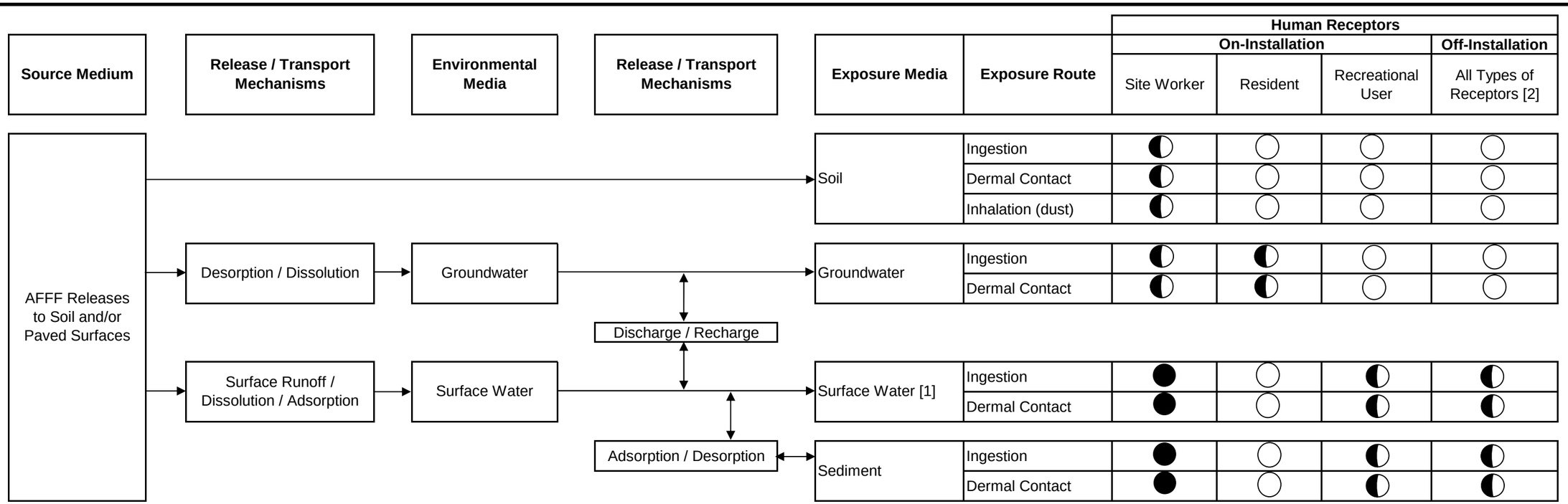
Legend:

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

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

Conceptual Site Model for the EF-15 AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-46



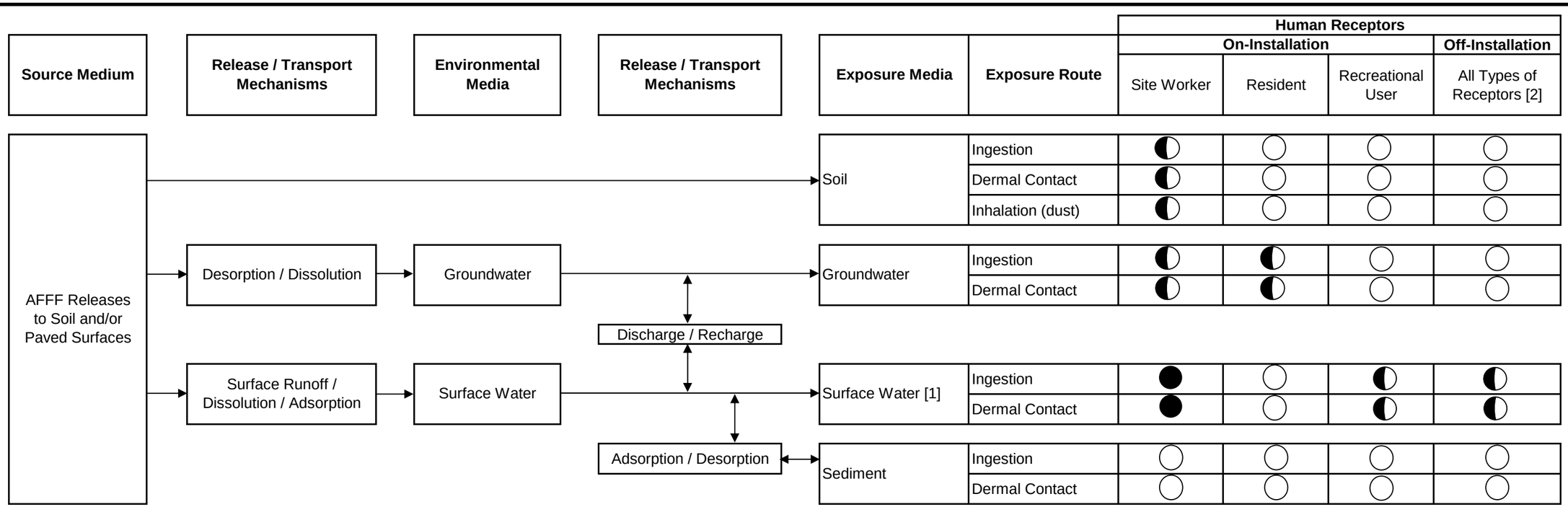
Legend:

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

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

Conceptual Site Model for the Fuze Range AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-47



Legend:

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

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

Conceptual Site Model for the H-Field Tank Fire Response Area AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-48

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

Legend:

● = Complete Exposure Pathway

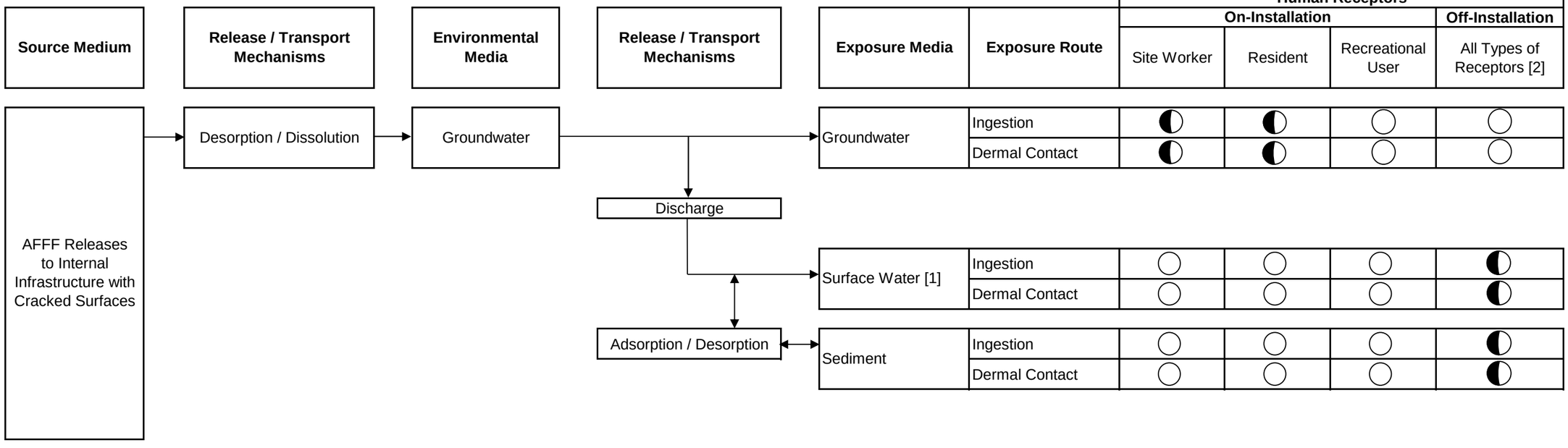
◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

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

Conceptual Site Model for the Building 2200 - Current Aberdeen Fire Station and Building 300 - Former Aberdeen Fire Station AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-49



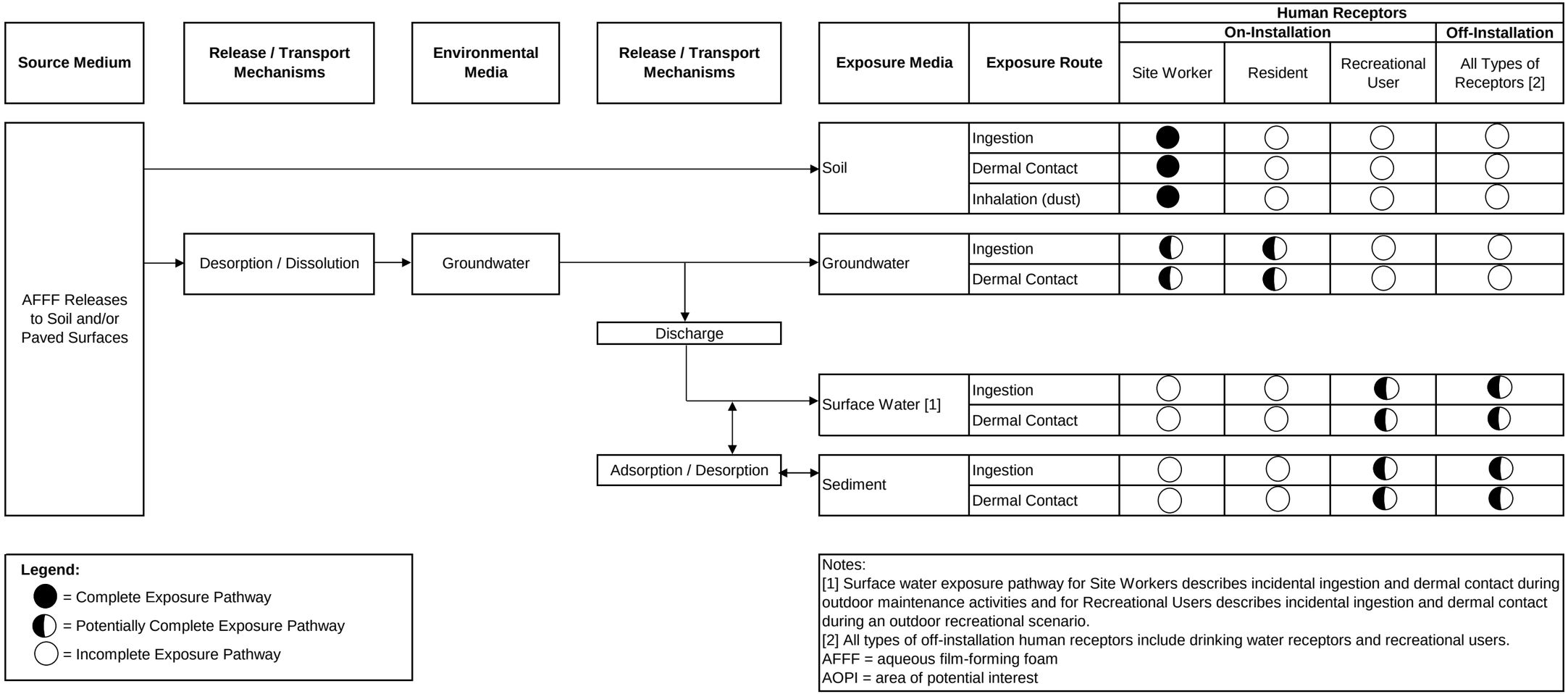
Legend:

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

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

Conceptual Site Model for the Building 2308 - Fire Department Storage Building AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

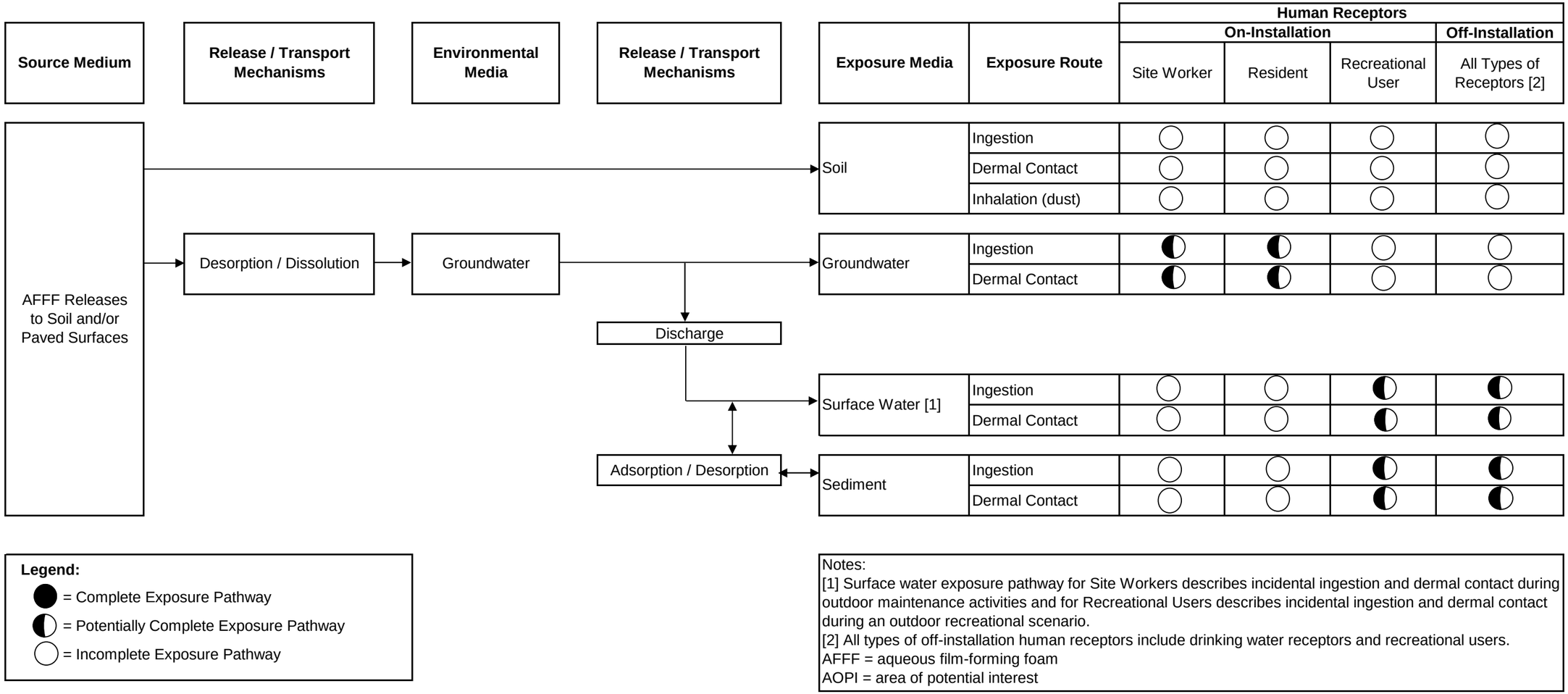
Figure 7-50



Conceptual Site Model for the Building E5005 – Edgewood Fire Department Storage, Building E5180 – Edgewood Fire Station, and G-Street Salvage Yard AOPIs

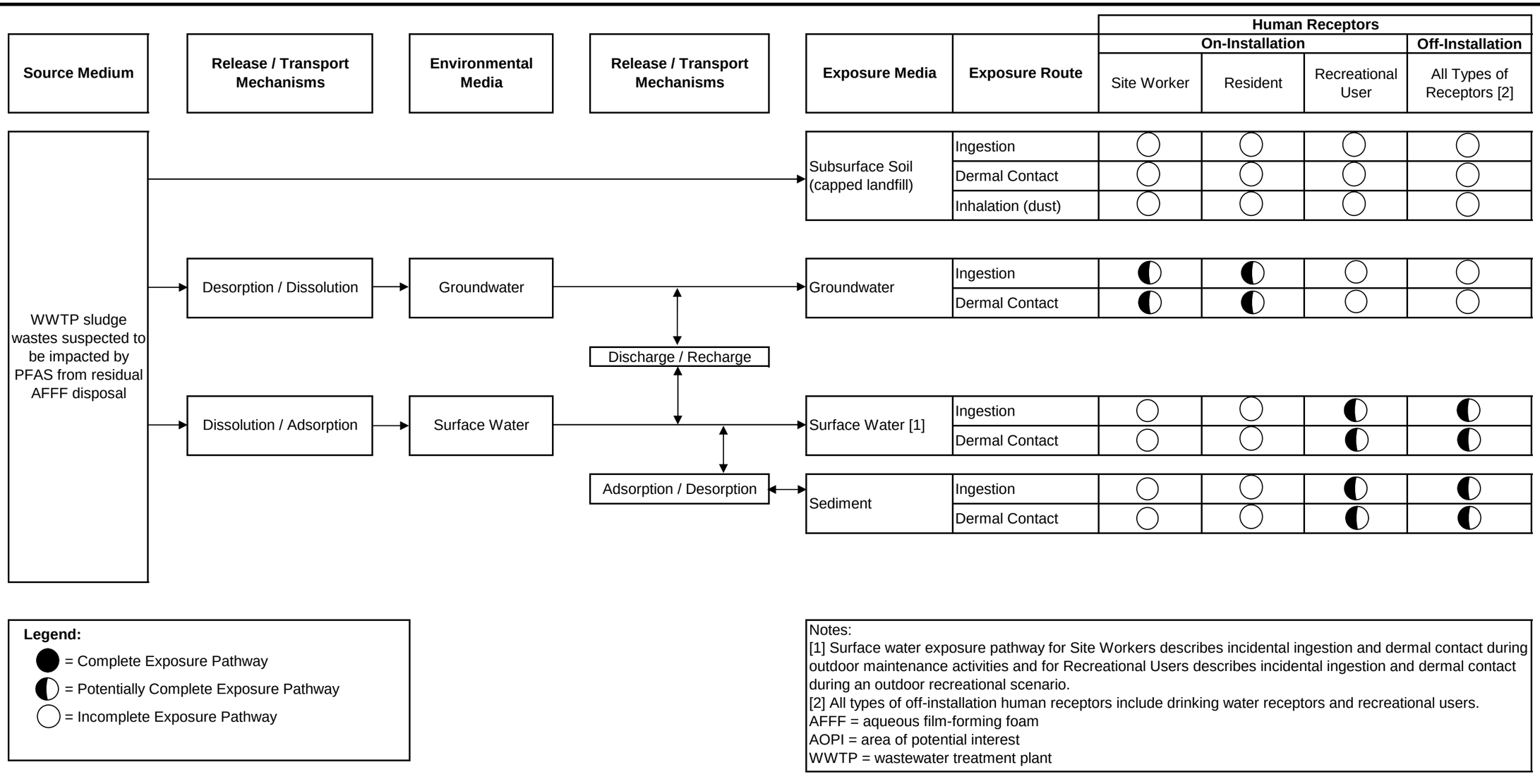
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-51



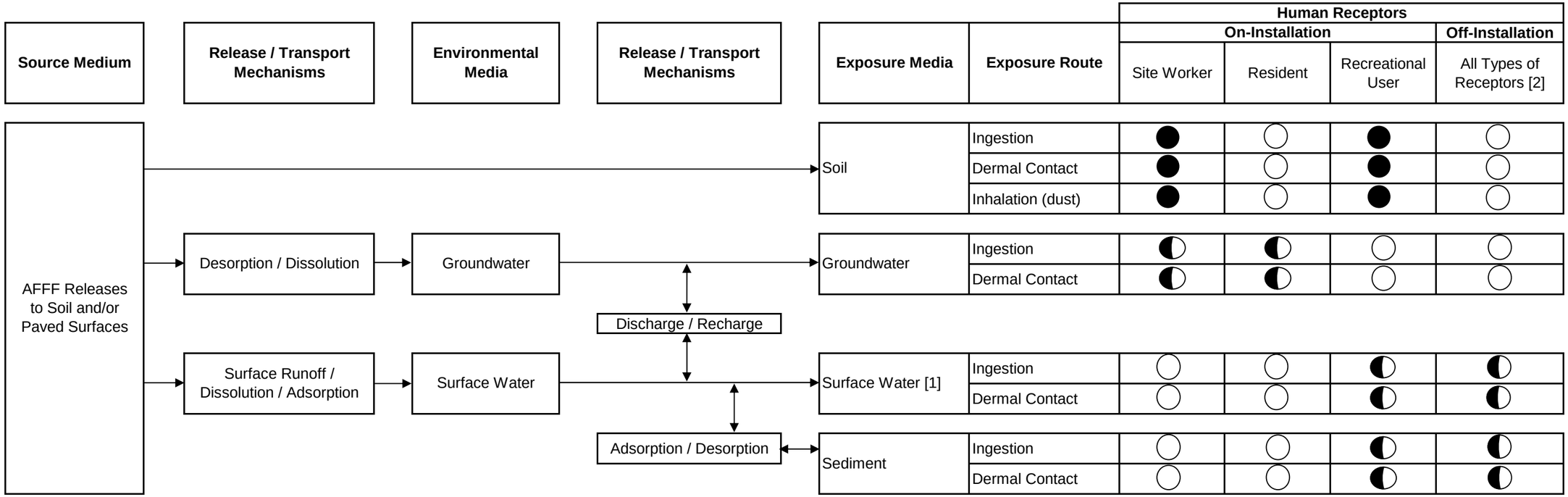
Conceptual Site Model for the G-Street Plane Crash Area AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-52



Conceptual Site Model for the Michaelsville Landfill AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-53



Legend:

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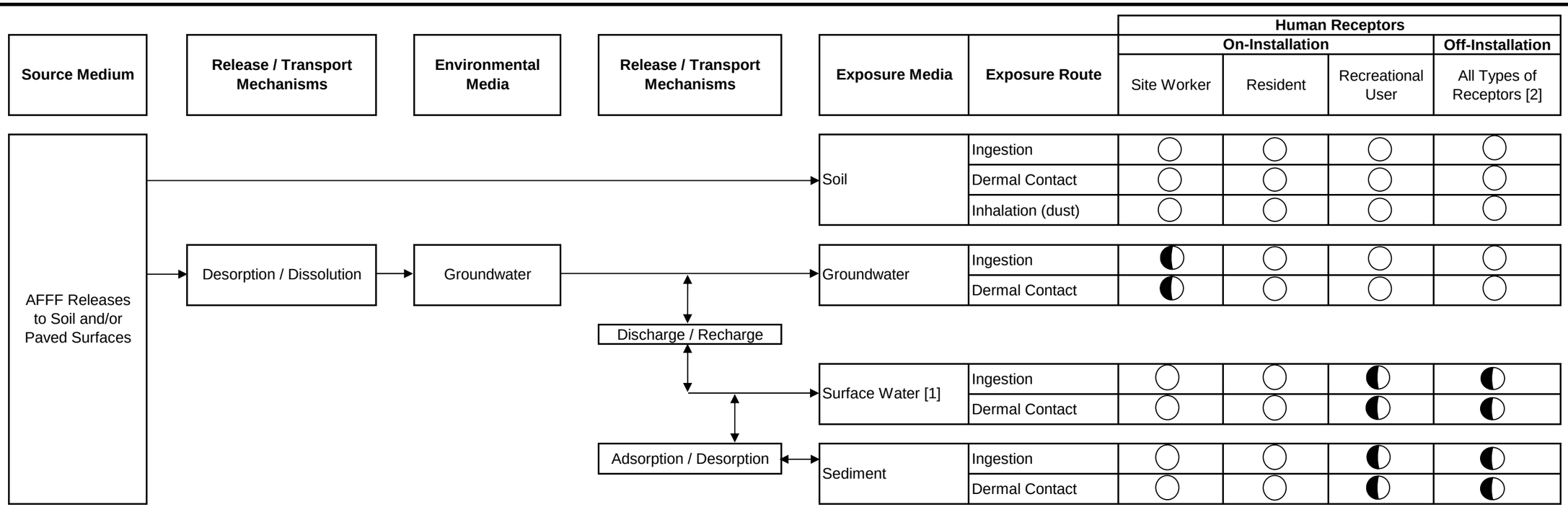
- ◐ = Potentially Complete Exposure Pathway
- ○ = Incomplete Exposure Pathway

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

Conceptual Site Model for the Noble Road - Former Fire Training Area AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-54



Legend:

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- ○ = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during outdoor maintenance activities and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
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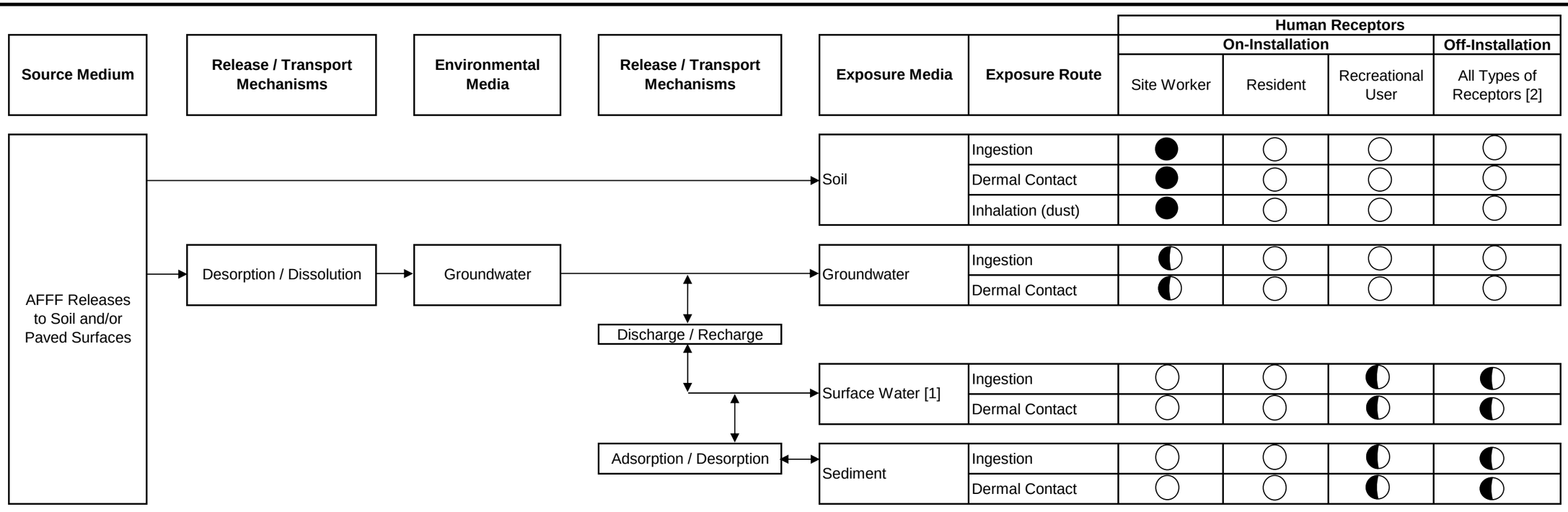
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Conceptual Site Model for the Biosolid Application Fields S-3 and S-6 AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-55



Legend:

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- ○ = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during outdoor maintenance activities and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
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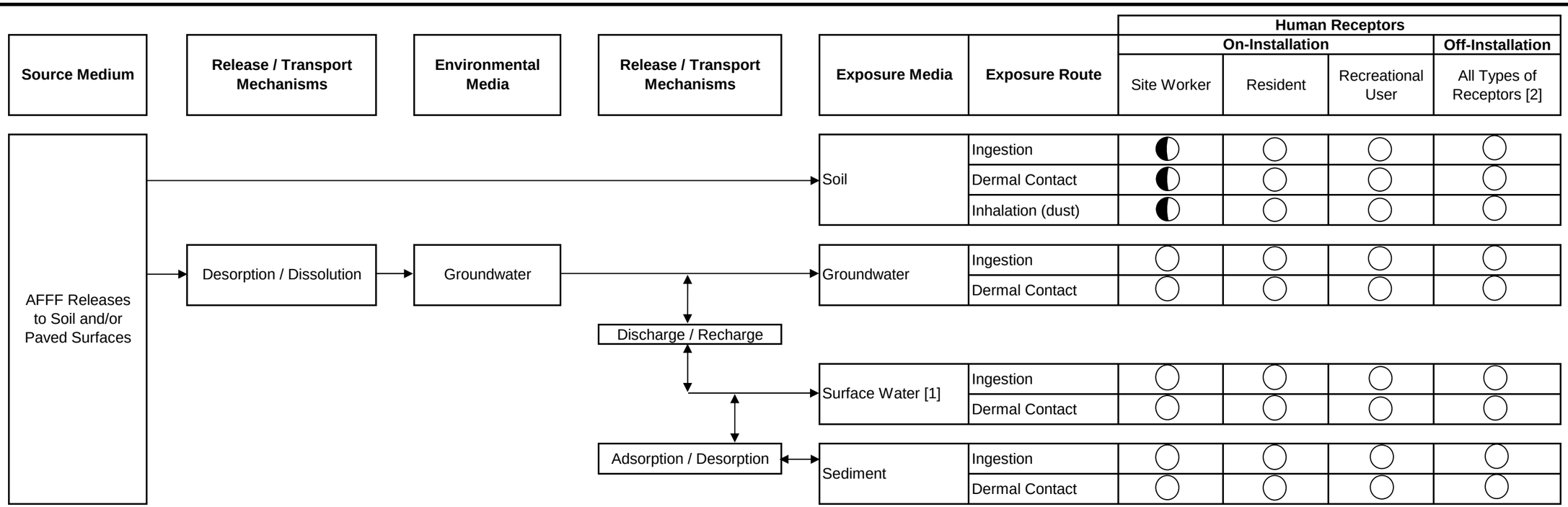
AOPI = area of potential interest

Conceptual Site Model for the Biosolid Application Field S-1A and Poverty Island - Minefield Range AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-56



Legend:

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Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during outdoor maintenance activities and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
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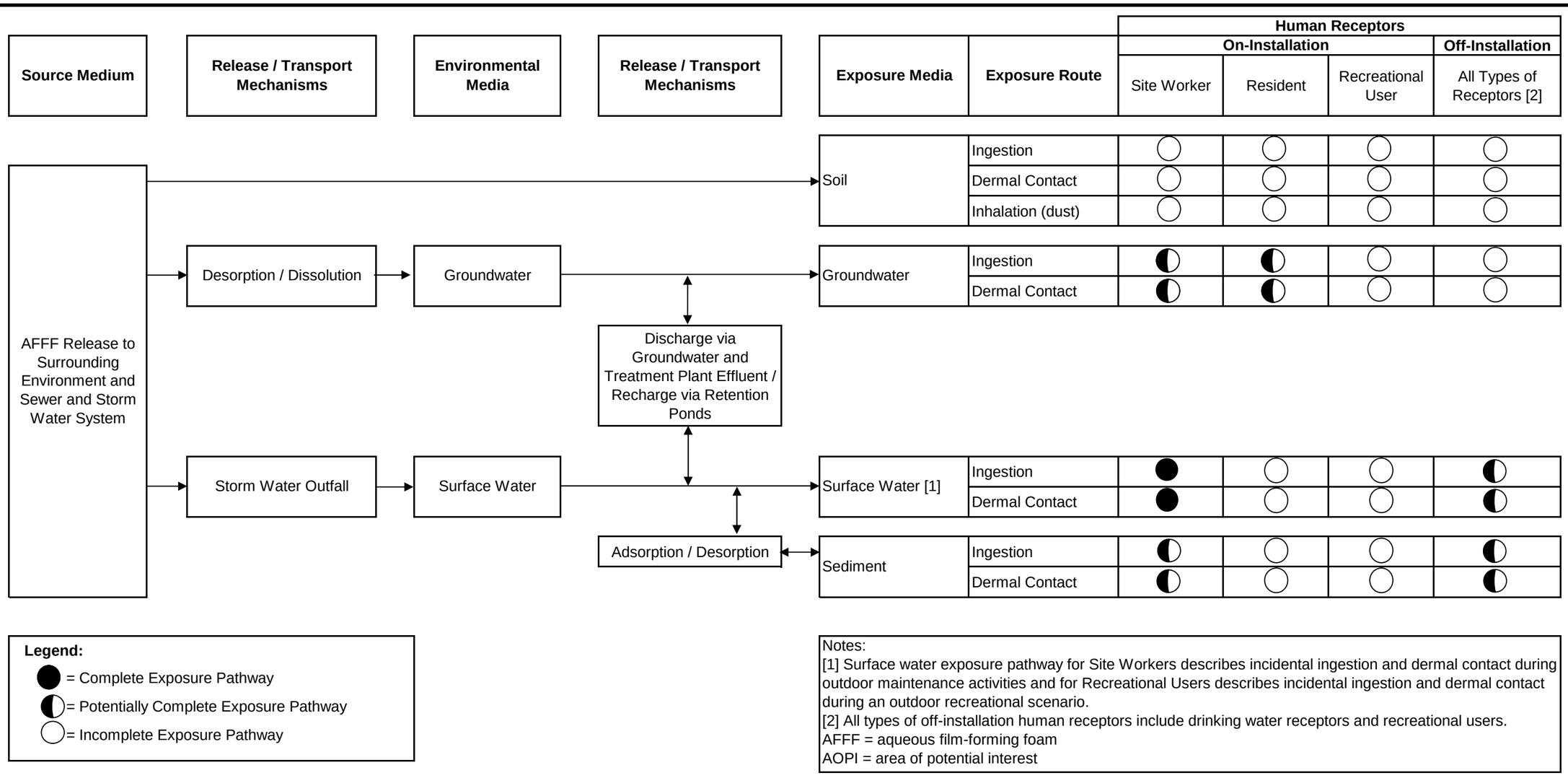
AFFF = aqueous film-forming foam
AOPI = area of potential interest

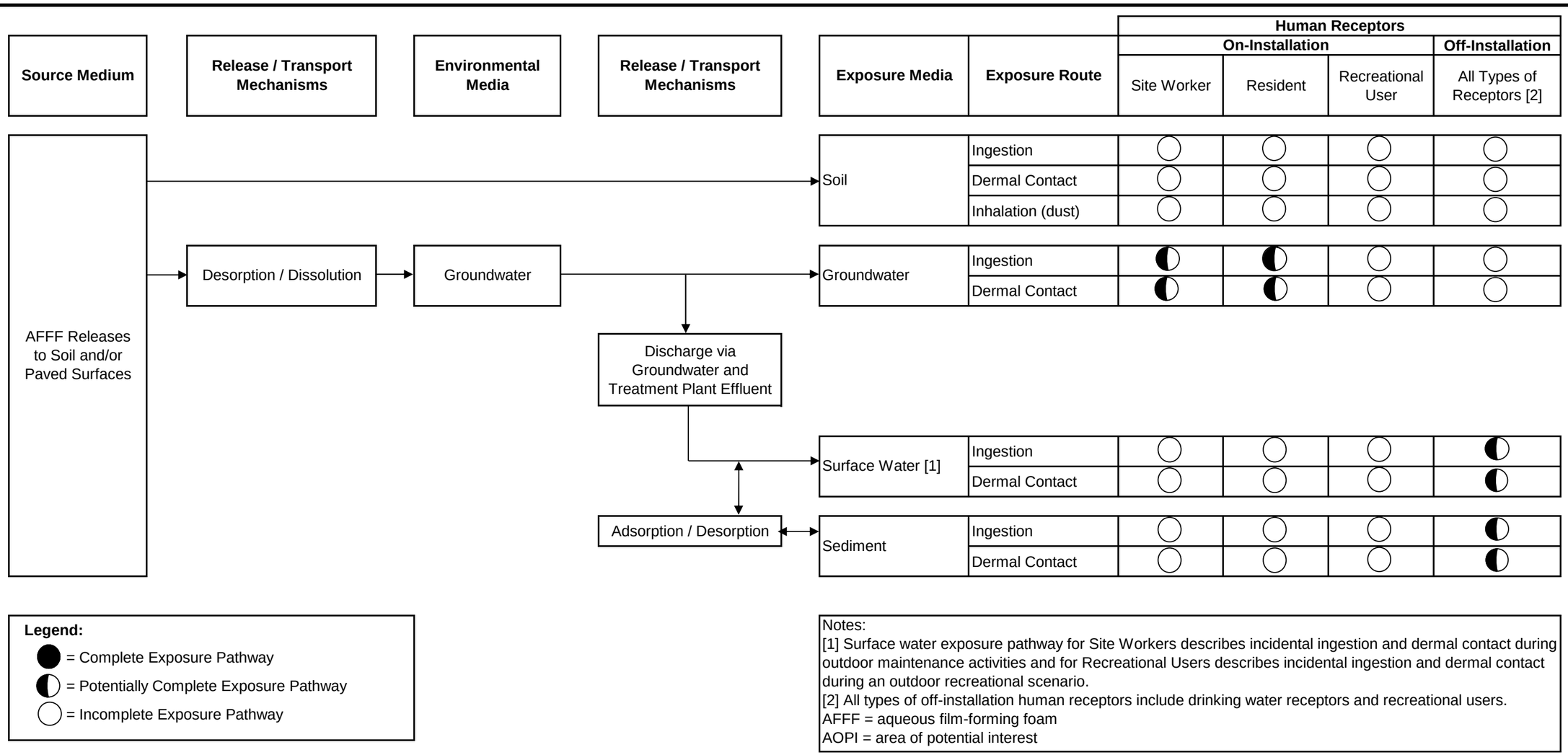
Conceptual Site Model for the Ford's Farm AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-57



Conceptual Site Model for the Building E4081 - Army Aviation Support Facility AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-58



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- = Incomplete Exposure Pathway

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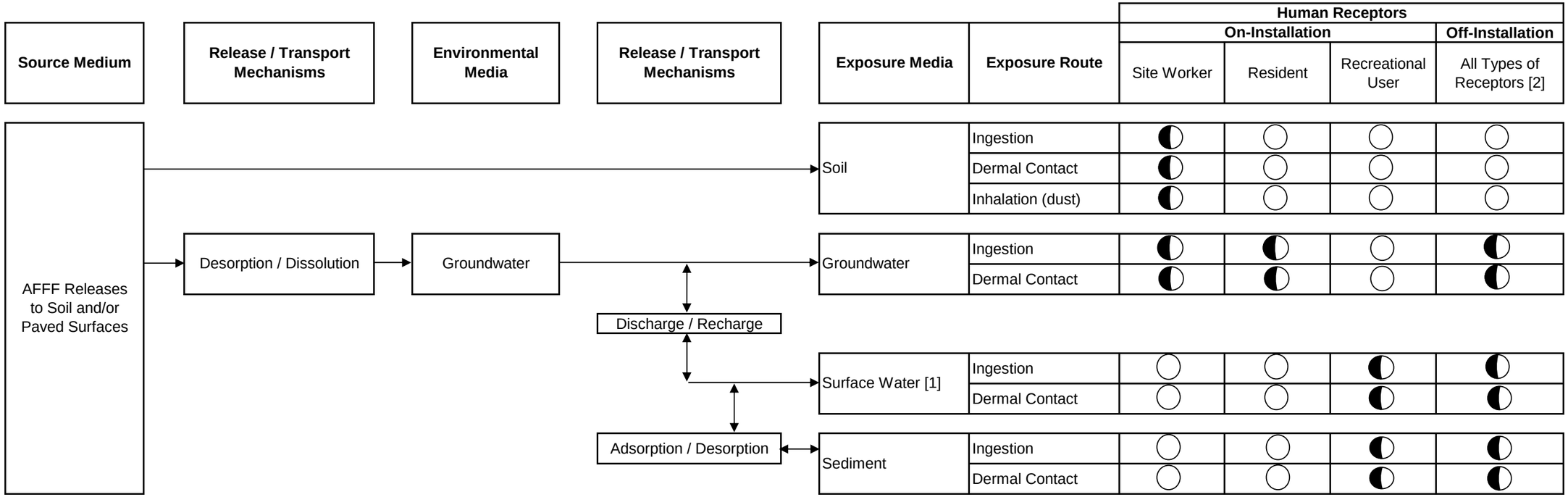
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during outdoor maintenance activities and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Conceptual Site Model for the Weide Airfield - Tarmac AFFF Release Area AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-59



Legend:

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

Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during outdoor maintenance activities and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
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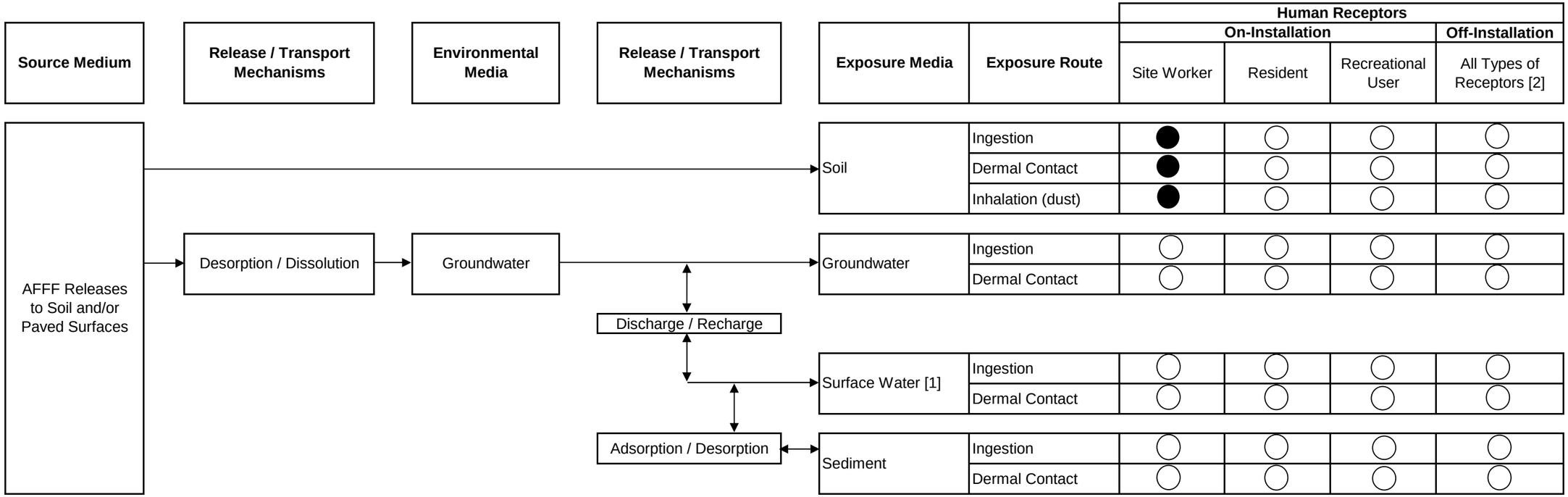
AFFF = aqueous film-forming foam
AOPI = area of potential interest

Conceptual Site Model for the Biosolid Application Field A-2, A-3, C-1, C-2, C-3, F, G, H, and I AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-60



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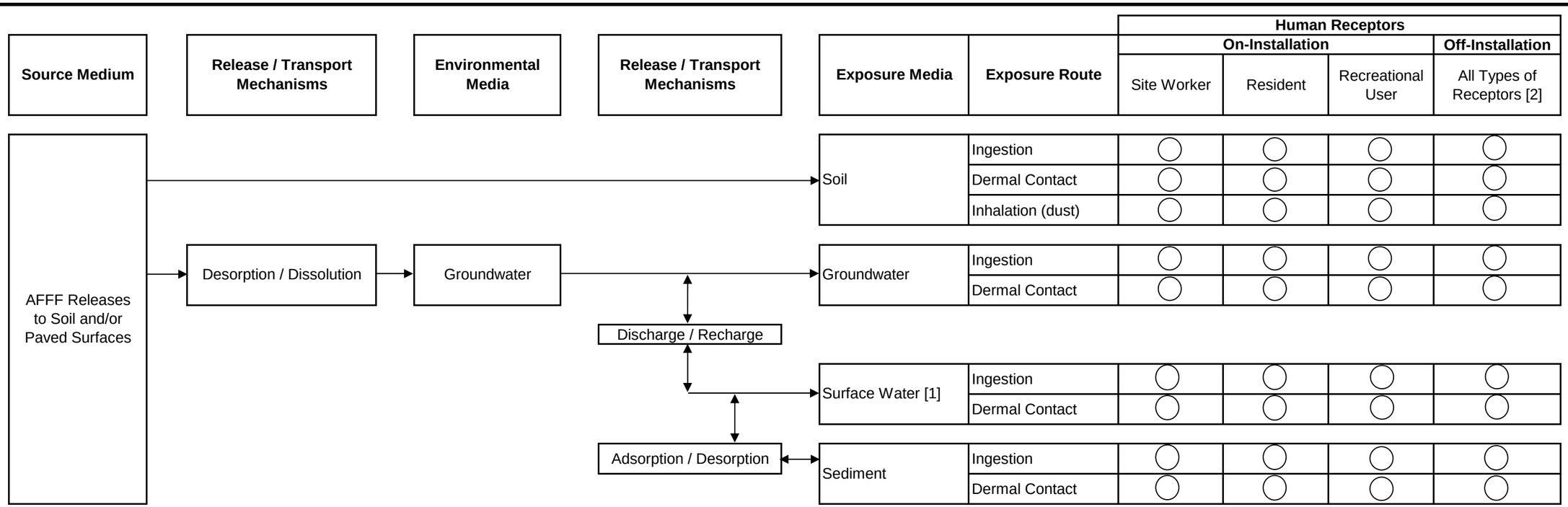
AOPI = area of potential interest

Conceptual Site Model for the Biosolid Application Field E-3 AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-61



Legend:

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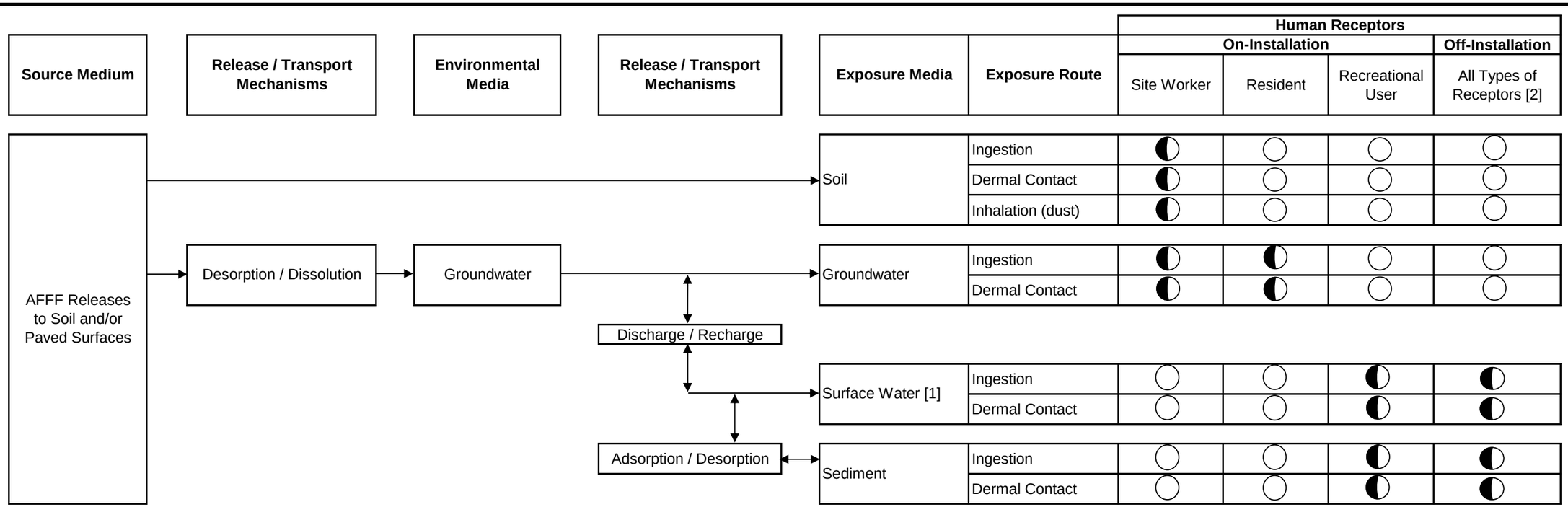
- ○ = Incomplete Exposure Pathway

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

Conceptual Site Model for the Biosolid Application Field ATC-1, ATC-2, and E-6 AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-62



Legend:

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- ○ = Incomplete Exposure Pathway

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

Conceptual Site Model for the Biosolid Application Field E-1, E-2, E-4, S-2, and S-5 AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Aberdeen Proving Ground, Maryland

Figure 7-63