DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND
US ARMY ENVIRONMENTAL COMMAND
2455 REYNOLDS ROAD
JOINT BASE SAN ANTONIO FORT SAM HOUSTON, TX 78234-7588

AMIM-AEC-N (200-1a2)

MEMORANDUM FOR RECORD

SUBJECT: Additional Per- and Poly-fluoroalkyl Substances (PFAS) Sites Requiring Further Evaluation in a Remedial Investigation

1. A PFAS Site Investigation (SI) has been completed at Fort George G. Meade, Maryland. In the SI, 11 Areas of Potential Interest (AOPIs) were screened against the September 2021 Office of the Assistant Secretary of Defense (OASD) memo, Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. This screening effort determined that 5 of the 11 AOPIs required additional investigation in the remedial investigation phase.

2. On July 6, 2022, OASD provided a revised memorandum that accounted for the May 2022 U.S. Environmental Protection Agency screening levels for six PFAS compounds (Perfluorooctanesulfonic acid (PFOS), Perfluorooctanoic acid (PFOA), Perfluorononanoic acid (PFNA), Perfluorohexanesulfonic acid (PFHxS), Perfluorobutane Sulfonate (PFBS) and Hexafluoropropylene oxide dimer acid (HFPO- DA) (Enclosure).

3. The data from the Fort George G. Meade SI effort were rescreened against the levels identified in the July 2022 OASD memo. It was determined that 11 of the 11 AOPIs now warrant further evaluation in a remedial investigation. The 11 AOPIs that will be included in the PFAS RI are:

- 2300 Area – AFFF Equipment Testing Area
- 900 Area – AFFF Equipment Testing Area
- Building 4230 – Former Fire Station
- Building 6619 – Current Fire Station
- Buildings 3486 and 3488 – Detached Fire Department Support Buildings
- CSL Cell 1
- CSL Cell 2
- CSL Cell 3
- Parade Ground Area
- Railroad Avenue – Fire Equipment Testing Area
- Salt Dome

4. The point of contact for this memorandum is the undersigned at 210-793-6898.

Encl
Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program

LAURIE HAINES-EKLUND
Team Lead, PFAS Program Team
USAEC Northeast Division

ENCLOSURE

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
3400 DEFENSE PENTAGON
WASHINGTON, DC 20301-3400

ENERGY, INSTALLATIONS,
AND ENVIRONMENT

July 6, 2022

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (INSTALLATIONS, ENERGY AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE NAVY (ENERGY, INSTALLATIONS AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE AIR FORCE (INSTALLATIONS, ENVIRONMENT AND ENERGY)
DIRECTOR, NATIONAL GUARD BUREAU (JOINT STAFF, J8)
DIRECTOR, DEFENSE LOGISTICS AGENCY (INSTALLATION MANAGEMENT)

SUBJECT: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program

The Department of Defense (DoD) conducts cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Defense Environmental Restoration Program (DERP). Our goal is protection of human health and the environment in a risk-based, fiscally-sound manner. This memorandum provides clarifying technical guidance on the investigation of perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA, or GenX), based on recent U.S. Environmental Protection Agency (EPA) information. This guidance is applicable to investigating these chemicals at Environmental Restoration Account-funded, Base Realignment and Closure Account-funded, and federal Air and Army Guard Operation and Maintenance account-funded sites.

This revised memorandum accounts for the May 2022 EPA screening levels for PFOS, PFOA, PFNA, PFHxS and HFPO-DA. PFBS remains unchanged since the May 2021 update. EPA has provided screening levels for these PFAS compounds using, updated, final, peer-reviewed information from the Agency for Toxic Substances and Disease Registry[1] and the EPA Office of Water.[2]

PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA are part of a larger class of chemicals known as per- and polyfluoroalkyl substances (PFAS). PFAS shall be addressed in the same manner as other contaminants of concern within the DERP. HFPO-DA has primarily

[1] Agency for Toxic Substances and Disease Registry (ATSDR), May 2021. *Toxicological Profile for Perfluoroalkyls*.

[2] U.S. Environmental Protection Agency (EPA), *Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonic Acid (CASRN 375-73-5)* and October 2021. *Human Health Toxicity Values for Hexafluoropropylene Oxide (HFPO) Dimer Acid and Its Ammonium Salt (CASRN 13252-13-6 and CASRN 62037-80-3), Also Known as "GenX Chemicals."* Office of Water.

been used as a replacement for PFOA in the manufacture of fluoropolymers, so it is not likely to have been released at the vast majority of DoD properties. As with other chemicals, the conceptual site model should be used to determine the necessity for addressing HFPO-DA.

Under CERCLA, site-specific regional screening levels[3] (RSLs) for these chemicals are shown in the EPA RSL Tables or may be calculated using the EPA online calculator. The values are provided in the attachment. When multiple PFAS are encountered at a site, RSLs set at a hazard quotient of 0.1 are used for screening purposes. These RSLs should be used to determine if further investigation in the remedial investigation (RI) phase is warranted or if no further action is required. Consistent with the CERCLA process, DoD Components will incorporate these screening values into ongoing and future preliminary assessment/site inspections (PA/SI) and will reevaluate completed PA/SIs with a determination of "no further action," to assess if an RI is now necessary.

During the RI phase, the RfDs for PFOS, PFOA, PFBS, PFNA, PFHxS, and HPFO-DA and the oral cancer slope factor (CSF) for PFOA of 0.07 $(mg/kg\text{-}day)^{-1}$ will be used to conduct site specific risk assessments in accordance with Risk Assessment Guidance for Superfund Volume I, Part A (EPA/540/1-89/002, December 1989).[4] Site-specific risk assessment results will depend on the levels of PFAS found at each site, and will be used to determine if any necessary remedial actions are required in accordance with CERCLA, DERP, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This memorandum is effective immediately and supersedes and cancels the Assistant Secretary of Defense for Sustainment memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program," September 15, 2021. The point of contact for this matter is Ms. Alexandria Long, at 703-571-9061 or alexandria.d.long.civ@mail.mil.

MCANDREW.MICHAEL.1043243000
Digitally signed by MCANDREW.MICHAEL.1043243000
Date: 2022.07.06 13:39:15 -04'00'

Michael McAndrew
Deputy Assistant Secretary of Defense for Construction
Performing the Duties of Principal Deputy Assistant Secretary of Defense for Energy, Installations, and Environment

Attachment:
As stated

[3] For sites on the National Priorities List, the DoD Components will use the EPA site specific screening levels, if provided.
[4] Currently there are six PFAS – PFOS, PFOA, PFBS, PFNA, PFHxS, HPFO-DA (GenX) – with established toxicity values that DoD can use to perform a baseline risk assessment to determine whether remedial action is needed under CERCLA.

Attachment: Risk Screening Levels Calculated for PFOS, PFOA, PFBS, PFNA, PFHxA, HFPO-DA in Groundwater or Soil Using EPA's RSL Calculator

Chemical	Carcinogenic Slope Factor - Oral (SF) (mg/kg-day)-1	Non-Carcinogenic Reference Dose (RfD) (mg/kg-day)	Residential Scenario Screening Levels Calculated Using EPA RSL Calculator								Industrial/Commercial Composite Worker Screening Levels Calculated Using EPA RSL Calculator			
			Tap Water (ng/L or pptr)				Soil (mg/kg or ppm)				Soil (mg/kg or ppm)			
			HQ = 0.1	HQ = 1.0	ILCR = 1E-06	ILCR = 1E-04	HQ = 0.1	HQ = 1.0	ILCR = 1E-06	ILCR = 1E-04	HQ = 0.1	HQ = 1.0	ILCR = 1E-06	ILCR = 1E-04
PFOS	NA	2.00E-06	4	40	NA	NA	0.013	0.13	NA	NA	0.16	1.6	NA	NA
PFOA	7.00E-02	3.00E-06	6	60	1,100	111,000	0.019	0.19	7.8	775	0.25	2.5	33	3,280
PFBS	NA	3.00E-04	601	6010	NA	NA	1.9	19	NA	NA	25	250	NA	NA
PFNA	NA	3.00E-06	6	59	NA	NA	0.019	0.19	NA	NA	0.25	2.5	NA	NA
PFHxS	NA	2.00E-05	39	394	NA	NA	0.13	1.30	NA	NA	1.6	16	NA	NA
HFPO-DA	NA	3.00E-06	6	60	NA	NA	0.023	0.23	NA	NA	0.35	3.5	NA	NA

HQ=Hazard Quotient
ILCR=Incremental Lifetime Cancer Risk
NA=Not available/applicable

NOTES:

- Apply the Tap Water RSLs to groundwater used as drinking water.
- The table represents screening levels based on residential and industrial/commercial worker receptor scenarios for either direct ingestion of groundwater (residential scenario only) or incidental ingestion of soil (both residential and composite worker scenarios).
- Default exposure assumptions for each potential receptor scenario, contained in EPA's RSL Calculator on May 2022.
- Final peer reviewed toxicity values considered valid for risk assessment, and the screening levels may be found in EPA's RSL table or EPA's RSL calculator used to develop them.
- Other potential receptor scenarios (e.g., recreational user, site trespasser, construction worker) are not included in the above table, but could be relevant receptors at a site potentially containing PFAS. These receptors, and their associated exposure scenarios, should be further considered in the scoping phase and completion of the Baseline Human Health Risk Assessment typically completed during an RI.
- The shaded values represent conservative screening levels in groundwater or soil that when exceeded should be considered a contaminant of potential concern in the risk assessment process and calculations of site-specific risk posed.

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Laurie Haines-Eklund
U.S. Army Environmental Command
Northeast Environmental Services and Support Division
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Fort Sam Houston, TX 78234-7664

Subject:
Final Preliminary Assessment/Site Inspection for Fort George G. Meade and Phoenix Military Reservation, Maryland
Contract No: W912DR-18-D-0004
Delivery Order No: W912DR18F0685

Environment

Date:
05 August 2022

Contact:
Keith Shepherd

Phone:
410.923.7826

Email:
Keith.Shepherd@arcadis-us.com

Our ref:
30001996

Dear Ms. Haines-Eklund:

Arcadis U.S., Inc. is pleased to provide the Final Preliminary Assessment/Site Inspection for per- and polyfluoroalkyl substances at Fort George G. Meade and Phoenix Military Reservation, Maryland. 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.
SI Project Manager

Copies:
Kent Gonser, USAEC
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Kimmie Schrupp, Arcadis

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

Fort George G. Meade and Phoenix Military Reservation, Maryland

Prepared For:
U.S. Army Corps of Engineers, Baltimore District
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August 2022

Keith Shepherd
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Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

Fort George G. Meade and Phoenix Military Reservation, Maryland

Prepared for:

U.S. Army Corps of Engineers

Contract No.: W912DR-18-D-0004

Delivery Order No.: W912DR1818F0685

Prepared by:

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Arcadis Ref.:

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Date:

August 2022

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**Appendices removed for file size are available from Fort Meade.*

EXECUTIVE SUMMARY

The United States Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The PA identifies areas of potential interest (AOPIs) where PFAS-containing materials were used, stored, and/or disposed, or areas where known or suspected releases to the environment occurred. The SI includes multi-media sampling at AOPIs to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required. This report provides the PA/SI for Fort George G. Meade (FGGM) and the PA for its sub-installation Phoenix Military Reservation (PMR) and was completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and The National Oil and Hazardous Substances Pollution Contingency Plan.

FGGM is a permanent U.S. Army installation located on 5,142 acres of land in the northwest corner of Anne Arundel County, Maryland. Anne Arundel County is in central Maryland, on the western shore of the Chesapeake Bay estuary, almost equidistant (12 miles) between Baltimore, Maryland, and Washington, D.C. southeast of the Baltimore-Washington Parkway, north of Maryland Route 32, and west of Maryland Route 175.

PMR is a sub-installation managed as part of U.S. Army Garrison FGGM. PMR is located approximately one-half mile west of Jacksonville, Baltimore County, Maryland. PMR historically consisted of two parcels of land: The Fire Control Area (FCA) and the Launch Control Area (LCA), each occupying approximately 17 acres of land. The two parcels are one-half mile apart, on adjacent hilltops, separated by a valley through which the Greene Branch flows. The LCA was dropped from the Department of the Army real property in 1976 and transferred to Baltimore County. It is no longer part of PMR and is not included in the Army's PA for PMR.

Based on the results of the PA for PMR, no AOPIs were identified and no SI or sampling for PFOS, PFOA, and/or PFBS was conducted. Based on the results of the PA for FGGM, 11 AOPIs have been identified. Following the AOPI identification, an SI for PFOS, PFOA, and PFBS was conducted in accordance with the CERCLA process. SI sampling was completed at FGGM at 11 of the 11 AOPIs to evaluate whether PFOS, PFOA, and PFBS were present at concentrations that exceed the OSD risk screening levels. 11 AOPIs had detections of PFOS, PFOA, and/or PFBS in groundwater, soil, sediment, and surface water and 5 AOPIs exceeded OSD risk screening levels.

In 1988, FGGM was realigned under the first round of Base Realignment and Closure (BRAC). The BRAC program authorized 9,000 acres to be excessed from FGGM; including Tipton Army Airfield (now Tipton Airport) and the Patuxent Research Refuge – North Tract. Currently, FGGM occupies approximately 5,142 acres and is the focus of the PA/SI effort at FGGM under Contract and Delivery Number W912DR-18-D-0004 / W912DR1818F0685 in addition to PMR.

During the PA for FGGM, information detailing the potential use, storage, and/or disposal of PFAS-containing materials at three areas located within Tipton Airport and one area within the Patuxent

Research Refuge – North Tract were identified during preliminary document reviews ahead of the site-visit to FGGM. The BRAC parcels are being investigated for PFAS separately.

Results from the PA/SI indicate further study in a remedial investigation for PFAS is not warranted at PMR and is warranted at FGGM in accordance with the guidance provided by the OSD. **Table ES-1** below summarizes the AOPIs identified during the PA, PFOS, PFOA, and PFBS sampling at FGGM, and recommendations for further study in a remedial investigation or no action at this time at each AOPI.

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

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Y/N/NS)				Recommendation
	GW	SO	SW	SE	
900 Area – AFFF Equipment Testing Area	N	N	NS	NS	No action at this time
2300 Area – AFFF Equipment Testing Area	Y	N	N	N	Further study in a remedial investigation
Salt Dome	N	N	N	N	No action at this time
Railroad Avenue – Fire Equipment Testing Area	Y	N	Y	N	Further study in a remedial investigation
Building 4230 – Former Fire Station	N	N	NS	NS	No action at this time
Building 6619 – Current Fire Station	Y	N	N	N	Further study in a remedial investigation
Buildings 3486 and 3488 – Detached Fire Department Support Buildings	N	N	NS	N	No action at this time
CSL Cell 1	Y	N	N	N	Further study in a remedial investigation
CSL Cell 2	N	N	N	N	No action at this time
CSL Cell 3	Y	N	Y	N	Further study in a remedial investigation
Parade Ground Area	N	N	NS	NS	No action at this time

Notes:
Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
Y – yes
N – no
NS – not sampled
SE – sediment
SO – soil
SW – surface water

1 INTRODUCTION

The United States (U.S.) Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The Army is the lead agency under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Executive Order 12580 and is conducting the PA/SI consistent with its authority under CERCLA, 42 United States Code §§ 9600, et seq. (as amended), and the Defense Environmental Restoration Program, 10 United States Code §§ 2701, et seq. The PFAS PA/SI included two distinct efforts. The PA identified locations that are areas of potential interest (AOPIs) at Fort George G. Meade (FGGM) and the Phoenix Military Reservation (PMR) based on the use, storage and/or disposal of PFAS-containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018). The SI included multi-media sampling at AOPIs to determine whether or not a release has occurred, and the PFOS, PFOA, and PFBS results were compared to the Office of the Secretary of Defense (OSD) PFOS, PFOA, and PFBS risk screening levels to determine whether further investigation is warranted. This report provides the PA/SI for FGGM and PA for PMR 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). The September 2021 Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program is provided for reference as **Appendix A**. The updated toxicity assessment for PFBS is provided for reference as **Appendix B**. The OSD risk screening levels for tap water (also used to evaluate groundwater or surface water used as drinking water sources) are 40 ng/L for PFOS and PFOA, and 600 ng/L for PFBS. The

PFOS and PFOA soil screening levels for the residential and industrial/commercial scenarios are 0.13 milligrams per kilogram (mg/kg) (residential) and 1.6 mg/kg (industrial/commercial). The soil screening levels for PFBS are 1.9 mg/kg (residential) and 25 mg/kg (industrial/commercial). These screening criteria are discussed further in **Section 6.5**.

1.2 PA/SI Objectives

This PA/SI at FGGM was conducted consecutively because the results of the PA yielded AOPIs that necessitated continuing onto the SI phase in accordance with CERCLA. Conversely, the results of the PA at PMR did not yield any AOPIs, so no SI phase was executed. 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 objective of the SI is to identify whether there has been a release of PFOS, PFOA, and PFBS to the environment from any of the AOPIs identified in the PA and to determine if further investigation is warranted.

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 FGGM and sub-installation PMR, PA and/or SI development followed a similar process as described in **Sections 1.3.1** through **1.3.5** below. **Section 3** provides a summary of the PA activities completed at both FGGM and PMR, and **Section 6** provides a summary of the SI activities completed for FGGM. The PA and SI processes are documented in the PA/SI Quality Control Checklist included as **Appendix C**.

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), FGGM, and Arcadis U.S., Inc. (Arcadis). The kickoff call occurred 22 January 2019, four weeks before the site visit to discuss the goals and scope of the PA, project scheduling, installation access, timeline for the site visit, access to installation-specific databases, and to request available records.

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

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

- The Installation Management Command (IMCOM) operation order
- The Army PA Operations Security requirements package, which includes the antiterrorism/operations security review cover sheet (**Appendix D**)
- 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 at FGGM was conducted on 25-27 February 2019. Through the evaluation of information obtained during records review and/or personnel interviews, no areas at PMR were identified as possible AOPIs ahead of the site visit to FGGM; therefore, no site visit to PMR was conducted. 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 FGGM and PMR. 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 at FGGM 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 sampling during the SI. Photo documentation of the preliminary locations was collected, and access limitations or advantages related to potential future sampling activities were noted.

An exit briefing was offered to installation personnel at the conclusion of the site visit to raise any items identified during the site visit, discuss any follow-up items, and review the schedule for submitting deliverables. The exit briefing was conducted on 27 February 2019 with representatives from FGGM, USAEC, and USACE to discuss preliminary findings of the PA site visit.

1.3.3 Post-Site Visit

After the site visit, information collected before, during, and after the site visit was reviewed and corroborated by cross-referencing records and reviewing interview details and observations noted during site visit reconnaissance. A site visit trip report was prepared 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 portions 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 identified at FGGM, which served as the basis for developing the SI scope of work presented in an installation-specific Quality Assurance Project Plan (QAPP) Addendum (Arcadis 2020).

1.3.4 Site Inspection Planning and Field Work

The SI process was initiated at the installation to evaluate PFOS, PFOA, and PFBS presence or absence at each AOPI and determine whether further investigation is warranted. First, an SI kickoff teleconference was held between the Army PA team and FGGM.

The objectives of the SI kickoff teleconference were to:

- discuss the AOPIs selected for sampling
- gauge regulatory involvement (USEPA, Maryland Department of the Environment [MDE]) requirements or preferences
- identify overlapping unexploded ordnance or cultural resource areas
- identify specific installation access requirements and potential schedule conflicts
- discuss general SI deliverable and field work schedule information and logistics

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

- regulatory involvement (USEPA, MDE) requirements or preferences
- confirm the plan for investigation derived waste (IDW) handling and disposal
- 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 QAPP Addendum was followed in conjunction with the PQAPP (Arcadis 2019) to complete the SI scope of work. 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 SI 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 FGGM (Arcadis 2020) in **Sections 6.1** through **6.3**.

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

1.3.5 Data Analysis, Validation, and Reporting

Environmental samples collected during the SI were submitted to a laboratory which is DoD Environmental Laboratory Accreditation Program (ELAP)-accredited for PFOS, PFOA, and PFBS analysis in accordance with the DoD Quality Systems Manual (QSM) 5.1.1 (or later; DoD 2018). 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 FGGM and PMR, 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 Installation Overview of Fort George G. Meade (FGGM)

2.1.1 Site Location

FGGM is a permanent U.S. Army installation located on 5,142 acres of land in the northwest corner of Anne Arundel County, Maryland as shown on **Figure 2-1** (Site Location) and **Figure 2-2** (Site Layout). Anne Arundel County is in central Maryland, on the western shore of the Chesapeake Bay estuary, almost equidistant (12 miles) between Baltimore, Maryland and Washington, D.C., southeast of the Baltimore-Washington Parkway, north of Maryland Route 32, and west of Maryland Route 175. Nearby communities include Odenton, Severn, Jessup, and Laurel. The resident and working populations of FGGM is approaching 90,000 (FGGM 2017).

2.1.2 Mission and Brief Site History

FGGM became an Army installation in 1917 and encompassed 9,349 acres. Originally named Camp Meade, the installation was renamed to Fort George G. Meade on 05 March 1929. During World War I, more than 100,000 soldiers passed through FGGM. The 79th, 92nd, and 11th Infantry Divisions trained at the installation, and an Ordnance Supply School was established in 1918. When the war ended, FGGM served as a demobilization center for returning troops. FGGM became a permanent Army installation after World War I.

By 1940, 251 permanent and 218 temporary buildings and more than 2,100 enlisted soldiers were present at the installation. By December 1941, the total land acquired by FGGM had grown to approximately 13,800 acres. In 1988, FGGM was realigned under the first round of Base Realignment and Closure (BRAC). The BRAC program authorized 9,000 acres to be excessed from FGGM. Between 1991 and 2000, approximately 8,471 acres of BRAC property were transferred out of the DoD's control. Currently, FGGM occupies 5,142 acres. The FGGM mission is to provide required services, infrastructure, a safe and secure community, and a quality of life that supports mission readiness and the FGGM community.

2.1.3 Current and Projected Land Use

FGGM is located in a mixed-use area, with light industrial, commercial, residential (areas of low-medium density, medium density, and high density) uses and wildlife preserves bordering the installation. Residential, training, commercial, and public (e.g., schools, shopping) use areas are present within FGGM (USACE 2004).

2.1.4 Climate

FGGM is located in the continental climate zone of the eastern U.S., where general atmospheric flow is from west to east. This climate region is characterized by summers that are long, warm, and often humid as a result of persisting maritime tropical air. Temperate weather prevails in the spring and autumn. Annual temperatures range from less than -6°F (degrees Fahrenheit) in winter to a high of more than 100°F in summer. The annual mean temperature at FGGM is 61°F with an average daily maximum of 72°F and an average daily minimum of 45°F. Annual precipitation averages 41 inches with approximately 22 inches of snow. Rainfall occurs throughout the year, but the greatest amounts occur in the summer (peaking in August) from strong thunderstorms. The region has moderate to high humidity levels throughout the year (USACE 2004).

2.1.5 Topography

In general, the topography of FGGM is characterized by flat land that gently slopes toward scattered water bodies throughout the installation (**Figure 2-3**). Local small-scale variations in elevation are abundant. Much of the installation topography has been altered by development (URS 2015).

2.1.6 Geology

FGGM is located in the Atlantic Coastal Plain physiographic province and is underlain by a thick wedge of unconsolidated sediments that dip and thicken to the southeast. The sediments beneath the installation are Early Cretaceous in age and belong to the Potomac Group. The Potomac Group consists of, from youngest to oldest, the Patapsco, Arundel, and Patuxent Formations, and has a total thickness of more than 600 feet. These formations are characterized as fluvial (river) and lacustrine (lake) deposits consisting of interbedded sand, silt, and clay that are limited in extent.

The Patapsco Formation can be subdivided into an upper, middle, and lower unit. The thickness of the upper Patapsco unit varies from 1 to 40 feet across the installation and appears to pinch out to the west. This unit consists of mottled, medium-fine sand to silty sand, usually yellow-brown, yellow-orange, light brown, or gray. Thin beds of clay and gravel are rare.

The middle Patapsco unit consists of a thick, hard, highly plastic, mottled, red-brown to light gray clay. This unit has an average thickness of 50 feet, with a maximum recorded thickness of 102 feet. Very fine silty sand lenses, 2 to 16 feet thick, are present throughout the middle unit, and a coal seam is present in the lower section of the middle Patapsco unit.

The lower Patapsco unit consists of medium-fine silty sand which grades vertically downward into coarse sand with minor silt. The color of this unit varies from pale to dark yellow-orange, dark brown, and dark yellow. The transition between the middle and lower units is gradual, marked by alternating silty sands and silty clays. The regional thickness of this unit ranges from 80 to 100 feet.

The Arundel Formation is approximately 250 feet thick. This formation consists of massive beds of red, brown, and gray clay, with several more permeable layers present. The Patuxent Formation underlies the Arundel Formation and overlies Precambrian to early Cambrian igneous and metamorphic rocks of the Piedmont Physiographic Province. The Patuxent Formation is composed primarily of sand and gravel with minor amounts of silty clay and clay (URS 2015).

2.1.7 Hydrogeology

Three distinct aquifers are present in the unconsolidated sediments beneath the site. The aquifers are known locally as the Upper Patapsco Aquifer (UPA), the Lower Patapsco Aquifer (LPA), and the Patuxent aquifers. Two confining layers, an unnamed unit corresponding to the Middle Patapsco Unit (herein referred to as the Middle Patapsco Clay) and the Arundel Formation, separate the three aquifers. The Lower Patapsco and Patuxent aquifers are under confining conditions except where the aquifers outcrop and unconfined conditions prevail.

The UPA is an unconfined (i.e., water table) aquifer. The regional groundwater flow is to the southeast; however, as a result of influences in topography, the local water table flow direction is highly variable. The transmissivity of the UPA ranges from 100 to 10,000 square feet per day. In 1992, EA Engineering, Science, and Technology (EA) measured the hydraulic conductivity of this aquifer as between 3x10-5 and 6x10-3 centimeters per second (cm/sec) (EA 1992).

The LPA acts as both a water table and a confined aquifer, depending on the presence of the upper and middle Patapsco units. Regional groundwater flow in the LPA is to the southeast, though the local groundwater flow direction also varies. The transmissivity of the LPA ranges between 900 to 6,000 square feet per day. In 1992, EA measured the hydraulic conductivity of the LPA as between 4x10-4 and 2x10-3 cm/sec for the confined portions of the aquifer and from 1x10-4 to 2x10-2 cm/sec in the unconfined portions of the aquifer. (EA 1992)

The Patuxent aquifer is the deepest aquifer in the unconsolidated material and is under confined conditions beneath the installation. The regional groundwater flow direction is to the southeast, consistent with the regional dip. The transmissivity of the Patuxent aquifer ranges from 80 to 9,000 square feet per day.

As stated above, the two confining units separating the three aquifers are the middle Patapsco unit and the Arundel Formation. The vertical hydraulic conductivity of the middle Patapsco unit has been documented as ranging from 1x10-8 to 2x10-7 cm/sec and 3x10-9 cm/sec. The vertical hydraulic conductivity of the Arundel Formation has been documented at 2.08x10-10 cm/sec (URS 2015).

2.1.8 Surface Water Hydrology

The entire Fort Meade property eventually drains to the Little Patuxent River via two primary tributaries (Midway Branch and Franklin Branch) and two small unnamed branches along the southwestern boundary of the installation. Midway Branch and Franklin Branch drain the west and east portions of the installation respectively, joining south of the installation as Rogue Harbor Branch, and eventually entering Soldier Lake south of Route 32. The third tributary consists of two small, unnamed branches located towards the southwestern edge of FGGM that converge before joining the Little Patuxent River. This tributary drains surface run-off from the southwest portion of the installation. Except for several stormwater management ponds, Burba Lake is the only enclosed water body on the base.

Midway Branch drains approximately 1,386 acres of FGGM. Midway Branch also drains approximately 290 acres offsite to the north. The stream is generally undergoing significant aggradation and degradation along the upper reaches, while the lower part appears to be relatively healthy.

The Franklin Branch watershed is divided into eight sub watersheds. It originates as an intermittent stream in the vicinity of Meade Senior High School in the northeast portion of the base, flowing generally in a southerly direction to Burba Lake. Exiting Burba Lake, Franklin Branch flows to the southwest, joining Midway Branch, and exiting the post at the south-central border as Rogue Harbor Branch. Franklin Branch drains approximately 1,163 acres of the post.

Two unnamed tributaries to the Little Patuxent River are located in the southwest portion of the post and north of Tipton Airfield. LP-1 is the southernmost of the two streams and large quantities of sediment are transported from this reach to the Patuxent River. LP-2 is a previously undesignated sub-watershed that lies to the north of LP-1. As with LP-1, there is an established overstory of vegetation with a sparse understory, particularly along the banks.

Upstream from a point approximately 1 mile south of the Route 198 bridge, the Little Patuxent River and its tributaries are designated "Use I-P" waters. This includes the reach of the Little Patuxent River passing through FGGM as well as the two unnamed tributaries LP-1 and LP-2. However, it does not include Midway Branch and Franklin Branch. Use I-P waters are protected for water contact recreation, protection of aquatic life and public water supply (Maryland Department of the Environment [MDE] 2020). They may be used for the following activities:

- Water contact sports
- Play and leisure-time activities where individuals may come into contact with the surface water
- Fishing
- The growth and propagation of fish (other than trout), other aquatic life, and wildlife
- Agricultural water supply
- Industrial water supply
- Public water supply

The portion of the installation with frontage on the Little Patuxent River, in the southwest corner of FGGM near the wastewater treatment facility, contains palustrine and riverine wetlands. This area also is part of the 100-year floodplain of the river (C2HM Hill 1999).

2.1.9 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 FGGM.

2.1.9.1 Stormwater Management System Description

The major stormwater drainage routes at FGGM are Franklin Branch and Midway Branch, both of which flow from north to south through FGGM; and the Little Patuxent River, which borders the western side of FGGM, also flows to the south. Franklin Branch and Midway Branch converge into Rogue Harbor Branch in the southern portion of FGGM, which continues to flow south after flowing through Soldier Lake to the

Little Patuxent River. Overland flow from the northeastern corner of FGGM flows to the east into Severn Run, which eventually becomes the Severn River.

Most overland flow of stormwater from FGGM flows through intermittent ditches or into storm drains, which lead to one of the three main drainages. In addition, a limited number of the storm drains lead into the privatized wastewater treatment plant rather than toe the drainage system (FGGM 2014).

Multiple stormwater pipes originating from AOPIs were identified following a review of documents and relevant FGGM stormwater system maps, and during site reconnaissance. Relevant stormwater details for AOPIs are discussed in **Section 5.2**.

2.1.9.2 Sewer System Description

Two separate wastewater collection and treatment systems have served the current installation boundaries of FGGM. FGGM is latitudinally divided by a ridge line which forms the drainage divide between the Little Patuxent River and Rogue Harbor Branch, this drainage divide separated the wastewater collection systems at FGGM into an eastern and a western portion. Sewage Treatment Plant (STP) Number 1 which serviced the eastern portion of the installation, began operating in the 1930s until it was retired in the early 1980s. STP Number 2 historically serviced the western portion of the installation starting in 1955. In 1983, STP Number 2 was redeveloped and remains in use today. It is currently operated by American Water.

Sanitary and stormwater sewage from certain storm drains at FGGM is collected through a 100-mile sewerage collection network and directed towards the Wastewater Treatment Facility (Malcolm Pirnie 2006).

2.1.10 Potable Water Supply and Drinking Water Receptors

FGGM obtains all the potable water used on the post from a combination of six groundwater wells. The groundwater wells draw from the Patuxent Aquifer. Static water levels in the wells range between 80 and 120 feet bgs.

The installation operates the withdrawal of water under a Water Appropriation and Use permit from the Maryland Department of Natural Resources, Water Resources Administration. This permit allows an average of 2 million gallons per day of water to be withdrawn annually from the installation's groundwater wells (C2HM Hill 1999)

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 (**Appendix F**), was generated for FGGM, which along with state and county GIS data provided by the installation identified several off-post public and private wells within 5 miles of the installation boundary (**Figure 2-4**).

On 04 April 2019, FGGM provided additional tabulated data compiled by Anne Arundel County which provided the addresses of all properties located within a 5-mile radius of FGGM that receive potable water supply via private wells. Information regarding the screened intervals and existing treatment systems was not requested or received.

In December 2020, Anne Arundel County provided a GIS inventory of registered groundwater supply wells located 5-miles southeast and hydraulically downgradient of the FGGM installation boundary. This dataset included point locations for identified supply wells. Information regarding the screened intervals and existing treatment systems was not requested or received.

2.1.11 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.

Extensive development at FGGM has resulted in the retention of few areas of native vegetation on-post, most of which is associated with stream corridors. The largest wooded area on-post is in the southwest corner and is associated with the Little Patuxent River. The dominant vegetation in this area is red maple (Acer rubrum), sweet gum (Liquidambar styraciflua), black gum (Nyssa sylvatica), northern arrowwood (Viburnum recognitum), Japanese honeysuckle (Lonicera japonica), greenbriar (Smilax rotundifolia), and poison ivy (Toxicodendron radicans).

The wildlife species found at FGGM are typical of those found in most urban-suburban areas. White-tailed deer frequent the post, especially along the Little Patuxent River. Other mammals that may be found on FGGM include gray squirrel, raccoon, opossum, eastern chipmunk, field mouse, vole, mole, and fox.

Common birds on the sites would be limited to those that have adapted to an urban-suburban existence, such as American robin, catbird, mockingbird, Carolina chickadee, Carolina wren, house wren, downy woodpecker, common flicker, European starling, house sparrow, rock dove, mourning dove, and song sparrow. The Maryland Department of Natural Resources performed the first fish survey of Burba Lake in 1995. The most abundant species were bluegill and pumpkinseed. The Maryland Department of Natural Resources also stocked the pond in 1995 with channel catfish, redear sunfish, and hybrid (bluegill x green) sunfish for the intended harvest during spring and fall fishing tournaments (CH2M Hill 1999).

Endangered species in Anne Arundel county, as reported by the U.S Fish and Wildlife Service, include the Northern Long-Eared Bat (Myotis septentrionalis), the Monarch Butterfly (Danaus plexippus), and the Puritan Tiger Beetle (Cicindela puritana) (U.S. Fish and Wildlife Service 2021).

2.1.12 Previous PFAS Investigations

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

In May 2016, the USEPA issued a PFOS and PFOA health advisory level of 70 ng/L; subsequently, in June 2016, the Army issued a guidance publication for PFAS contamination assessments (Army 2018). In response to these actions, sampling of the FGGM potable water supply system was conducted during both the third Unregulated Contaminant Monitoring Rule (UCMR3) in 2015, and IMCOM Operations Order 16-088 in 2016.

The USEPA conducted the UCMR3 related monitoring between 2013 and 2015. UCMR3 is a national program that collects data for contaminants that are suspected to be present in drinking water and do not

have health-based standards set under the Safe Drinking Water Act. The UCMR3 analyte list published in 2012 included the analysis of PFOS and PFOA in public water systems serving more than 10,000 people (USEPA 2012). The laboratory that analyzed samples under UCMR3 met the USEPA's UCMR3 Laboratory Approval Program application and Proficiency Testing criteria for USEPA Method 537 Version 1.1.

The FGGM Water Treatment Plant (WTP) point of entry was sampled during the UCMR3 in June 2015 and results indicated that PFOS and PFOA were not detected above the minimal reporting level (MRL). The MRL during this analysis was 40 and 20 ng/L for PFOS and PFOA respectively, below the USEPA lifetime health advisory level of 70 ng/L combined for PFOS and PFOA.

In response to the IMCOM Operations Order 16-088, pre-treatment water from the six potable wells that supply the FGGM WTP (**Figure 2-2**) were sampled for PFOS and PFOA in August 2016. Results from this sampling event indicated that PFOS and PFOA were not detected above the MRL of 20 ng/L for PFOS and PFOA. Samples collected under IMCOM Operations Order 16-088 were analyzed under USEPA Method 537 in accordance with DoD QSM 5.1.1 Table B-15.

2.2 Installation Overview of Phoenix Military Reservation (PMR)

2.2.1 Site Location

PMR is a sub-installation managed as part of U.S. Army Garrison FGGM. The location of the PMR is shown on **Figure 2-5**.

PMR occupies 17 acres of land and is located approximately one-half mile west of Jacksonville, Baltimore County, Maryland. PMR 2013).

2.2.2 Mission and Brief Site History

PMR was developed in 1954 as a Nike Ajax missile site. In 1958, the site was modified to support Nike Hercules missiles. In 1966, the Nike missile program was terminated, and the site remained relatively inactive until 1974. In 1974, the Maryland Army National Guard was granted a 5-year lease of the property from the U.S. Army. The Maryland Army National Guard used the facility as a year-round training ground for its military police. In 1979, the Guard requested, and was granted, a 5-year lease extension, though the Guard ceased active operations at PMR in 1982. The buildings were demolished shortly thereafter, and the site has remained unoccupied. (PMR 2019).

2.2.3 Current and Projected Land Use

PMR is located within a residential area that is characterized by large, single-family homes situated on lots that are greater than one acre in size. The site and the majority of the surrounding area include mature mixed hardwood forests with isolated open lawns and fields. To the east, there is a large contiguous wooded area composed of mature mixed hardwoods. Areas of steep slope adjacent to the site are wooded with mature hardwoods and understory. Historical photographs indicate that the area was farmed prior to the installation of the Fire Control Area (FCA). The surrounding areas were open pasture

in the 1960s and have reverted to forest during the last 40 years. The site layout of PMR is shown on **Figure 2-6**.

2.2.4 Climate

The Chesapeake Bay moderates the climate of the Baltimore, Maryland area. The winters are relatively mild; throughout the year, humidity tends to be higher near the bay than in more inland areas. The percent relative humidity during the year ranges from mid-60% to low 70%. Precipitation is generally uniform throughout the year, with maximum precipitation in August and minimum precipitation in October. The average annual precipitation is 45.7 inches. The mean daily temperature ranges from 34 ˚F in the winter to 75 ˚F in the summer. Average wind speed is 6 to 9 miles per hour year-round. Prevailing winds are from the north-northwest in the winter months and south to south-southwest in the summer months. (Arcadis 2012).

2.2.5 Topography

PMR lies in the Piedmont physiographic province of northeastern Maryland. The topography is characterized by rolling hills formed by the differential erosion of fractured and unfractured metamorphic bedrock. The FCA lies at a maximum elevation of approximately 587 feet above mean sea level (amsl), and topography slopes to the north. The lowest elevation is about 540 feet amsl at the northern boundary of the FCA. A topographic map for PMR is displayed on **Figure 2-7** (Arcadis 2012).

2.2.6 Geology

Baltimore County, Maryland is located in the eastern part of the Piedmont physiographic province. The province is composed of hard, crystalline igneous and metamorphic rocks and extends from the inner edge of the Coastal Plain westward to Catoctin Mountain, the eastern boundary of the Blue Ridge province. Bedrock in the eastern part of the Piedmont consists of schist, gneiss, gabbro, and other highly metamorphosed sedimentary and igneous rocks of probable volcanic origin. In several places, granitic plutons and pegmatites have intruded these rocks. Several domal uplifts of Precambrian gneiss mantled with quartzite, marble, and schist are present in Baltimore County and in parts of adjacent counties. Differential erosion of these contrasting rock types creates a distinctive topography in this part of the Piedmont (Arcadis 2012).

2.2.7 Hydrogeology

PMR site is situated on the top of a ridge, and shallow groundwater appears to flow northwest from the site toward the Greene Branch, which, with its two intermittent tributaries, is the interpreted discharge point of the aquifer. In contrast, shallow groundwater on the southern portion of the ridge appears to generally flow south/southeast toward Overshot Run and its intermittent tributary. Deep groundwater in the underlying Loch Raven Schist primarily occurs within fractures within the top 100 feet of bedrock. (Arcadis 2012).

2.2.8 Surface Water Hydrology and Relevant Utility Infrastructure

There are no surface water bodies on PMR. Surface runoff from the site and groundwater beneath the site are mainly interpreted to flow into the Greene Branch, which is a swift-flowing erosional stream located about 1,400 feet to the north of the site. The Greene Branch flows westward through an erosional stream channel at an elevation that decreases from about 400 feet amsl north of the FCA to about 240 feet amsl west of the site. The flow rate of the Greene Branch has been estimated at 50 cubic yards per minute, or approximately 10,000 gallons per minute (Weston 1990). The Greene Branch flows 2.5 miles from the site to the 22,000-acre Loch Raven Reservoir. However, it should be noted that at the southernmost portion of the site, surface runoff and underlying groundwater are interpreted to flow south toward an unnamed tributary of Overshot Run. In addition to the main water bodies, there are two intermittent streams to the north of the FCA and one to the south. These streams feed into the Greene Branch and Overshot Run, respectively (Arcadis 2012). No major man-made stormwater management systems or sewer systems are present on site at PMR. Stormwater at PMR is inferred to flow via natural channels and flow pathways down topography towards Greene Branch.

2.2.9 Potable Water Supply and Drinking Water Receptors

In 2004, homeowners living adjacent to PMR were interviewed regarding water supply and, if applicable, residential well information as part of a volatile organic compound investigation at PMR. Fourteen residences within the immediate vicinity of PMR are connected to and utilize a community water supply (which was installed by Baltimore County as a result of previous groundwater contamination emanating from the site). Based on the homeowner interviews conducted in 2004, a review of Baltimore County files and conversations with Baltimore County personnel, no other homes in the area utilize a public water supply (Arcadis 2012).

There are five property owners located to the northwest of the site, (on Sunnybrook Road) and six property owners to the southwest of the site, (on Mollie Court) that are not connected to the community water supply system. Of the five properties along Sunnybrook Road that are not on the community water supply system, three have houses and are utilizing private wells, one is a vacant property with an existing potable well, and one is a vacant property with no well (Arcadis 2012).

Three other public supply wells within a 5-mile radius of PMR were included in an EDR well search report compiled for the sub-installation. All identified potable wells within a 5-mile radius of PMR as identified in the supplied EDR well search report are included on **Figure 2-8**.

2.2.10 Ecological Receptors

Due to the limited availability of adequate toxicity data, the Army focused the PA/SI on human receptors. During the PA, available information regarding ecological receptors in the installation documents was reviewed. The following information is provided for future reference should the Army decide to evaluate exposure pathways relevant to the ecological receptors.

PMR is located atop a topographic high overlooking the Greene Branch valley. The parcel historically was farmed and more recently maintained as lawn to facilitate site access and visibility. As observed during site reconnaissance in June 2006 to support the screening level ecological risk assessment, the eastern portion of the FCA contains early successional stage plants. Surface cover in this area is difficult to walk

through, although meadow clearings exist in several locations within this area. The remainder of the site remains cleared with scattered residual landscaping plants and frontier species that are reforesting open areas. There are no records from the U.S. Fish and Wildlife Service or Baltimore County indicating any threatened or endangered species in this area. The surrounding area is primarily suburban and wooded with isolated expansive lawn areas. (Arcadis 2012).

2.2.11 Previous PFAS Investigations

No historical PFAS investigations (including PFOS, PFOA, and/or PFBS) have taken place at PMR.

While many of the residential homes surrounding PMR receive their potable water from domestic supply wells, drinking water is also supplied to areas within a 5-mile radius of Phoenix, Maryland by the Baltimore City Water Authority and/or other community water systems present in Baltimore County. Multiple samples from entry points to the Baltimore City Water Authority distribution system were sampled between February and October 2017 under UCMR3 for PFAS, including PFOS, PFOA, and PFBS. There were no reported detections of PFOS, PFOA, or PFBS at concentrations above the MRL for all three compounds.

One public water system, the Harford County Department of Public Works Perryman WTP, servicing one zip-code located within a 5-mile radius of PMR was sampled under UCMR3. Analysis of the sample collected in September 2013 detected PFOA equal to the MRL at a concentration of 20 ng/L. The MRL during this analysis was 40 and 20 ng/L for PFOS and PFOA respectively, below the USEPA lifetime health advisory level of 70 ng/L combined for PFOS and PFOA. Review of operational details for the Harford County Department of Public Works Perryman WTP indicates that the potable supply wells used to supply water to the Perryman WTP are located approximately 18.5 miles east of PMR in Aberdeen, Maryland.

3 SUMMARY OF PRELIMINARY ASSESSMENT ACTIVITIES AT FGGM AND PMR

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

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

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

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. A summary of the observations made, and data collected through records reviews (**Appendix G**), installation personnel interviews (**Appendix H**), and site reconnaissance logs (**Appendix J**) during the PA process for FGGM and PMR is presented in **Section 4**. Further discussion regarding areas not retained for further investigation/AOPIs are presented in **Section 5.1/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, FGGM fire department documents, FGGM and PMR Directorate of Public Works documents, and GIS files. Internet searches were also conducted to identify publicly available and other relevant information. Additionally, an EDR report generated for FGGM and PMR were reviewed to obtain off-post water supply well information. A list of the specific documents reviewed is provided in **Appendix G**.

3.2 Personnel Interviews

Interviews were conducted during the site visit, which was completed on 27 February 2019. If a previously identified interviewee was not available during the site visit, attempts were made to complete the interview via telephone before or following the site visit or by contacting an alternate interviewee identified by the installation POC.

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

- FGGM Fire Department, retired Deputy Fire Chief
- FGGM Fire Department, two retired Fire Chiefs
- FGGM IRP Program, IRP Program Manager

- Sundance Consulting, two IRP Environmental Engineers
- Calibre, BRAC Environmental Coordinator
- FGGM Fire Department, Fire Chief
- FGGM Fire Department, Deputy Fire Chief
- FGGM Fire Department, Fire Captain
- FGGM Directorate of Public Works, Engineer Tech / Former WTP Operator

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

3.3 Site Reconnaissance

Site reconnaissance and visual surveys were conducted at 9 of the preliminary locations identified at FGGM during the records review process, the installation in-brief meeting, and/or during the installation personnel interviews. All 9 locations were identified as AOPIs. Two additional AOPIs were identified following the FGGM site-visit. Site-reconnaissance was not conducted at these two locations prior to the SI. Following the review of information collected at FGGM pertinent to PMR, no locations at PMR were identified for site-reconnaissance. A photo log from the site reconnaissance is provided in **Appendix I**; photos were used to assist in verification of qualitative data collected in the field. The site reconnaissance logs are provided in **Appendix J**.

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

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

FGGM and PMR were evaluated for all potential current and historical use, storage, and/or disposal of PFAS-containing materials. There are a variety of PFAS-containing materials used in relation to current and historical Army operations. However, the use, storage, and/or disposal of AFFF is the most prevalent potential source of PFAS chemicals at DoD facilities. As such, this section is organized to summarize the AFFF-related uses first, and all remaining potential PFAS-containing materials in the subsequent section.

4.1 Fort George G. Meade

4.1.1 AFFF Use, Storage, and Disposal Areas at FGGM

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

According to a retired fire chief interviewed prior to the site-visit, the FGGM Fire Department first received AFFF following the purchase of a foam-capable fire engine in the late 1970s. The FGGM Fire Department used AFFF in conjunction with fire-equipment testing operations, and as part of live-fire training exercises at the Tipton Airfield BRAC parcel.

Current and former Fire Department personnel interviewed before and during the site-visit stated that prior to 2001, AFFF was stored in the basement of Building 4230, the Former FGGM Fire Station. Although an exact inventory was not documented, interviewed personnel stated that AFFF was stored in 5-gallon containers.

AFFF used by fire department personnel is currently stored within the basement of Building 6619; the current FGGM Fire Station. Army-wide installation AFFF inventory records provided by USAEC were reviewed prior to the FGGM site visit. The inventory file, titled “IMCOM AFFF Inventory 20171103 v3 to Garrisons,” reported that 115 total gallons of AFFF were stored at FGGM. Prior to the site visit, FGGM Fire Department personnel provided a tally of the installation’s current AFFF inventory. It was reported that FGGM stored 165 gallons of 1%/3% alcohol resistant – AFFF, with 90 gallons stored within the 30-gallon capacity foam tanks of three fire engines, and the remaining 75 gallons stored in fifteen 5-gallon pails within the basement of Building 6619. During a site-reconnaissance visit to the Building 6619 Fire Station, forty-two 5-gallon drums of 1%/3% Universal Gold alcohol resistant -AFFF were recorded in

storage. The current storage inventory of the fire engines was not evaluated during the site reconnaissance trip to Building 6619.

According to a retired FGGM Fire Chief interviewed prior to the site visit, the FGGM Fire Department would historically dispose of empty 5-gallon AFFF buckets by first rinsing and dumping residual foam along the former Building 4230 driveway before disposing of the buckets in a dumpster behind the fire station. Refuse from the dumpsters were reportedly carted off and disposed of at the now closed sanitary landfill, located along the southeast border of FGGM.

Through interviews with retired and active installation personnel, four areas were identified that included the release of AFFF as part of fire equipment training exercises: The 2300 Area, the 900 Area, Railroad Avenue, and the Salt Dome.

The 2300 Area and 900 Area operated as the main fire equipment training areas for FGGM Fire Department personnel. A retired FGGM Fire Chief stated in his interview that foam-inductor training, whereby a dedicated AFFF injection valve is placed into an AFFF bucket, then injected into a hose line and mixed with running water for direct and immediate foam application, regularly occurred at these two areas. A retired FGGM Fire Chief stated that the 2300 Area was operated as a training ground from the late 1970s to the late 1990s and was reportedly used as often as 12-15 times per year. The 900 Area operated from the 1980s until the mid-1990s and was used less frequently than the 2300 Area, reportedly being used for foam inductor training on at least three occasions. Both the 2300 Area and 900 Area were selected for training due to the presence of open land that would allow for the unimpeded extension of fire hoses. Neither area contained any dedicated training equipment, berms, or burn pits. In addition to the 2300 Area and 900 Area, both active and retired FGGM Fire Department personnel recalled a single release of 15-20 gallons of AFFF at the Salt Dome area towards the southeastern border of FGGM. During a site-reconnaissance trip to this area, a “Fire Department Training in Progress” sign was seen lying on the ground along with construction debris.

The Railroad Avenue area, according to interviewed retired fire chiefs, was used for fire-hose training operations. Although training involving the direct use of AFFF did not reportedly occur here, a retired FGGM Fire Chief stated that residual AFFF left in hose-lines from foam inductor training exercises at the 2300 Area and 900 Area was very likely released to the ground and tarmac during training exercises with water and hoses at Railroad Avenue.

4.1.2 Other PFAS Use, Storage, and/or Disposal Areas at FGGM

During a telephonic interview with the IMCOM Pest Management Consultant, it was noted that products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS and were phased out in 1996. During the PA records review, the IMCOM Pest Management Consultant provided records of potentially PFAS-containing pesticides and insecticides used at and/or stored at Army installations, and did/did not identify FGGM as an installation having used or stored PFAS-containing pesticides/insecticides. Additionally, the PA team reviewed available pesticide use inventory documentation provided by the installation and did not identify PFAS-containing pesticides use, storage, or disposal.

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

Following document reviews, personnel interviews, and site reconnaissance trips to the identified AOPIs at FGGM, it was concluded that AFFF or any other PFAS wastes would not have been released into the sanitary sewer system.

4.1.3 Readily Identifiable Off-Post PFAS Sources

An exhaustive search to identify all potential off-post PFAS sources (i.e., not related to operations at FGGM) is not part of the PA/SI. However, potential off-post PFAS sources within a 5-mile radius of the installation that were identified during the records search and site visit are described below.

Nearby community fire departments such as the Odenton Fire Department, Jessup Fire Department, and Maryland City Fire Department could potentially be off-post PFAS sources within close proximity of FGGM, if they use AFFF.

Although the exact locations of release were not identified during the PA, a retired FGGM Fire Chief stated AFFF was used during joint off-post fire responses with neighboring fire departments. The same retired FGGM Fire Chief recalled a joint-training exercise between FGGM Fire Department personnel and Baltimore-Washington International (BWI) Airport Fire Department personnel, where AFFF may have been released at the airport as part of training.

During the PA for FGGM, information detailing the potential use, storage, and/or disposal of PFAS-containing materials at three areas located within Tipton Airport and one area within the Patuxent Research Refuge – North Tract were identified during preliminary document reviews ahead of the site-visit to FGGM. These areas: the Former Open Burn Area, Tipton Airfield Fire Training Area (FTA) 1, Tipton Airfield FTA 2 (located within the Tipton Airport BRAC parcel) and the Sewage Treatment Plant 1 (located within the Patuxent Research Refuge – North Tract) were identified as potential off-post PFAS sources. These BRAC parcels, including the four identified areas within them, are being investigated for PFAS separately.

4.2 Phoenix Military Reservation

4.2.1 AFFF Use, Storage, and Disposal Areas at PMR

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

According to multiple current and retired fire chiefs interviewed prior to the site-visit at FGGM, AFFF was never stored or released at PMR. Additional review of historical CERCLA reports also indicated that no firefighting or fire training exercises utilizing or storing AFFF were conducted at PMR.

4.2.2 Other PFAS Use, Storage, and/or Disposal Areas at PMR

During a telephonic interview with the IMCOM Pest Management Consultant, it was noted that products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS and were phased out in 1996. During the PA records review, the IMCOM Pest Management Consultant provided records of potentially PFAS-containing pesticides and insecticides used at and/or stored at Army installations and did/did not identify PMR as an installation having used or stored PFAS-containing pesticides/insecticides.

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

4.2.3 Readily Identifiable Off-Post PFAS Sources

An exhaustive search to identify all potential off-post PFAS sources (i.e., not related to operations at PMR) is not part of the PA/SI. However, potential off-post PFAS sources within a 5-mile radius of the sub-installation that were identified during the records search and site visit are described below.

Nearby community fire departments such as the Jacksonville Volunteer Fire Company Station 47, Cockeysville Volunteer Fire Company Station 39, Long Green Volunteer Fire Company Station 38, and Baltimore County Fire Department Texas - Station 17 could potentially be off-post PFAS sources within close proximity of PMR, if they use AFFF.

5 SUMMARY AND DISCUSSION OF PA RESULTS

5.1 Fort George G. Meade

The areas evaluated for potential use, storage and/or disposal of PFAS-containing materials at FGGM 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, 11 have been identified as AOPIs. The process used for refining these areas is presented on **Figure 5-1**, below.

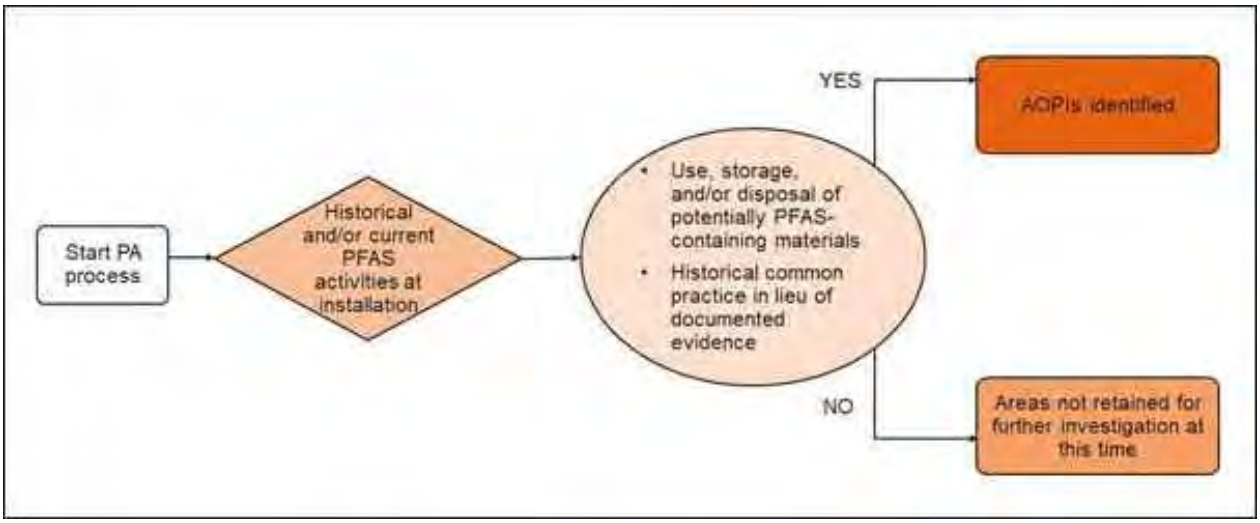

Figure 5-1: AOPI Decision Flowchart

The areas not retained for further investigation at FGGM are presented in **Section 5.1.1**. The areas retained as AOPIs are presented in **Section 5.1.2**.

Data limitations for this PA/SI at FGGM are presented in **Section 8**.

5.1.1 Areas Not Retained for Further Investigation

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

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

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

Area Description	Dates of Operation	Relevant Site History	Rationale
Gas Mask Training Area	None	Identified by Retired Fire Chief as a Fire Training Area.	The Retired Fire Chief iterated in a second follow-on interview that he did not recall AFFF being used here, due to the lack of available water at the location. Dry fire training exercises would have been conducted here
Building 2250 - Post Laundry Facility	1941 to 1991	Former laundry facility now operates as on-post recycling center.	Removed following review of administrative record documents indicating that PFAS containing materials were not used here.
Building 4680 - Photo-processing Building	Uncertain	Small scale photo processing conducted in this Building.	Review of chemical inventory associated with photo processing indicated PFOS/PFOA containing chemicals were not used.
Building 6621 - Former Pesticide Shop	1958 to 1978	Former pesticide storage shop identified during the Installation site visit.	As discussed in Section 4.1.3, review of USAEC pesticide inventories did not indicate FGGM as an installation ever having contained, used, or stored PFAS-containing pesticides/insecticides
Current Pesticide Shop	1999 to Present	Current pesticide storage shop identified during the Installation site visit	As discussed in Section 4.1.3, review of USAEC pesticide inventories did not indicate FGGM as an installation ever having contained, used, or stored PFAS-containing pesticides/insecticides
Building 8481 – Boiler House	1960s to 2000	Waste petroleum and POL products were collected and transferred to a 3,785-liter waste oil tank and burned with No. 2 fuel oil at this location.	Confirmed during site visit that no AFFF suppression systems exist on-post. AFFF never used in on-post response by fire department.
EOD/Open Burn Area	1971 to Present	Ordnance destruction area. Used four times yearly since at least 1971	Confirmed during site visit that AFFF was never used at this location.
Building 2246 – DOL Tactical and Support Vehicle/Heavy Equipment Maintenance Facility	1934 to Present	Vehicle maintenance facility where basic fire truck maintenance limited to oil changes and minor repairs was conducted.	Confirmed during site reconnaissance trip to Building 6619 – Current Fire Station that repairs to AFFF tanks and related apparatuses on fire trucks was contracted off-post and not performed at FGGM.

Area Description	Dates of Operation	Relevant Site History	Rationale
Buildings 9800 and 9817 –Plating Operations	Uncertain	Metal plating operations were conducted within these buildings. Plating wastes emptied into sanitary sewer system and sent to STP 2, the current Wastewater Treatment Plant (WWTP) for FGGM.	Review of chemical inventory associated with plating operations indicated PFOS/PFOA containing chemicals were not used for plating operations.
Flammable Storage Warehouse	Uncertain	Building used to store chemicals associated with photographic processing and plating operations.	Review of chemical inventory associated with plating operations and photographic processing indicated PFOS/PFOA containing chemicals were not used for plating operations
Sewage Treatment Plant 1	1930s to Early 1980s	Retired sewage treatment plant. Located in the Patuxent Research Tract (BRAC). Identified in the 1990 PA report.	AFFF or any other PFAS wastes would not have been released into the sanitary sewer system.
Current WWTP	1983 to Present	Current sewage treatment plant located within the current FFGM installation boundaries. Wastes from FGGM operations discharge to this WWTP	AFFF or any other PFAS wastes would not have been released into the sanitary sewer system. No PFAS-containing materials were identified at Buildings 9800, 9817, or 9811. No history of CSL leachate collection or disposal at this WWTP was identified at FGGM.
Building 4708 - On-Post AAFES Car Wash	Unknown	Carwash identified by FGGM personnel. Site recon to carwash identified a waxing agent called Tri-Foam, short for" triple-foam," was used for washing vehicles.	Triple foam has been created by multiple manufacturers, including Simoniz®. Following the review of available chemical data for Tri-Foam, it could not be confirmed that PFOS, PFOA, or PFBS were used as part of this waxing agent.
Building 4587 –AAFES Personnel Vehicle Repair Shop	Unknown	Identified by FGGM personnel as possible car wash/vehicle maintenance facility during site visit. Formerly operated as motor pool, now identified as a personal vehicle repair shop.	Site reconnaissance trip to the site did not indicate car washing waxes containing PFOS/PFOA occurred at this location.
Building 4680 – Detailing Shop	1970s to Present	Identified by FGGM personnel as a possible car wash/vehicle maintenance facility during site visit. Building operates as an on-post detailing shop.	Chemical inventory of building was not collected during or following site visit. Interviews with site personnel conducted during the site-visit indicated that the use of PFAS containing materials at this detailing shop was unlikely.

5.1.2 AOPIs

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

The AOPI locations are shown on **Figure 5-2**. Aerial photographs of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-3** through **5-13** and display monitoring wells in the vicinity of each AOPI.

5.1.2.1 900 Area – AFFF Equipment Testing Area

The 900 Area – AFFF Equipment Testing Area (AOPI #1) (**Figure 5-3**) is identified as an AOPI following personnel interviews, and site reconnaissance due to the historical release of AFFF as part of fire department training exercises that included fire hose training and foam inductor testing. These foam inductor tests generated small releases of AFFF to soil in the application area, and fire hoses at the AOPI may have contained residual AFFF that was subsequently released to the environment during training. Training was conducted at this AOPI on at least three occasions between the 1980s and 1990s. The AOPI is located along the mid-eastern boundary of FGGM and resides atop a grassed hill defined by shifting areas of shallow and steep topographic relief bounded to the north by thick trees and vegetation, and to the south by the FGGM Visitor Center. Surface runoff flows along topography towards the southwest and into the FGGM stormwater system before eventually draining into Burba Lake via Franklin Branch.

The 900 Area – AFFF Equipment Testing Area AOPI borders one historical FGGM vehicle wash-rack (WR) and motor pool (MP) pair (WR-9 and MP-13) documented under the existing IRP site: Motor Pools, Washracks, Buildings (Former) (FGGM-96/24355.1054). In the mid-1990s, multiple historical motor pools, wash-racks, vehicle service and staging areas, and buildings where chemical releases may have occurred were identified based on review of aerial photography. A PA/SI of these areas was conducted and concluded there are 38 areas where tests and screening-level risk analysis results confirmed that additional environmental actions were required. WR-9 and MP-13 were included in the list of 38 areas requiring additional environmental actions (FGGM 2017). A draft Supplemental Site Inspection (SSI) report published in 2020 and recommending No Further Action (FFA) for this site is currently pending regulatory approval (USACE 2020).

The 900 Area – AFFF Equipment Testing Area CSM information is presented in **Section 7.16**.

5.1.2.2 2300 Area – AFFF Equipment Testing Area

Similar to the 900 Area – AFFF Equipment Testing Area AOPI, the 2300 Area – AFFF Equipment Testing Area (AOPI #2) (**Figure 5-4**) is identified as an AOPI following personnel interviews and site reconnaissance due to the historical release of AFFF as part of fire department training exercises that included fire hose training and foam inductor testing. These foam inductor tests generated small releases of AFFF to soil in the application area, and fire hoses used at the AOPI may have contained residual

AFFF that was subsequently released to the environment during training. Training was reportedly conducted at this AOPI at least 12 to 15 times per year between the 1980s and 1990s. The AOPI is located in the south-eastern portion of the FGGM at the intersection of Wilson Street and 85th Medical Battalion Avenue. The historical releases of AFFF at this AOPI occurred in an open field. The area is now defined by light vegetation and scattered trees. The AOPI is also surrounded by a recreational vehicle park that is used for on-installation housing and recreational uses. Surface runoff from this AOPI reportedly flows along topography towards the southwest and into a short perennial stream that flows directly into Burba Lake.

The 2300 Area – AFFF Equipment Testing Area CSM information is presented in **Section 7.16**.

5.1.2.3 Salt Dome

The Salt Dome (AOPI #3) (**Figure 5-5**) is identified as an AOPI following personnel interviews, and site reconnaissance due to a single reported release of approximately 15 to 20 gallons of AFFF as part of a FGGM Fire Department training exercise that occurred sometime in the 1990s. The AOPI is located in the southeastern portion of FGGM along Rock Avenue. The historical releases of AFFF at this AOPI reportedly occurred within the graveled area surrounding the Salt Dome. Surface runoff reportedly flows radially along topography and is captured by a storm water swale system that encircles the area. Captured runoff outfalls into an unnamed stream that eventually feeds into Rogue Harbor Branch.

The Salt Dome CSM information is presented in **Section 7.16**.

5.1.2.4 Building 4230 – Former Fire Station

The Building 4230 – Former Fire Station (AOPI #4) (**Figure 5-6**) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical testing of firefighting equipment that contained AFFF. The AOPI is located in the southern portion of FGGM at the intersection of Rock Avenue and Roberts Avenue. The area surrounding the former fire station is heavily developed and consists primarily of support buildings, parking lots, asphalt roadways and small grass lawns. The releases of AFFF at this AOPI reportedly occurred to the fire station driveway and surrounding asphalt, which would then have runoff along topography into a stormwater inlet located directly south of the former fire station along York Avenue. Stormwater from this location was originally identified to outfall south of the AOPI and west of Railroad Avenue. Following utility mark-outs ahead of the SI, it was determined that the storm-sewer line that managed surface water runoff from the AOPI was reconstructed, and the outfall was moved to a location further south of the AOPI and off-post as shown on **Figure 5-6**.

The Building 4230 – Former Fire Station AOPI resides directly upgradient of one existing FGGM IRP site (FGGM-74/24355.1027). Contamination at this site is due to past Army activities. A Human Health and Risk Assessment (HHRA) completed in 2014 indicated that lead concentrations in soil at two hot spot areas at depths of seven and 10 feet bgs presented an unacceptable risk to the future commercial worker and hypothetical resident under a hypothetical regrading or excavation scenario. Per the Record of Decision (ROD), the selected remedy (hot spot excavation with off-site disposal) was chosen to mitigate the potential hazards posed by contaminants of concern (COCs) in subsurface soil. The Remedial Action (RA) was completed in 2017 (FGGM 2017).

The Building 4230 – Former Fire Station CSM information is presented in **Section 7.16**.

5.1.2.5 Railroad Avenue – Fire Equipment Testing Area

The Railroad Avenue – Fire Equipment Testing Area (AOPI #5) (**Figure 5-7**) is identified as an AOPI following personnel interviews, and site reconnaissance due to the historical storage of AFFF, and the recollection by a retired FGGM fire chief that residual AFFF stored within firehoses may have been released at the area during hose testing and training exercises. The AOPI is located on a land parcel located in the southeastern corridor of FGGM that was transferred from the Army on 30 September 1994. As part of a Federal Facility Agreement signed by the Army, the USEPA, and the current parcel operator, the Army retained environmental liability of the parcel; therefore, the site was identified as an AOPI and sampled for PFOS, PFOA and PFBS as part of the SI. The AOPI is located along the southern FGGM boundary along Railroad Avenue. The AOPI served as a fire department training area from the late 1970s until the late 1990s. AFFF at this AOPI was reportedly released to a 0.5 mile long asphalt access road, with surface runoff draining south along topography towards a drainage swale that runs parallel to the access road.

The Railroad Avenue – Fire Equipment Testing Area AOPI resides within the boundaries of one existing FGGM IRP site(FGGM-74/24355.1027). Contamination at this site is due to past Army activities. A HHRA completed in 2014 indicated that lead concentrations in soil at two hot spot areas at depths of seven and 10 feet bgs presented an unacceptable risk to the future commercial worker and hypothetical resident under a hypothetical regrading or excavation scenario. Per the ROD, the selected remedy (hot spot excavation with off-site disposal) was chosen to mitigate the potential hazards posed by COCs in subsurface soil. The RA was completed in 2017 (FGGM 2017).

The Railroad Avenue – Fire Equipment Testing Area CSM information is presented in **Section 7.16**.

5.1.2.6 Building 6619 – Current Fire Station

The Building 6619 – Current Fire Station (AOPI #6) (**Figure 5-8**) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical storage of AFFF as well as the reported testing of fire equipment that contained AFFF along the east facing and west facing fire station driveways from 2001 to an uncertain date. The AOPI is located in the southwestern portion of FGGM at the intersection of Mapes Road and York Avenue. Surface runoff from the west facing driveway, and therefore AFFF from fire equipment testing, reportedly flowed into a drainage swale down topography into a retention pond located along the eastern boundary of the current fire station. Surface runoff and AFFF from the east facing driveway reportedly flowed along topography and into a stormwater inlet located along York Avenue. Based on review of FGGM storm water maps, storm water from this inlet would eventually outfall into Midway Branch.

The Building 6619 – Current Fire Station AOPI resides directly upgradient of one existing FGGM IRP site: Pesticide Shop Building 6621 (FGGM-13/24355.1007). The site was historically used as a pesticide shop and maintenance facility. Releases of pesticides during this time were due to spills and the mishandling of pesticides and not due to the legal application of pesticides. Building 6621 was demolished, and the site was re-graded in 1996. The Former Pesticide Shop is presently a 0.9 acre fenced-in lot with no permanent structures. Remedial Action Objectives were established for the Former Pesticide Shop to address unacceptable risk posed by heptachlor epoxide and chlordane concentrations in soil and chlorinated VOC concentrations in groundwater. The selected remedy of soil excavation and enhanced

reductive dichlorination with long-term monitoring was approved and signed by the Army and USEPA in 2012. Implementation of the selected remedy was conducted between December 2013 and June 2014. Long-term monitoring of the site began in 2017.

The Building 6619 – Current Fire Station CSM information is presented in **Section 7.16**.

5.1.2.7 Closed Sanitary Landfill Cell 1 (FGGM-17)

The CSL Cell 1 (AOPI #7) (**Figure 5-9**) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the reported disposal of empty 5-gallon buckets of AFFF from the Building 4230 – Former Fire Station from the start of AFFF use at FGGM in the early 1980s until the CSL Cell closure in 1996. The CSL Cell 1 is located in the southeastern portion of FGGM and is currently part of the FGGM IRP program under the Site ID: FGGM-17. The landfill was constructed as an unlined facility with no leachate collection system and was initially designated as the Active Sanitary Landfill. Cell 1 was capped and closed between 1995 and 1997. A flexible membrane liner was incorporated into the final cap system for Cell 1. Cell 1 covers approximately 155 acres and is separated from Cell 2 by a drainage swale.

The CSL Cell 1 AOPI is currently listed under the FGGM IRP as the Closed Sanitary Landfill (FGGM-17/24355.1009). A landfill-gas collection system operates along the eastern edge of this landfill cell (prevents off-site migration) to control emissions from the site (this action is part of the FGGM Compliance Cleanup Program). As part of an Interim Remedy to address shallow groundwater contamination at FGGM-17, an air-sparge system was installed between the southeast corner of Cell 1 and the southeast installation boundary and brought online in December 2020. A comprehensive groundwater and surface water monitoring program is in place pursuant to the state's post-closure monitoring requirements and a separate long-term monitoring program for the Interim Remedy.

The CSL Cell 1 CSM information is presented in **Section 7.16**.

5.1.2.8 Closed Sanitary Landfill Cell 2 (FGGM-17)

The CSL Cell 2 (AOPI #8) (**Figure 5-10**) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the reported disposal of empty 5-gallon buckets of AFFF from the Building 4230 – Former Fire Station from the start of AFFF use at FGGM in the early 1980s until the CSL Cell closure in 1996. The CSL Cell 2 is located in the southeastern portion of FGGM and is currently part of the FGGM IRP program under the Site ID: FGGM-17. The landfill was constructed as an unlined facility with no leachate collection system and was initially designated as the Active Sanitary Landfill. Cell 2 was capped and closed between 1997 and 1998. A flexible membrane liner was incorporated into the final cap system for Cell 2. Cell 2 covers approximately 66 acres and is separated from Cell 1 by a drainage swale.

The CSL Cell 2 AOPI is currently listed under the FGGM IRP as the Closed Sanitary Landfill (FGGM-17/24355.1009). A landfill-gas collection system operates along the eastern edge of this landfill cell (to prevent off-site migration) to control emissions from the site (this action is part of the FGGM Compliance Cleanup Program). A comprehensive groundwater and surface water monitoring program is in place pursuant to the state's post-closure monitoring requirements. The CSL Cell was capped under the MDE Disposal Permit 1992-WSF0022-0 issued in 1992.

The CSL Cell 2 CSM information is presented in **Section 7.16**.

5.1.2.9 Closed Sanitary Landfill Cell 3 (FGGM-97)

The CSL Cell 3 (AOPI #9) (**Figure 5-11**) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the reported disposal of empty 5-gallon buckets of AFFF from the Building 4230 – Former Fire Station from the start of AFFF use at FGGM in the early 1980s. The CSL Cell 3 is located in the southeastern most portion of FGGM. Landfill operations at the CSL, including Cell 3, began in 1958 using the trench and fill method. Unlined trenches extended approximately 10 to 12 feet below ground surface (bgs), 600 feet in length, and 20 feet in width. Mixed-residential, commercial, and nonhazardous wastes were disposed of at this landfill. Refuse was deposited, compacted, and covered with daily cover material. The landfill was covered with 2 feet of final cover material in 1976 and no flexible membrane liner was installed at Cell 3. The area was either seeded with grass or winter wheat, or it was reforested.

The CSL Cell 3 AOPI is currently listed under the FGGM IRP as Cell 3 (FGGM-97). During implementation of the 2007 Groundwater RI for the CSL, six test pits were installed across Cell 3. Test pits and soil samples identified buried waste and exceedances of industrial risk-based criteria in soil at Cell 3. An RI/Feasibility Study (FS) is currently underway to fully characterize the site and determine if unacceptable risks to human health or the environment are present. The Draft RI/FS was submitted for regulatory review in December 2018. An Engineering Evaluation/Cost Analysis has been completed and the public comment period occurred in June 2019. An Action Memo has been completed and was approved by EPA in November 2019 (USACE 2020)

The CSL Cell 3 CSM information is presented in **Section 7.16**.

5.1.2.10 Parade Ground Area

The Parade Ground Area (AOPI #10) (**Figure 5-12**) is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the reported parking of fire trucks stocked with AFFF at this location. No direct release of AFFF (e.g., spraying of AFFF and/or refilling of AFFF tanks) was identified at this AOPI in the PA. The Parade Ground Area AOPI encompasses approximately 28.5 acres of open grassed land located in the south-central portion of FGGM. The northern-most portion of the area is located at the intersection of Mapes Road and Cooper Road. No major surface water bodies reside within the AOPI boundaries. Surface water runoff flows along topography toward the southwest corner of the field, where it is captured by multiple curb inlets located along Cooper Road and eventually discharged into Burba Lake.

The Parade Ground Area AOPI CSM information is presented in **Section 7.16**.

5.1.2.11 Buildings 3486 and 3488 – Detached Fire Department Support Buildings

The Buildings 3486 and 3488 – Detached Fire Department Support Buildings (AOPI #11) (**Figure 5-13**) are identified as an AOPI following records research, personnel interviews, and site reconnaissance due to parking/storage of a FGGM Fire Department pumper truck stocked with AFFF at the location. No direct release of AFFF (e.g., spraying of AFFF and/or refilling of AFFF tanks) was identified at this AOPI in the PA. Buildings 3486 and 3488 are located adjacent to one another in the northwestern area of FGGM at

the intersection of 27th Street and Clark Road. A large asphalt parking lot extends southward from both buildings along with a cement fire station driveway extending southward from Building 3488. Thick trees and wetland vegetation border the AOPI to the west and north. Topography slopes gently northward for approximately 100 feet before dropping steeply towards an unnamed creek. Surface runoff from the southern exterior of the buildings is collected via curb inlets along Clark Road to the south. Runoff from the northern exterior of the building flows northward along topography towards the unnamed creek, before flowing approximately 500 feet westward into a series of unnamed wetland surface water bodies along Rockenbach Road.

The Buildings 3486 and 3488 – Detached Fire Department Support Buildings AOPI resides within the boundaries of one FGGM vehicle WR and MP pair (WR-13 and MP-10) documented under the existing IRP site: Motor Pools, Washracks, Buildings (Former) (FGGM-96/24355.1054). In the mid-1990s, multiple historical motor pools, wash-racks, vehicle service and staging areas, and buildings where chemical releases may have occurred were identified based on review of aerial photography. A PA/SI of these areas was conducted and concluded there are 38 areas where tests and screening-level risk analysis results confirmed that additional environmental actions were required (FGGM 2017). WR-13 and MP-19 were not included in the list of 38 areas requiring additional environmental actions, and the USEPA approved NFA for these sites in August 2016 (USACE 2020).

The Buildings 3486 and 3488 – Detached Fire Department Support Buildings AOPI CSM information is presented in **Section 7.16**.

5.2 Phoenix Military Reservation

Through the evaluation of information obtained during records review and/or personnel interviews no areas at PMR were identified as possible AOPIs ahead of the site visit to FGGM. As a result, no areas were identified for additional evaluation or subjected to the AOPI decision flow chart as presented on **Figure 5-1** and presented in **Section 5.1**. No SI was conducted at PMR, and the sub-installation will not be mentioned again in this report until the Conclusions and Recommendations section (**Section 8**).

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at FGGM, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at FGGM at eleven AOPIs to evaluate presence or absence of PFOS, PFOA, and PFBS in comparison with the OSD risk screening levels. In addition to the eleven AOPIs, the OU-4 hydraulic containment (HC) groundwater treatment system influent and effluent samples were collected and analyzed to determine presence and absence of PFAS. As such, an installation-specific QAPP Addendum (Arcadis 2020) was developed to supplement the general information provided in the PQAPP (Arcadis 2019) and to detail the site-specific proposed scopes of work for the SI. A preliminary CSM was prepared for each of the installation's AOPIs in accordance with the USACE Engineer Manual on CSMs, 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 eighteen 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 August 2021 through the collection of field data and analytical samples.

The SI field work was completed in accordance with the standard operating procedures (SOPs), technical guidance instructions (TGIs), sampling design, and QA/QC requirements as detailed in the QAPP Addendum (Arcadis 2020) and PQAPP (Arcadis 2019). The subsections below summarize the DQOs, sampling design and rationale, sampling activities and methods, and data analyses procedures for the SI phase at FGGM. Non-conformances to the prescribed procedures in the PQAPP and QAPP Addendum are described in **Section 6.3.3**. Analytical results obtained through SI field activities are summarized in **Section 7**.

6.1 Data Quality Objectives

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

6.2 Sampling Design and Rationale

The rationale for sampling at each AOPI, the OU-4 HC system, and off-post monitoring wells is illustrated on **Figure 6-1** below.

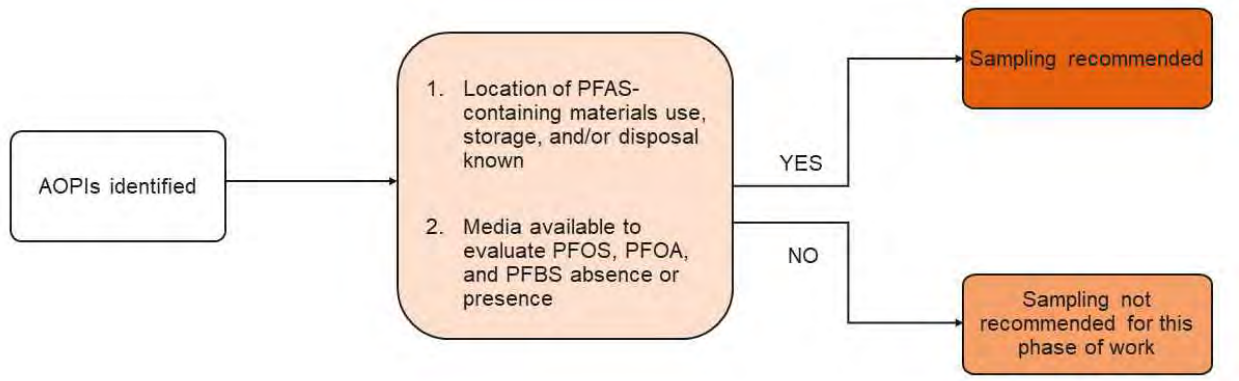

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI sampling activities at FGGM is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2020). With the exception of 900 Area and 2300 Area AFFF Equipment Testing Area AOPIs and Building 4239 – Former Fire Station AOPI (as summarized in **Section 6.3.3**), the sampling design was implemented as follows. Briefly, the areas of focus for this SI (i.e., 900 Area – AFFF Equipment Testing Area, 2300 Area – AFFF Equipment Testing Area, Salt Dome, Building 4230 – Former Fire Station, Railroad Avenue – Fire Equipment Testing Area, Building 6619 – Current Fire Station, CSLs Cell 1 and Cell 2 [FGGM-17], CSL Cell 3 [FGGM-97], OU-4 HC System, Parade Ground Area, and Buildings 3486 and 3488 – Detached Fire Department Support Buildings AOPIs) were selected based on PA results. Soil and grab groundwater samples were collected from eight of the 11 AOPIs sampled during the SI. All AOPIs except the three CSLs were sampled for soil and grab groundwater. Due to land use controls associated with the landfill caps at CSL 1 and 2, as well as on-going re-development efforts at CSL 3, soil and grab groundwater samples via direct-push technology (DPT) were not collected from the three CSLs. Instead, groundwater samples were collected from the three landfill sites at appropriately located existing monitoring wells. Nine out of 11 AOPIs were sampled for groundwater from existing monitoring well locations (all AOPIs except the Salt Dome and Parade Ground Area). Surface water and sediment samples were collected at nine out of the 11 AOPIs. No surface water samples were collected at the Area 900 – AFFF Equipment Testing Area and the Parade Ground Area due to the lack of surface water bodies in the vicinity of the 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.

One DPT grab groundwater sample and one DPT grab groundwater sample co-located with one soil sample where AFFF was suspected to have been released were collected at the 900 Area – AFFF Equipment Testing Area (AOPI #1). One downgradient groundwater sample from the existing monitoring well MP-12-1 screened from 20 to 35 feet bgs was also collected at the 900 Area – AFFF Equipment Testing Area AOPI.

Two DPT grab groundwater samples co-located with two soil samples where AFFF was suspected to have been released were collected at the 2300- AFFF Equipment Testing Area (AOPI #2). Two downgradient groundwater samples were collected from the existing monitoring wells OU4MW-30 and

OU4MW-28 screened at 13 to 23 feet bgs and 23 to 33 feet bgs respectively. In addition, one co-located surface water and sediment sample was collected at the unnamed surface water body downstream from the suspected AFFF release area flowing south into Burba Lake.

At the Salt Dome AOPI (AOPI #3), two DPT grab groundwater samples co-located with soil samples were collected downgradient of the testing area where AFFF is suspected to have been released. One co-located surface water and sediment sample was collected from the location of the Salt Dome stormwater outfall where surface water exits the AOPI.

Following utility mark-outs ahead of the SI, it was determined that the storm-sewer line that managed surface water runoff from the Building 4230 – Former Fire Station AOPI (AOPI #4) was reconstructed and moved south of the AOPI and off-post. To evaluate presence and absence of PFOS, PFOA, and PFBS in surface media, one soil sample was added to the scope of work and collected along a grassed area bordering the fire station building, downslope of where AFFF was suspected to have been released. One groundwater sample was collected from existing downgradient monitoring well NW8 screened at 20 to 30 feet bgs.

One DPT grab groundwater sample co-located with a surface soil sample was collected at the Railroad Avenue – Fire Equipment Testing Area AOPI towards the eastern most downgradient portion of the equipment testing area. One co-located surface water and sediment sample was collected from the surface water drainage ditch running parallel to the equipment testing area where surface water exits from this AOPI. Two groundwater samples from existing monitoring wells located in the equipment testing area, well AOCNW-11 (screened 28 to 38 feet bgs) located towards the western most portion of the equipment testing area and well AOCNW-12 (screened 40 to 50 feet bgs) located in the center of the equipment testing area.

At the Building 6619 – Current Fire Station AOPI, one surface soil sample was collected along and down slope of the fire truck washing area which is located on the southwest facing fire station driveway. One co-located surface water and sediment sample was collected at the discharge point between the southwest facing fire station driveway drainage ditch and the retention pond. Two downgradient groundwater samples were also collected from existing monitoring wells MW-05 and MW03R screened at 24 to 34 feet bgs and 17 to 27 feet bgs respectively.

At the CSL Cell 1 (FGGM-17), one co-located surface water and sediment sample was collected from the surface water body running along the eastern edge of the CSL cell boundary. Groundwater samples from four existing monitoring wells (MW-18 screened at 20 to 35 feet bgs, MW-2S screened at 24 to 29 feet bgs, MW-14 screened at 20 to 30 feet bgs, and MW-19 screened at 22.5 to 37.5 feet bgs) were collected along eastern edge of CSL Cell 1 boundary.

At the CSL Cell 2 (FGGM-17), one co-located surface water and sediment sample was collected from the surface water body running along the eastern edge of the CSL cell boundary. One groundwater sample was collected from the existing monitoring well MW-13S (screened 19 to 34 feet bgs), which is located along eastern edge of CSL Cell 2 boundary.

At the CSL Cell 3 (FGGM-97), one co-located surface water and sediment sample was collected from the surface water body running along the southwestern edge of the CSL cell boundary. Groundwater samples were collected from the two existing monitoring wells MW-17 and MW-06 (screened at 20 to 35 feet bgs and 8 to 18 feet bgs respectively), which are located along eastern edge of the Cell 3 boundary.

At the Parade Ground Area, one surface soil sample was collected within the northern end of the parade ground field, where pumper trucks containing AFFF may have been stationed. A second surface soil sample was collected within the center of the parade ground field, where pumper trucks containing AFFF may have been stationed. One DPT grab groundwater sample co-located with a third surface soil sample was collected within the southern end of the parade ground field, where pumper trucks containing AFFF may have been stationed, which was downgradient of groundwater flow originating from the AOPI.

At Buildings 3486 and 3488 – Detached Fire Department Support Buildings, two surface soil samples were collected, one each along the eastern and western edge of Building 3486 and adjacent to the building driveway where fire trucks were suspected to have been parked. A third surface soil sample was collected along the southern edge of Building 3486. One groundwater sample was collected from the existing monitoring well MP19-3, screened at 24.5 to 39.5 feet bgs, located directly to the south of Building 3486. One co-located surface water and sediment sample was collected from the surface water body located to the north and directly down topography of Buildings 3486 and 3488.

In addition to the listed AOPIs above the OU-4 HC system was also sampled. The OU-4 HC system operates six extraction wells (locations shown on **Figure 5-2**) and four injection wells located in the southeastern portion of FGGM. The OU-4 HC system was constructed to address volatile organic compound plumes emanating from the OU-4 site. Extracted groundwater is pumped to a remediation building and treated using granular activated carbon vessels. Treated groundwater is then reinjected into the LPA to enhance contaminant flushing. Influent and effluent samples were collected from existing sampling ports installed within the OU-4 HC system remediation building to evaluate the presence or absence of PFOS, PFOA, and PFBS in groundwater within the LPA before and after groundwater treatment through the OU-4 HC system.

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

6.3 Sampling Methods and Procedures

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

The sampling methods employed during the SI are detailed in the PQAPP (Arcadis 2019) and QAPP Addendum (Arcadis 2020). The subsections below provide a summary of the field methods and procedures utilized to complete the SI scope of work. Field notes and field forms (i.e., soil boring logs,

groundwater purging logs, equipment calibration forms, tailgate health and safety forms, and sample collection logs) documenting the SI sampling activities are included in **Appendices J** and **K**.

6.3.1 Field Methods

Groundwater samples were collected to evaluate presence of PFAS (including PFOS, PFOA, and PFBS) in groundwater and update the individual AOPI CSMs. 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 2020). Shallow (first encountered) groundwater was sampled at each of the sampling points. No permanent infrastructure (e.g., monitoring wells) were installed and matting was used when working in wet areas to minimize potential impacts to the ground cover.

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). 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, boreholes were advanced via DPT and soil samples were collected prior to sampling of the co-located grab groundwater. Soil samples were collected by method of a stainless-steel hand auger from 0 to 2 feet bgs. Stainless steel trowels were used to place soil directly into a polyethylene bag before being mixed and placed in lab provided jars. Alconox® or Liquinox® in conjunction with laboratory certified PFAS-free water provided by Eurofins Lancaster Laboratories Environmental (ELLE) was used for decontamination between boring locations. A peristaltic pump with PFAS-free disposable high-density polyethylene (HDPE) tubing was used to collect groundwater samples through a screen-point sampler. At the OU-4 HC system, influent and effluent samples were collected from existing sampling ports installed within the remediation building.

Co-located surface water and sediment samples were collected at the AOPIs identified for such sampling, as described in **Section 6.2**. Surface water samples were collected before sediment sample collection 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 2020), typically at a rate of 1 per 20 parent samples. Field duplicates and matrix spike/matrix spike duplicate samples were collected for media sampled for PFOS, PFOA, and PFBS, and total organic carbon (TOC) only. EBs were collected for media sampled for PFOS, PFOA, and PFBS, at a frequency of one per piece

of relevant equipment for each sampling event, as specified in the QAPP Addendum (Arcadis 2020). The decontaminated reusable equipment from which EBs were collected include HDPE tubing, bailers, water-level meters, hand augers, and hand shovels, as applicable to the sampled media. Source blanks were collected from the water used to pressure-wash drill tooling. Analytical results for blank samples are discussed in **Section 7.15**.

6.3.3 Field Change Reports

No instances of major scope modifications (i.e., those that may have had a significant impact on the project scope and/or data usability/quality, or required stop-work, and warranted discussion with USACE) were encountered during the FGGM SI work.

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

Modifications from and clarifications for the procedures and scope of work detailed in the QAPP Addendum and PQAPP are summarized from the FCRs below:

- One FCR was completed for the Area 900 – Fire Equipment Testing Area AOPI grab groundwater sample point FGGM-900Area-1-GW-MMDDYY due to DPT hitting refusal at 27 feet bgs before encountering groundwater, and therefore, the groundwater sample was eliminated from the scope of work. Two additional GW sampling locations existed within the approved scope thus the elimination of FGGM-900Area-1-GW-MMDDYY posed minimal impact to the overall scope of project work.
- One FCR was completed for the Building 4230 - Former Fire Station AOPI. Surface Water location FGGM-B4230-1-SW-MMDDYY and Sediment location FGGM-B4230-1-SE-MMDDYY were eliminated from the PFAS SI due to the removal of the identified storm water outfall as part of construction efforts sometime between October 2018 and October 2019. The newly installed storm water outfall location is located off-post along the installation perimeter fence. As AFFF at the Building 4230 – Former Fire Station AOPI was historically used and stored between the late 1970s and 2001, surface water and sediment samples collected from the newly installed outfall would not have been representative of AFFF releases from the AOPI. An additional surface soil sample was collected along the Former Fire Station driveway as a supplemental investigative point for AOPI 4.
- One FCR was completed for the 2300 Area – Fire Equipment Testing Area AOPI proposed groundwater sample from monitoring well FGGM-OU4MW-27. Field teams were unable to locate FGGM-OU4MW-27 after extensive searching. In response, another existing monitoring well (FGGM-OU4MW-28) located downgradient of the 2300 Area – Fire Equipment Testing Area AOPI was added to the sampling plan; therefore, the elimination of a groundwater sample from FGGM- OU4MW-27 posed minimal impact to the overall scope of project work.

6.3.4 Decontamination

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

6.3.5 Investigation-Derived Waste

IDW, including soil cuttings, excess sediment, groundwater, surface water, decontamination fluids, and disposable 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, and transported to a staging area prior to shipping and off-post disposal of the materials by U.S. Ecology. The IDW was transported off-post for disposal at a Subtitle C Landfill in Belleville, Michigan on 31 August 2021. The completed waste profiles and associated waste manifests are provided in **Appendix N**. Equipment IDW includes personal protective equipment and other disposable materials (e.g., gloves, plastic sheeting, Lexan™ tubes, and HDPE and silicon tubing) that may have come in contact with sampling media.

6.4 Data Analysis

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

6.4.1 Laboratory Analytical Methods

Analytical samples collected during the SI were submitted to ELLE, an ELAP-accredited laboratory for PFOS, PFOA, and PFBS analysis. Laboratory analyses associated with the SI were completed in accordance with Worksheets #12.1 through #12.5 in the PQAPP (Arcadis 2019b). PFOS, PFOA, and PFBS, were analyzed for in groundwater, soil, surface water, and sediment samples using a PFAS analytical method that is ELAP-accredited and compliant with QSM 5.1.1, Table B-15 (DoD 2018).

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

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

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

The laboratory limit of detection (LOD) is defined as “the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99 percent confidence” (DoD

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

6.4.2 Data Validation

All analytical data generated during the SI, except grain size, were verified and validated in accordance with the data verification procedures described in Worksheets #34 through #36 of the PQAPP (Arcadis 2019). Each laboratory data package/sample delivery group underwent Stage 3 data validation in accordance with DoD QSM 5.1.1 (DoD 2018). 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**.

6.4.3 Data Usability Assessment and Summary

A data usability assessment was completed for all analytical data associated with SI sampling at FGGM. Documentation generated during the data usability assessments, which were compiled into a DUSR (**Appendix N**), 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 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 FGGM 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 2018b) and FGGM QAPP Addendum (Arcadis 2020). Data qualifiers applied to laboratory analytical results for samples collected during the SI at FGGM 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 the respective figures.

6.5 Office of the Secretary of Defense Risk Screening Levels

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

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

Chemical	Residential Scenario RSLs Calculated Using USEPA RSL Calculator		Industrial/Commercial Scenario RSLs Calculated Using USEPA RSL Calculator
	Tap Water (ng/L or ppt) [1]	Soil (mg/kg or ppm) [1,2]	Soil (mg/kg or ppm) [1,2]
PFOS	40	0.13	1.6
PFOA	40	0.13	1.6
PFBS	600	1.9	25

Notes:

1. Risk screening levels for tap water and soil provided by the OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15 (**Appendix A**).
2. All soil 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 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 RSLs only, and soil samples collected from greater than 15 feet bgs will not be compared to either risk screening level.

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

The OSD residential tap water risk screening levels will be used to compare all groundwater and/or surface water data for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPIs at FGGM are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, and PFBS will be used to evaluate detected soil and/or sediment concentrations. The data from the SI sampling event are compared to the OSD risk screening levels in **Section 7**. If concentrations of PFOS, PFOA, or PFBS are detected greater than the applicable OSD risk screening levels, further study in a remedial investigation is recommended in **Section 8**.

7 SUMMARY AND DISCUSSION OF SI RESULTS

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

Tables 7-1 through **7-5** provide a summary of the on-post groundwater, soil, surface water, sediment, and off-post groundwater analytical results for PFOS, PFOA, and PFBS. **Table 7-6** summarizes AOPIs and whether their 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 FGGM with OSD risk screening level exceedances are depicted on **Figure 7-1**. **Figures 7-2** through **7-13** show the PFOS, PFOA, and PFBS analytical results in groundwater, soil, and surface water and sediment for each of the 11 AOPIs and the OU-4 HC system. Non-detected results are reported as less than the LOQ. Detections of PFOS, PFOA, and/or PFBS greater than the applicable OSD risk screening levels are highlighted in summary tables and on figures. Final qualifiers applied to the data by the laboratory and the project chemist (as defined in **Section 6.4.3**) are presented on the analytical tables. Groundwater 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 L**. Soil and sediment descriptions are provided on the field forms in **Appendix L**. The results of the SI are grouped by AOPI and discussed for each medium as applicable. Groundwater was first encountered at depths of approximately 2 to 10.55 feet bgs in temporary borings installed as part of DPT operations. Groundwater was encountered between 3.42 and 41.76 feet bgs at existing monitoring wells across the installation.

Table 7-6 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Y/N)
900 Area – AFFF Equipment Testing Area	N
2300 Area – AFFF Equipment Testing Area	Y
Salt Dome	N
Railroad Avenue – Fire Equipment Testing Area	Y
Building 4230 – Former Fire Station	N
Building 6619 – Current Fire Station	Y
Buildings 3486 and 3488 – Detached Fire Department Support Buildings	N
CSL Cell 1	Y
CSL Cell 2	N
CSL Cell 3	Y
Parade Ground Area	N

7.1 900 Area – AFFF Equipment Testing Area

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with 900 Area – AFFF Equipment Testing Area AOPI shown on **Figure 7-2** and **Tables 7-1**, and **7-2**.

7.1.1 Groundwater

Groundwater samples were collected from one boring via DPT and an existing monitoring well MP-12 (screened from 20 to 35 feet bgs) at the 900 Area – AFFF Equipment Testing Area AOPI (**Figure 7-2** and **Table 7-1**). Grab (i.e. groundwater samples from DPT borings were collected at first-encountered groundwater. PFOS and PFOA were detected at concentrations below the OSD risk screening level of 40 ng/L in the two groundwater samples: FGGM-900AREA-2-GW-082120 (11 J ng/L PFOS and 7.1 ng/L PFOA, 33 to 37 feet bgs) and FGGM-MP-12-1 (9.5 ng/L PFOS and 10 ng/L PFOA, screened at 20 to 35 feet bgs). PFBS concentration was below detection limit at FGGM-900A-2 (9.6 U ng/L) and detected at FGGM-MP-12-1 (at an estimated concentration of 1.5 ng/L) below the OSD risk screening level of 600 ng/L (**Table 7-1**). The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.1.2 Soil

Soil samples were collected from two borings at the 900 Area – AFFF Equipment Testing Area AOPI co-located with the grab groundwater samples (**Figure 7-2**). Each boring included one shallow soil sample from 0 to 2 feet bgs. PFOA and PFBS were not detected above the LOD in any samples. PFOS was detected in both samples FGGM-900AREA-1-SO-(0-2) and FGGM-900AREA-2-SO-(0-2) at concentrations 0.0021 mg/kg and an estimated concentration of 0.00052 mg/kg, respectively, below the OSD risk screening level of 0.13 mg/kg and 1.6 mg/kg for residential and industrial/commercial receptor scenarios, respectively. The full suite of analytical results are included in **Table 7-2** and **Appendix P** .

7.2 2300 – AFFF Equipment Testing Area

The subsections below summarize the groundwater, soil, surface water and sediment PFOS, PFOA, and PFBS analytical results associated with 2300 – AFFF Equipment Testing Area AOPI shown on **Figure 7-3** and **Tables 7-1** through **7-4**.

7.2.1 Groundwater

Groundwater samples were collected from two borings via DPT and two existing monitoring wells FGGM-OU4MW-28 (screened at 23 to 33 feet bgs) and FGGM-OU4MW-30(screened at 13 to 23 feet bgs) at the 2300 – AFFF Equipment Testing Area AOPI (**Figure 7-3** and **Table 7-1**). Grab groundwater samples were collected at first-encountered groundwater. PFOS and PFOA were detected at concentrations greater than the OSD risk screening level of 40 ng/L in groundwater samples at both the borings: FGGM-2300AREA-1-GW (48 ng/L PFOS and 53 ng/L PFOA) and FGGM-2300AREA-2-GW (52 ng/L PFOS and 21 ng/L PFOA). PFOA was also detected at a concentration of 49 ng/L (above the OSD risk screening level of 40 ng/L) in a duplicate sample collected at FGGM-2300AREA-2-GW.

Groundwater samples collected from existing monitoring wells FGGM-OU4MW-28, and FGGM-OU4MW-30 exhibited PFOS and PFOA below the OSD risk screening level of 40 ng/L, ranging between 1.7 ng/L and 6.9 ng/L in groundwater samples FGGM-OU4MW-28, and FGGM-OU4MW-30, respectively. PFBS concentrations were below OSD risk screening level of 600 ng/L and ranged between an estimated concentration of 0.96 ng/L (FGGM-OU4MW-30) and 12 ng/L (FGGM-2300AREA-1-GW). The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.2.2 Soil

Soil samples were collected from two borings at the 2300 – AFFF Equipment Testing Area AOPI co-located with the grab groundwater samples (**Figure 7-3**). Each boring included one shallow soil sample from 0 to 2 feet bgs. PFOA and PFBS were not detected above the LOD in any parent samples, though PFOA was detected above the LOD at a concentration of 0.00021 mg/kg in a duplicate sample collected at FGGM-2300AREA-2-SO-(0-2). PFOS was detected in both samples FGGM-2300AREA-1-SO-(0-2) and FGGM-2300AREA-2-SO-(0-2) at concentrations 0.0022 mg/kg and an estimated concentration of 0.00025 mg/kg, respectively, below the OSD risk screening level of 0.13 mg/kg and 1.6 mg/kg for residential and industrial/commercial receptor scenarios, respectively. The full suite of analytical results are included in **Table 7-2** and **Appendix P**.

7.2.3 Surface Water

One surface water sample FGGM-2300AREA-1-SW was collected from the unnamed surface water body downstream from the 2300 – AFFF Equipment Testing Area AOPI flowing south into Burba Lake (**Figure 7-3**). PFOS was detected at 30 ng/L, PFOA was detected at 13 ng/L, and PFBS was detected at 2.1 ng/L. These detected concentrations do not exceed their respective OSD risk screening levels for tap water. The full suite of analytical results are included in **Table 7-3** and **Appendix P**.

7.2.4 Sediment

One co-located sediment sample FGGM-2300AREA-1-SE was collected along with the surface water sample at the 2300 – AFFF Equipment Testing Area AOPI (**Figure 7-3**). PFOS was detected at an estimated concentration of 0.00048 mg/kg. PFOA and PFBS were below their respective detection limits and therefore, these concentrations do not exceed their respective OSD risk screening levels. The full suite of analytical results are included in **Table 7-4** and **Appendix P**.

7.3 Salt Dome

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Salt Dome AOPI shown on **Figure 7-4** and **Tables 7-1** through **Table 7-4**.

7.3.1 Groundwater

Groundwater samples were collected from two borings via DPT at the Salt Dome AOPI (**Figure 7-4** and **Table 7-1**). Grab groundwater samples were collected at first-encountered groundwater. PFOS and PFOA were detected at concentrations below than the OSD risk screening level of 40 ng/L in groundwater samples at the two borings: FGGM-SALT-DOME-1-GW (estimated concentration of 8.1

ng/L PFOS and 16 ng/L PFOA) and FGGM-SALT-DOME-2-GW (13 ng/L PFOS and 4.8 ng/L PFOA) collected temporary well screens set at 5 to 15 feet bgs and 10 to 15 feet bgs, respectively. PFBS concentrations were detected below OSD risk screening level of 600 ng/L at the two boring locations at concentrations 1.9 ng/L and 1.8 ng/L, respectively. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.3.2 Soil

Soil samples were collected from two borings at the Salt Dome AOPI co-located with the grab groundwater samples (**Figure 7-4**). Each boring included one shallow soil sample from 0 to 2 feet bgs. PFOA and PFBS were not detected above the LOD in any samples. PFOS was detected at FGGM-SALT-DOME-1-SO-(0-2) at an estimated concentration 0.00059 mg/kg below the OSD risk screening level of 0.13 mg/kg and 1.6 mg/kg for residential and industrial/commercial receptor scenarios. The full suite of analytical results are included in **Table 7-2** and **Appendix P**.

7.3.3 Surface Water

One surface water sample FGGM-SALT-DOME-1-SW was collected from the Salt Dome stormwater capture outfall where surface water exits this AOPI (**Figure 7-4**). PFOS was detected at 9.2 ng/L, PFOA was detected at 5.7 ng/L, and PFBS was detected at an estimated concentration of 3.3 ng/L. These detected concentrations do not exceed their respective OSD risk screening levels for tap water. The full suite of analytical results are included in **Table 7-3** and **Appendix P**.

7.3.4 Sediment

One co-located sediment sample FGGM-SALT-DOME-1-SE was collected along with the surface water sample at the Salt Dome AOPI (**Figure 7-4**). PFOS was detected at an estimated concentration of 0.00035 mg/kg. PFOA and PFBS were below their respective detection limits and therefore, do not exceed their respective OSD risk screening levels. The full suite of analytical results are included in **Table 7-4** and **Appendix P**.

7.4 Building 4230 – Former Fire Station

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Building 4230 – Former Fire Station AOPI shown on **Figure 7-5** and **Tables 7-1** through **7-2**.

7.4.1 Groundwater

One groundwater sample FGGM-NW-8 was collected from existing monitoring well FGGM-NW8 (screened at 20 to 30 feet bgs) downgradient of the Building 4230 – Former Fire Station AOPI (**Figure 7-5** and **Table 7-1**). PFOS and PFOA were detected at concentrations below the OSD risk screening level of 40 ng/L in the groundwater sample collect at monitoring well FGGM-NW8 (7.8 ng/L PFOS and 8.9 ng/L PFOA). PFBS concentrations were detected below OSD risk screening level of 600 ng/L at monitoring

well FGGM-NW8 at 1.7 ng/L. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.4.2 Soil

One soil sample FGGM-B4230-1-SO-(0-2) was collected from a depth of 0 to 2 feet bgs at Building 4230 – Former Fire Station AOPI (**Figure 7-5**). PFOA and PFBS were not detected above the LOD. PFOS was detected at a concentration of 0.0014 mg/kg below the OSD risk screening level of 0.13 mg/kg and 1.6 mg/kg for residential and industrial/commercial receptor scenarios. The full suite of analytical results are included in **Table 7-2** and **Appendix P**.

7.5 Railroad Avenue– Fire Equipment Testing Area

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Railroad Avenue– Fire Equipment Testing Area AOPI shown on **Figure 7-6** and **Tables 7-1** through **Table 7-4**.

7.5.1 Groundwater

Groundwater samples were collected from one DPT boring (FGGM-RRA-1-GW) and two existing monitoring wells AOCNW-11, and AOCNW-12 at the Railroad Avenue– Fire Equipment Testing Area AOPI (**Figure 7-6** and **Table 7-1**). A grab groundwater sample was collected at first-encountered groundwater at the DPT boring. PFOS and PFOA were detected at concentrations above than the OSD risk screening level of 40 ng/L in the groundwater sample at boring FGGM-RRA-1-GW (estimated concentrations of 58 ng/L PFOS and 72 ng/L PFOA) collected from a temporary well screen set at 5 to 15 feet bgs. PFOS exceeded the OSD risk screening level at one of the existing monitoring wells sampled, AOCNW-11 (screened at 28 to 38 feet bgs) at 90 ng/L and was detected below OSD risk screening level (3.9 ng/L) at the other existing monitoring well AOCNW-12, which is screened at 40 to 50 feet bgs. PFBS concentrations were detected below OSD risk screening level of 600 ng/L in all three groundwater samples with concentrations ranging between 1.0 ng/L and 2.4 ng/L. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.5.2 Soil

A soil sample was collected from one boring at the Railroad Avenue– Fire Equipment Testing Area AOPI (**Figure 7-6**). This shallow soil sample FGGM-RRA-1-SO-(0-2) was collected from 0 to 2 feet bgs. PFBS was not detected above the LOD. PFOS and PFOA were detected in the soil sample at estimated concentrations of 0.00048 mg/kg and 0.00029 mg/kg respectively, below the OSD risk screening level of 0.13 mg/kg and 1.6 mg/kg for residential and industrial/commercial receptor scenarios. The full suite of analytical results are included in **Table 7-2** and **Appendix P**.

7.5.3 Surface Water

One surface water sample FGGM-RRA-1-SW was collected from a surface water drainage ditch adjacent to the Railroad Avenue– Fire Equipment Testing Area AOPI (**Figure 7-6**). PFOS was detected at 8.5

ng/L, PFOA was detected above the OSD risk screening level at 380 ng/L, and PFBS was detected at an estimated concentration of 1.7 ng/L. PFOS and PFBS concentrations do not exceed their respective OSD risk screening levels for tap water. The full suite of analytical results are included in **Table 7-3** and **Appendix P**.

7.5.4 Sediment

One co-located sediment sample FGGM-RRA-1-SE was collected along with the surface water sample at the Railroad Avenue– Fire Equipment Testing Area AOPI (**Figure 7-6**). PFOS was detected at 0.0012 mg/kg and PFOA at 0.0037 mg/kg. PFBS concentration was below the LOD and therefore, do not exceed their respective OSD risk screening levels. The full suite of analytical results are included in **Table 7-4** and **Appendix P**.

7.6 Building 6619 – Current Fire Station

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Building 6619 – Current Fire Station AOPI shown on **Figure 7-7** and **Tables 7-1** through **Table 7-4**.

7.6.1 Groundwater

Groundwater samples were collected from two existing monitoring wells (FGGM-MW-03R and FGGM-MW-05) at Building 6619 – Current Fire Station AOPI (**Figure 7-7** and **Table 7-1**). PFOS and PFOA were detected at concentrations above than the OSD risk screening level of 40 ng/L in the groundwater sample FGGM-MW-03R collected from monitoring well FGGM-MW-03R (120 ng/L PFOS and 400 ng/L PFOA) screened at 17 to 27 feet bgs. PFOS and PFOA were detected below OSD risk screening level at an estimated concentration of 18 ng/L and 16 ng/L, respectively, at the other existing monitoring well FGGM-MW-05 sampled at this AOPI, which is screening at 24 to 34 feet bgs. PFBS concentrations were detected below OSD risk screening level of 600 ng/L at both monitoring well locations with concentrations at 6.0 ng/L and 1.9 ng/L, respectively. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.6.2 Soil

One surface soil sample FGGM-B6619-SO-(0-2) from 0 to 2 feet bgs was collected down slope of the fire truck washing area at Building 6619 – Current Fire Station AOPI (**Figure 7-7**). PFBS was not detected above the LOD. PFOS and PFOA were detected in the soil sample at estimated concentrations of 0.00044 mg/kg and 0.00043 mg/kg, respectively, below the OSD risk screening level of 0.13 mg/kg and 1.6 mg/kg for residential and industrial/commercial receptor scenarios. The full suite of analytical results are included in **Table 7-2** and **Appendix P**.

7.6.3 Surface Water

One surface water sample FGGM-B6619-1-SW was collected at the discharge point between the southwest facing fire station driveway drainage ditch and the retention pond at this AOPI (**Figure 7-7**). PFOS, PFOA, and PFBS were detected at 5.4 ng/L, 31 ng/L and an estimated concentration of 1.1 ng/L,

respectively. These concentrations do not exceed their respective OSD risk screening levels for tap water. The full suite of analytical results are included in **Table 7-3** and **Appendix P**.

7.6.4 Sediment

One co-located sediment sample FGGM-B6619-1-SE-082420 was collected with the surface water sample at Building 6619 – Current Fire Station AOPI (**Figure 7-7**). PFOS and PFOA were detected at an estimated concentration of 0.00062 mg/kg and 0.00080 mg/kg, respectively, below their respective OSD risk screening levels. PFBS concentration was below LOD. The full suite of analytical results are included in **Table 7-4** and **Appendix P**.

7.7 Closed Sanitary Landfill Cell – 1 (FGGM-17)

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with CSL Cell – 1 AOPI shown on **Figure 7-8** and **Tables 7-1, Table 7-3, and Table 7-4**.

7.7.1 Groundwater

Groundwater samples were collected from four existing monitoring wells (FGGM-MW-2S, FGGM-MW-14, FGGM-MW-18, and FGGM-MW-19) at the CSL Cell – 1 AOPI (**Figure 7-8** and **Table 7-1**). PFOS was detected at a concentration above than the OSD risk screening level of 40 ng/L at monitoring well FGGM-MW-18 (75 ng/L PFOS) screened at 20 to 35 feet bgs. PFOA was detected at concentrations above than the OSD risk screening level of 40 ng/L at FGGM-MW-14(47 ng/L) and FGGM-MW-19(73 ng/L) screened at 20 to 30 feet bgs and 22.5 to 37.5 feet bgs, respectively. PFBS concentrations were detected below OSD risk screening level of 600 ng/L at each of the four monitoring wells sampled at concentrations ranging from 1.7 ng/L to 7.8 ng/L. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.7.2 Surface Water

One surface water sample FGGM-CSL1-1-SW was collected from the surface water body running along the eastern edge of the Cell 1 boundary (**Figure 7-8**). PFOS, PFOA, and PFBS were detected at 18 ng/L, 17 ng/L and an estimated concentration of 18 ng/L, respectively. The concentrations do not exceed their respective OSD risk screening levels for tap water. The full suite of analytical results are included in **Table 7-3** and **Appendix P**.

7.7.3 Sediment

One co-located sediment sample FGGM-CSL1-1-SE was collected from the surface water body running along the eastern edge of the Cell 1 boundary (**Figure 7-8**) PFOS was detected at 0.00098 mg/kg, below the OSD risk screening level. PFOA and PFBS concentrations were below LOD. The full suite of analytical results are included in **Table 7-4** and **Appendix P**.

7.8 Closed Sanitary Landfill Cell – 2 (FGGM-17)

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with CSL Cell – 2 AOPI shown on **Figure 7-9** and **Tables 7-1, Table 7-3,** and **Table 7-4**.

7.8.1 Groundwater

A groundwater sample was collected from one existing monitoring well FGGM-MW13S (screened at 19 to 34 feet bgs) at the CSL Cell – 2 AOPI (**Figure 7-9** and **Table 7-1**). PFOS and PFOA were detected below their OSD risk screening levels (40 ng/L) in groundwater sample FGGM-MW13S-082520 at concentrations 4.7 ng/L and 30 ng/L, respectively. PFBS was detected at an estimated concentration of 2.6 ng/L, which is below the OSD risk screening level of 600 ng/L. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.8.2 Surface Water

One surface water sample FGGM-CSL2-1-SW was collected from the surface water body running along the southern edge of the Cell 2 boundary (**Figure 7-9**). PFOS, PFOA, and PFBS were detected at 18 ng/L, 13 ng/L and 6.6 ng/L, respectively. The concentrations do not exceed their respective OSD risk screening levels for tap water. The full suite of analytical results are included in **Table 7-3** and **Appendix P**.

7.8.3 Sediment

One co-located sediment sample FGGM-CSL2-1-SE-082420 was collected from the surface water body running along the southern edge of the Cell 2 boundary (**Figure 7-9**). PFOS was detected at 0.00093 mg/kg, below the OSD risk screening level. PFOA and PFBS concentrations were below their respective LOD. The full suite of analytical results are included in **Table 7-4** and **Appendix P**.

7.9 Closed Sanitary Landfill Cell – 3 (FGGM-97)

The subsection below summarizes the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with CSL Cell – 3 AOPI shown on **Figure 7-10** and **Table 7-1**.

7.9.1 Groundwater

Groundwater samples were collected from two existing monitoring wells FGGM-MW-06, and FGGM-MW-17 at the Closed Sanitary Landfill Cell – 3 AOPI (**Figure 7-10** and **Table 7-1**). PFOS was detected above its OSD risk screening level (40 ng/L) at FGGM-MW-06 at a concentration of 66 ng/L, screened at 8 to 18 feet bgs. PFOS was detected at FGGM-MW-17 at a concentration of 12 ng/L, below the OSD risk screening level. PFOA was detected below its OSD risk screening level (40 ng/L) at both monitoring wells sampled at CSL Cell – 3 AOPI and concentrations ranged between 5 ng/L and 27 ng/L. PFBS concentrations in the groundwater samples ranged between and estimated concentration of 2.8 ng/L and 4.2 ng/L, which are below the OSD risk screening level of 600 ng/L. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.9.2 Surface Water

One surface water sample FGGM-CSL3-1-SW was collected from the surface water body running along the western edge of the Cell 3 boundary (**Figure 7-10**). PFOS, PFOA, and PFBS were detected at 79 ng/L, 24 ng/L and an estimated concentration of 6.5 ng/L, respectively. PFOS was detected above the OSD risk screening level of 40 ng/L. The concentrations of PFOA and PFBS did not exceed their respective OSD risk screening levels for tap water. The full suite of analytical results are included in **Table 7-3** and **Appendix P**.

7.9.3 Sediment

One sediment sample FGGM-CSL3-1-SE-082520 was collected from the surface water body running along the western edge of the Cell 3 boundary (**Figure 7-10**). PFOS was detected above the LOD at a concentration of 0.002 mg/kg, but not at a concentration exceeding the residential or industrial/commercial OSD risk screening level of 0.13 mg/kg and 1.6 mg/kg, respectively. PFOA and PFBS were not detected at concentrations above the LOD. The full suite of analytical results are included in **Table 7-4** and **Appendix P**.

7.10 Parade Ground Area

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Parade Ground Area AOPI shown on **Figure 7-11 and Tables 7-1 through Table 7-2**.

7.10.1 Groundwater

A grab groundwater sample was collected from one boring via DPT at the Parade Ground Area AOPI (**Figure 7-11** and **Table 7-1**). PFOS and PFOA were detected below their OSD risk screening levels (40 ng/L) in groundwater sample FGGM-PGHL-1-GW from the temporary screen set at 10 to 20 feet bgs at concentrations 6.3 ng/L and 12 ng/L, respectively. PFBS was detected at a concentration of 3.8 ng/L, which is below the OSD risk screening level of 600 ng/L. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.10.2 Soil

Three surface soil samples FGGM-PGHL-1-SO-(0-2), FGGM-PGHL-2-SO-(0-2) and FGGM-PGHL-3-SO-(0-2) were collected from 0 to 2 feet bgs at the northern, central, and southern end of the parade ground field, respectively, where pumper trucks containing AFFF may have been stationed at the Parade Ground Area AOPI (**Figure 7-11**). PFBS were not detected above the LOD in any samples. PFOS was detected in the soil samples at concentrations ranging from an estimated concentration of 0.0003 mg/kg and 0.0032 mg/kg, below the OSD risk screening level of 0.13 mg/kg and 1.6 mg/kg for residential and industrial/commercial receptor scenarios. PFOA was detected below the OSD risk screening level in soil sample FGGM-PGHL-2-SO-(0-2) at an estimated concentration of 0.00053 mg/kg. PFOA concentrations were below the LOD at the other two soil samples FGGM-PGHL-1-SO-(0-2) and FGGM-PGHL-3-SO-(0 to 2) collected at this AOPI. The full suite of analytical results are included in **Table 7-2** and **Appendix P**.

7.11 Buildings 3486 and 3488 – Detached Fire Department Support Buildings

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Buildings 3486 and 3488 – Detached Fire Department Support Buildings AOPI shown on **Figure 7-12** and **Tables 7-1, Table 7-2,** and **Table 7-4**.

7.11.1 Groundwater

A groundwater sample was collected from one existing monitoring well FGGM-MP-19-3 screened at 22.5 to 39.5 feet bgs at Buildings 3486 and 3488 – Detached Fire Department Support Buildings AOPI (**Figure 7-12** and **Table 7-1**). PFOS and PFOA were detected below their OSD risk screening levels (40 ng/L) at concentrations of 13 ng/L and 2.8 ng/L, respectively. The PFBS concentration was below the LOD. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.11.2 Soil

Three surface soil samples FGGM-B3486-1-SO-(0-2), FGGM-B3486-2-SO-(0-2) and FGGM-B3486-3-SO-(0-2) were collected from 0 to 2 feet bgs along the eastern and western edges of Building 3486 and adjacent to the building driveway where fire trucks were suspected to have been parked and the third location is situated along the southern edge of Building 3486 at the Buildings 3486 and 3488 – Detached Fire Department Support Buildings AOPI (**Figure 7-12**). PFBS were not detected above the LOD in any samples. PFOS was detected in the soil samples at concentrations ranging between 0.00071 mg/kg and 0.013 mg/kg, below the OSD risk screening level of 0.13 mg/kg and 1.6 mg/kg for residential and industrial/commercial receptor scenarios. PFOA was detected below the OSD risk screening level in two soil samples FGGM-B3486-2-SO-(0-2) and FGGM-B3486-3-SO-(0-2) at estimated concentrations of 0.00048 mg/kg and 0.00035 mg/kg, respectively. PFOA concentrations were below LOD at the remaining soil sample FGGM-B3486-1-SO-(0-2) collected at this AOPI. The full suite of analytical results are included in **Table 7-2** and **Appendix P**.

7.11.3 Sediment

One sediment sample FGGM-B3486-1-SE-082420 was collected along the surface water body located to the north and directly down topography of Buildings 3486 and 3488 at this AOPI (**Figure 7-12**). PFOS, PFOA and PFBS concentrations were all below LOD. The full suite of analytical results are included in **Table 7-4** and **Appendix P**.

7.11.4 Surface Water

One surface water sample FGGM-B3486-1-SW was proposed for collection along with the sediment sample FGGM-B3486-1-SE as described above. At the time of sampling, no surface water was present in the stream and no sample was collected for analysis.

7.12 Operable Unit (OU) 4 Hydraulic Containment System

The subsection below summarizes the groundwater PFOS, PFOA, and PFBS analytical results associated with the influent and effluent of OU4 HC system shown on **Figure 7-13** and **Tables 7-1**. The OU4 HC system consists of six extraction wells that treat and manage groundwater in the LPA. The system was re-activated on 5 November 2020 as part of a new contract authorization and influent and effluent samples for PFAS analysis were collected from the system on the same day. Upon activation of the system, one of the six HC system extraction wells (EW-6) was not functioning properly and remained offline. The effluent sample collected from the system on 5 November 2020 is representative of extracted groundwater from five of the six extraction wells (EW-1 through EW-5) in operation at the time the sample was collected.

7.12.1 Groundwater

Two groundwater samples (one influent and one effluent) were collected from existing sampling ports installed on the remediation building at the OU-4 HC system (**Figure 7-13** and **Table 7-1**). PFOS, PFOA and PFBS were not detected above the LOD in the effluent groundwater sample FGGM-HCS-EFF. PFOS and PFOA were detected below their OSD risk screening level (40 ng/L) in influent groundwater sample FGGM-HCS-INF at concentrations of 19 ng/L and 6.0 ng/L, respectively. PFBS concentration was detected at 2.7 ng/L, which is below the OSD risk screening level of 600 ng/L. The full suite of analytical results are included in **Table 7-1** and **Appendix P**.

7.13 Off-Post Monitoring Wells

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with on-post and off-post FGGM monitoring wells located downgradient of all identified AOPIs at FGGM. Due to exceedance PFOS and PFOA above the OSD risk screening levels in groundwater at monitoring wells sampled at the CSL Cell 1 AOPI (AOPI #7), located along and hydraulically upgradient of the southeast installation boundary, a sub-set of off-post monitoring wells were sampled. Samples were collected during a second mobilization in December 2020 to evaluate the presence or absence of PFOS, PFOA, and PFBS in the UPA and LPA in off-post areas. Three of the five sampled wells were screened in the UPA. The remaining two monitoring wells were screened in the LPA. Sampling results are shown on **Figure 7-14, Figure 7-15** and **Table 7-5**.

7.13.1 Groundwater

Groundwater samples were collected from four existing off-post monitoring wells: FGGM-MW-105, FGGM-MW-106, FGGM-MW-107, and FGGM-MW-116D. A groundwater sample was also collected from one existing on-post monitoring well located directly along the southeastern installation boundary of FGGM: FGGM-MW-39. The existing monitoring wells FGGM-MW-105, FGGM-MW-106, FGGM-MW-107 are screened within the UPA, between 20 feet bgs and 37.5 feet bgs. FGGM-MW-116D and FGGM-MW-39 are screened within the LPA, between 166 feet bgs and 211 feet bgs.

PFOS, PFOA, and PFBS were detected in concentrations above the LOD but below the OSD risk screening levels in all samples collected from wells screened within the UPA (FGGM-MW-105, FGGM-MW-106, and FGGM-MW-107). PFOS was detected at concentrations above the LOD in three

groundwater samples (two normal samples and one duplicate sample), with concentrations ranging between 0.5 ng/L and 4.8 JM ng/L. PFOS concentrations were below the LOD in the parent groundwater sample collected from FGGM-MW-106; however, its associated duplicate sample detected PFOS at a concentration of 0.52 JM ng/L. PFOA and PFBS were detected at concentrations above the LOD in all four groundwater samples (three normal samples and one duplicate sample), with concentrations ranging between 4.1 N ng/L and 6.0 ng/L for PFOA, and 0.52 J ng/L to 3.1 M ng/L for PFBS.

PFOS and PFOA were detected in concentrations above the LOD but below the OSD risk screening levels in all samples collected from wells screened within the LPA (FGGM-MW-39 and FGGM-MW-116D), with concentrations ranging between 1.4 J ng/L and 4.8 ng/L for PFOS, and 0.75 JM ng/L and 0.85 JM ng/L for PFOA. PFBS concentrations were below the LOD in both collected samples.

The full suite of analytical results for the samples collected from off-post monitoring wells are included in **Table 7-5** and **Appendix P**.

7.14 TOC, pH, and Grain Size

In addition to sampling soil for PFOS, PFOA, and PFBS, one soil sample per AOPI was analyzed for TOC, pH, moisture content, and grain size data as they may be useful in future fate and transport studies. The TOC in the soil samples ranged from 1,750 mg/kg [in sample FGGM-2300AREA-2-SO-(0 to 2)-082020] to 304,000 mg/kg [in sample FGGM-SALT-DOME-1-SO-(0 to 2)-082020]. The TOC at this installation was within range of typical organic content in topsoil (topsoil: 5,000 to 30,000 mg/kg) at most of the AOPIs. TOC concentration at the Salt Dome was higher and in the organic soil range: greater than 120,000 mg/kg. The combined percentage of fines in soils at FGGM ranged from 5.6% to 13.5% with an average of 10.38%. 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 7.9% to 30.3% with an average of 12.38% and was typical for loam (0 to 12%). The average pH of the soil was neutral (approximately 7). Based on the geochemical data obtained during the SI at FGGM, while PFAS constituents are relatively more mobile in soils with low percentages of fines, elevated TOC may retard transport of the constituents from soil to groundwater.

7.15 Blank Samples

The full analytical results for blank samples collected during the SI are included in **Appendix P**. Detections of PFOS, PFOA, and PFBS constituents at concentrations greater than the LODs are summarized below for blank samples. Most detected concentrations were low-level. Other than those noted below, concentrations of PFOS, PFOA, and PFBS in all other blank samples were not detected above LODs.

- PFOS was detected (18 ng/L) at a concentration greater than the LOD in the source blank sample FGGM-AOPI6-FB-081920. The source blank was collected at Building 6619 – Current FGGM Fire Station AOPI to determine background PFAS (including PFOS, PFOA, and PFBS) levels in the vicinity of the AOPI while normal samples were collected. Source water for the field effort was procured from the FGGM Contractor Filling Station located along Dutt Road. PFOA was detected (1.5 ng/L) at a concentration greater than the LOD in the source blank sample FGGM-SB-1-082020. The

source blank was collected to determine PFAS presence in source water used during the decontamination process.

- PFOA was detected (1.4 ng/L) at a concentration greater than the LOD in the source blank sample FGGM-SB-2-082120. The source blank was collected to determine PFAS presence in source water used during the decontamination process.

7.16 Conceptual Site Models

The preliminary CSMs presented in the QAPP Addendum (Arcadis 2020) were re-evaluated and updated, if necessary, based on the SI sampling results. The CSMs presented on **Figures 7-16** through **7-21** and in this section therefore represent the current understanding of the potential for human exposure. For some AOPIs, the CSM is the same and thus shown on the same figure.

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

Based on the use, storage, and/or disposal of PFAS-containing materials at the AOPIs, affected media are likely to consist of soil, groundwater, surface water, and sediment.

Release and transport mechanisms include dissolution/desorption from soil to groundwater, transport via sediment carried in and dissolution to stormwater and surface water, discharge/recharge between groundwater and surface water, and adsorption/desorption between surface water and sediment. Generic categories of potential human receptors and their associated exposure scenarios that are typically evaluated in a CERCLA human health risk assessment were considered and include on-installation site workers (e.g., industrial/commercial workers, utility workers, or future construction workers who could be exposed to chemicals in soil at an AOPI or to chemicals in tap water in an industrial/commercial building), on-installation residents (e.g., adults and children who could be exposed to chemicals in tap water in a residence), and on-installation recreational users (e.g., hikers or hunters who could be exposed to chemicals in waterways at an installation). Off-installation receptor types could include drinking water receptors (i.e., commercial/industrial workers or residents) and recreational users.

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

Following the SI sampling, 11 out of the 11 AOPIs with confirmed PFOS, PFOA, and/or PFBS presence were considered to have complete or potentially complete exposure pathways. Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for remedial investigation is based on the comparison of analytical results for PFOS, PFOA, and PFBS to the OSD risk screening levels (**Table 6-2**).

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

- The AOPIs are wholly-located on post and are not likely to be accessed by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at or downgradient of all AOPIs. All identified AOPIs are located upgradient or side-gradient of potable water wells screened within the Patuxent Aquifer that are used to supply potable water at FGGM (**Figure 2-2**). However, the Patuxent Aquifer is confined, and groundwater from these AOPIs is unlikely to infiltrate through the confining unit. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are incomplete. Recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-installation recreational users is also incomplete.
- Groundwater originating at all identified FGGM AOPIs flows off-post through the installation's eastern or southeastern boundaries. Most of the potable water supplied in off-post areas in Odenton, Maryland located east and southeast of FGGM is provided by Anne Arundel County. However, there are residential and commercial properties which receive potable water from wells screened in both the UPA and LPA. Therefore, the groundwater exposure pathway for off-installation receptors is potentially complete.

Figure 7-16 shows the CSM for Building 6619 – Current FGGM Fire Station, Salt Dome, Railroad Avenue– Fire Equipment Testing Area and the Buildings 3486 and 3488 – Detached Fire Department Support Building AOPIs. AFFF was either stored at these locations or historically released to soil and pavement during firefighter and equipment training exercises and fire truck washing at these locations between the 1980s and late 2000s.

- PFOS, PFOA, and/or PFBS were detected in soil. Site workers (i.e., installation personnel) could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete.
- There are no residences on-post in the vicinity of the AOPIs, and the AOPIs are not likely to be accessed by on-installation residents and recreational users. Therefore, the soil exposure pathways for these receptors are incomplete.
- Surface water bodies on-post are not used for potable water. However, on-installation site workers and recreational users could potentially contact constituents in surface water and sediment; therefore, these exposure pathways are potentially complete. On-installation residents are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete.
- Surface water bodies flow off-post through Franklin Branch, Midway Branch, Rogue Harbor Branch, and into the Little Patuxent River. The Little Patuxent River is classified as non-potable downgradient of all identified AOPIs at FGGM. Recreational users off-post could contact constituents in surface

water and sediment through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-17 shows the CSM for the 900 Area – AFFF Equipment Testing Area. AFFF was historically released to soil during firefighter training exercises at this location between the 1980s and 1990s.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs. Site workers (i.e., installation personnel) could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete.
- There are no residences on-post in the vicinity of the AOPIs, and the AOPIs are not likely to be accessed by on-installation residents and recreational users. Therefore, the soil exposure pathways for these receptors are incomplete.
- There are no surface bodies transecting or originating from this AOPI. Therefore, surface water and sediment are not included as potential exposure media on this CSM figure.

Figure 7-18 shows the CSM for the 2300 Area – AFFF Equipment Testing Area. AFFF was historically released to soil during firefighter training exercises at this location between the 1970s and 1990s. The area now operates as a recreational vehicle park for on-post residents and recreational users.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs. Site workers (i.e., installation personnel) could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete. Mobile home housing exists in the vicinity of this AOPI, and the AOPI is accessed by on-installation residents and recreational users. Therefore, the soil exposure pathways for these receptors are also complete.
- Surface water bodies on-post are not used for potable water. However, on-installation site workers and recreational users could potentially contact constituents in surface water and sediment; therefore, these exposure pathways are potentially complete. On-installation residents are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete.
- Surface water bodies flow off-post through Franklin Branch, Midway Branch, Rogue Harbor Branch, and into the Little Patuxent River. The Little Patuxent River is classified as non-potable downgradient of all identified AOPIs at FGGM. Recreational users off-post could contact constituents in surface water and sediment through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-19 shows the CSM for the CSL Cells 1, 2 and 3 AOPIs. Residual AFFF may have been introduced to these landfill cells as a result of AFFF bucket disposal practices.

- No soil samples were collected at the CSL cells. However, as the CSL cells are capped, the soil exposure pathways for all receptors are incomplete.
- Surface water bodies on-post are not used for potable water. On-installation site workers could potentially contact constituents in surface water and sediment; therefore, these exposure pathways are potentially complete. On-installation residents are not likely to contact surface water and sediment and there are no recreational areas around these AOPIs. Therefore, the surface water and sediment exposure pathways for on-installation residents and recreational users are incomplete.
- Surface water bodies flow off-post through Franklin Branch, Midway Branch, Rogue Harbor Branch, and into the Little Patuxent River. The Little Patuxent River is classified as non-potable downgradient of all identified AOPIs at FGGM. Recreational users off-post could contact constituents in surface

water and sediment through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-20 shows the CSM for the Parade Ground Area. Fire Department pumper trucks stocked with AFFF were parked at this area sometime between the early 1970s and 1990s.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs. Site workers (i.e., installation personnel) could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete. The parade ground area is publicly accessible to on-installation residents and recreational users. Therefore, the soil exposure pathways for these receptors are also complete.
- Surface water bodies on-post are not used for potable water. However, on-installation site workers and recreational users could potentially contact constituents in surface water and sediment; therefore, these exposure pathways are potentially complete. On-installation residents are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete.
- Surface water bodies flow off-post through Franklin Branch, Midway Branch, Rogue Harbor Branch, and into the Little Patuxent River. The Little Patuxent River is classified as non-potable downgradient of all identified AOPIs at FGGM. Recreational users off-post could contact constituents in surface water and sediment through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

Figure 7-21 shows the CSM for the Building 4230 – Former FGGM Fire Station AOPI. AFFF was stored at this location and historically released to soil and pavement during fire truck washing at these locations between the early 1980s and 2001.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs. Site workers (i.e., installation personnel) could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete.
- Residential homes reside adjacent to and northwest of the Building 4230 – Former FGGM Fire Station AOPI; however, it is unlikely that the AOPI would be accessed by on-installation residents and recreational users Therefore, the soil exposure pathways for these receptors are incomplete.
- Surface water and sediment samples were not collected at this AOPI because the intended sample location was determined to be off post. On-installation site workers could potentially contact constituents in surface water and sediment if they maintain the off-post outfall location. Therefore, the surface water and sediment exposure pathways are potentially complete.
- On-installation residents and recreational users are not likely to contact surface water and sediment discharged from the Building 4230 outfall location; therefore, these exposure pathways are incomplete.
- Surface water bodies flow off-post through Franklin Branch, Midway Branch, Rogue Harbor Branch, and into the Little Patuxent River. The Little Patuxent River is classified as non-potable downgradient of all identified AOPIs at FGGM. Recreational users off-post could contact constituents in surface water and sediment through incidental ingestion and dermal contact; as such, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete.

8 CONCLUSIONS AND RECOMMENDATIONS

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

The PFAS PA at PMR did not identify the use, storage, and/or disposal of PFAS-containing materials at any locations on-post; therefore, an SI was not conducted at PMR.

OSD provided residential risk screening levels based on the USEPA oral reference dose for PFOS, PFOA, and PFBS in soil and groundwater (tap water) and industrial/commercial risk screening levels for PFOS, PFOA, and PFBS in soil (**Appendix A**). A combination of document review, internet searches, interviews with installation personnel, and an installation site visit were used to identify specific areas of suspected PFOS, PFOA, and PFBS use, storage, and/or disposal at FGGM. Following the evaluation, 11 AOPIs were identified.

The six potable wells that supply the FGGM WTP, and the WTP point of entry were sampled for PFOS and PFOA during the UCMR3 and in response to IMCOM Operations Order 16-088 in June 2015 and August 2016, respectively. Results indicated that PFOS and PFOA were not detected above the LOD (40 and 20 ng/L for PFOS and PFOA respectively in both studies) in either sampling event. In September 2013, the Harford County Department of Public Works Perryman WTP, located approximately 18.5 miles east of PMR, detected PFOA at a concentration equal to the laboratory LOD,

Eleven AOPIs, the OU-4 HC system, and a sub-set of off-post monitoring wells were sampled during the SI at FGGM to identify presence or absence of PFOS, PFOA, and PFBS at each AOPI and in hydraulically downgradient portions of the UPA/LPA. The SI scope of work was completed in accordance with the Final PQAPP (Arcadis 2019) and the FGGM QAPP Addendum (Arcadis 2020).

- 11 AOPIs had detections of PFOS, PFOA, and PFBS in groundwater, soil, surface water, and/or sediment and 5 AOPIs exceeded OSD risk screening levels. All 27 collected groundwater samples had detections of PFOS, PFOA, and/or PFBS. Eleven out of 27 groundwater samples collected had PFOS, PFOA, and/or PFBS detections above their respective OSD risk screening levels (40 ng/L, 40 ng/L, and 600 ng/L). The maximum groundwater detection was observed at the Building 6619 – Current FGGM Fire Station AOPI (400 ng/L for PFOA), above the OSD risk screening level. The remaining 16 groundwater samples did not have detections above the OSD risk screening levels.
- 13 out of 15 soil samples collected had PFOS, PFOA, and/or PFBS detections. The maximum soil detection was observed at Fire Station 1 – Building 721 (0.013 mg/kg for PFOS), below the OSD risk screening level.
- All seven surface water samples collected had PFOS, PFOA and/or PFBS detections. Two samples had concentrations of PFOS and PFOA above their OSD risk screen level (40 ng/L). The maximum surface water detection for PFOA was observed at the Railroad Avenue – Fire Equipment Testing Area AOPI (380 ng/L), and the maximum surface water detection for PFOS was observed at the CSL – Cell 3 AOPI (79 ng/L).

- Seven out of eight sediment samples collected had PFOS, PFOA and/or PFBS detections. The maximum sediment detection was observed at the CSL – Cell 3 AOPI (0.002 mg/kg for PFOS).
- The influent sample collected from the OU4 HC system had PFOS, PFOA and PFBS detections. The maximum detection observed was 6 ng/L for PFOA. PFOS, PFOA and PFBS were not detected in the collected effluent sample.
- All five groundwater samples collected from off-post wells screened in the UPA and LPA had PFOS, PFOA and/or PFBS detections. The maximum detection observed was in the UPA well MW-106 (6 ng/L for PFOA).

Following the SI sampling, 11 AOPIs with confirmed PFOS, PFOA, and/or PFBS presence were considered to have complete or potentially complete exposure pathways.

- Soil exposure pathways are complete at eight of the 11 AOPIs.
- Although PFOS, PFOA, and/or PFBS were detected in groundwater at or downgradient of all AOPIs and the AOPIs are upgradient or side-gradient of potable water wells at FGGM, the Patuxent Aquifer is confined, and groundwater from these AOPIs is unlikely to infiltrate through the confining unit. Therefore, the groundwater exposure pathways for on-installation drinking water receptors are incomplete.
- Off-installation drinking water wells located hydraulically downgradient of all AOPIs are believed to be screened within both the UPA or LPA. The identified AOPIs at FGGM reside atop the UPA or LPA at points where they are surficial water table aquifers; therefore, the groundwater exposure pathways for off-installation drinking water receptors remain potentially complete at all 11 AOPIs.
- Surface water and sediment exposure pathways are potentially complete for on-installation site workers and/or recreational users and for off-installation recreational users at 10 of the 11 AOPIs.

Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for future study in a remedial investigation is based on the comparison of analytical results for PFOS, PFOA, and PFBS to the OSD risk screening levels. (**Table 6-2**). **Table 9-1** below summarizes the AOPIs identified at FGGM, PFOS, PFOA, and PFBS sampling and recommendations for each AOPI; further investigation is warranted at FGGM. In accordance with CERCLA, site-specific risk will be assess during a future phase to evaluate whether remedial actions are required.

Table 9-1. Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at FGGM, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Y/N/NS)				Recommendation
	GW	SO	SW	SE	
900 Area – AFFF Equipment Testing Area	N	N	NS	NS	No action at this time
2300 Area – AFFF Equipment Testing Area	Y	N	N	N	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Y/N/NS)				Recommendation
	GW	SO	SW	SE	
Salt Dome	N	N	N	N	No action at this time
Railroad Avenue – Fire Equipment Testing Area	Y	N	Y	N	Further study in a remedial investigation
Building 4230 – Former Fire Station	N	N	NS	NS	No action at this time
Building 6619 – Current Fire Station	Y	N	N	N	Further study in a remedial investigation
Buildings 3486 and 3488 – Detached Fire Department Support Buildings	N	N	NS	N	No action at this time
CSL Cell 1	Y	N	N	N	Further study in a remedial investigation
CSL Cell 2	N	N	N	N	No action at this time
CSL Cell 3	Y	N	Y	N	Further study in a remedial investigation
Parade Ground Area	N	N	NS	NS	No action at this time

Notes:
Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
Y – yes
N – no
NS – not sampled
SE – sediment
SO – soil SW –surface water

Data collected during the PA (**Section 3**, **Section 4**, and **Section 5**) and SI (**Section 6** and **Section 7**) were sufficient to draw the conclusions summarized in **Section 8**. The data limitations relevant to the development of this PA for PFOS, PFOA, and PFBS at PMR, and this PA/SI for PFOS, PFOA, and PFBS at FGGM are discussed below.

Records gathered for the use, storage and/or disposal of PFAS-containing materials were reviewed during the PA process. Documentation specific to AFFF may have been limited (e.g., each AFFF use; procurement records, documentation of AFFF used during crash responses or fire training activities) due to lack of recordkeeping requirements for the full timeline of common AFFF practices. Anecdotal accounts of AFFF use (and therefore likely PFOS, PFOA, and PFBS use) were limited to available installation personnel, whose knowledge of AFFF use may have been restricted by their time spent at the installation or previous roles held that limited their relevant knowledge of potential AFFF (or other PFAS-containing material) use.

A comprehensive well survey was not completed as part of the PA at FGGM and PMR; therefore, the information reviewed regarding off-post wells is limited to what is contained in the off post well search results and registered well records as provided by Anne Arundel County. The EDR well search report (**Appendix F**) and Anne Arundel County well records were referenced when identifying potential off-post drinking water receptors at FGGM.

The searches for ecological receptors and off-post PFOS, PFOA, and PFBS sources were not exhaustive and were limited to easily identifiable and readily available information evaluated during the relevant documents research, installation personnel interviews, and site reconnaissance. Additionally, the CSMs do not include ecological receptors and exposure pathways. The potential for ecological exposures to PFOS, PFOA, and PFBS may be evaluated at a future date if those pathways warrant further consideration.

Finally, the available PFOS, PFOA and PFBS analytical data is limited to results from groundwater samples collected from existing monitoring wells at nine AOPIs, shallow groundwater samples from borings at five AOPIs, shallow soil samples from eight AOPIs, surface water and sediment samples at seven AOPIs, and groundwater samples collected from five existing monitoring wells located off-post and hydraulically downgradient of identified AOPIs. No residential wells or private wells were included in the SI. Groundwater results do not include aquifers other than where drinking water wells are screened. Additionally, the available PFAS data, including PFOS, PFOA, and/or PFBS is limited to the 18 PFAS-related compounds as listed in (**Table 6-2**) which were analyzed per the selected analytical method. The limited sampling scope of the SI focused on identifying presence or absence of PFOS, PFOA, and PFBS at the AOPIs. SI sampling locations at or in proximity of the AOPIs did not delineate the extent of PFOS, PFOA, and PFBS impacts or identify the primary migration pathways for the chemicals.

Based on the information included within this PA/SI report, a more comprehensive evaluation may be conducted for those AOPIs that warrant further study in a remedial investigation.

9 REFERENCES

Arcadis U.S., Inc. (Arcadis). 2012. Final Remedial Investigation Report. Phoenix Military Reservation, Jacksonville, Maryland. November

Arcadis. 2018. Accident Prevention Plan: A-E Services, PFASs Contamination in the Cleanup/Restoration Programs at Active Army Installations – Nationwide. Prepared for USACE, Baltimore District. March.

Arcadis. 2019. Final Programmatic Uniform Federal Policy (UFP) Quality Assurance Project Plan (QAPP), USAEC PFAS PA/SI, Active Army Installations, Nationwide, USA. October.

Arcadis. 2020. Final UFP QAPP Addendum, Revision 0, USAEC PFAS PA/SI, FGGM, Maryland. August.

Army. 2018. Army Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances. September 4. Available online at: https://www.fedcenter.gov/admin/itemattachment.cfm?attachmentid=1150.

CH2M Hill 1999. RCRA Facility Assessment – Third Phase Sampling Visits Report. Fort George G. Meade, Fort Meade, Maryland. December.

Department of Defense (DoD). 2017. Fact Sheet: Detection and Quantitation – What Project Managers and Data Users Need to Know. October.

DoD. 2018. Quality Systems Manual, Version 5.1.1, 2018. February.

DoD. 2019. Environmental Data Quality Working Group: Final General Data Validation Guidelines. November 4.

DoD. 2020. Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15. May 1.

EA Engineering Science and Technology, Inc. (EA). 1992. Final Fort George G. Meade Base Closure Parcel Site Inspection Study. October 1992.

Fort George G. Meade (FGGM) 1981. Final Overall Installation Environmental Impact Statement. Existing Activities and Conditions. Fort George G. Meade, Maryland. August.

FGGM. 2014. Final Stormwater Pollution Prevention Plan (SWP3). Fort George G. Meade. December.

FGGM. 2017. FY2016 Fort George G. Meade. Army Defense Environmental Restoration Program. Installation Action Plan. June.

Interstate Technology Regulatory Council. 2017. History and Use of Per-and Polyfluoroalkyl Substances (PFAS). November. Available online at: https://pfas-1.itrcweb.org/wp-content/uploads/2017/11/pfas_fact_sheet_history_and_use__11_13_17.pdf.

Interstate Technology Regulatory Council. 2020. Section 3.1 Firefighting Foams. Updated April 14. Available online at: https://pfas-1.itrcweb.org/3-firefighting-foams/#3_1

Malcolm Pirnie. 2006. Remedial Investigation Architect of the Capitol, Library of Congress Campus Facility. Fort George G. Meade, Maryland. July.

Maryland Department of the Environment (MDE). 2020. Maryland's Designated Use Classifications and Water Quality Standards. Accessed Online June 2020. Available online at:

https://mde.maryland.gov/programs/Water/TMDL/WaterQualityStandards/Pages/DesignatedUsesMaps.aspx

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

OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.

Phoenix Military Reservation (PMR). 2013. FY2012 Phoenix Military Reservation. Army Defense Environmental Restoration Program. Installation Action Plan. September.

PMR. 2019. FY2018 Phoenix Military Reservation. Army Defense Environmental Restoration Program. Installation Action Plan. September.

URS. 2015. Preliminary Assessment/Site Inspection Southeast Areas of Interest Fort George G. Meade Anne Arundel county, Maryland. October.

US Army Corps of Engineers (USACE). 2004. Final Environmental Baseline Survey Site M. Fort Meade, Maryland. May.

USACE. 2005. Environmental Quality: Guidance for Evaluating Performance-Based Chemical Data, Engineer Manual 200-1-10, CEMP-RA/CECW-E, June 30.

USACE. 2012. Environmental Quality: Conceptual Site Models, Engineer Manual 200-1-12, CEMP-CE, December 28.

USACE. 2020. Final Site Management Plan 2020 Annual Update. Fort George G. Meade. Fort Meade, Maryland. November.

U.S. Environmental Protection Agency (USEPA). 1991. Guidance for Performing Preliminary Assessments Under CERCLA. EPA/540/G-91/013. September. Available online at: https://semspub.epa.gov/work/11/157081.pdf.

USEPA. 2012. The Third Unregulated Contaminant Monitoring Rule. Searching for Emerging Contaminants in Drinking Water. Available online at: https://www.epa.gov/sites/production/files/2015-10/documents/ucmr3_factsheet_general.pdf

USEPA. 2014. Provisional Peer-Reviewed Toxicity Values for Perfluorobutane Sulfonate (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Sulfonate (CASRN 29420-49-3). EPA/690/R-14/012F. July 17.

USEPA. 2016. Lifetime Health Advisories and Health Effects Support Documents for Perfluorooctanoic Acid and Perfluorooctane Sulfonate. EPA-HQ-OW-2014-0138; FRL-9946-91-OW. Federal Register/ Vol. 81. No. 101. May 25. Available online at: https://www.govinfo.gov/content/pkg/FR-2016-05-25/pdf/2016-12361.pdf.

USEPA. 2021. Human Health Toxicity Values for Perfluorobutane Sulfonic Acid (CASRN 375-73-5) and Related Compound Potassium Perfluorobutane Sulfonate (CASRN 29420-49-3). EPA/600/R-20/345F. Center for Public Health and Environmental Assessment, Office of Research and Development, Washington DC. April.

U.S. Fish and Wildlife Service. 2021. Environmental Conservation Online System. Accessed digitally June 2021. Available online at: https://www.fws.gov/endangered/

Weston. 1990. Report No-CETHA-IR-CR-90163. Preliminary Assessment Report for Phoenix Military Reservation. September.

ACRONYMS

°F	degrees Fahrenheit
%	percent
AFFF	aqueous film-forming foam
amsl	above mean sea level
AOPI	area of potential interest
Arcadis	Arcadis U.S., Inc.
Army	United States Army
bgs	below ground surface
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
cm/sec	centimeter per second
COC	Contaminants of Concern
CSM	conceptual site model
DoD	Department of Defense
DPT	direct-push technology
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DUSR	Data Usability Summary Report
EA	EA Engineering, Science, and Technology
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
FCA	fire control area
FCR	field change report
FGGM	Fort George G. Meade
FTA	Fire Training Area
GIS	geographic information system
HC	hydraulic containment
HDPE	high-density polyethylene

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
LPA	Lower Patapsco Aquifer
MDE	Maryland Department of the Environment
mg/kg	milligrams per kilogram (parts per million)
MRL	Minimum Reporting Level
NA	not available
ng/L	nanograms per liter (parts per trillion)
OSD	Office of the Secretary of Defense
OU	operable unit
PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PMR	Phoenix Military Reservation
POC	point of contact
ppm	parts per million
ppt	parts per trillion
PQAPP	Programmatic Uniform Federal Policy-Quality Assurance Project Plan
PSL	project screening level
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RA	Remedial Action
ROD	Record of Decision

RSL	Risk Screening Level
SI	site inspection
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
STP	sewage treatment plant
TGI	technical guidance instruction
TOC	total organic carbon
UCMR3	third Unregulated Contaminant Monitoring Rule
UPA	Upper Patapsco Aquifer
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
WTP	water treatment plant
WWTP	wastewater treatment plant

TABLES

Table 6-1 - Monitoring Well Construction Details
USAEC PFAS PA/SI
Fort George G. Meade, Maryland

Associated AOPI	Well Identification	Top of Casing Elevation (ft msl)	Screened Interval (ft bgs)	Total Depth (ft bgs)
Area 900 - AFFF Equipment Testing Area	MP-12-1	*185.02 ft	20 - 35 ft bgs	35 ft bgs
Area 2300 - AFFF Equipment Testing Area	OU4MW-30	144.84 ft	13 - 23 ft bgs	23 ft bgs
Area 2300 - AFFF Equipment Testing Area	OU4MW-27	155.69 ft	24.5-44.5 ft bgs	44.5 ft bgs
Railroad Avenue	AOCNW-11	143.03 ft	28 - 38 ft bgs	38 ft bgs
Railroad Avenue	AOCNW-12	150.28 ft	40 - 50 ft bgs	50 ft bgs
Building 4230 - Former FGGM Fire Station	NW8	120.45 ft	20 - 30 ft bgs	30 ft bgs
Building 6619 - Current FGGM Fire Station	MW-3R	154.80 ft	17 - 27 ft bgs	27 ft bgs
Building 6619 - Current FGGM Fire Station	MW-5	154.36 ft	24 - 34 ft bgs	34 ft bgs
Closed Sanitary Landfill Cell 1	MW-18	167.84 ft	20 - 35 ft bgs	35 ft bgs
Closed Sanitary Landfill Cell 1	MW-2S	163.93 ft	24 - 29 ft bgs	29 ft bgs
Closed Sanitary Landfill Cell 1	MW-14	165.68 ft	20 - 30 ft bgs	30 ft bgs
Closed Sanitary Landfill Cell 1	MW-19	170.01 ft	22.5 - 37.5 ft bgs	37.5 ft bgs
Closed Sanitary Landfill Cell 2	MW-13S	169.16 ft	19 - 34 ft bgs	34 ft bgs
Closed Sanitary Landfill Cell 3	MW-06	143.77 ft	8 - 18 ft bgs	18 ft bgs
Closed Sanitary Landfill Cell 3	MW-17	171.81 ft	20 - 35 ft bgs	35 ft bgs

*Denotes ground surface elevation

Acronyms and Abbreviations:
AFFF = aqueous film-forming foam
AOPI = area of potential interest
bgs = below ground surface
FGGM = Fort George G. Meade
ft = feet
msl = mean sea level

Table 7-1
Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

					Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
					OSD Tapwater RiskScreening Level	40		40		600	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Area 2300 - Fire Equipment Testing Area	Monitoring Well	FGGM-2300A-1	FGGM-2300AREA-1-GW-082020	08/20/2020	N	**48**		**53**		**12**	
Area 2300 - Fire Equipment Testing Area	Monitoring Well	FGGM-2300A-2	FGGM-GW-DUP-01-082020 / FGGM-2300AREA-2-GW-082020	08/20/2020	FD	**40**		**49**		**11**	
			FGGM-2300AREA-2-GW-082020	08/20/2020	N	**52**		**21**		**11**	
Area 2300 - Fire Equipment Testing Area	Monitoring Well	FGGM-OU4MW-28	FGGM-OU4MW-28-082620	08/26/2020	N	**2.5**		**6.9**		**1.9**	
Area 2300 - Fire Equipment Testing Area	Monitoring Well	FGGM-OU4MW-30	FGGM-OU4MW-30-081820	08/18/2020	N	**1.7**		**1.7**		**0.96**	J
Area 900 - Fire Equipment Testing Area	Monitoring Well	FGGM-900A-2	FGGM-900AREA-2-GW-082120	08/21/2020	N	**11**	J	**7.1**	J	9.6	U
			FGGM-GW-DUP-02-082120 / FGGM-900AREA-2-GW-082120	08/21/2020	FD	**7.4**	J	**16**	J	**3.8**	
Area 900 - Fire Equipment Testing Area	Monitoring Well	FGGM-MP-12	FGGM-MP-12-082620	08/26/2020	N	**9.5**		**10**		**1.5**	J
Buildings 3486 and 3488	Monitoring Well	FGGM-MP-19	FGGM-MP19-3-081920	08/19/2020	N	**13**		**2.8**		1.6	U
Building 4230 - Former Fire Station	Monitoring Well	FGGM-NW8	FGGM-NW-8-081920	08/19/2020	N	**7.8**		**8.9**		**1.7**	
Building 6619 – Current Fire Station	Monitoring Well	FGGM-MW-03R	FGGM-MW-03R-081920	08/19/2020	N	**120**		**400**		**6.0**	
Building 6619 – Current Fire Station	Monitoring Well	FGGM-MW-05	FGGM-MW-05-081920	08/19/2020	N	**18**	BJ+	**16**		**1.9**	
Closed Sanitary Landfill Cell 1	Monitoring Well	FGGM-MW-14	FGGM-MW-14-081820	08/18/2020	N	**30**		**47**		**2.5**	J-
Closed Sanitary Landfill Cell 1	Monitoring Well	FGGM-MW-18	FGGM-MW-18-081820	08/18/2020	N	**75**		**20**		**7.8**	
Closed Sanitary Landfill Cell 1	Monitoring Well	FGGM-MW-19	FGGM-MW-19-081820	08/18/2020	N	**28**		**73**	J	**7.2**	J+
Closed Sanitary Landfill Cell 1	Monitoring Well	FGGM-MW-2S	FGGM-MW-2S-081820	08/18/2020	N	**7.2**		**12**		**1.7**	
Closed Sanitary Landfill Cell 2	Monitoring Well	FGGM-MW-13S	FGGM-MW13S-082520	08/25/2020	N	**4.7**		**30**		**2.6**	J-
Closed Sanitary Landfill Cell 3	Monitoring Well	FGGM-MW-06	FGGM-MW-06-082520	08/25/2020	N	**66**		**27**		**2.8**	J-
Closed Sanitary Landfill Cell 3	Monitoring Well	FGGM-MW-17	FGGM-MW-17-082520	08/25/2020	N	**12**		**5.0**		**4.2**	
OU4 Hydraulic Containment System	Treatment System - Effluent	FGGM-HCS-EFF	FGGM-HCS-EFF-110520	11/05/2020	N	1.9	U	1.9	U	1.9	U
OU4 Hydraulic Containment System	Treatment System - Influent	FGGM-HCS-INF	FGGM-HCS-INF-110520	11/05/2020	N	**19**		**6.0**		**2.7**	
Parade Ground Area	Monitoring Well	FGGM-PGHL-1	FGGM-PGHL-1-GW-082120	08/21/2020	N	**6.3**		**12**		**3.8**	
Railroad Avenue	Monitoring Well	FGGM-NW-11	FGGM-AOCNW-11-082620	08/26/2020	N	**90**		**5.5**		**1.0**	J
Railroad Avenue	Monitoring Well	FGGM-NW-12	FGGM-AOCNW-12-082620	08/26/2020	N	**3.9**		**5.5**		**1.3**	J
Railroad Avenue	Monitoring Well	FGGM-RAIL_AVE-1	FGGM-RRA-1-GW-082020	08/20/2020	N	**58**	J+	**72**	J+	**2.4**	

Table 7-1
Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

					Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
					OSD Tapwater RiskScreening Level	40		40		600	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Salt Dome	Monitoring Well	FGGM-Salt_Dome-1	FGGM-SALT-DOME-1-GW-082020	08/20/2020	N	**8.1**	J	**16**		**1.9**	
Salt Dome	Monitoring Well	FGGM-Salt_Dome-2	FGGM-SALT-DOME-2-GW-082020	08/20/2020	N	**13**		**4.8**		**1.8**	

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Grey shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.)
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Acronyms/Abbreviations:
-- = not applicable
AOPI = Area of Potential Interest
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

Qualifier
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).
BJ+ = (Estimated; contamination): The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect and reported result may be biased high.

Table 7-2
Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			Analyte			PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
			OSD Industrial/Commercial Risk Screening Level			1.6		1.6		25	
			OSD Residential RiskScreening Levels			0.13		0.13		1.9	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Area 2300 - Fire Equipment Testing Area	Soil	FGGM-2300A-1	FGGM-2300AREA-1-SO-(0-2)-082020	08/20/2020	N	**0.0022**		0.00065	U	0.0022	U
Area 2300 - Fire Equipment Testing Area	Soil	FGGM-2300A-2	FGGM-2300AREA-2-SO-(0-2)-082020	08/20/2020	N	**0.00025**	J	0.00061	U	0.002	U
			FGGM-SO-DUP-01-(0-2)-082020 / FGGM-2300AREA-2-SO-(0-2)-082020	08/20/2020	FD	0.00063	U	**0.00021**	J	0.0021	U
Area 900 - Fire Equipment Testing Area	Soil	FGGM-900A-1	FGGM-900AREA-1-SO-(0-2)-082120	08/21/2020	N	**0.0021**		0.00063	U	0.0021	U
Area 900 - Fire Equipment Testing Area	Soil	FGGM-900A-2	FGGM-900AREA-2-SO-(0-2)-082120	08/21/2020	N	**0.00052**	J	0.00067	U	0.0022	U
Buildings 3486 and 3488	Soil	FGGM-B3486-1	FGGM-B3486-1-SO-(0-2)-082420	08/24/2020	N	**0.00071**		0.0007	U	0.0023	U
Buildings 3486 and 3488	Soil	FGGM-B3486-2	FGGM-B3486-2-SO-(0-2)-082420	08/24/2020	N	**0.013**		**0.00048**	J	0.0022	U
Buildings 3486 and 3488	Soil	FGGM-B3486-3	FGGM-B3486-3-SO-(0-2)-082420	08/24/2020	N	**0.0056**		**0.00035**	J	0.0027	U
Building 4230 - Former Fire Station	Soil	FGGM-B4230-1	FGGM-B4230-1-SO-(0-2)-082420	08/24/2020	N	**0.0014**		0.00067	U	0.0022	U
Building 6619 – Current Fire Station	Soil	FGGM-B6619-1	FGGM-B6619-SO-(0-2)-082420	08/24/2020	N	**0.00044**	J	**0.00043**	J	0.0022	U
Parade Ground Area	Soil	FGGM-PGHL-1	FGGM-PGHL-1-SO-(0-2)-082120	08/21/2020	N	**0.0003**	J	0.00068	U	0.0023	U
Parade Ground Area	Soil	FGGM-PGHL-2	FGGM-PGHL-2-SO-(0-2)-082120	08/21/2020	N	**0.0032**		**0.00053**	J	0.002	U
Parade Ground Area	Soil	FGGM-PGHL-3	FGGM-PGHL-3-SO-(0-2)-082120	08/21/2020	N	**0.00029**	J	0.00065	U	0.0022	U
Railroad Avenue	Soil	FGGM-RAIL_AVE-1	FGGM-RRA-1-SO-(0-2)-082020	08/20/2020	N	**0.00048**	J	**0.00029**	J	0.0021	U
Salt Dome	Soil	FGGM-Salt_Dome-1	FGGM-SALT-DOME-1-SO-(0-2)-082020	08/20/2020	N	**0.00059**	J	0.0006	U	0.002	U
Salt Dome	Soil	FGGM-Salt_Dome-2	FGGM-SALT-DOME-2-SO-(0-2)-082020	08/20/2020	N	0.00061	U	0.00061	U	0.002	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the 2021 Office of the Secretary of Defense (OSD) risk screening levels for the residential and commerical/industrial scenario (OSD. 2021), (Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.).
3. Grey shaded values indicate the result was detected greater than or equal to the OSD risk screening level for the residential scenario. Italicized values indicate the result was detected greater than the OSD risk screening level for the industrial/commercial and residential scenario.

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
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

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

Table 7-3
Surface Water PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

						PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
					Analyte						
					OSD Tapwater RiskScreening Level	40		40		600	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Area 2300 - Fire Equipment Testing Area	Surface Water/Seep	FGGM-2300A-1	FGGM-2300AREA-1-SW-082020	08/20/2020	N	**30**		**13**		**2.1**	
Building 6619 – Current Fire Station	Surface Water/Seep	FGGM-B6619-1	FGGM-B6619-1-SW-082420	08/24/2020	N	**5.4**		**31**		**1.1**	J
Closed Sanitary Landfill Cell 1	Surface Water/Seep	FGGM-CSL1-1	FGGM-CSL1-1-SW-082520	08/25/2020	N	**18**		**17**		**18**	J-
			FGGM-DUP-01-082520 / FGGM-CSL1-1-SW-082520	08/25/2020	FD	**18**		**16**		**18**	
Closed Sanitary Landfill Cell 2	Surface Water/Seep	FGGM-CSL2-1	FGGM-CSL2-1-SW-082420	08/24/2020	N	**18**		**13**		**6.6**	
Closed Sanitary Landfill Cell 3	Surface Water/Seep	FGGM-CSL3-1	FGGM-CSL3-1-SW-082520	08/25/2020	N	**79**		**24**		**6.5**	J-
Railroad Avenue	Surface Water/Seep	FGGM-RAIL_AVE-1	FGGM-RRA-1-SW-082020	08/20/2020	N	**8.5**		**380**		**1.7**	J-
Salt Dome	Surface Water/Seep	FGGM-Salt_Dome-1	FGGM-SALT-DOME-1-SW-082020	08/20/2020	N	**9.2**		**5.7**		**3.3**	J-

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Grey shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.).

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

Qualifier
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.

Table 7-4
Sediment PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			Analyte			PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
			OSD Industrial/Commercial Risk Screening Level			1.6		1.6		25	
			OSD Residential RiskScreening Levels			0.13		0.13		1.9	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Area 2300 - Fire Equipment Testing Area	Sediment	FGGM-2300A-1	FGGM-2300AREA-1-SE-082020	08/20/2020	N	**0.00048**	J	0.00076	U	0.0025	U
Buildings 3486 and 3488	Sediment	FGGM-B3486-1	FGGM-B3486-1-SE-082420	08/24/2020	N	0.00062	U	0.00062	U	0.0021	U
Building 6619 – Current Fire Station	Sediment	FGGM-B6619-1	FGGM-B6619-1-SE-082420	08/24/2020	N	**0.00062**	J	0.0008	U	0.0027	U
Closed Sanitary Landfill Cell 1	Sediment	FGGM-CSL1-1	FGGM-CSL1-1-SE-082520	08/25/2020	N	**0.00098**		0.00071	U	0.0024	U
Closed Sanitary Landfill Cell 2	Sediment	FGGM-CSL2-1	FGGM-CSL2-1-SE-082420	08/24/2020	N	**0.00093**		0.00076	U	0.0025	U
			FGGM-SE-DUP-01-082420 / FGGM-CSL2-1-SE-082420	08/24/2020	FD	**0.0019**		0.00069	U	0.0023	U
Closed Sanitary Landfill Cell 3	Sediment	FGGM-CSL3-1	FGGM-CSL3-1-SE-082520	08/25/2020	N	**0.002**		0.0011	U	0.0035	U
Railroad Avenue	Sediment	FGGM-RAIL_AVE-1	FGGM-RRA-1-SE-082020	08/20/2020	N	**0.0012**		**0.0037**		0.0029	U
Salt Dome	Sediment	FGGM-Salt_Dome-1	FGGM-SALT-DOME-1-SE-082020	08/20/2020	N	**0.00035**	J	0.00092	U	0.0031	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the 2021 Office of the Secretary of Defense (OSD) risk screening levels for the residential and commerical/industrial scenario (OSD. 2021), (Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.).
3. Grey shaded values indicate the result was detected greater than or equal to the OSD risk screening level for the residential scenario. Italicized values indicate the result was detected greater than the OSD risk screening level for the industrial/commercial and residential scenario.

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
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

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

Table 7-5
Off-Post Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

					Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
					OSD Tapwater RiskScreening Level	40		40		600	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Off Post Wells	UPA Monitoring Well	FGGM-MW-105	MW-105(122920)	12/29/2020	N	**0.50**	J	**4.1**		**2.5**	
Off Post Wells	UPA Monitoring Well	FGGM-MW-106	MW-106(122920)	12/29/2020	N	1.6	U	**5.5**		**2.9**	
			DUP-01(122920) / MW-106(122920)	12/29/2020	FD	**0.52**	J	**6.0**		**3.1**	J-
Off Post Wells	UPA Monitoring Well	FGGM-MW-107	MW-107(122920)	12/29/2020	N	**4.8**		**4.6**		**1.7**	J
Off Post Wells	LPA Monitoring Well	FGGM-MW-116D	MW116D(122920)	12/29/2020	N	**4.8**		**0.75**	J	1.7	U
Off Post Wells	LPA Monitoring Well	FGGM-OU4-MW39	OU4MW39(122920)	12/29/2020	N	**1.4**	J	**0.85**	J	1.7	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Grey shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.).

Acronyms/Abbreviations:
-- = not applicable
AOPI = Area of Potential Interest
FD = field duplicate sample
ID = identification
LPA = Lower Patapsco Aquifer
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier
UPA = Upper Patapsco Aquifer

Qualifier
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only
J- = The result is an estimated quantity; the result may be biased low.
U = The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).

FIGURES

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

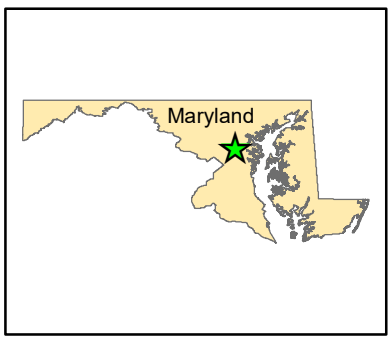
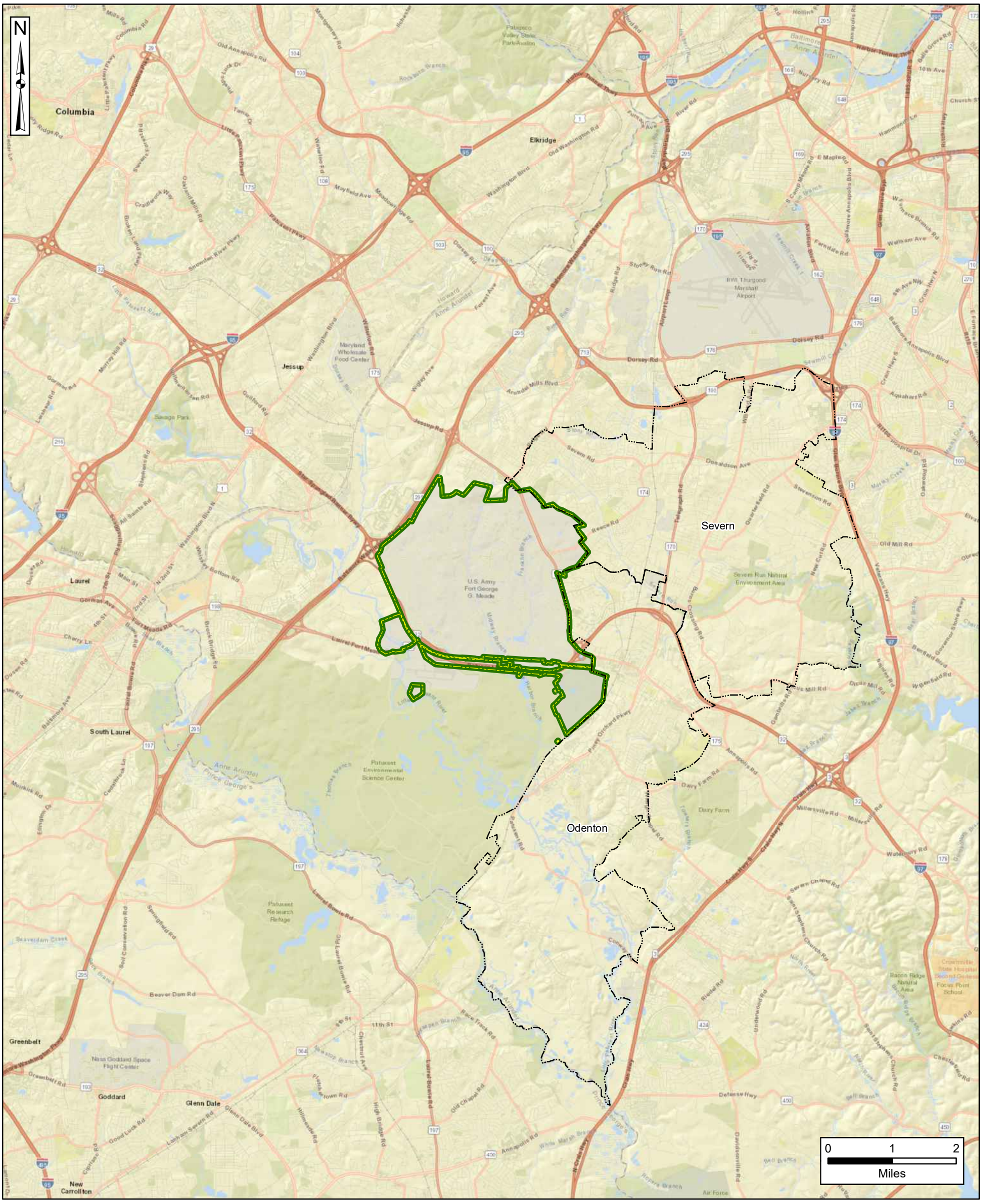


Figure 2-1
FGGM Site Location



Installation Boundary

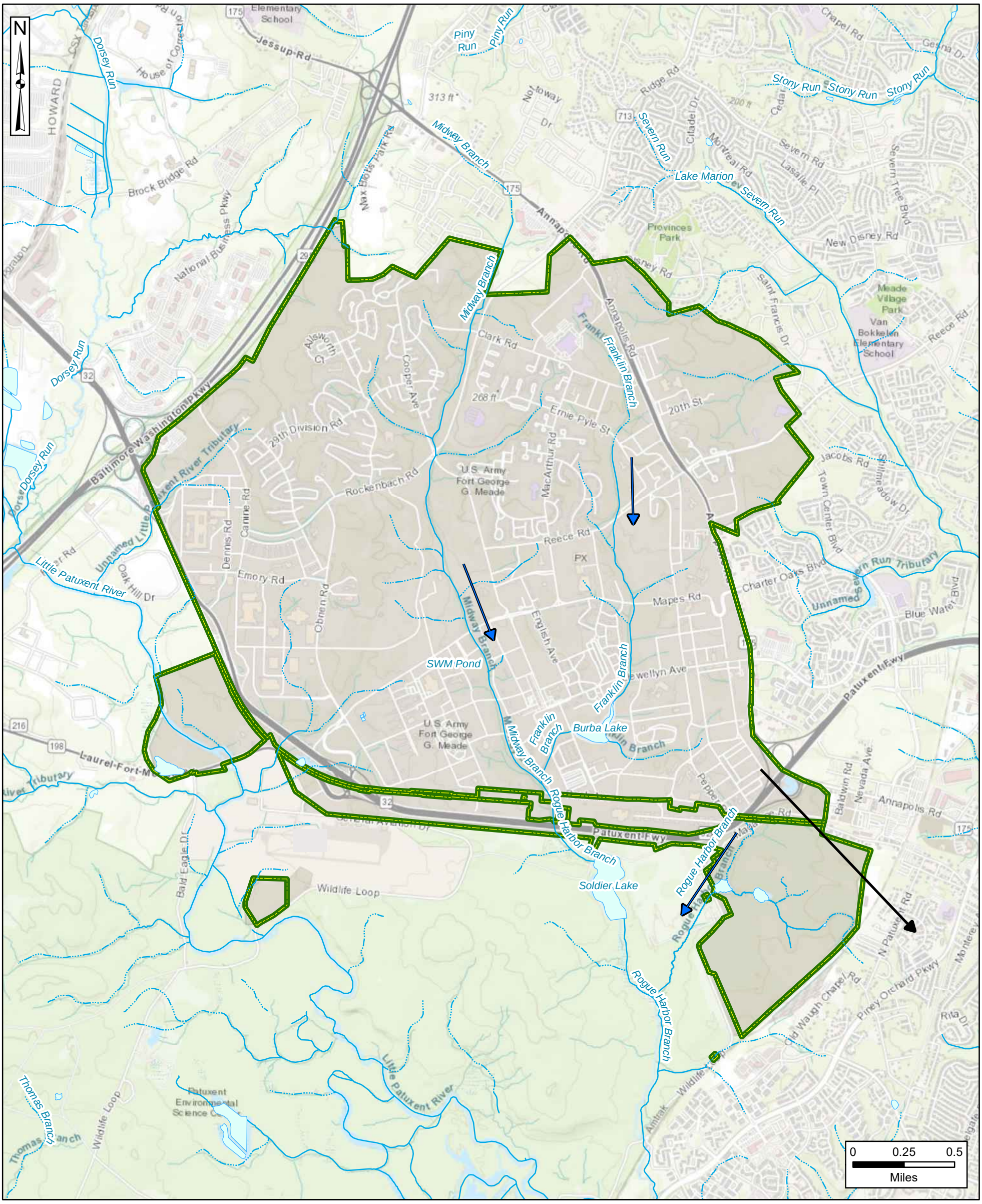
Municipal Boundary

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

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 2-2
FGGM Site Layout



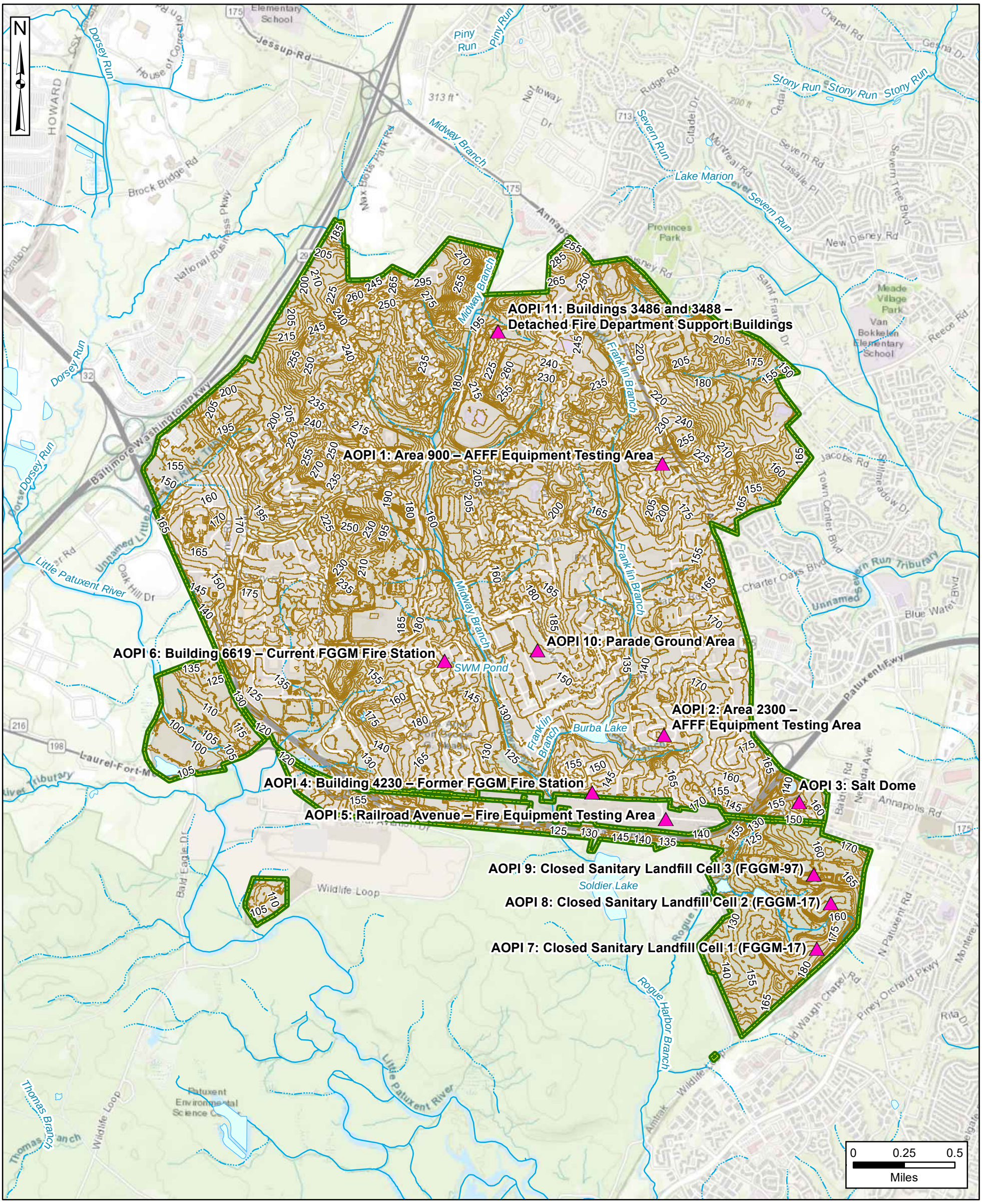
Installation Boundary
River/Stream (Perennial)
Stream (Intermittent)
Water Body
Groundwater Flow Direction
Surface Water Flow Direction

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 2-3
FGGM Site Topography



- Installation Boundary
- AOPI Location
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Elevation Contour (feet)

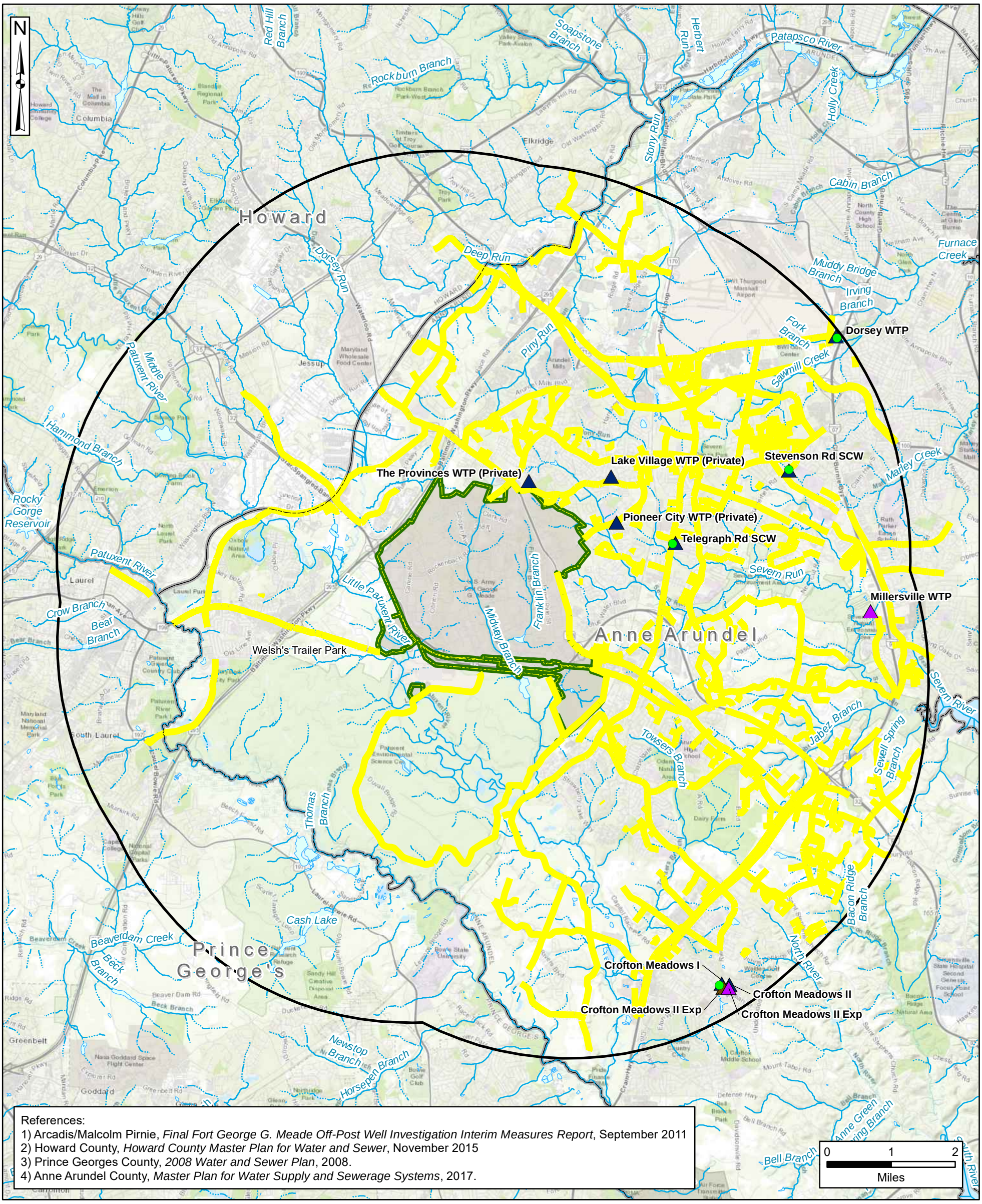
AFFF = aqueous film-forming foam
AOC = Architect of the Capitol
AOPI = area of potential interest
OU = Operable Unit

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 2-4
FGGM Off-Post Potable Supply Wells



References:
1) Arcadis/Malcolm Pirnie, *Final Fort George G. Meade Off-Post Well Investigation Interim Measures Report*, September 2011
2) Howard County, *Howard County Master Plan for Water and Sewer*, November 2015
3) Prince Georges County, *2008 Water and Sewer Plan*, 2008.
4) Anne Arundel County, *Master Plan for Water Supply and Sewerage Systems*, 2017.

Installation Boundary
5-Mile Radius
County Boundary
River/Stream (Perennial)
Stream (Intermittent)
Water Body

Street with One or More Private Drinking Water Wells Identified in Study (ARCADIS/Malcolm Pirnie, 2011) and Anne Arundel Department of Health

Anne Arundel County County Water & Sewer Master Plan Features

Existing Well Field
Capital Facility WTP
Existing WTP
Future WTP

SCW = self-contained well
WTP = water treatment plant

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

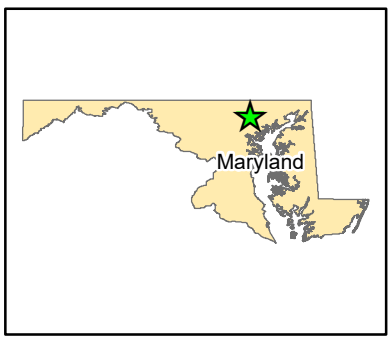
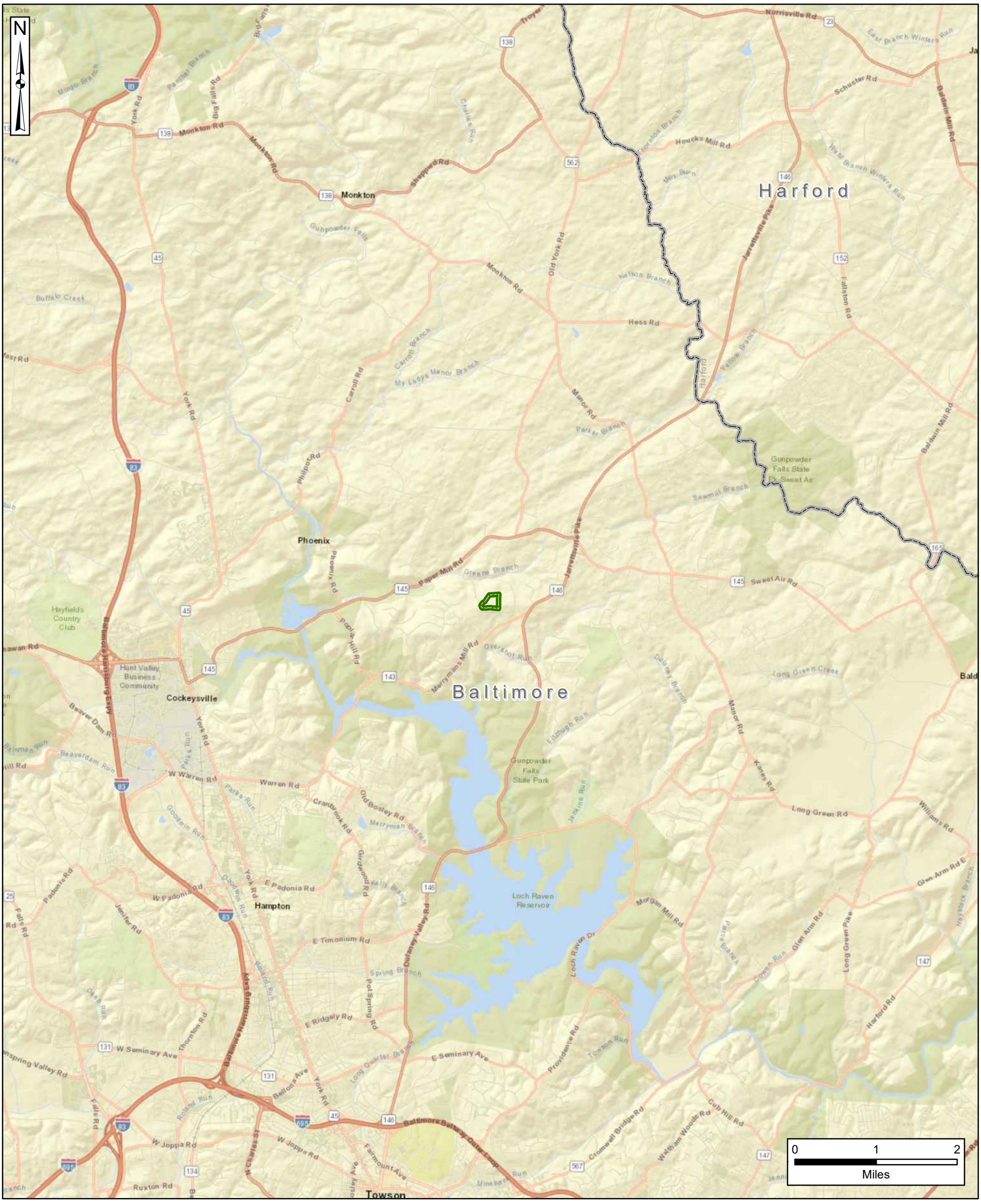


Figure 2-5
PMR Site Location

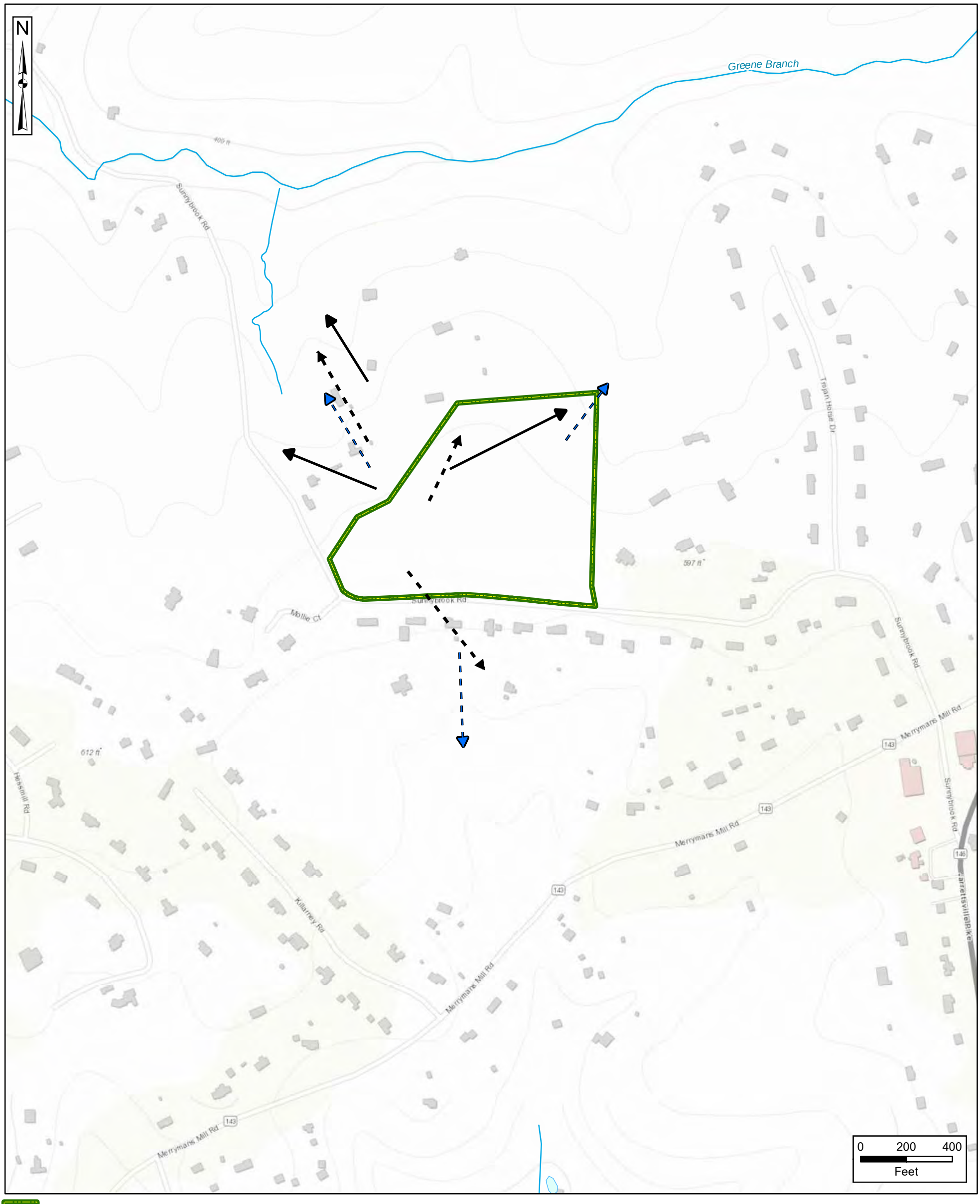


Data Sources:
Fort Meade, GIS Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 2-6
PMR Site Layout



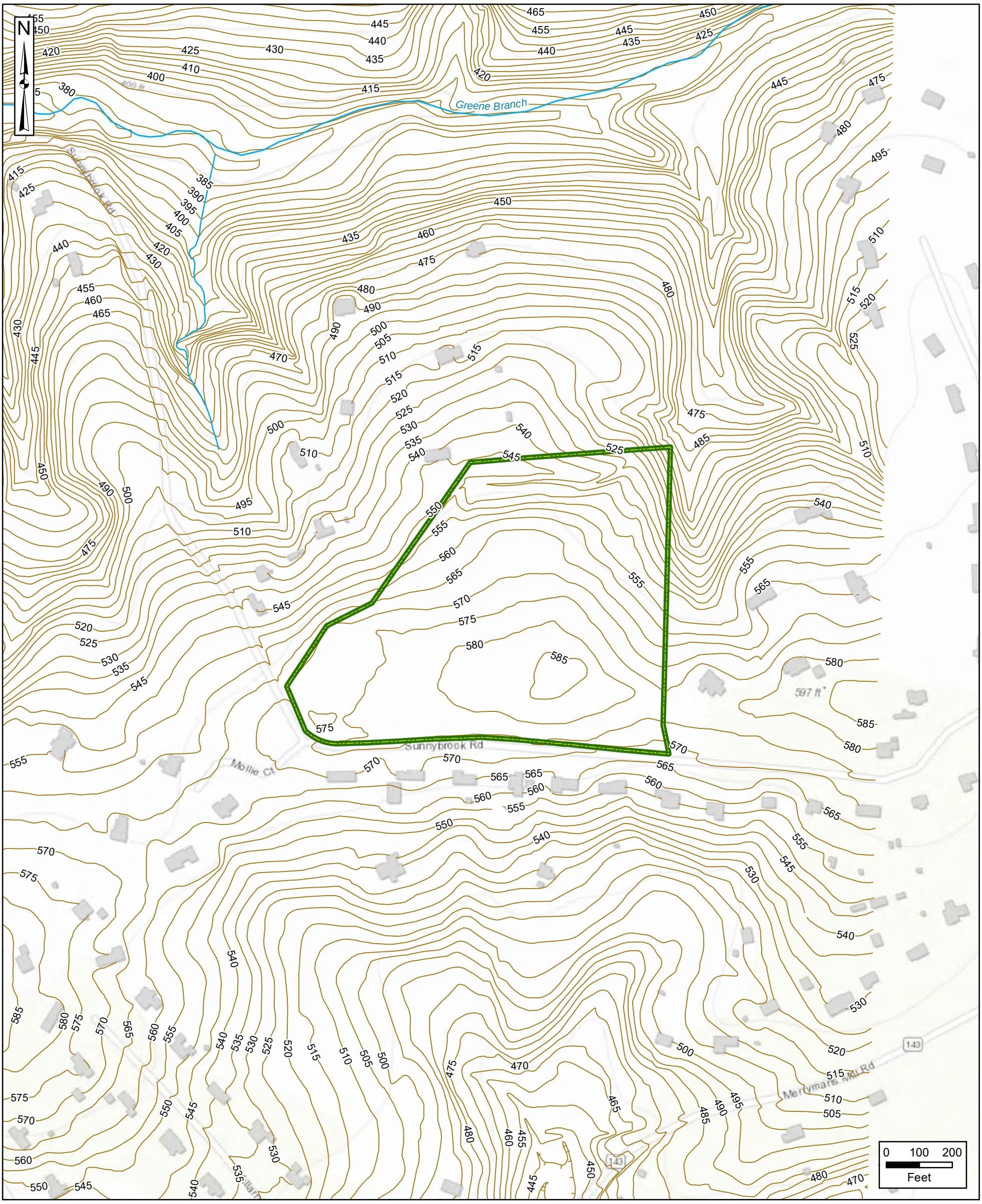
Installation Boundary
Stream (Perennial)
Surface Runoff Flow Direction
Shallow Groundwater Flow Direction
Deep Groundwater Flow Direction

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 2-7
PMR Site Topography



Installation Boundary
Stream (Perennial)
Elevation Contour (feet)

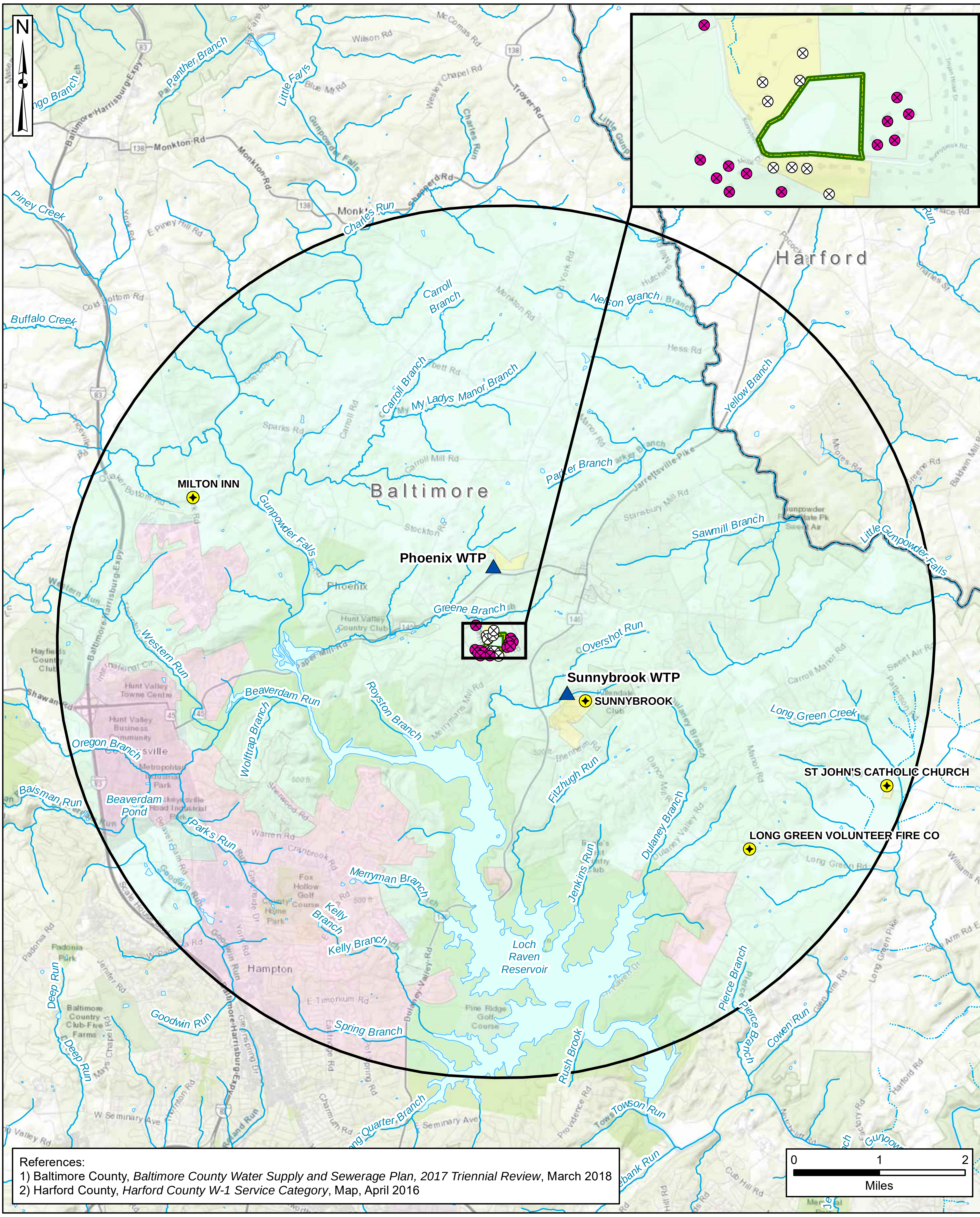
Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

ARCADIS

Figure 2-8
PMR Off-Post Potential Potable Receptors



References:
1) Baltimore County, *Baltimore County Water Supply and Sewerage Plan, 2017 Triennial Review*, March 2018
2) Harford County, *Harford County W-1 Service Category*, Map, April 2016

Installation Boundary
5-Mile Radius
County Boundary
River/Stream (Perennial)
Stream (Intermittent)
Water Body

Public Water Supply System Well
Active Domestic Well Location
Inactive Domestic Well Location
Water Treatment Facility

Water Service Areas
Existing Service
No Current Service
Community System

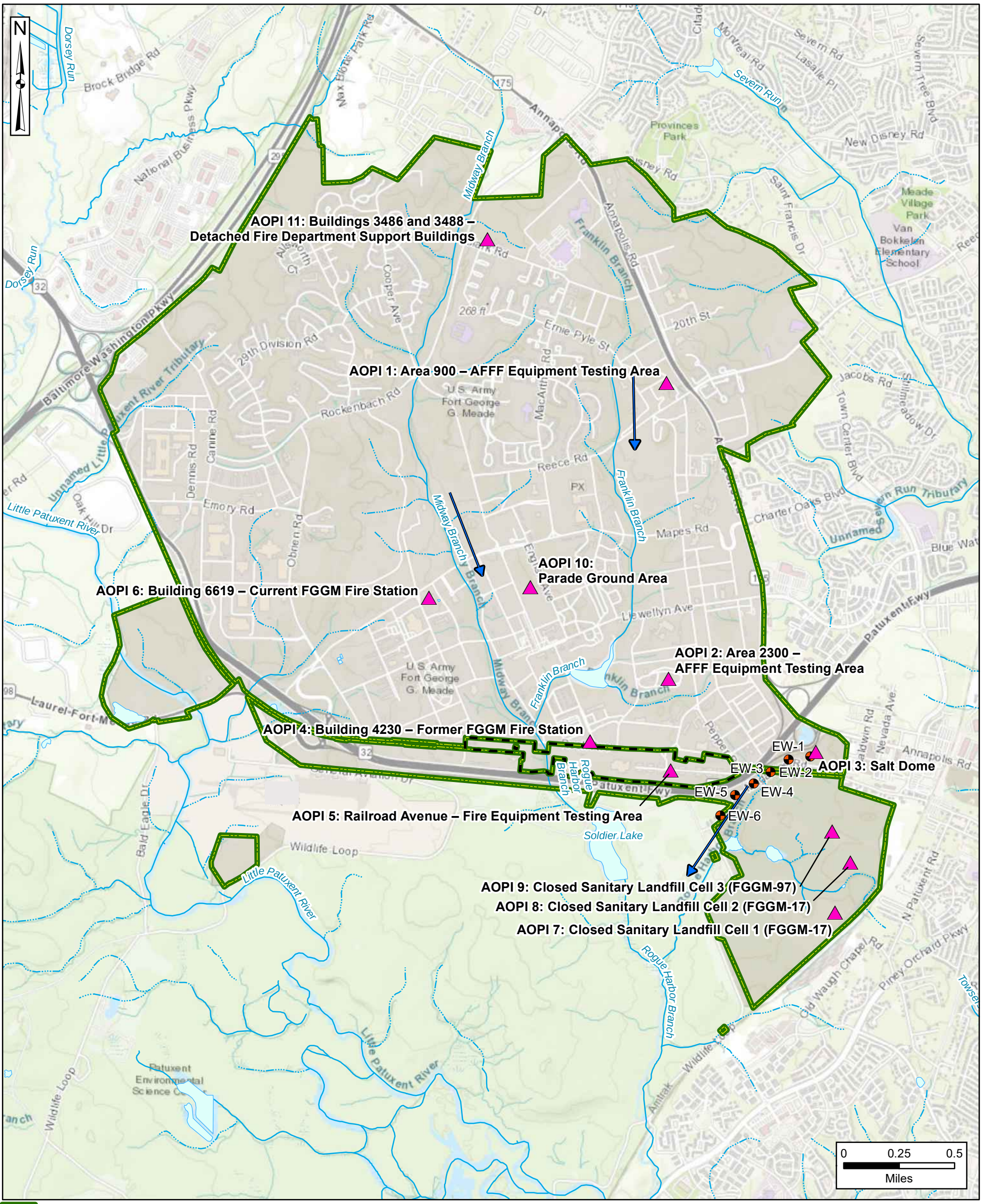
WTP = Water Treatment Plant

Data Sources:
Fort Meade, GIS Data, 2019
EDR, Public Water Supply System Wells, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-2
AOPI Locations



Installation Boundary
FGGM-74 Parcel Boundary
AOPI Location
River/Stream (Perennial)
Stream (Intermittent)
Water Body
Surface Water Flow Direction
OU4 Study Area Extraction Well

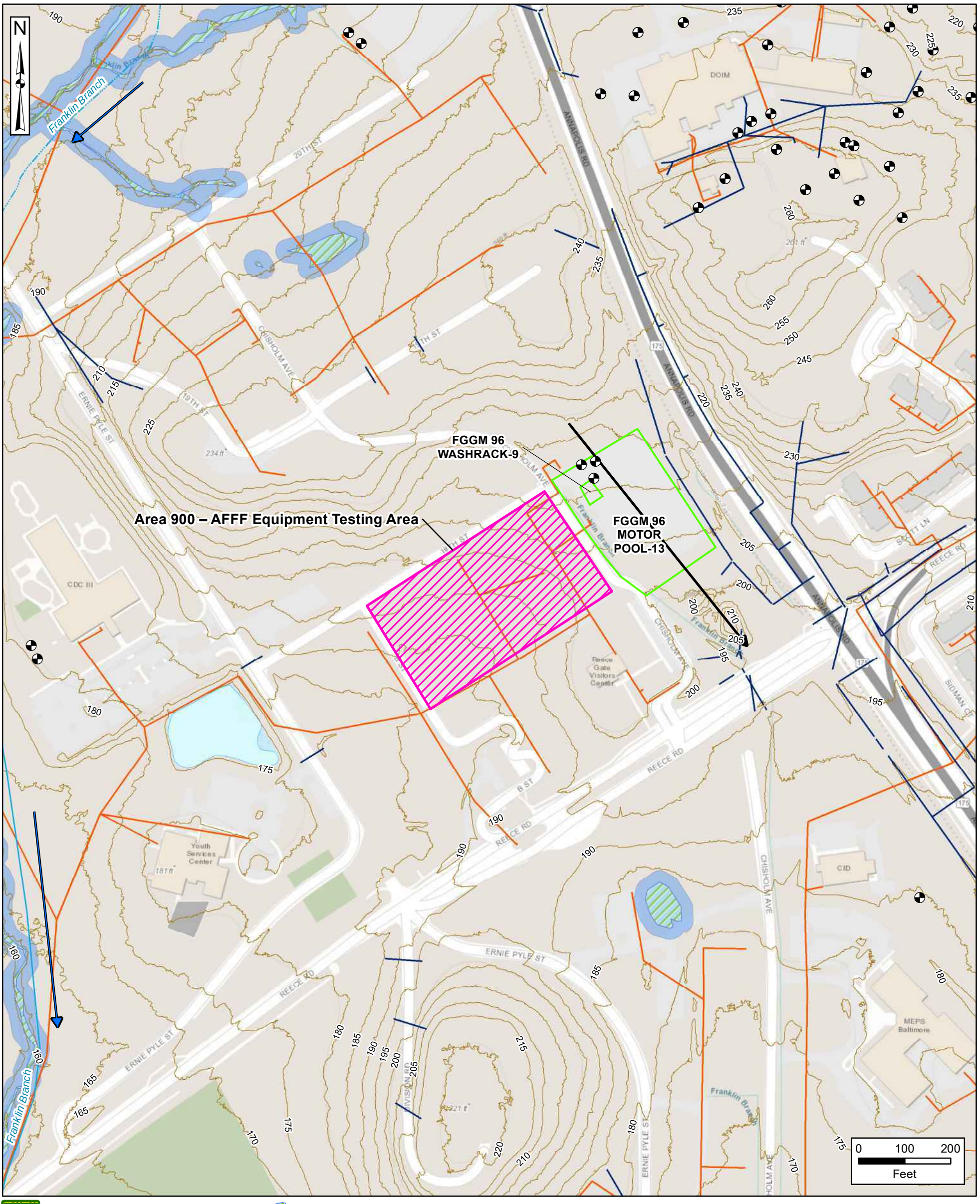
AFFF = aqueous film-forming foam
AOPI = area of potential interest
OU = Operable Unit

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-3
AOPI 1:
Area 900 – AFFF Equipment Testing Area



- Installation Boundary
- AOPI
- Suspected AFFF Release Area
- IRP Site
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Wetland
- Wetland Buffer (25 feet)
- Elevation Contour (feet)
- Stormwater Line
- Wastewater Line
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well

AFFF = aqueous film-forming foam
AOPI = area of potential interest
IRP = installation restoration program

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-4
AOPI 2:
Area 2300 – AFFF Equipment Testing Area

Area 2300 – AFFF Equipment Testing Area

Installation Boundary
AOPI
Suspected AFFF Release Area
River/Stream (Perennial)
Stream (Intermittent)
Wetland
Wetland Buffer (25 feet)
Elevation Contour (feet)
Stormwater Line
Wastewater Line
Approximate Shallow Groundwater Flow Direction
Surface Water Flow Direction
Monitoring Well

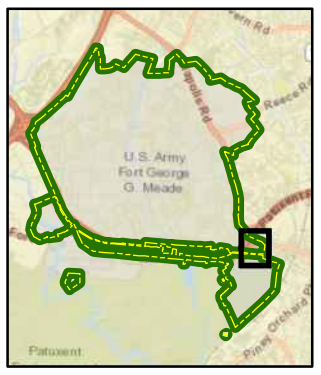
AFFF = aqueous film-forming foam
AOPI = area of potential interest

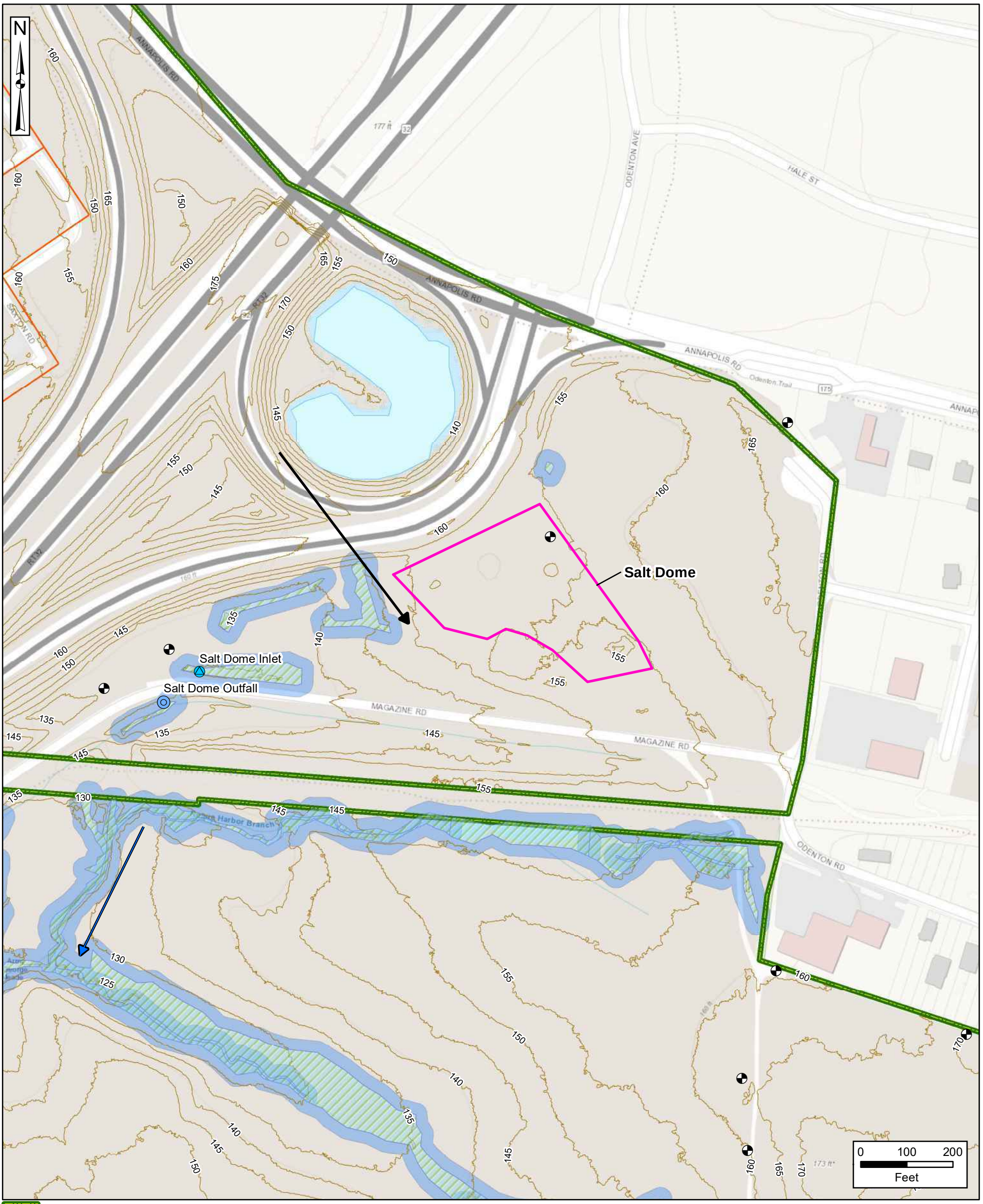
Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-5
AOPI 3:
Salt Dome





Installation Boundary
AOPI
Inlet
Outfall
Water Body
Wetland
Wetland Buffer (25 feet)
Wastewater Line
Elevation Contour (feet)
Approximate Shallow Groundwater Flow Direction
Surface Water Flow Direction
Monitoring Well

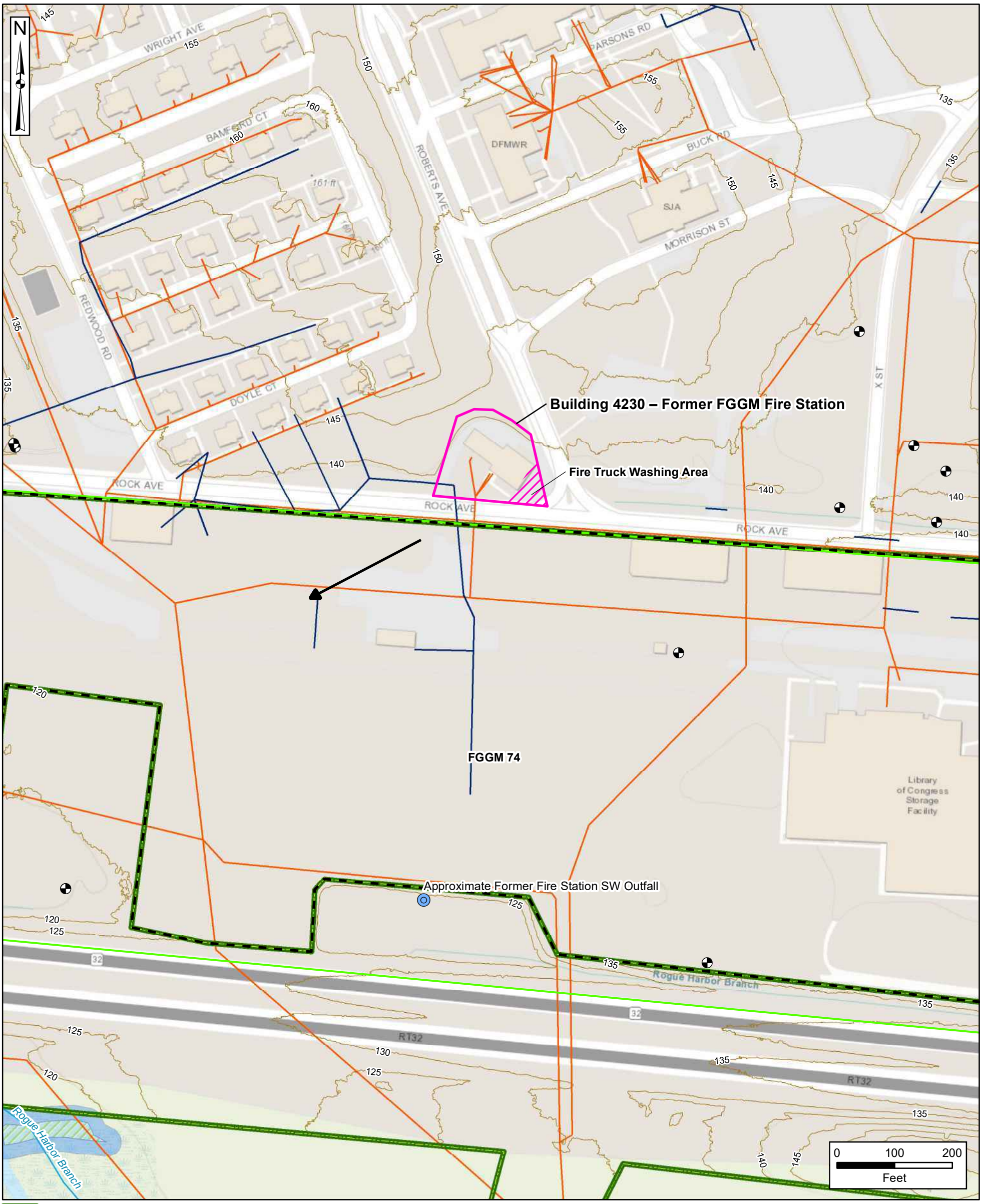
AOPI = area of potential interest

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-6
AOPI 4:
Building 4230 – Former FGGM Fire Station



- Installation Boundary
- FGGM-74 Parcel Boundary
- AOPI
- AFFF Release Area
- River/Stream (Perennial)
- Wetland
- Wetland Buffer (25 feet)
- Outfall
- Stormwater Line
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Monitoring Well
- IRP Site

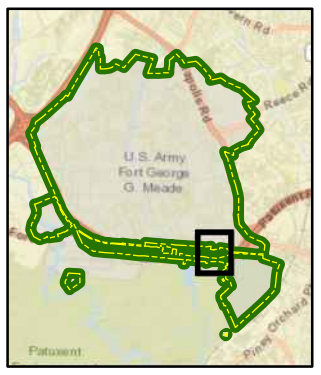
AFFF = aqueous film-forming foam
AOPI = area of potential interest
IRP = installation restoration program

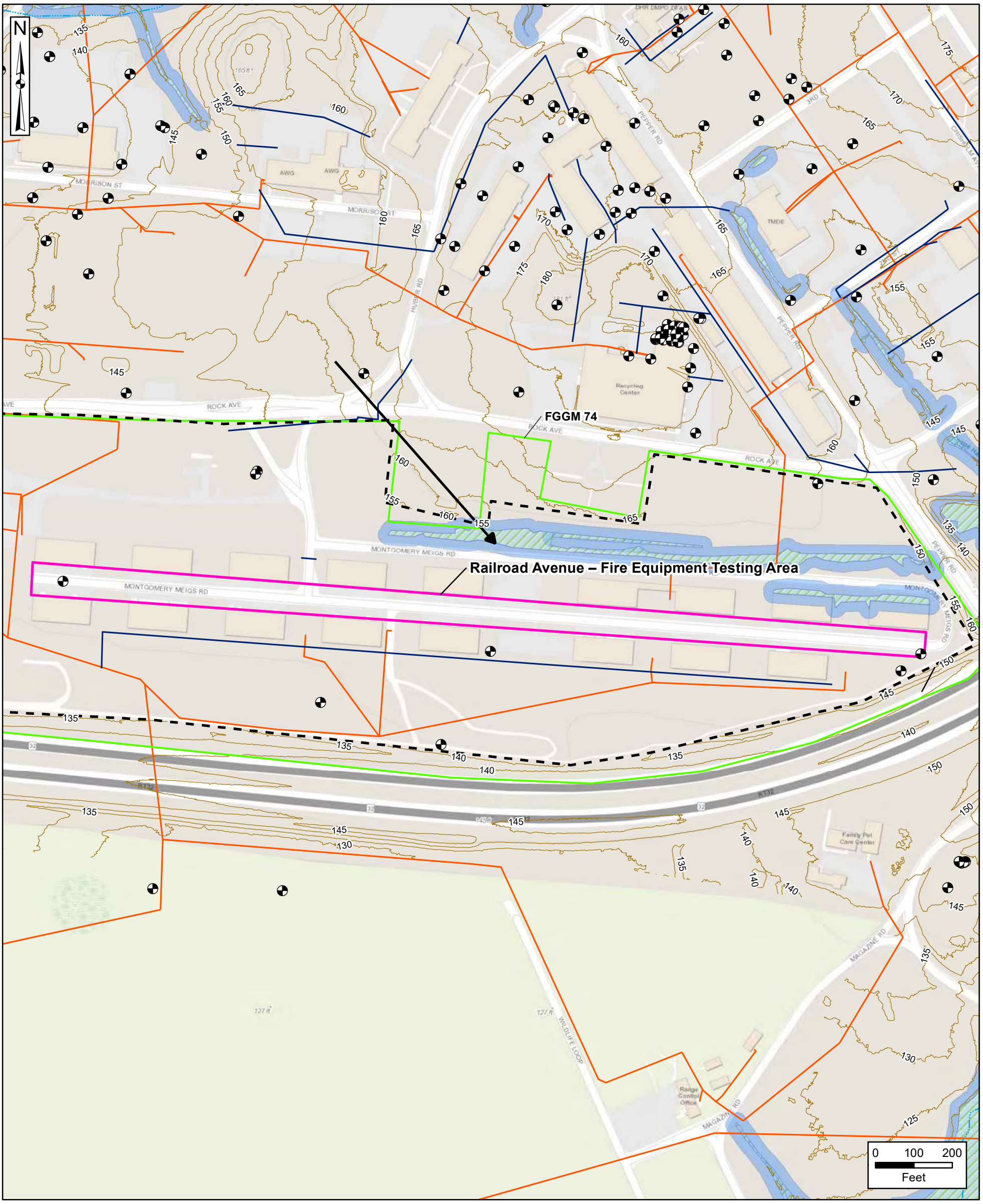
Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-7
AOPI 5:
Railroad Avenue – Fire Equipment Testing Area





- Installation Boundary
- FGGM-74 Parcel Boundary
- AOPI
- IRP Site
- Stream (Intermittent)
- Wetland
- Wetland Buffer (25 feet)
- Stormwater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Monitoring Well

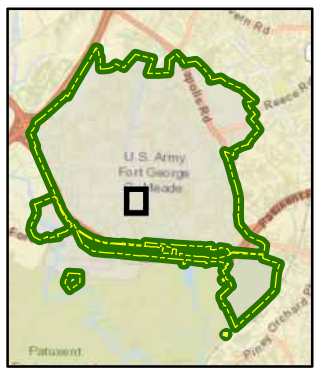
AOPI = area of potential interest
IRP = installation restoration program

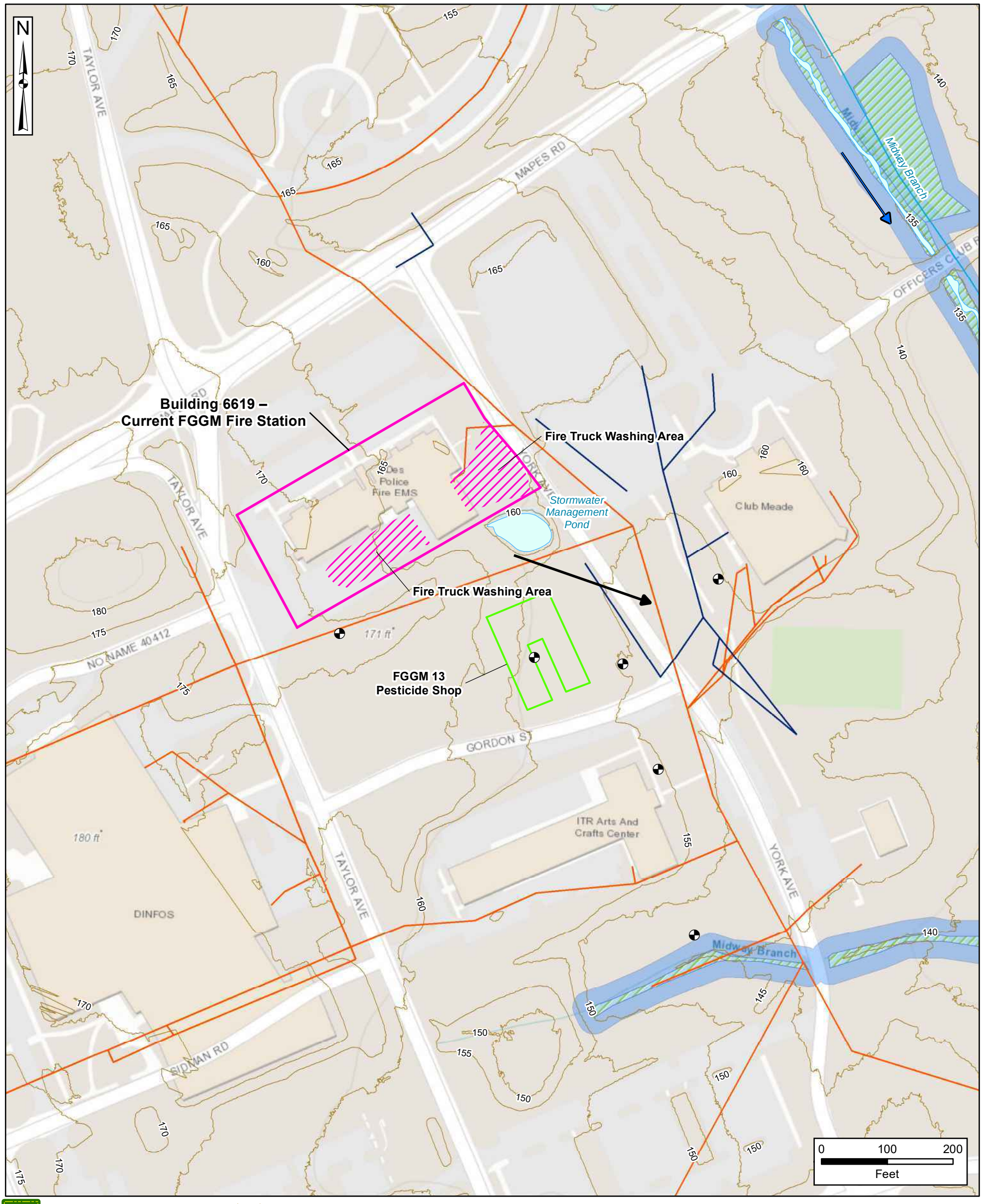
Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-8
AOPI 6:
Building 6619 – Current FGGM Fire Station





- Installation Boundary
- AOPI
- AFFF Release Area
- IRP Site
- River/Stream (Perennial)
- Water Body
- Wetland
- Wetland Buffer (25 feet)
- Elevation Contour (feet)
- Stormwater Line
- Wastewater Line
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well

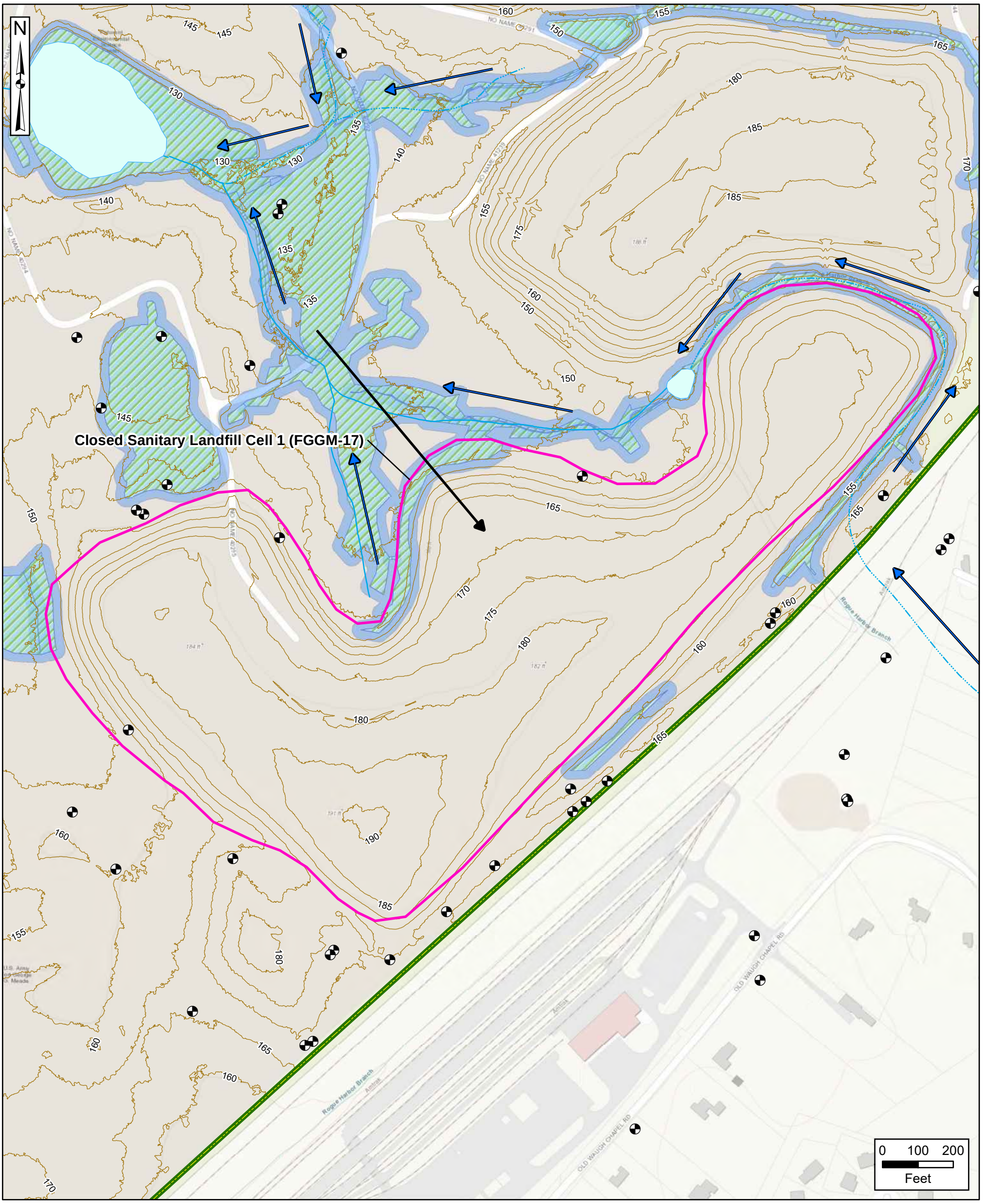
AFFF = aqueous film-forming foam
AOPI = area of potential interest
IRP = installation restoration program

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-9
AOPI 7:
Closed Sanitary Landfill Cell 1 (FGGM-17)



Installation Boundary
AOPI
River/Stream (Perennial)
Stream (Intermittent)
Water Body
Wetland
Wetland Buffer (25 feet)
Elevation Contour (feet)
Approximate Shallow Groundwater Flow Direction
Surface Water Flow Direction
Monitoring Well

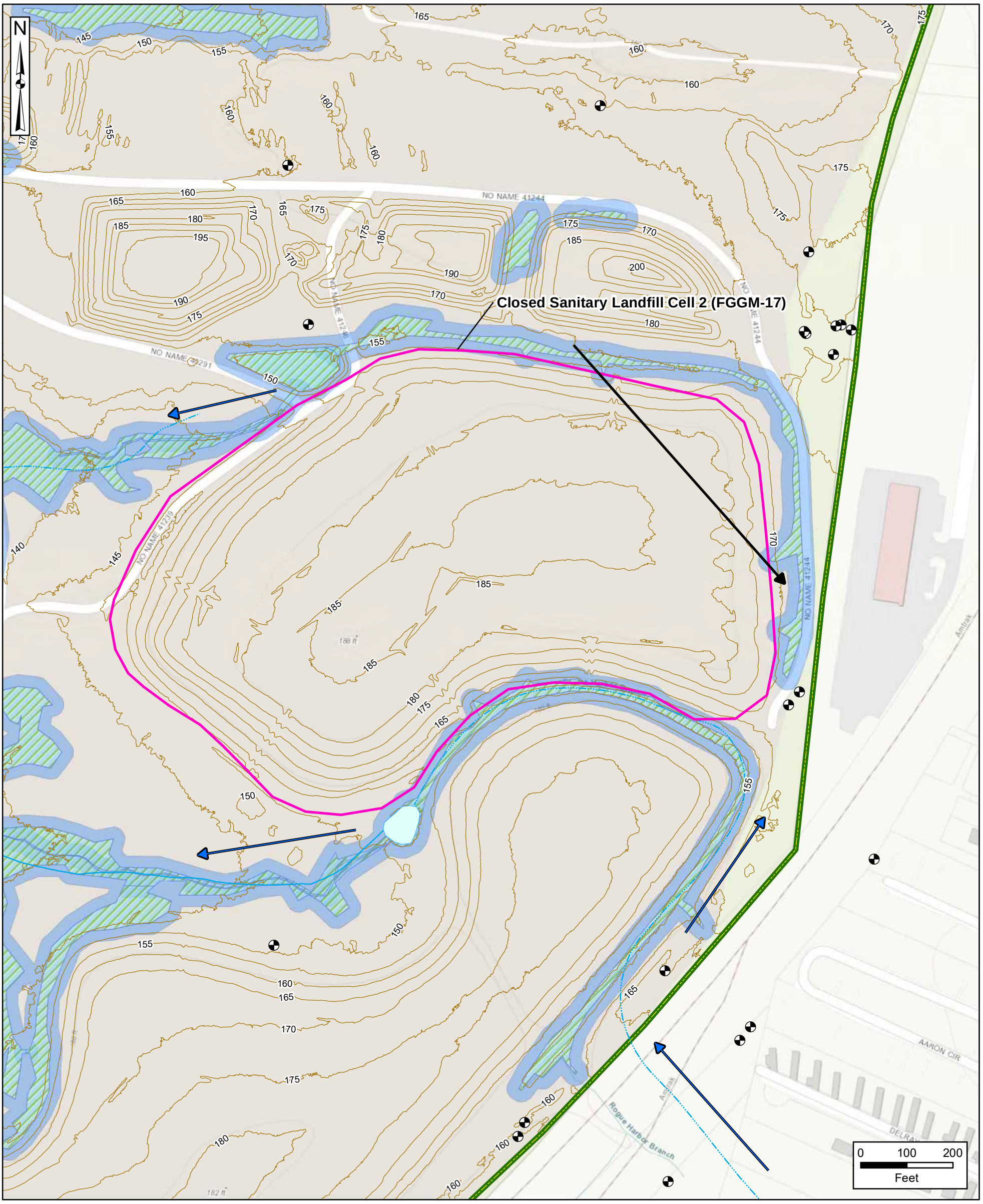
AOPI = area of potential interest

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-10
AOPI 8:
Closed Sanitary Landfill Cell 2 (FGGM-17)



- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Wetland
- Wetland Buffer (25 feet)
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well

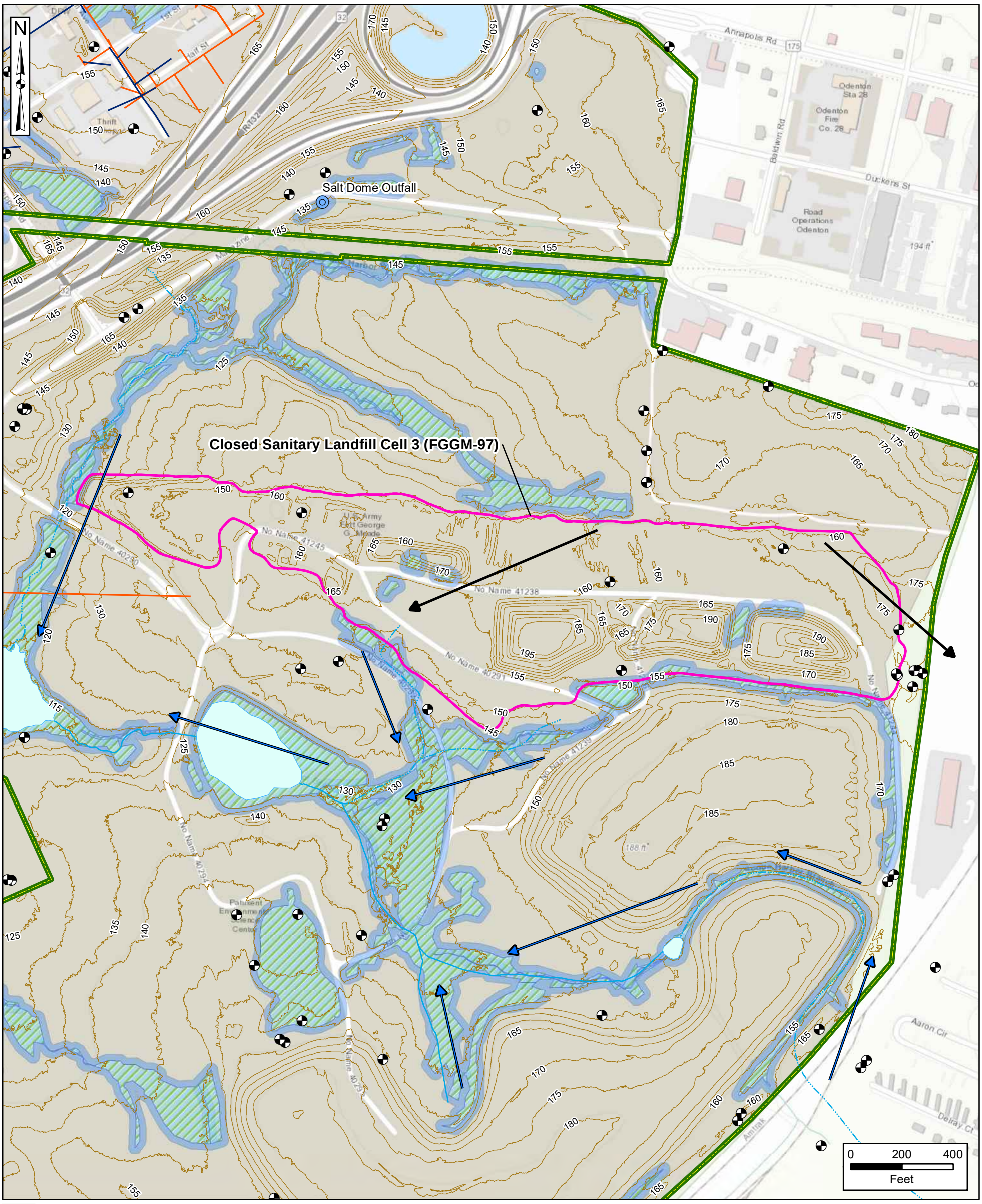
AOPI = area of potential interest

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-11
AOPI 9:
Closed Sanitary Landfill Cell 3 (FGGM-97)



- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Wetland
- Wetland Buffer (25 feet)
- Outfall
- Stormwater Line
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well

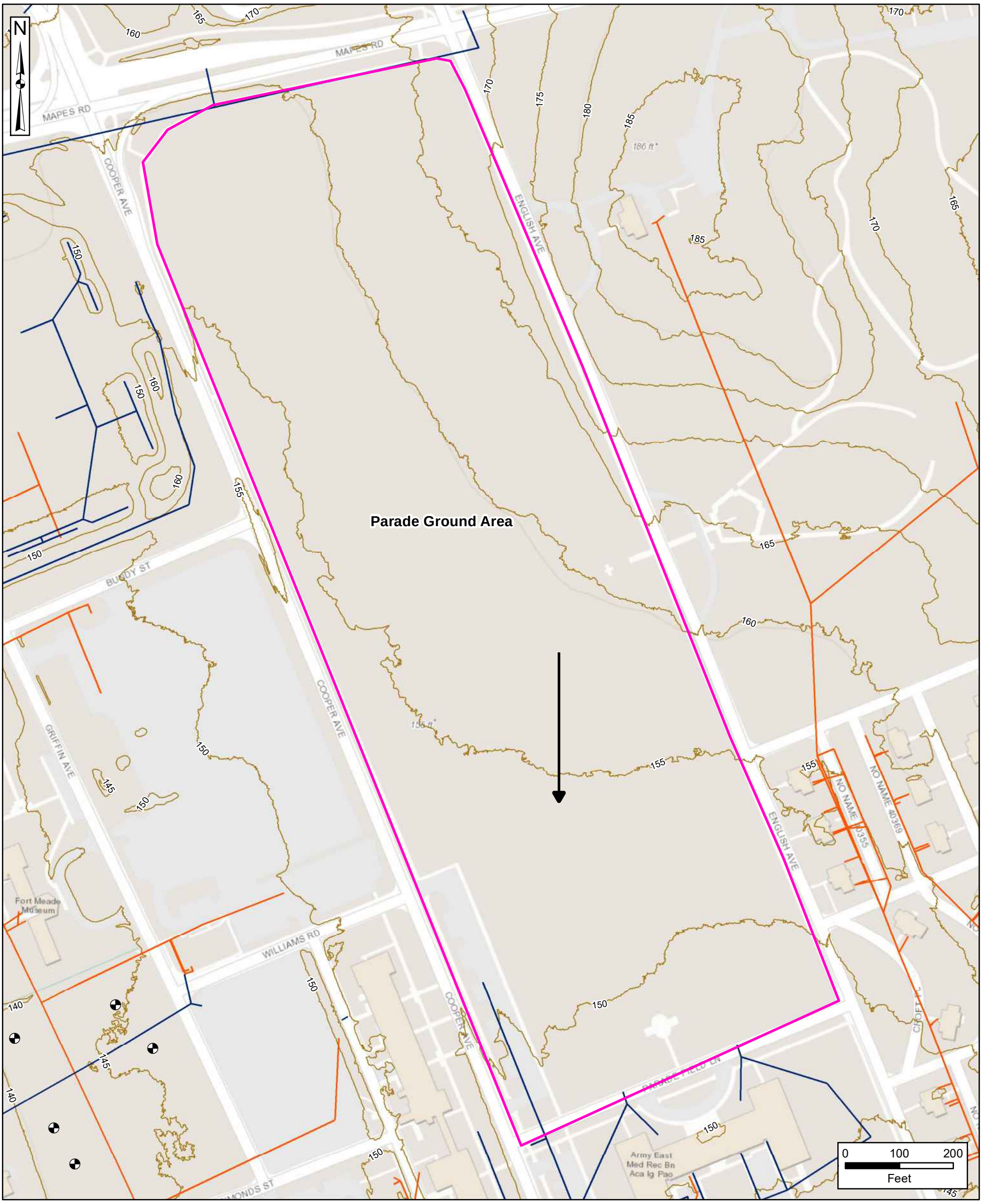
AOPI = area of potential interest

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-12
AOPI 10:
Parade Ground Area



- Installation Boundary
- AOPI
- Stormwater Line
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Monitoring Well

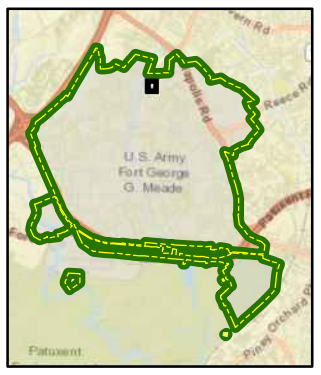
AOPI = area of potential interest

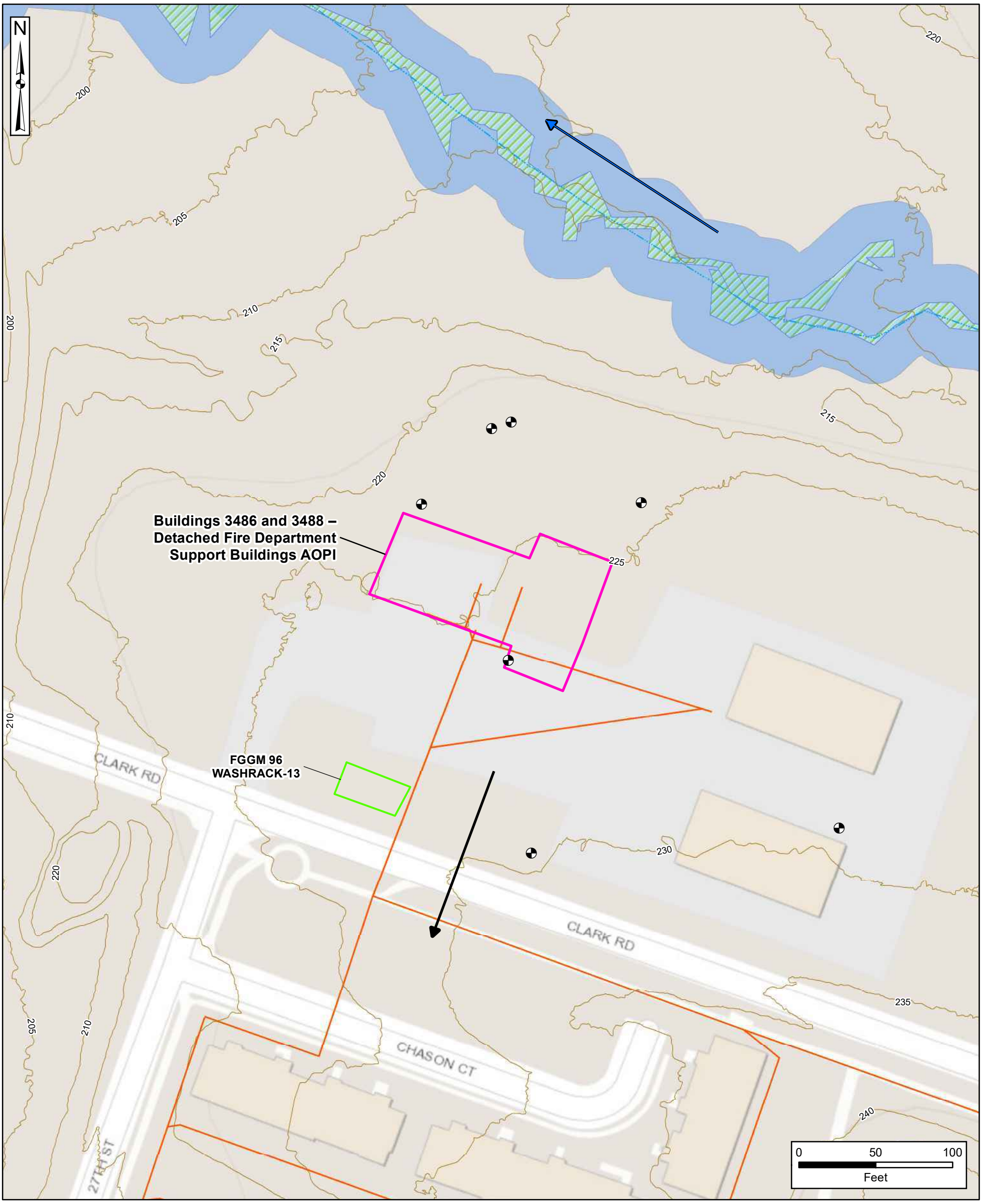
Data Sources:
Fort Meade, GIS Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 5-13
AOPI 11: Buildings 3486 and 3488 – Detached Fire Department Support Buildings





- Installation Boundary
- AOPI
- IRP Site
- Stream (Intermittent)
- Wetland
- Wetland Buffer (25 feet)
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well

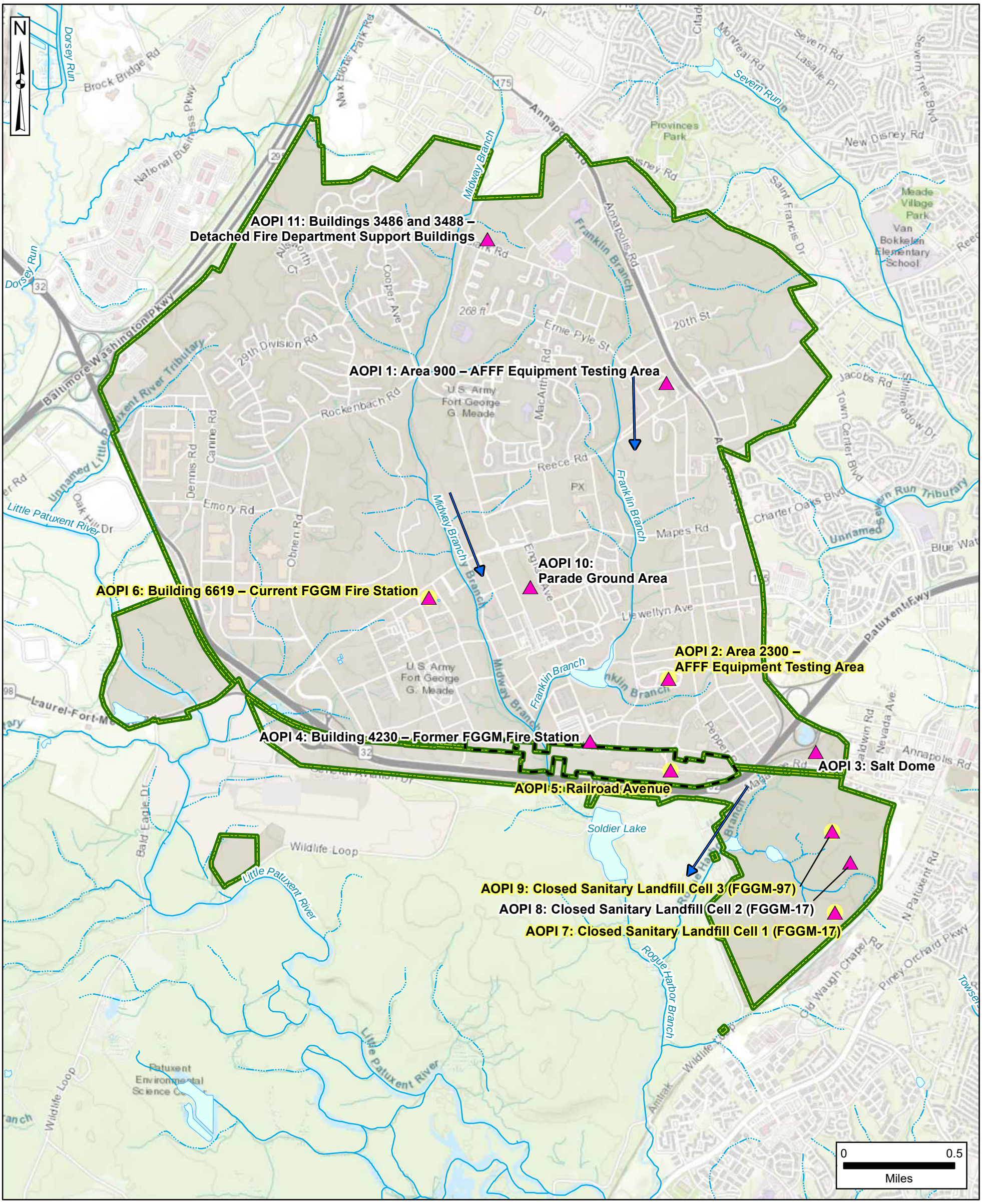
AOPI = area of potential interest
IRP = installation restoration program

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

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



Installation Boundary
FGGM-74 Parcel Boundary
AOPI Location
AOPI with OSD Risk Screening Level Exceedance
River/Stream (Perennial)
Stream (Intermittent)
Water Body
Surface Water Flow Direction

AFFF = aqueous film-forming foam
AOPI = area of potential interest
OSD = Office of the Secretary of Defense

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-2
AOPI 1:
Area 900 – AFFF Equipment Testing Area
PFOS, PFOA, and PFBS Analytical Results

FGGM-900AREA-1-SO	
Date	08/21/2020
Depth	0-2 ft
PFOS	**0.0021**
PFOA	0.00063 U
PFBS	0.0021 U

FGGM-900AREA-2-SO	
Date	08/21/2020
Depth	0-2 ft
PFOS	**0.00052 J**
PFOA	0.00067 U
PFBS	0.0022 U

FGGM-900AREA-2-GW	
Date	08/20/2020
PFOS	**11 J [7.4 J]**
PFOA	**7.1 J [16 J]**
PFBS	9.6 U **[3.8]**

FGGM-MP-12-1	
Date	08/26/2020
Depth	20-35 ft
PFOS	**9.5**
PFOA	**10**
PFBS	**1.5 J**

Notes:
1. Groundwater results (shown in blue) are reported in nanograms per liter (ng/L).
2. Soil results (shown in green) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. First-encountered groundwater was collected via low-flow sampling at boring locations advanced using DPT. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

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
AOPI
Suspected AFFF Release Area
River/Stream (Perennial)
Stream (Intermittent)
Water Body
Wetland
Wetland Buffer (25 feet)
Elevation Contour (feet)
Stormwater Line
Wastewater Line
Approximate Shallow Groundwater Flow Direction
Surface Water Flow Direction
Monitoring Well
DPT Soil/Groundwater Sampling Location
Soil Sampling Location
Monitoring Well Sampling Location

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

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-3
AOPI 2:
Area 2300 – AFFF Equipment Testing Area
PFOS, PFOA, and PFBS Analytical Results

FGGM-2300A-2-GW	
Date	08/20/2020
PFOS	**52 [40]**
PFOA	**21 [49]**
PFBS	**11 [11]**

FGGM-2300AREA-2-SO	
Date	08/20/2020
Depth	0-2 ft
PFOS	**0.00025 J** [0.00063 U]
PFOA	0.00061 U **[0.00021 J]**
PFBS	0.0020 U [0.0021 U]

Area 2300 – AFFF Equipment Testing Area

FGGM-2300A-1-GW	
Date	08/20/2020
PFOS	**48**
PFOA	**53**
PFBS	**12**

FGGM-2300AREA-1-SO	
Date	08/20/2020
Depth	0-2 ft
PFOS	**0.0022**
PFOA	0.00065 U
PFBS	0.0022 U

FGGM-2300A-1-SW	
Date	08/20/2020
PFOS	**30**
PFOA	**13**
PFBS	**2.1**

FGGM-2300AREA-1-SE	
Date	08/20/2020
PFOS	**0.00048 J**
PFOA	0.00076 U
PFBS	0.0025 U

FGGM-OU4MW-30	
Date	08/18/2020
Depth	13-23 ft
PFOS	**1.7**
PFOA	**1.7**
PFBS	**0.96 J**

FGGM-OU4MW-28	
Date	08/26/2020
Depth	23-33 ft
PFOS	**2.5**
PFOA	**6.9**
PFBS	**1.9**

Notes:
1. Groundwater and surface water results (both shown in blue) are reported in nanograms per liter (ng/L).
2. Soil results (shown in green) and sediment results (shown in brown) are reported in milligrams per kilogram (mg/kg).
3. Duplicate results are shown in brackets.
4. Bolded values indicate detections.
5. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.
6. First-encountered groundwater was collected via low-flow sampling at boring locations advanced using DPT. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

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
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

0 100 200 Feet

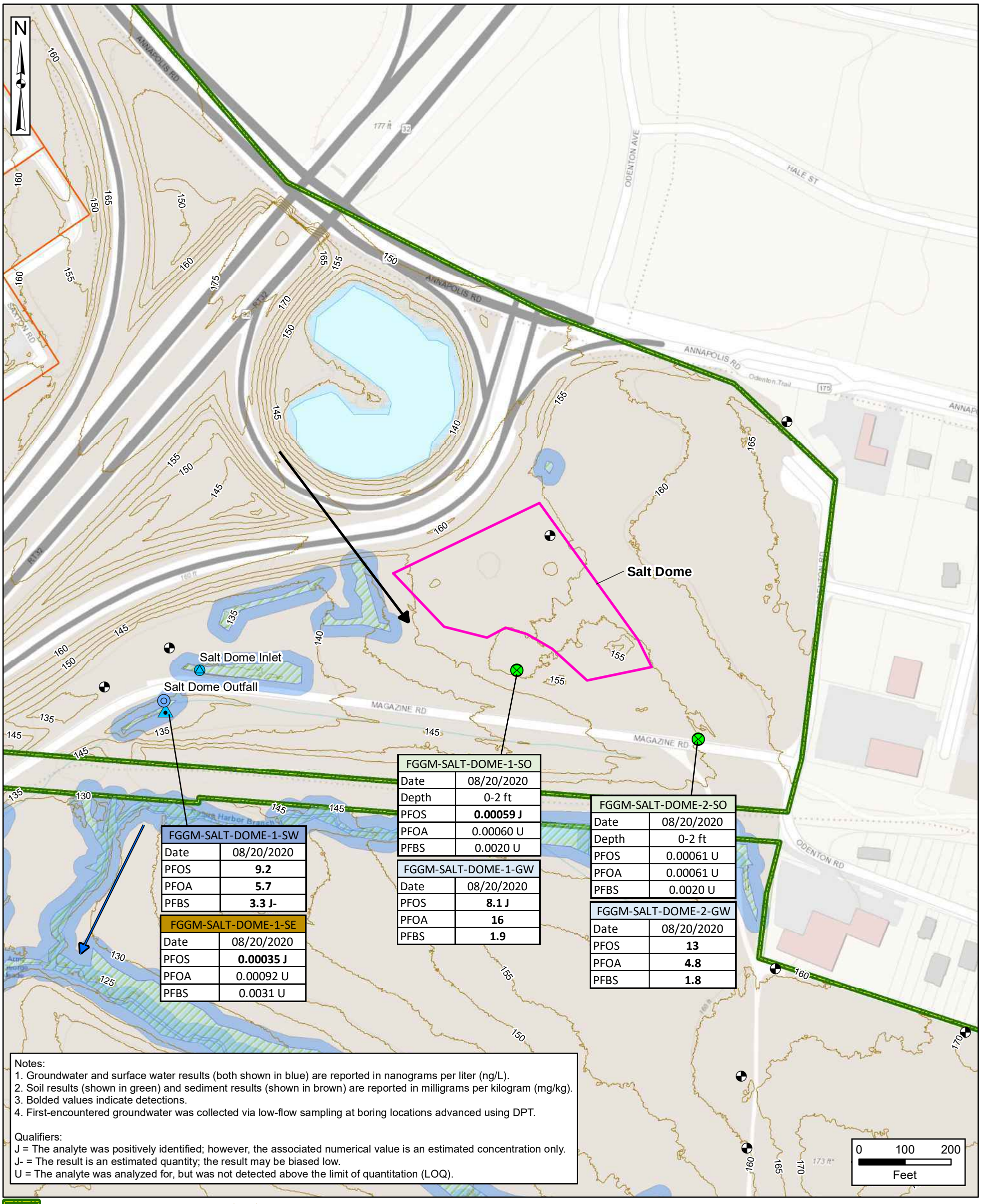
- Installation Boundary
- AOPI
- Suspected AFFF Release Area
- River/Stream (Perennial)
- Stream (Intermittent)
- Wetland
- Wetland Buffer (25 feet)
- Elevation Contour (feet)
- Stormwater Line
- Wastewater Line
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well
- DPT Soil/Groundwater Sampling Location
- Surface Water / Sediment Sampling Location
- Monitoring Well Sampling Location

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-4
AOPI 3:
Salt Dome
PFOS, PFOA, and PFBS Analytical Results



FGGM-SALT-DOME-1-SW	
Date	08/20/2020
PFOS	**9.2**
PFOA	**5.7**
PFBS	**3.3 J-**

FGGM-SALT-DOME-1-SE	
Date	08/20/2020
PFOS	**0.00035 J**
PFOA	0.00092 U
PFBS	0.0031 U

FGGM-SALT-DOME-1-SO	
Date	08/20/2020
Depth	0-2 ft
PFOS	**0.00059 J**
PFOA	0.00060 U
PFBS	0.0020 U

FGGM-SALT-DOME-1-GW	
Date	08/20/2020
PFOS	**8.1 J**
PFOA	**16**
PFBS	**1.9**

FGGM-SALT-DOME-2-SO	
Date	08/20/2020
Depth	0-2 ft
PFOS	0.00061 U
PFOA	0.00061 U
PFBS	0.0020 U

FGGM-SALT-DOME-2-GW	
Date	08/20/2020
PFOS	**13**
PFOA	**4.8**
PFBS	**1.8**

Notes:
1. Groundwater and surface water results (both shown in blue) are reported in nanograms per liter (ng/L).
2. Soil results (shown in green) and sediment results (shown in brown) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. First-encountered groundwater was collected via low-flow sampling at boring locations advanced using DPT.

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).

- Installation Boundary
- AOPI
- Inlet
- Outfall
- Water Body
- Wetland
- Wetland Buffer (25 feet)
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well
- DPT Soil/Groundwater Sampling Location
- Surface Water / Sediment Sampling Location

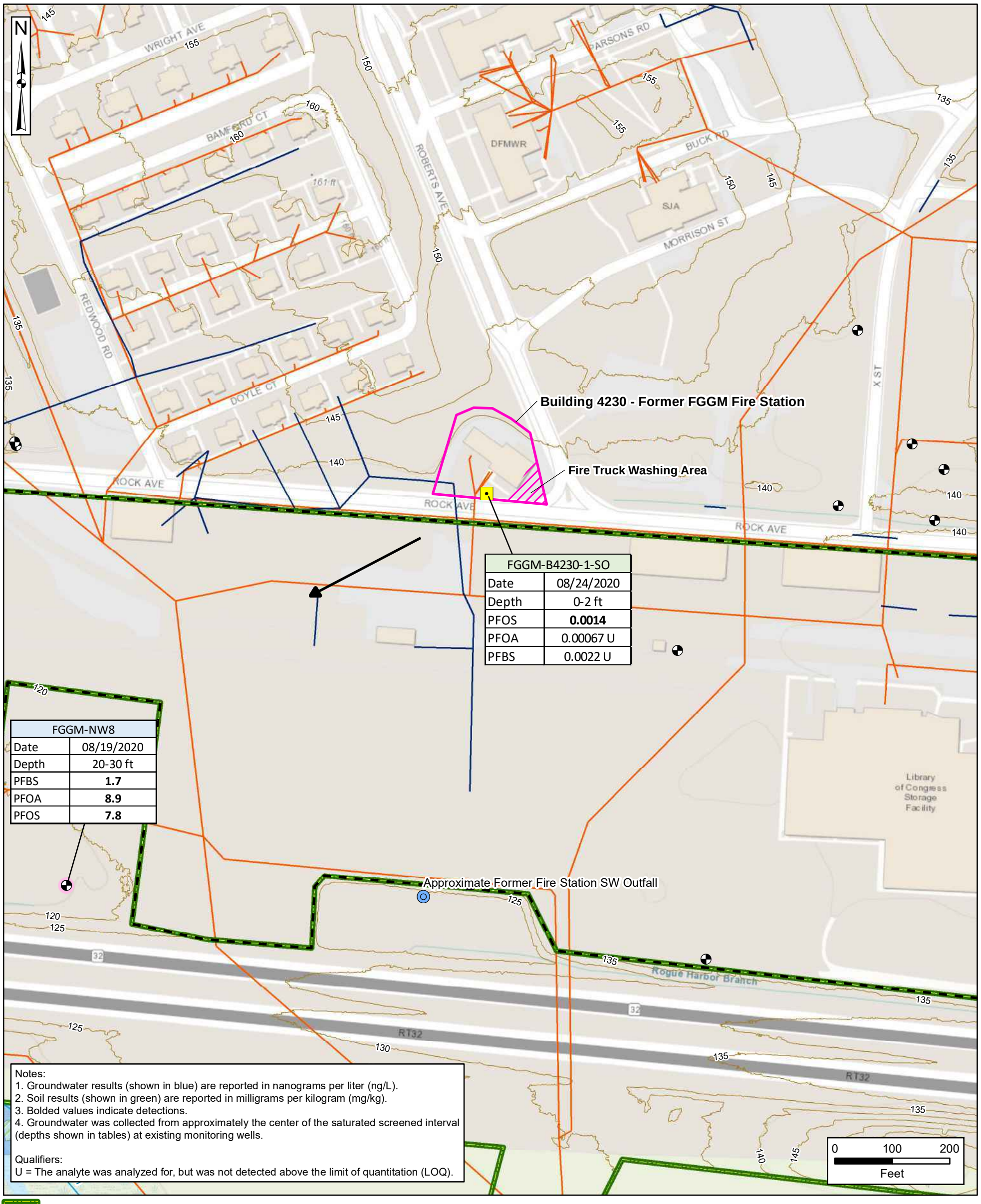
AOPI = area of potential interest
DPT = direct-push technology
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-5
AOPI 4:
Building 4230 - Former FGGM Fire Station
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Groundwater results (shown in blue) are reported in nanograms per liter (ng/L).
2. Soil results (shown in green) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

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

- Installation Boundary
- FGGM-74 Parcel Boundary
- AOPI
- AFFF Release Area
- River/Stream (Perennial)
- Wetland
- Wetland Buffer (25 feet)
- Outfall
- Stormwater Line
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Monitoring Well
- Soil Sampling Location
- Monitoring Well Sampling Location

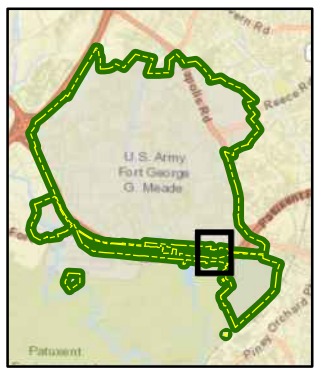
AFFF = aqueous film-forming foam
AOPI = area of potential interest
FGGM = Fort George G. Meade
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-6
AOPI 5:
Railroad Avenue – Fire Equipment Testing Area
PFOS, PFOA, and PFBS Analytical Results



Railroad Avenue – Fire Equipment Testing Area

FGGM-AOCNW-11	
Date	08/26/2020
Depth	28-38 ft
PFOS	**90**
PFOA	**5.5**
PFBS	**1 J**

FGGM-AOCNW-12	
Date	08/26/2020
Depth	40-50 ft
PFOS	**3.9**
PFOA	**5.5**
PFBS	**1.3 J**

FGGM-RRA-1-SO	
Date	08/20/2020
Depth	0-2 ft
PFOS	**0.00048 J**
PFOA	**0.00029 J**
PFBS	0.0021 U

FGGM-RRA-1-GW	
Date	08/20/2020
PFOS	**58 J+**
PFOA	**72 J+**
PFBS	**2.4**

FGGM-RRA-1-SW	
Date	08/20/2020
PFOS	**8.5**
PFOA	**380**
PFBS	**1.7 J-**

FGGM-RRA-1-SE	
Date	08/20/2020
PFOS	**0.0012**
PFOA	**0.0037**
PFBS	0.0029 U

Notes:
1. Groundwater and surface water results (both shown in blue) are reported in nanograms per liter (ng/L).
2. Soil results (shown in green) and sediment results (shown in brown) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.
5. First-encountered groundwater was collected via low-flow sampling at boring locations advanced using DPT. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
J+ = The result is an estimated quantity; the result may be biased high.
J- = The result is an estimated quantity; the result may be biased low.
U = The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).

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

0 100 200
Feet

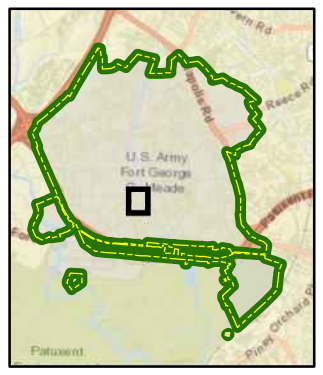
- Installation Boundary
- FGGM-74 Parcel Boundary
- AOPI
- Stream (Intermittent)
- Wetland
- Wetland Buffer (25 feet)
- Stormwater Line
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Monitoring Well
- DPT Soil/Groundwater Sampling Location
- Surface Water / Sediment Sampling Location
- Monitoring Well Sampling Location

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-7
AOPI 6:
Building 6619 – Current FGGM Fire Station
PFOS, PFOA, and PFBS Analytical Results



N

FGGM-B6619-1-SW	
Date	08/24/2020
PFOS	**5.4**
PFOA	**31**
PFBS	**1.1 J**

FGGM-B6619-1-SE	
Date	08/24/2020
PFOS	**0.00062 J**
PFOA	0.00080 U
PFBS	0.0027 U

FGGM-MW-05	
Date	08/19/2020
Depth	24-34 ft
PFOS	**18 BJ+**
PFOA	**16**
PFBS	**1.9**

FGGM-B6619-1-SO	
Date	08/24/2020
Depth	0-2 ft
PFOS	**0.00044 J**
PFOA	**0.00043 J**
PFBS	0.0022 U

FGGM-MW-03R	
Date	08/19/2020
Depth	17-27 ft
PFOS	**120**
PFOA	**400**
PFBS	**6**

Notes:
1. Groundwater results (shown in blue) are reported in nanograms per liter (ng/L).
2. Soil results (shown in green) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.
5. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

Qualifiers:
B = The compound has been found in the sample as well as its associated blank; its presence in the sample may be suspect.
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
J+ = The result is an estimated quantity; the result may be biased high.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

0 100 200
Feet

- Installation Boundary
- AOPI
- AFFF Release Area
- River/Stream (Perennial)
- Water Body
- Wetland
- Wetland Buffer (25 feet)
- Elevation Contour (feet)
- Stormwater Line
- Wastewater Line
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well
- Surface Water / Sediment Sampling Location
- Soil Sampling Location
- Monitoring Well Sampling Location

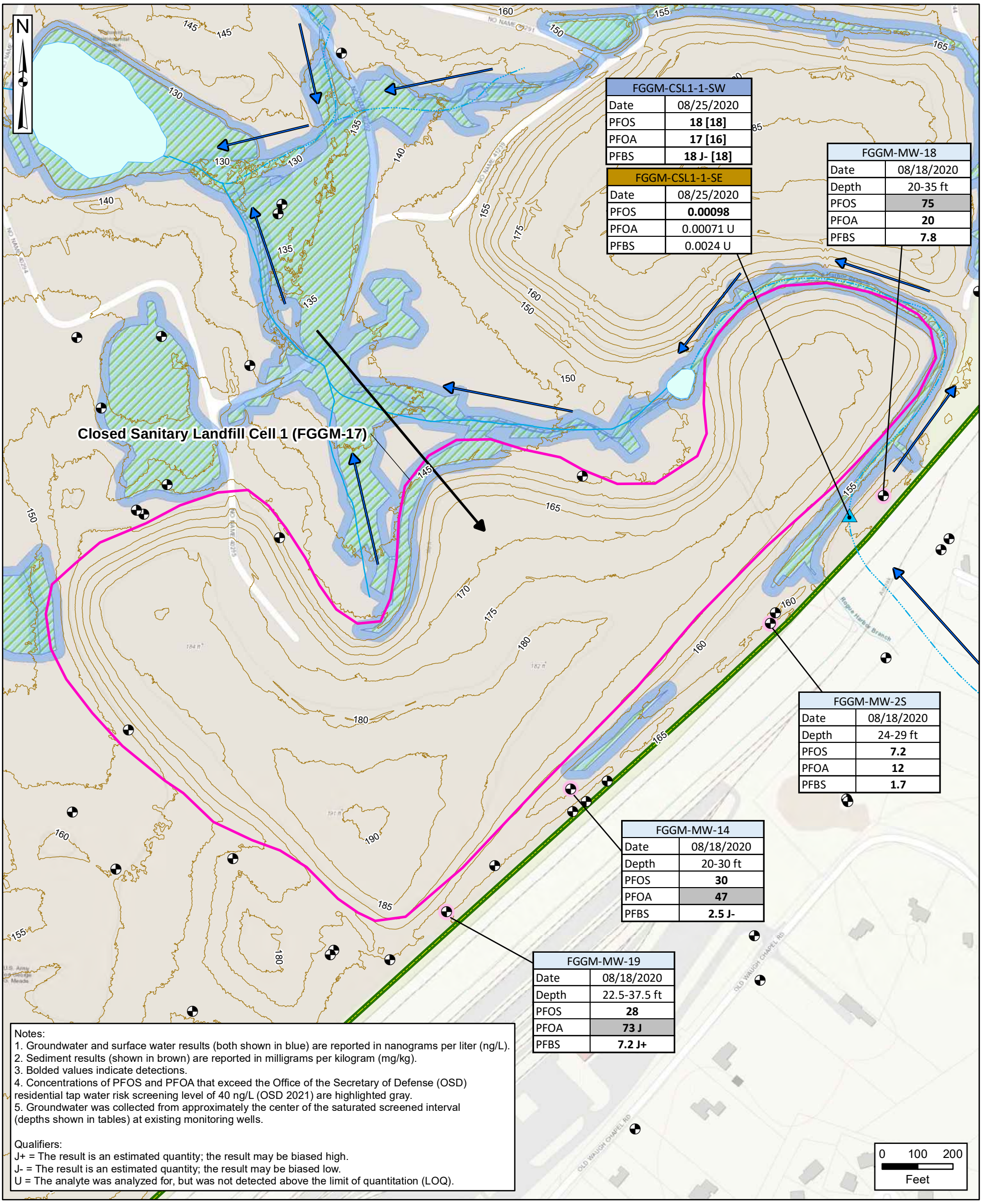
AFFF = aqueous film-forming foam
AOPI = area of potential interest
FGGM = Fort George G. Meade
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-8
AOPI 7:
Closed Sanitary Landfill Cell 1 (FGGM-17)
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Groundwater and surface water results (both shown in blue) are reported in nanograms per liter (ng/L).
2. Sediment results (shown in brown) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.
5. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

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

- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Wetland
- Wetland Buffer (25 feet)
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well
- Surface Water / Sediment Sampling Location
- Monitoring Well Sampling Location

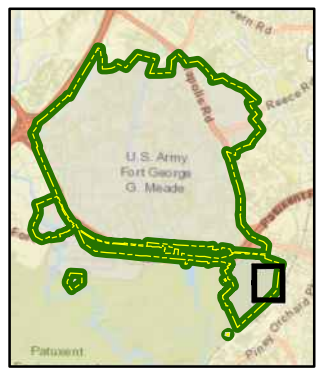
AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

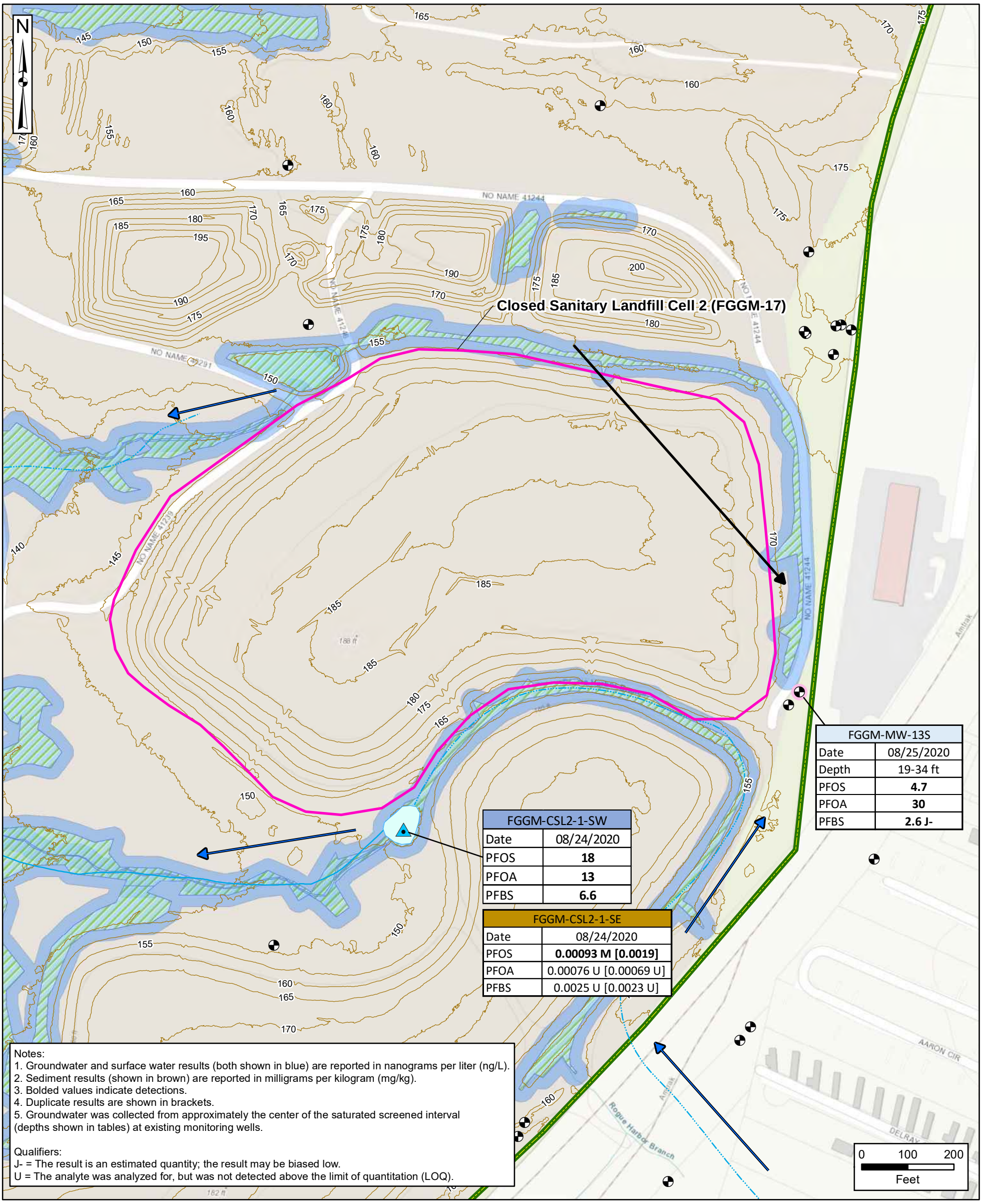
Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-9
AOPI 8:
Closed Sanitary Landfill Cell 2 (FGGM-17)
PFOS, PFOA, and PFBS Analytical Results





FGGM-CSL2-1-SW	
Date	08/24/2020
PFOS	**18**
PFOA	**13**
PFBS	**6.6**

FGGM-CSL2-1-SE	
Date	08/24/2020
PFOS	**0.00093 M [0.0019]**
PFOA	0.00076 U [0.00069 U]
PFBS	0.0025 U [0.0023 U]

FGGM-MW-13S	
Date	08/25/2020
Depth	19-34 ft
PFOS	**4.7**
PFOA	**30**
PFBS	**2.6 J-**

Notes:
1. Groundwater and surface water results (both shown in blue) are reported in nanograms per liter (ng/L).
2. Sediment results (shown in brown) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Duplicate results are shown in brackets.
5. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

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

- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Wetland
- Wetland Buffer (25 feet)
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well
- Surface Water / Sediment Sampling Location
- Monitoring Well Sampling Location

AOPI = area of potential interest
FGGM = Fort George G. Meade
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-10
AOPI 9:
Closed Sanitary Landfill Cell 3 (FGGM-97)
PFOS, PFOA, and PFBS Analytical Results

Closed Sanitary Landfill Cell 3 (FGGM-97)

FGGM-CSL3-1-SW	
Date	08/25/2020
PFOS	**79**
PFOA	**24**
PFBS	**6.5 J-**

FGGM-CSL3-1-SE	
Date	08/25/2020
PFOS	**0.002**
PFOA	0.0011 U
PFBS	0.0035 U

FGGM-MW-06	
Date	08/25/2020
Depth	8-18 ft
PFOS	**66**
PFOA	**27**
PFBS	**2.8 J-**

FGGM-MW-17	
Date	08/25/2020
Depth	20-35 ft
PFOS	**12**
PFOA	**5**
PFBS	**4.2**

Notes:
1. Groundwater and surface water results (both shown in blue) are reported in nanograms per liter (ng/L).
2. Sediment results (shown on brown) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.
5. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

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

0 200 400
Feet

- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Wetland
- Wetland Buffer (25 feet)
- Stormwater Line
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well
- Surface Water / Sediment Sampling Location
- Monitoring Well Sampling Location

AOPI = area of potential interest
FGGM = Fort George G. Meade
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-11
AOPI 10:
Parade Ground Area
PFOS, PFOA, and PFBS Analytical Results

FGGM-PGHL-3-SO	
Date	08/21/2020
Depth	0-2 ft
PFOS	**0.00029 J**
PFOA	0.00065 U
PFBS	0.0022 U

FGGM-PGHL-2-SO	
Date	08/21/2020
Depth	0-2 ft
PFOS	**0.0032**
PFOA	**0.00053 J**
PFBS	0.0020 U

FGGM-PGHL-1-SO	
Date	08/21/2020
Depth	0-2 ft
PFOS	**0.0003 J**
PFOA	0.00068 U
PFBS	0.0023 U

FGGM-PGHL-1-GW	
Date	08/21/2020
PFOS	**6.3**
PFOA	**12**
PFBS	**3.8**

Parade Ground Area

Notes:
1. Groundwater results (shown in blue) are reported in nanograms per liter (ng/L).
2. Soil results (shown in green) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. First-encountered groundwater was collected via low-flow sampling at boring locations advanced using DPT.

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
- AOPI
- Stream (Intermittent)
- Wetland
- Wetland Buffer (25 feet)
- Stormwater Line
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Monitoring Well
- DPT Soil/Groundwater Sampling Location
- Soil Sampling Location

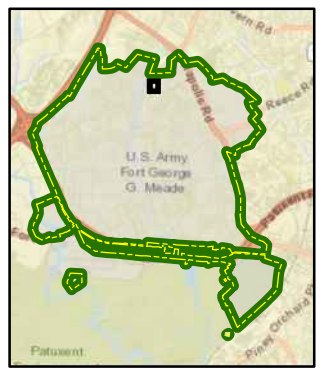
AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-12
AOPI 11: Buildings 3486 and 3488 – Detached Fire Department Support Buildings PFOS, PFOA, and PFBS Analytical Results



FGGM-B3486-1-SE	
Date	08/24/2020
PFOS	0.00062 U
PFOA	0.00062 U
PFBS	0.0021 U

FGGM-B3486-2-SO	
Date	08/24/2020
Depth	0-2 ft
PFOS	**0.013**
PFOA	**0.00048 J**
PFBS	0.0022 U

Buildings 3486 and 3488 – Detached Fire Department Support Buildings AOPI

FGGM-B3486-1-SO	
Date	08/24/2020
Depth	0-2 ft
PFOS	**0.00071**
PFOA	0.00070 U
PFBS	0.0023 U

FGGM-MP19-3	
Date	08/19/2020
Depth	24.5-39.5 ft
PFOS	**13**
PFOA	**2.8**
PFBS	1.6 U

FGGM-B3486-3-SO	
Date	08/24/2020
Depth	0-2 ft
PFOS	**0.0056**
PFOA	**0.00035 J**
PFBS	0.0027 U

CLARK RD

Notes:
1. Groundwater results (shown in blue) are reported in nanograms per liter (ng/L).
2. Soil results (shown in green) and sediment results (shown in brown) are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

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
- AOPI
- Stream (Intermittent)
- Wetland
- Wetland Buffer (25 feet)
- Wastewater Line
- Elevation Contour (feet)
- Approximate Shallow Groundwater Flow Direction
- Surface Water Flow Direction
- Monitoring Well
- Sediment Sampling Location
- Soil Sampling Location
- Monitoring Well Sampling Location

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

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-13
Operable Unit (OU) 4 Hydraulic Containment System
PFOS, PFOA, and PFBS Analytical Results

FGGM-HCS-INF	
Date	11/05/2020
PFOS	**19**
PFOA	**6**
PFBS	**2.7**

FGGM-HCS-EFF	
Date	11/05/2020
PFOS	1.9 U
PFOA	1.9 U
PFBS	1.9 U

EW-1
EW-2
EW-3
EW-4
EW-5
EW-6
IW-1
IW-2
IW-3
IW-4
OU4 Hydraulic Containment System Equipment Compound
Soldier Lake
Rogue Harbor Branch
Meadedale
Broadstone at Odenton
Tree Side MHP
Patuxent Woods
Patuxent Environmental Science Center
0 500 1,000
Feet

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

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

- Installation Boundary
- FGGM-74 Parcel Boundary
- OU4 Geographic Footprint Boundary
- OU4 Hydraulic Containment System Equipment Compound
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Elevation Contour (feet)
- Wetland
- Wetland Buffer (25 feet)
- Approximate Groundwater Flow Direction
- Surface Water Flow Direction
- Subsurface Piping
- Monitoring Well
- OU4 Study Area Extraction/Injection Well
- Equipment Compound: Influent and Effluent Sample Location

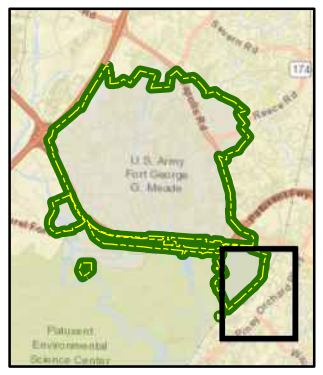
OU = Operable Unit
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

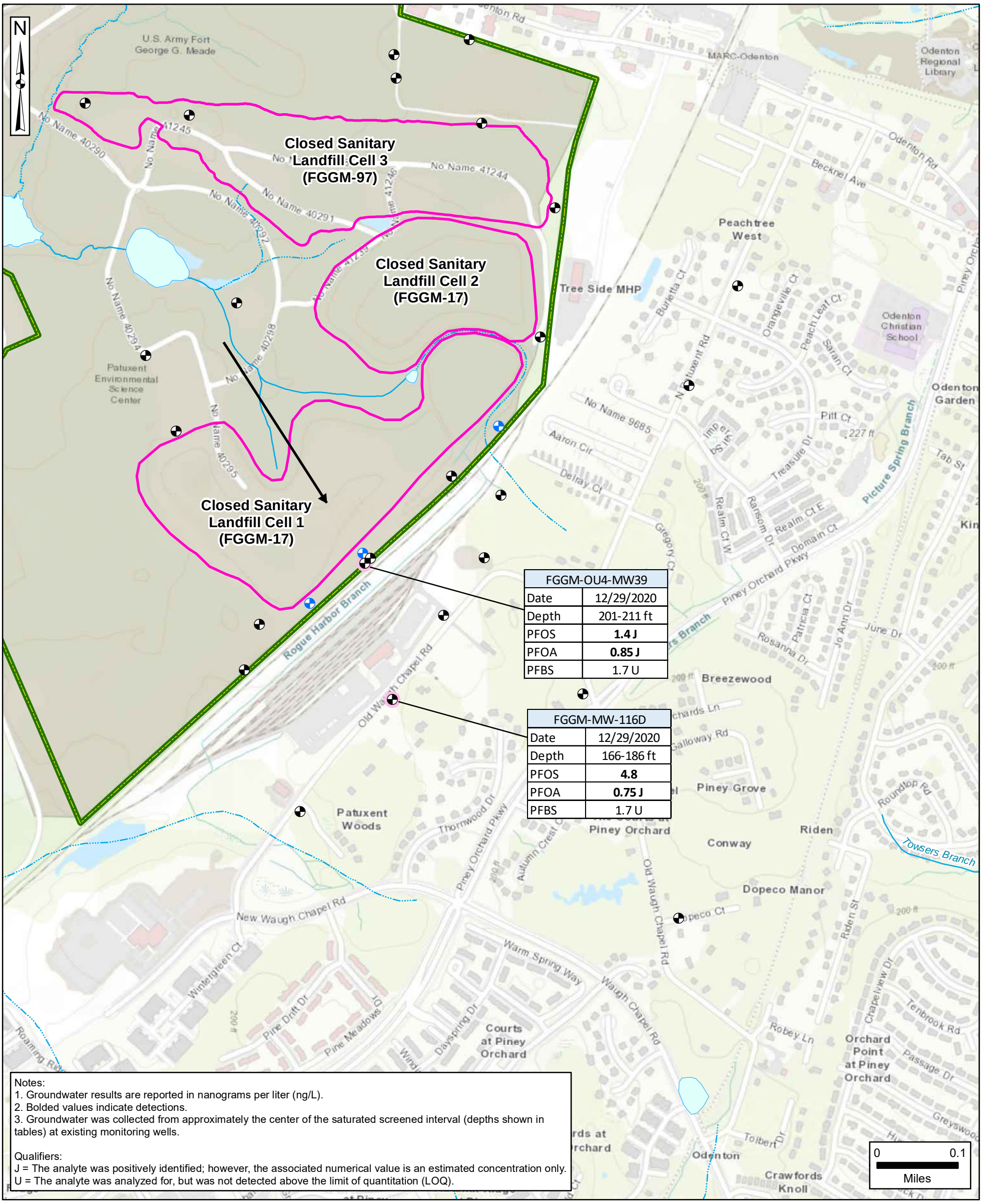
Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-14
Off-Post LPA Monitoring Well
PFOS, PFOA, and PFBS Analytical Results





FGGM-OU4-MW39	
Date	12/29/2020
Depth	201-211 ft
PFOS	**1.4 J**
PFOA	**0.85 J**
PFBS	1.7 U

FGGM-MW-116D	
Date	12/29/2020
Depth	166-186 ft
PFOS	**4.8**
PFOA	**0.75 J**
PFBS	1.7 U

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Bolded values indicate detections.
3. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

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
- AOPI
- River/Stream (Perennial)
- Stream (Intermittent)
- Water Body
- Groundwater Flow Direction
- Lower Aquifer Well
- Upper Aquifer Well
- Monitoring Well Sampling Location

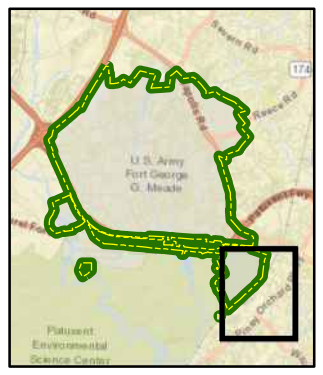
AOPI = area of potential interest
ft = feet
LPA = Lower Patapsco Aquifer
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate

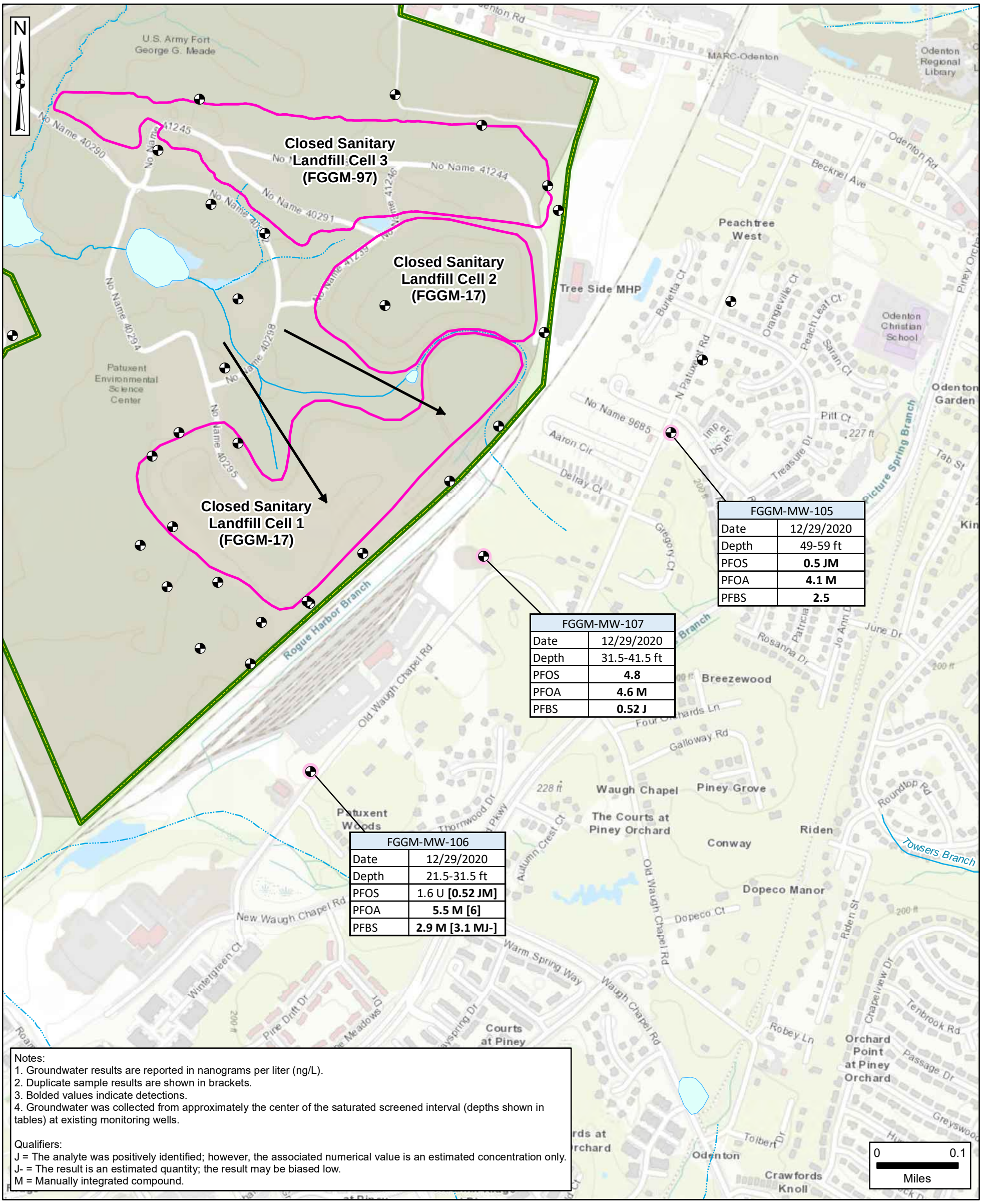
Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade (FGGM) and
Phoenix Military Reservation (PMR), MD

Figure 7-15
Off-Post UPA Monitoring Well
PFOS, PFOA, and PFBS Analytical Results





FGGM-MW-105	
Date	12/29/2020
Depth	49-59 ft
PFOS	**0.5 JM**
PFOA	**4.1 M**
PFBS	**2.5**

FGGM-MW-107	
Date	12/29/2020
Depth	31.5-41.5 ft
PFOS	**4.8**
PFOA	**4.6 M**
PFBS	**0.52 J**

FGGM-MW-106	
Date	12/29/2020
Depth	21.5-31.5 ft
PFOS	1.6 U **[0.52 JM]**
PFOA	**5.5 M [6]**
PFBS	**2.9 M [3.1 MJ-]**

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Duplicate sample results are shown in brackets.
3. Bolded values indicate detections.
4. Groundwater was collected from approximately the center of the saturated screened interval (depths shown in tables) at existing monitoring wells.

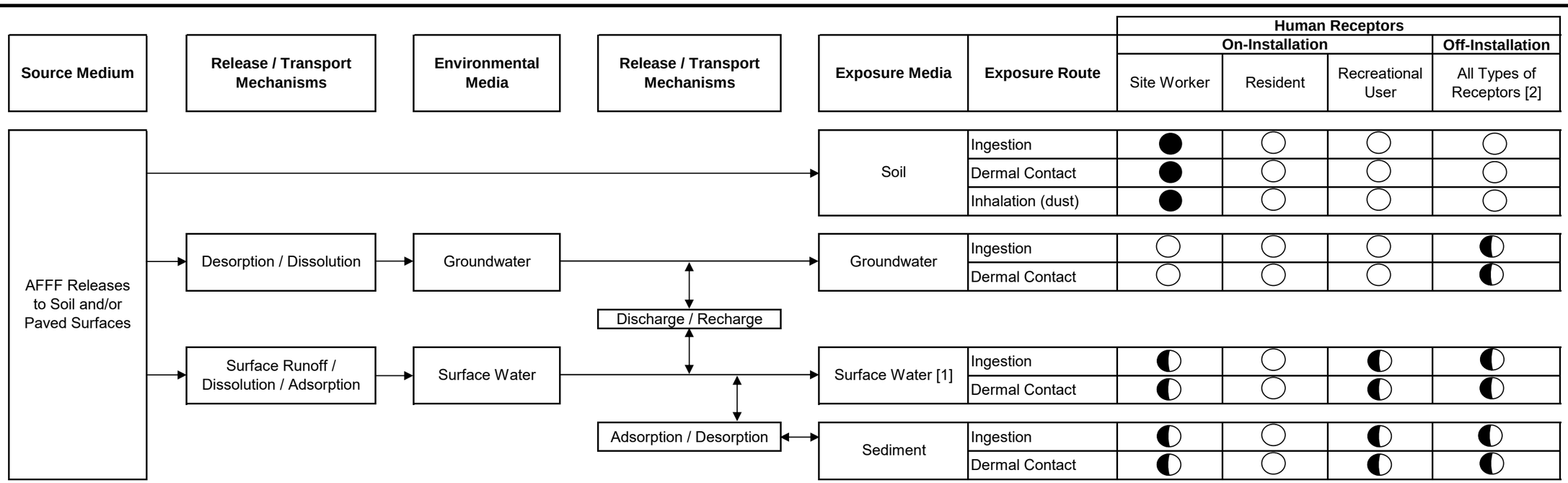
Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
J- = The result is an estimated quantity; the result may be biased low.
M = Manually integrated compound.

Installation Boundary
AOPI
River/Stream (Perennial)
Stream (Intermittent)
Water Body
Groundwater Flow Direction
Upper Aquifer Well
Monitoring Well Sampling Location

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

Data Sources:
Fort Meade, GIS Data, 2019
USGS, NHD Data, 2019
ESRI, ArcGIS Online, World Topo Map

Coordinate System:
WGS 1984, UTM Zone 18 North



Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

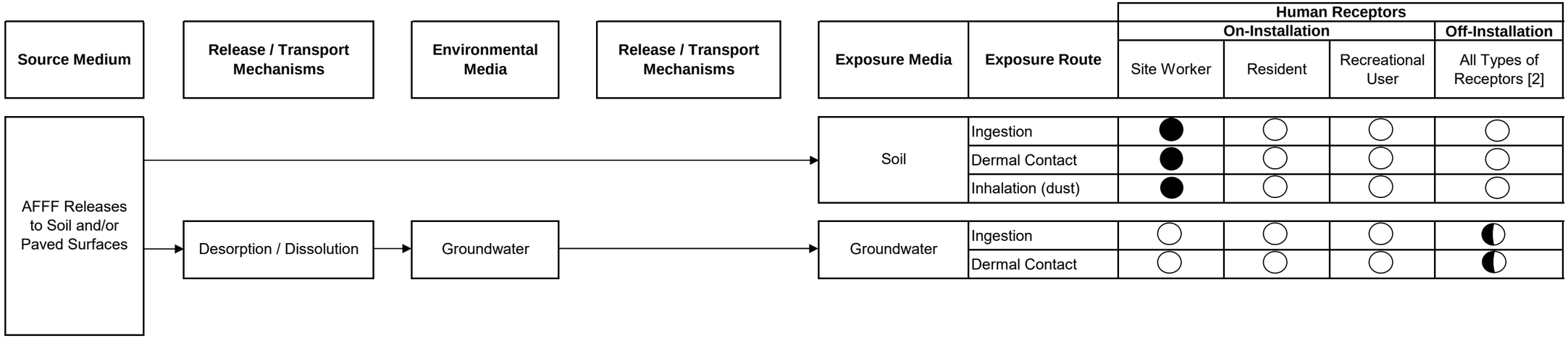
○ = Incomplete Exposure Pathway

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

ARCADIS

Conceptual Site Model for the Building 6619 - Current FGGM Fire Station, Salt Dome, Railroad Avenue and the Buildings 3486 and 3488 - Detached Fire Department Support Building AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade, Maryland

Figure 7-16



Legend:

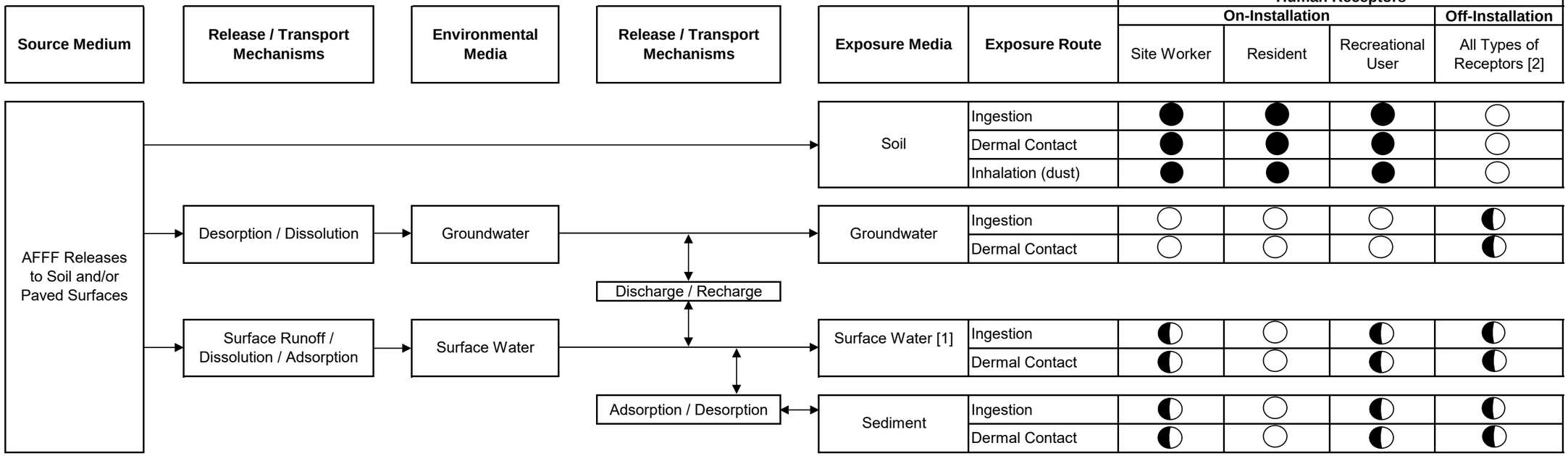
- = Complete Exposure Pathway
- = Potentially Complete Exposure Pathway
- = Incomplete Exposure Pathway

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

ARCADIS

Conceptual Site Model for the 900 Area - AFFF Equipment Testing Area AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade, Maryland

Figure 7-17



Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

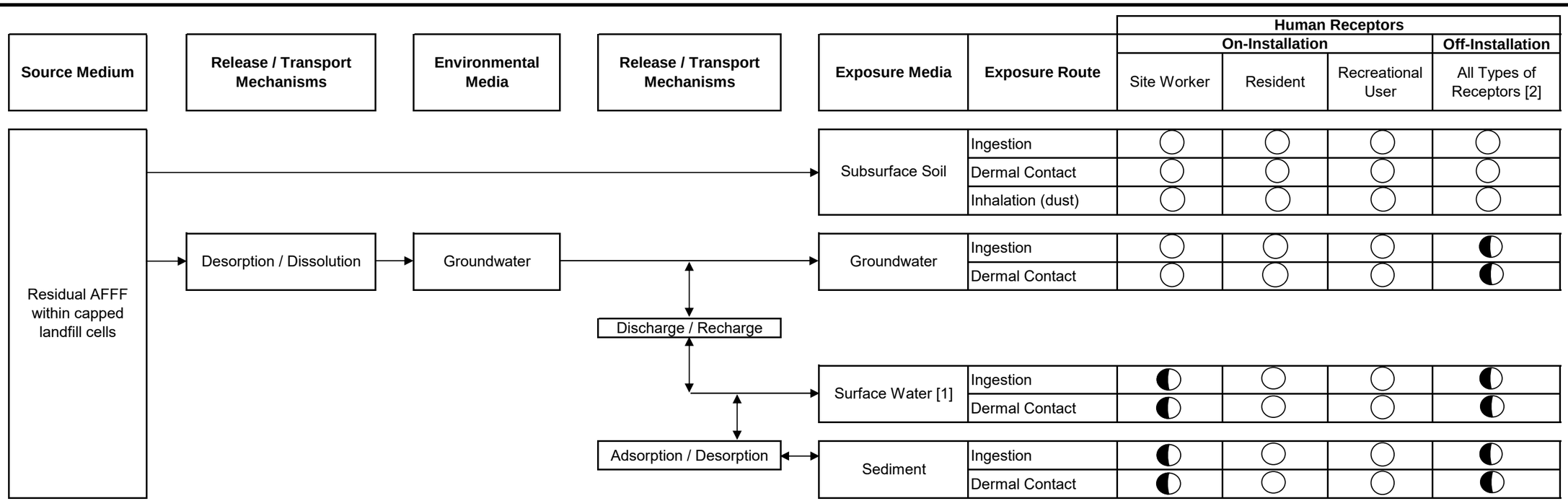
○ = Incomplete Exposure Pathway

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

ARCADIS

Conceptual Site Model for the 2300 Area - AFFF Equipment Testing Area AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade, Maryland

Figure 7-18



Exposure Media	Exposure Route	Human Receptors: On-Installation: Site Worker	Human Receptors: On-Installation: Resident	Human Receptors: On-Installation: Recreational User	Human Receptors: Off-Installation: All Types of Receptors [2]
Subsurface Soil	Ingestion	○	○	○	○
	Dermal Contact	○	○	○	○
	Inhalation (dust)	○	○	○	○
Groundwater	Ingestion	○	○	○	◐
	Dermal Contact	○	○	○	◐
Surface Water [1]	Ingestion	◐	○	○	◐
	Dermal Contact	◐	○	○	◐
Sediment	Ingestion	◐	○	○	◐
	Dermal Contact	◐	○	○	◐

Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

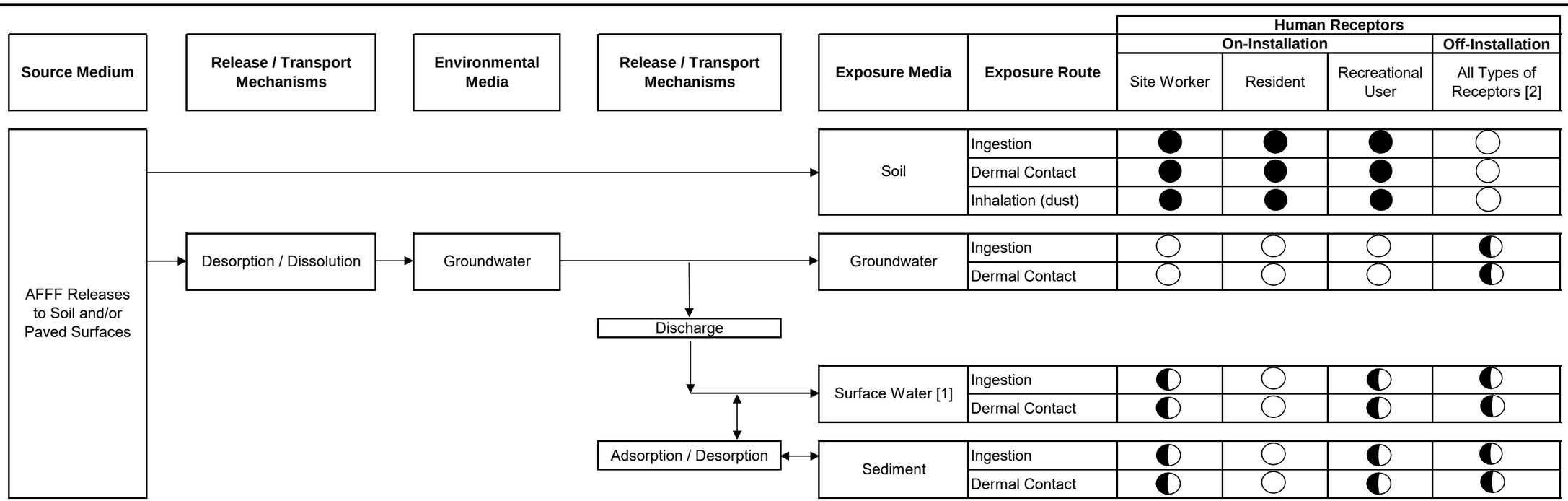
○ = Incomplete Exposure Pathway

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

ARCADIS

Conceptual Site Model for the Closed Sanitary Landfill Cells 1, 2 and 3 AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade, Maryland

Figure 7-19



Legend:

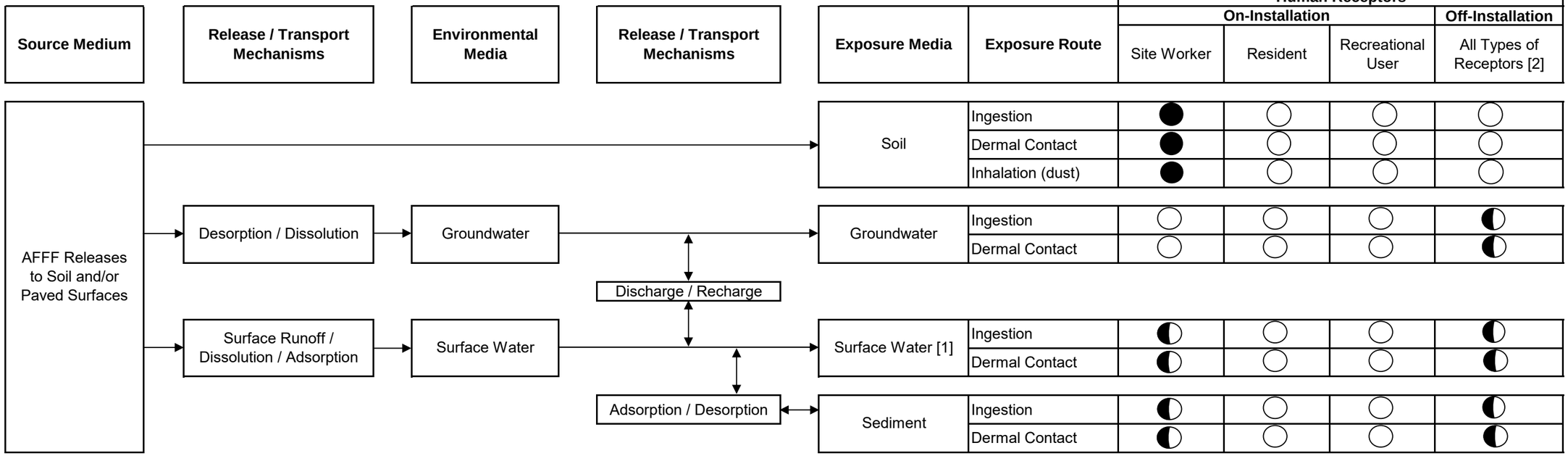
- ● = Complete Exposure Pathway
- ◐ = Potentially Complete Exposure Pathway
- ○ = Incomplete Exposure Pathway

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

ARCADIS

Conceptual Site Model for the Parade Ground Area AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade, Maryland

Figure 7-20



Legend:

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

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

ARCADIS

Conceptual Site Model for the Building 4230 - Former FGGM Fire Station AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort George G. Meade, Maryland

Figure 7-21

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
3500 DEFENSE PENTAGON
WASHINGTON, DC 20301-3500

SUSTAINMENT

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (INSTALLATIONS, ENERGY AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE NAVY (ENERGY, INSTALLATIONS AND ENVIRONMENT)
ASSISTANT SECRETARY OF THE AIR FORCE (INSTALLATIONS, ENVIRONMENT AND ENERGY)
DIRECTOR, NATIONAL GUARD BUREAU (JOINT STAFF, J8)
DIRECTOR, DEFENSE LOGISTICS AGENCY (INSTALLATION MANAGEMENT)

SUBJECT: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program

The Department of Defense (DoD) conducts cleanup under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the Defense Environmental Restoration Program (DERP). Our goal is protection of human health and the environment in a risk-based, fiscally-sound manner. This memorandum provides clarifying technical guidance on the investigation of perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS). This guidance is applicable to investigating PFOS, PFOA, and PFBS at Environmental Restoration Account-funded, Base Realignment and Closure Account-funded, and Operation and Maintenance accounts for the National Guard-funded sites.

This revised memorandum accounts for the updated PFBS screening levels and updates the Assistant Secretary of Defense for Sustainment (ASD(S)) memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program," October 15, 2019. The U.S. Environmental Protection Agency (EPA) reassessed the toxicity of PFBS in 2021.[1] One purpose of the assessment was to update and replace the existing 2014 Provisional Peer-Reviewed Toxicity Value (PPRTV) assessment for PFBS used by the EPA's Superfund Program. Based on studies published since 2014, the PFBS chronic reference dose (RfD) was reduced and use of the new value results in lower human health screening levels for this chemical.

PFOS, PFOA, and PFBS are part of a larger class of chemicals known as per- and polyfluoroalkyl substances (PFAS). PFAS shall be addressed in the same manner as other contaminants of concern within the DERP.

[1] U.S. EPA. Human Health Toxicity Values for Perfluorobutane Sulfonic Acid and Related Compound Potassium Perfluorobutane Sulfonate. U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-20/345F, April 2021.

Under CERCLA, site-specific regional screening levels[2] (RSLs) for PFOS and PFOA are calculated using the EPA online calculator using the oral RfD of 2E-05 mg/kg-day. The RSL for PFBS is calculated using the EPA PPRTV RfD of 3E-04 mg/kg-day (old value was 2E-02 mg/kg-day), or it may be read off the tables available on the EPA RSL website. The values are provided in the attachment. These RSLs should be used for screening to determine if further investigation in the remedial investigation (RI) phase is warranted or if the site can proceed to site closeout. When multiple PFAS are encountered at a site, a 0.1 factor is applied to the screening level when it is based on noncarcinogenic endpoints. For example, in cases where there are multiple PFAS, the screening level for PFOS and PFOA individually in tap water is 40 parts per trillion (ppt) (0.1 x 400 ppt = 40 ppt) and for PFBS it is 600 ppt (old value was 40,000 ppt).

During the RI phase, the RfDs for PFOS, PFOA, and PFBS and the oral cancer slope factor (CSF) for PFOA of 0.07 $(mg/kg\text{-}day)^{-1}$ will be used to conduct site specific risk assessments in accordance with Risk Assessment Guidance for Superfund Volume I, Part A (EPA/540/1-89/002, December 1989).[3] Site-specific risk assessment results will be used to determine if any necessary remedial actions are required in accordance with CERCLA, DERP, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This guidance is effective immediately and supersedes and cancels the ASD(S) memorandum, "Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program," October 15, 2019. The point of contact for this matter is Ms. Alexandria Long, Office of the Deputy Assistant Secretary of Defense for Environment and Energy Resilence, at 703-571-9061 or alexandria.d.long.civ@mail.mil.

Steven J. Morani
Principal Deputy Assistant Secretary of Defense
for Sustainment (Logistics)
Acting Assistant Secretary of Defense for
Sustainment

Attachment:
As stated

[2] For sites on the National Priorities List, the DoD Components will use the EPA site specific screening levels, if provided.
[3] Currently there are only three PFAS – PFOS, PFOA, and PFBS – with established toxicity values that DoD can use to perform a baseline risk assessment to determine whether remedial action is needed under CERCLA.

Attachment: Risk Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil Using EPA's RSL Calculator

Chemical	Carcinogenic Slope Factor - Oral (SF) $(mg/kg\text{-}day)^{-1}$	Non-Carcinogenic Reference Dose (RfD) (mg/kg-day)	Residential Scenario Screening Levels Calculated Using EPA RSL Calculator								Industrial/Commercial Composite Worker Screening Levels Calculated Using EPA RSL Calculator			
			Tap Water (µg/L or ppb)				Soil (mg/kg or ppm)				Soil (mg/kg or ppm)			
			HQ = 0.1	HQ = 1.0	ILCR = 1E-06	ILCR = 1E-04	HQ = 0.1	HQ = 1.0	ILCR = 1E-06	ILCR = 1E-04	HQ = 0.1	HQ = 1.0	ILCR = 1E-06	ILCR = 1E-04
PFOS	NA	2.00E-05	0.040	0.40	NA	NA	0.13	1.3	NA	NA	1.6	16	NA	NA
PFOA	7.00E-02	2.00E-05	0.040	0.40	1.1	111	0.13	1.3	7.8	775	1.6	16	33	3,280
PFBS	NA	3.00E-04	0.6	6.0	NA	NA	1.9	19	NA	NA	25	250	NA	NA

HQ=Hazard Quotient
ILCR=Incremental Lifetime Cancer Risk
NA=Not available/applicable

NOTES:

- The table represents screening levels based on residential and industrial/commercial worker receptor scenarios for either direct ingestion of groundwater (residential scenario only) or incidental ingestion of contaminated soil (both residential and composite worker scenarios).
- All values were calculated using slope factors or reference doses for PFOS and PFOA published by EPA Office of Water in support of the LHA, and default exposure assumptions for each potential receptor scenario, contained in EPA's RSL Calculator on April 6, 2018.
- Peer reviewed toxicity values considered valid for risk assessment exist for PFBS, and the screening levels may be found in EPA's RSL table or EPA's RSL calculator used to develop them.
- Other potential receptor scenarios (e.g., recreational user, site trespasser, construction worker) are not included in the above table, but could be relevant receptors at a site potentially contaminated with PFOS, PFOA and/or PFBS. These receptors, and their associated exposure scenarios, should be further considered in the scoping phase and completion of the Baseline Human Health Risk Assessment typically completed during an RI.
- The shaded values represent conservative screening levels for PFOS and PFOA in groundwater or soil that when exceeded should be considered a contaminant of potential concern in the risk assessment process and calculations of site-specific risk posed.

APPENDIX B

USEPA Toxicity Assessment for PFBS Fact Sheet

Fact Sheet: Toxicity Assessment for PFBS

Federal, state, tribal, and local governments are working together to address per- and polyfluoroalkyl substances (PFAS) in the environment. PFAS are synthetic chemicals used in a wide range of products because of their ability to repel water, grease, and oil. EPA is announcing the finalization and posting of the toxicity assessment for perfluorobutane sulfonic acid (PFBS) and its potassium salt, potassium perfluorobutane sulfonate (K+PFBS), to increase the amount of information the public has on PFAS. The PFBS toxicity assessment can be used along with exposure information and other important considerations to assess potential health risks to determine if, and when, it is appropriate to address this chemical. The PFBS toxicity assessment adds to existing EPA health assessments of the legacy PFAS, perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which are no longer widely produced in the United States but may still be found in the environment.

Questions and Answers

What are PFAS?

PFAS: Per- and polyfluoroalkyl substances (PFAS) are a group of synthetic chemicals that have been in use since the 1940s and are (or have been) found in many consumer products like cookware, food packaging, and stain repellants. PFAS manufacturing and processing facilities, airports, and military installations that use firefighting foams are some of the main sources of PFAS. PFAS may be released into the air, soil, and water, including sources of drinking water. PFOA and PFOS are the most studied PFAS chemicals and have been voluntarily phased out by industry, though they are still persistent in the environment. There are many other PFAS, including PFBS in use throughout our economy.

PFBS: PFBS is a replacement chemical for PFOS, a chemical that was voluntarily phased out by the primary U.S. manufacturer by 2002. PFBS has been identified in the environment and consumer products, including surface water, wastewater, drinking water, dust, carpeting and carpet cleaners, and floor wax.

How are people exposed to PFBS?

People can be potentially exposed to PFBS through a number of different pathways, including contaminated drinking water, inhaling polluted air, and contact with PFAS containing products. EPA's final assessment for PFBS focuses solely on the potential human health effects associated with oral exposure; it does not consider potential cumulative (mixture) effects or possible interactions with other PFAS and/or other chemicals.

What health effects are associated with PFBS?

Animal studies have shown health effects on the thyroid, reproductive organs and tissues, developing fetus, and kidney following oral exposure. Based on information across different sexes, lifestages, and durations of exposure, the thyroid appears to be particularly sensitive to oral PFBS exposure. The data are inadequate to evaluate cancer effects associated with PFBS exposure.

What is an EPA toxicity assessment?

A toxicity assessment is part of the human health risk assessment process and is a written summary of the potential health effects associated with a chemical and identifies the exposure levels at which those health effects may occur. Specifically, the PFBS toxicity assessment covers the first two steps (Step 1. Hazard Identification and Step 2. Dose-Response) of the four-step risk assessment process developed by the National Academy of Sciences. Risk characterization, which is not done in these toxicity assessments, requires additional consideration of exposure. For more details about this process see: https://www.epa.gov/risk/conducting-human-health-risk-assessment.

The toxicity values from the PFBS assessment can be combined with specific exposure information (Step 3. Exposure Assessment) to help characterize the potential public health risks associated with exposure to this PFAS (Step 4. Risk Characterization).

The PFBS toxicity assessment is comparable to assessments developed under EPA's Integrated Risk Information System (IRIS) and Provisional Peer-Reviewed Toxicity Value (PPRTV) Programs; it provides hazard identification, dose-response information, and toxicity values. These types of toxicity assessments provide qualitative and quantitative toxicity information that can be used along with exposure information and other important considerations to assess potential health risks to determine if, and when, it is appropriate to take action to address this chemical. Although not an IRIS assessment, the PFBS toxicity assessment underwent a similar review process (EPA/Agency review, cross-federal agency/interagency review, public comment, and external peer review). The PFBS toxicity assessment is available for use across multiple EPA program and regional offices, other federal agencies, states, tribes, external stakeholders, and other entities as needed. One use of this assessment is to update and replace the existing 2014 PPRTV assessment for PFBS used by the EPA's Superfund Program.

EPA will continue to work with state, tribal, and local partners to provide technical assistance as they consider the final PFBS toxicity values in relevant exposure scenarios. After the full risk assessment process is completed, public officials can work to identify how to manage the identified risk. Under the risk assessment/risk management paradigm the supporting science, as well as statutory and legal considerations, risk management options, potential public health impacts, cost/benefit analyses, economic and social factors, and other considerations are evaluated and integrated. All users are advised to review the information provided in this document to ensure that the assessment is

appropriate for the types of exposures and circumstances in question and the risk management decisions that would be supported by the risk assessment.

What are the reference doses for PFBS?

As part of EPA's toxicity assessment, the agency has developed chronic and subchronic oral reference doses (RfDs) for PFBS. A reference dose is an estimate of the amount of a chemical a person can ingest daily over a lifetime (chronic RfD) or less (subchronic RfD) that is unlikely to lead to adverse health effects. EPA will continue to work with state, tribal, and local partners to provide technical assistance should they wish to use the final values with relevant exposure scenarios to develop risk assessments to support risk management decisions.

Chemical	Subchronic RfD	Chronic RfD
PFBS	0.001 mg/kg-day	0.0003 mg/kg-day

To learn more about EPA's risk assessment practices including development of toxicity values, please visit: https://www.epa.gov/risk/conducting-human-health-risk-assessment.

How does the toxicity of PFBS compare to PFOA and PFOS?

The RfD for PFBS suggests it is less toxic than PFOA and PFOS.

Toxicity is only one piece of information that public officials consider when determining whether there is a risk to public health. Other factors, such as exposure, must also be considered.

Chemical	Chronic RfD (mg/kg-day)
PFBS	0.0003
PFOA	0.00002
PFOS	0.00002

How might PFBS impact my drinking water?

If you are concerned about PFBS in your drinking water, EPA recommends you contact your local water utility to learn more about your drinking water and to see whether they have monitoring data for PFBS or can provide any specific recommendations for your community. PFBS typically comes from use of products containing PFBS and/or other PFAS that degrade to PFBS. This compound can migrate in the environment and impact the quality of surface water and groundwater which may be used as sources of drinking water. If you own a private well, EPA recommends learning more about how to protect and maintain your well for all contaminants of concern. For information on private wells visit: www.epa.gov/privatewells.

What levels of PFBS did EPA find in the Unregulated Contaminant Monitoring Rule (UCMR) testing?

99.8 percent of water systems reported that they did not find PFBS in the UCMR 3 drinking water samples collected from 2013 through 2015. EPA found 8 out of 4,920 public water systems reported UCMR 3 results for PFBS at or above the minimum reporting level of 0.09 µg/L. EPA is proposing monitoring for more PFAS, including PFBS, at lower levels than was previously possible under the next UCMR (UCMR5). For more information on the UCMR visit: https://www.epa.gov/dwucmr.

Does EPA plan to issue a regulation for PFBS?

Not at this time. EPA is making the final toxicity assessment available to provide states, tribes, and local governments with the tools they need to better understand PFBS and to help inform whether local actions are needed to protect public health. To view the final toxicity assessment and other related information on PFBS, visit https://www.epa.gov/pfas/learn-about-human-health-toxicity-assessment-pfbs.

Appendix C
Installation Preliminary Assessment / Site Inspection Quality Control Checklist
Per- and Polyfluoroalkyl Substances Preliminary Assessment/Site Inspection
Fort George G. Meade and Phoenix Military Reservation, MD

Action Item *(Target Date)*	Comments	Completed Date	Completed By
Preliminary Assessment			
Pre-Site Visit			
Kickoff teleconference *(6 weeks prior to site visit)*	Arcadis U.S., Inc. (Arcadis) hosted a teleconference to introduce the U.S. Army Environmental Command (USAEC) per-and polyfluoroalkyl substances program with Fort George G. Meade (FGGM), the U.S. Army Corps of Engineers (USACE), and the USAEC.	22 January 2019	M Blower
Kickoff teleconference meeting minutes *(1 week after teleconference)*	Deliverable was reviewed by Arcadis Regional Lead and Technical Editor prior to distribution to FGGM, the USACE, and the USAEC.	28 January 2019	M Blower
Read-ahead package *(2 weeks prior to site visit)*	Pre-site visit records search was started in January 2019. 'Deliverable was reviewed by Arcadis Regional Lead and Technical Editor prior to distribution to FGGM, the USACE, and the USAEC.	08 February 2019	M Blower
Site Visit			
In-briefing	Arcadis hosted an in-briefing for several personnel, including FGGM Directorate of Public Works (DPW), fire department staff, and USACE and USAEC representatives.	25 February 2019	M Blower
Site visit records search	Arcadis collected various documents and records during the site visit.	25-26 February 2019	M Blower
Site visit personnel interviews	Arcadis interviewed several personnel (retired and active fire department personnel, DPW staff, engineer tech, Base Realignment and Closure coordinator) during the site visit, completing interview logs for each interviewee (or group of interviewees).	25-26 February 2019	M Blower
Site reconnaissance trips	Arcadis conducted site reconnaissance with USAEC and FGGM staff at several areas during the site visit, completing site reconnaissance logs for each area (or group of areas) visited.	26 February 2019	M Blower
Exit briefing	Arcadis hosted an informal exit briefing with FGGM Department of Public Works staff. During the site visit, Arcadis scheduled or obtained possible dates for the AOPI teleconference from necessary U.S. Army installation points of contact.	26 February 2019	M Blower
Post-Site Visit			
Site Visit Trip Report *(submittal and closing of pending action items within 2 weeks of site visit)*	Arcadis evaluated additional information and data collected during the site visit to determine AOPI designations. Deliverable was reviewed by Arcadis Regional Lead and Technical Editor prior to distribution to FGGM, the USACE, and the USAEC.	14 March 2019	M Blower
Post-site visit teleconference *(within 4 weeks of site visit)*	Arcadis hosted a discussion of proposed AOPIs with FGGM, the USACE, and USAEC staff. The list of AOPIs was not finalized, pending final decision from USAEC on AOPI classifications.	13 June 2019	M Blower

Appendix C
Installation Preliminary Assessment / Site Inspection Quality Control Checklist
Per- and Polyfluoroalkyl Substances Preliminary Assessment/Site Inspection
Fort George G. Meade and Phoenix Military Reservation, MD

Action Item *(Target Date)*	Comments	Completed Date	Completed By
Site Inspection			
Site inspection (SI) kickoff teleconference	Arcadis hosted a kickoff meeting with FGGM and the USACE to discuss sampling options for the site inspection.	29 October 2019	M Blower
SI kickoff teleconference meeting minutes	Deliverable was reviewed by Arcadis SI Project Manager and Technical Editor prior to distribution to FGGM, the USACE, and the USAEC.	4 November 2019	M Blower
SI scoping teleconference/meeting	Arcadis hosted a joint in-person meeting and teleconference with FGGM, USAEC, and USACE to discuss the sampling scope and schedule for the site inspection.	26 November 2019	M Blower
SI scoping teleconference meeting minutes	Deliverable was reviewed by Arcadis SI Project Manager and Technical Editor prior to distribution to FGGM, the USACE, and the USAEC.	5 December 2019	M Blower
Draft Quality Assurance Project Plan (QAPP) Addendum and Site Safety and Health Plan (SSHP)	Arcadis provided a draft proposed scope of work based on the determination of AOPIs discussed during the post-site-visit teleconference and the SI kickoff meeting. Deliverable was reviewed by the Arcadis SI Project Manager, Technical Lead, Quality Control Reviewer, and Technical Editor prior to distribution to FGGM, the USACE, and the USAEC.	19 March 2020	M Blower
Submittal of responses to comments *(within 7 days of RTC discussion teleconference)*	The comments were addressed as agreed upon during the response to comment discussion teleconference, and the response to comment matrix detailing the completed revisions was submitted to FGGM, the USACE, and the USAEC. Concurrence on responses to comments was received on 22 June 2020.	8 June 2020	M Blower
Draft Final QAPP Addendum *(within 2 weeks of concurrence on responses to comments on the Draft QAPP Addendum and SSHP)*	Arcadis provided the draft final proposed scope of work agreed upon by the installation, USACE, and USAEC for the installation to provide to regulators.	4 August 2020	M Blower
Submittal of responses to comments *(within 2 weeks of concurrence from installation, USACE, and USAEC)*	Arcadis addressed the response to comment matrix detailing the completed revisions was submitted to FGGM, the USACE, and the USAEC. Concurrence on responses to comments was received on 22 July 2020.	13 July 2020	M Blower
Final QAPP Addendum and SSHP *(submittal within 2 weeks of receipt of client comments)*	Arcadis revised the draft final document as agreed upon by FGGM, the USACE, and the USAEC prior to finalizing the document.	4 August 2020	M Blower
Site inspection planning	Arcadis SI Project Manager finalized site inspection logistics and completed all access requirements, scheduling, and/or permits necessary.	17 August 2020	M Blower
Site inspection field work *(timing dependent on availability of subcontractors)*	Arcadis completed the scope of work outlined in the QAPP Addendum with drilling subcontractors GSI Mid Atlantic and Soft Dig.	28 August 2020	M Blower

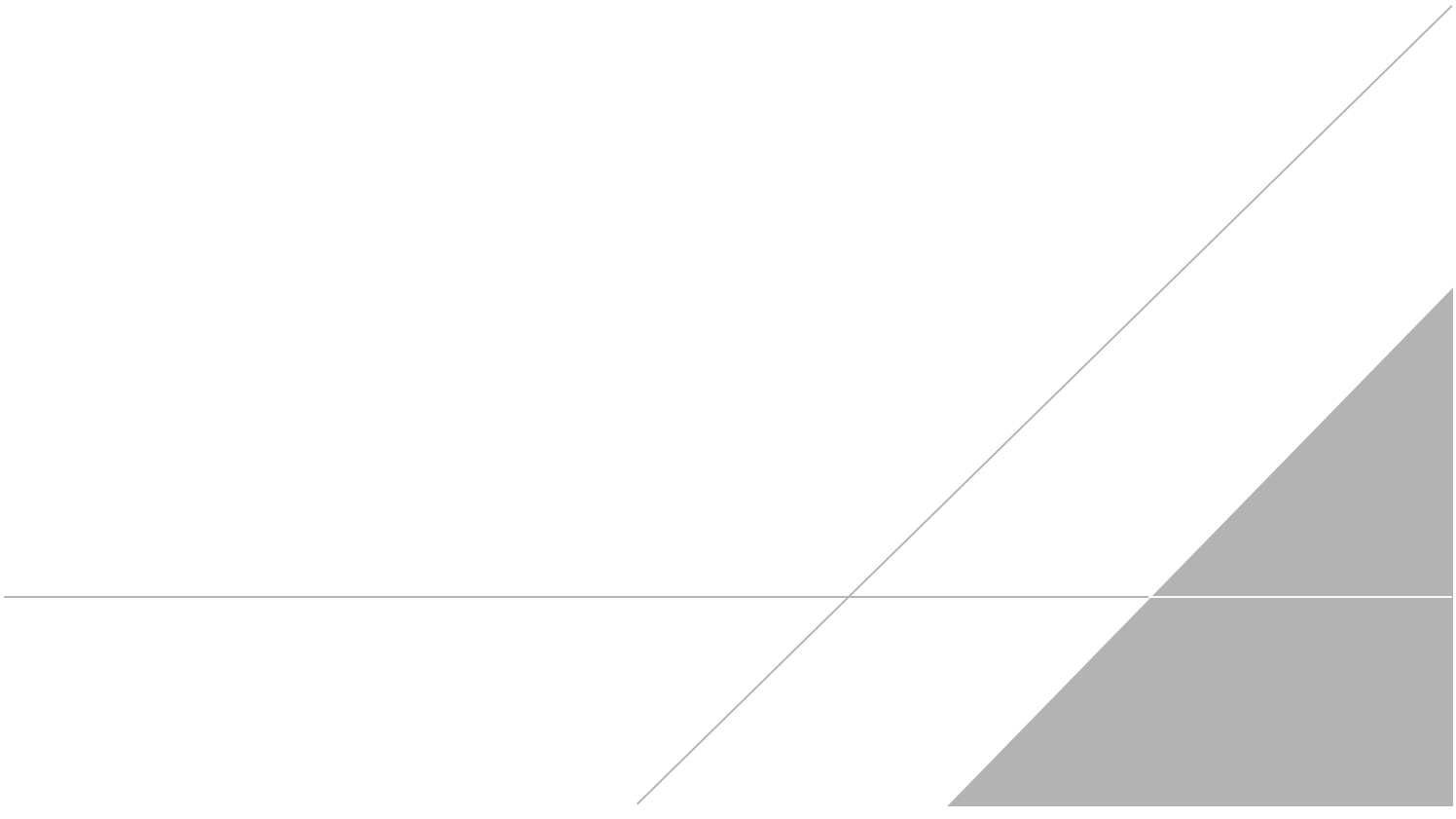
Appendix C
Installation Preliminary Assessment / Site Inspection Quality Control Checklist
Per- and Polyfluoroalkyl Substances Preliminary Assessment/Site Inspection
Fort George G. Meade and Phoenix Military Reservation, MD

Action Item *(Target Date)*	Comments	Completed Date	Completed By
Preliminary Assessment/Site Inspection Report			
Draft Preliminary Assessment/Site Inspection (PA/SI) Report *(submittal within 90 days of site inspection data validation or 30 days after the site inspection results discussion, whichever is later)*	An Arcadis chemist, independent of the project team, validated and verified all analytical data collected during the SI and summarized the data usability in a report for inclusion as an appendix to the PA/SI Report. Deliverable was reviewed by Arcadis Project Manager, Quality Control Reviewer, and Technical Editor prior to distribution to FGGM, the USACE, and the USAEC.	4 June 2021	M Blower
Submittal of responses to comments	The response to comment matrix detailing the completed revisions was submitted to FGGM, the USACE, and the USAEC.	10 September 2021	M Blower
Draft Final PA/SI Report *(within 2 weeks of concurrence on responses to comments on the Draft PA/SI)*	Arcadis provided the draft final PA/SI Report agreed upon by FGGM, USACE, and USAEC for FGGM to provide to Army Legal and Headquarters Army (HQDA).	5 October 2021	M Blower
Final PA/SI Report *(submittal within 45 days of receipt of comments)*	Revised deliverable was reviewed by Arcadis Project Manager, Quality Control Reviewer, and Technical Editor prior to distribution to FGGM, the USACE, and the USAEC.	3 August 2022	M Blower

Preliminary assessment/site inspection complete at FGGM - Quality Control Reviewer — Jessica Travis, Seres E&S

APPENDIX D

Antiterrorism/Operations Security Review Cover Sheet



APPENDIX F

Installation EDR Survey Reports

**Appendices removed for file size are available from Fort Meade.*

APPENDIX G

Compiled Research Log

APPENDIX H

Compiled Interview Logs

APPENDIX I

Site Reconnaissance Photo Log

APPENDIX J

Compiled Site Reconnaissance Logs

APPENDIX K

Site Inspection Field Notes

APPENDIX L

Site Inspection Field Forms

APPENDIX M

Field Change Reports

Appendix M
Field Change Report
U.S. Army Environmental Command
Per- and Polyfluoroalkyl Substances Preliminary Assessment/Site Inspection
Fort George G. Meade, MD

Installation Name:	Fort George G. Meade, MD	Event Date:	21 August 2020
Contract No:	W912DR-18-D-0004	Prepared By:	D. Lynch
Project/Task No:	30001996.3CA50	Applicable Document:	Quality Assurance Project Plan Addendum: Worksheet #18 and associated figure(s)
Field Change Report No:	FCR-FGGM-01		

1. Description

One planned co-located groundwater sample was not collected at AOPI 1 – Area 900 – Fire Equipment Testing Area (FGGM-900Area-1-GW-MMDDYY).

2. Reason for Change

Direct Push Technology drill rig hit refusal at 27' before reaching first encountered ground water at FGGM-900Area-1-GW-MMDDYY. A temporary well was installed to allow recharge but abandoned after an hour of no recharge.

3. Impact on Present and Completed Work

Despite encountering refusal at the boring location FGGM-900Area-1-GW and not obtaining a grab groundwater sample, groundwater samples were collected from boring location FGGM-900Area-2-GW (located within the suspected release area) and monitoring well FGGM-MP12-1 (located hydraulically downgradient of boring location FGGM-900Area-1-GW). None of the groundwater samples collected from these two locations exhibited PFOS, PFOA, or PFBS concentrations above their respective OSD risk screening levels. Therefore, the data-quality objectives for this AOPI have been achieved with the collection of the two groundwater and two surface soil samples collected within and downgradient of the suspected AFFF release area. No impact on the overall scope of project work is anticipated.

4. Remarks

None.

Appendix M
Field Change Report
U.S. Army Environmental Command
Per- and Polyfluoroalkyl Substances Preliminary Assessment/Site Inspection
Fort George G. Meade, MD

Installation Name:	Fort George G. Meade, MD	Event Date:	21 August 2020
Contract No:	W912DR-18-D-0004	Prepared By:	D. Lynch
Project/Task No:	30001996.3CA50	Applicable Document:	Quality Assurance Project Plan Addendum: Worksheet #18 and associated figure(s)
Field Change Report No:	FCR-FGGM-02		

1. Description

One sediment and one surface water sample at AOPI 4 – Building 4230 – Former Fire Station area were removed from the SI scope of work. Visual observations revealed the outfall was rerouted off post due to active construction. The original approved scope identified the stormwater outfall existing north of the installation boundary. In response to this observation, the proposed surface water and sediment samples were removed from the scope of work, and a supplemental soil sample was collected from soil bordering the former fire station AOPI.

2. Reason for Change

During the site walk to mark-out sampling locations at FGGM, field observations identified the stormwater outfall location at the Building 4230 – Former Fire Station AOPI was rerouted to exist south of the installation boundary fence. The historical storm water outfall was removed during construction efforts sometime between October 2018 and October 2019. The newly installed storm water outfall is located off-post along the installation perimeter fence. As AFFF at the Building 4230 – Former Fire Station AOPI was historically used and stored between the late 1970s and 2001, surface water and sediment samples collected from the newly installed outfall would not have been representative of AFFF releases from the AOPI.

3. Impact on Present and Completed Work

The removal of the proposed sampling points from the scope of work impacts the ability to determine presence/absence of PFAS in Sediment and Surface Water at AOPI 4 – Building 4230 - Former Fire Station area. The primary goals of the SI as detailed in the FGGM QAPP Addendum were to verify PFAS presence or absence at individual AOPIs on the installation and refine the AOPI CSMs. Analytical data from the groundwater sample collected downgradient of the AOPI and the supplemental soil sample collected along the Former Fire Station driveway at the identified AOPI satisfied the data

quality objectives of the SI at this AOPI. Additionally, the conceptual site model for the Former Fire Station area AOPI does not identify any on-post or off-post receptor exposure scenarios for PFAS in surface water or sediment.

4. Remarks

None.

Appendix M
Field Change Report
U.S. Army Environmental Command
Per- and Polyfluoroalkyl Substances Preliminary Assessment/Site Inspection
Fort George G. Meade, MD

Installation Name:	Fort George G. Meade, MD	Event Date:	21 August 2020
Contract No:	W912DR-18-D-0004	Prepared By:	D. Lynch
Project/Task No:	30001996.3CA50	Applicable Document:	Quality Assurance Project Plan Addendum: Worksheet #18 and associated figure(s)
Field Change Report No:	FCR-FGGM-03		

1. Description

A groundwater sample was collected from existing monitoring well FGGM-OU4MW-28 instead of existing monitoring well FGGM-OU4MW-27 at AOPI 2 – 2300 Area – Fire Equipment Testing Area.

2. Reason for Change

One monitoring well (FGGM-OU4MW-27) selected for sampling at AOPI 2 – 2300 Area – Fire Equipment Testing Area was not located during sampling mark outs ahead of the SI at FGGM. In response, another existing monitoring well (FGGM-OU4MW-28) located hydraulically downgradient of the identified AOPI was added to the sampling plan.

3. Impact on Present and Completed Work

Both wells are located hydraulically downgradient of the identified AOPI and are screened within the same lithologic interval; therefore, the elimination of a groundwater sample from FGGM- OU4MW-27 posed minimal impact to the overall scope of project work.

4. Remarks

None.

APPENDIX N

Site Inspection Investigation Derived Waste Documentation

APPENDIX O

Data Usability Summary Report

APPENDIX P

Site Inspection Laboratory Analytical Results

Appendix P
Site Inspection Laboratory Analytical Results - On Post Groundwater
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	Area 2300 - Fire Equipment Testing Area		Area 2300 - Fire Equipment Testing Area		Area 2300 - Fire Equipment Testing Area	
			Location	FGGM-2300A-1		FGGM-2300A-2		FGGM-2300A-2	
			Sample/Parent ID	FGGM-2300AREA-1-GW-082020		FGGM-2300AREA-2-GW-082020		FGGM-GW-DUP-01-082020 / FGGM-2300AREA-2-GW-082020	
			Sample Date	08/20/2020		08/20/2020		08/20/2020	
			Sample Type	N		N		FD	
			Matrix	Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.5	U	4.4	U	4.7	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.7	U	2.6	U	2.8	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.7	U	2.6	U	2.8	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.8	U	1.8	U	1.9	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**12**		**11**		**11**	
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**22**		**17**		**20**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.8	U	1.8	U	1.9	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.8	U	1.8	U	1.9	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**24**		**15**		**25**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**51**		**94**		**48**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**28**		**27**		**24**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**3.2**		**1.9**		**3.0**	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**48**		**52**		**40**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**53**		**21**		**49**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**16**		**20**		**15**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.8	U	1.8	U	1.9	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.8	U	1.8	U	1.9	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.8	U	1.8	U	1.9	U

Notes:

Qualifier

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.
J+: The result is an estimated quantity; the result may be biased high.
R: The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Rejection of the data was decided by the project team and USACE chemist.
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 imprecise.
BJ+: The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect and reported result may be biased high.

Appendix P
Site Inspection Laboratory Analytical Results - On Post Groundwater
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	Area 2300 - Fire Equipment Testing Area		Area 2300 - Fire Equipment Testing Area		Area 900 - Fire Equipment Testing Area	
			Location	FGGM-OU4MW-28		FGGM-OU4MW-30		FGGM-900A-2	
			Sample/Parent ID	FGGM-OU4MW-28-082620		FGGM-OU4MW-30-081820		FGGM-900AREA-2-GW-082120	
			Sample Date	08/26/2020		08/18/2020		08/21/2020	
			Sample Type	N		N		N	
			Matrix	Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.3	U	4.2	U	24	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.6	U	2.5	U	14	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.6	U	2.5	U	14	U
N-Methylperfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.7	U	1.7	U	9.6	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**1.9**		**0.96**	J	9.6	U
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**6.6**		**2.9**	J	**15**	J
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.7	U	1.7	U	9.6	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.7	U	1.7	U	9.6	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**1.4**	J	**0.59**	J	9.6	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**0.78**	J	**10**		9.6	U
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**2.3**		**1.2**	J	9.6	UJ
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	1.7	U	1.7	U	9.6	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**2.5**		**1.7**		**11**	J
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**6.9**		**1.7**		**7.1**	J
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**3.1**		**1.2**	J-	**2.6**	J
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.7	U	1.7	U	9.6	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.7	U	1.7	U	9.6	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.7	U	1.7	U	9.6	U

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Appendix P
Site Inspection Laboratory Analytical Results - On Post Groundwater
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	Area 900 - Fire Equipment Testing Area		Area 900 - Fire Equipment Testing Area		AOPI 11 - Buildings 3486 and 3488	
			Location	FGGM-900A-2		FGGM-MP-12-1		FGGM-MP-19-3	
			Sample/Parent ID	FGGM-GW-DUP-02-082120 / FGGM-900AREA-2-GW-082120		FGGM-MP-12-082620		FGGM-MP19-3-081920	
			Sample Date	08/21/2020		08/26/2020		08/19/2020	
			Sample Type	FD		N		N	
			Matrix	Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.2	U	4.2	U	4.1	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.5	U	2.5	U	2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.5	U	2.5	U	2.5	U
N-Methylperfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.7	U	1.7	U	1.6	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**3.8**		**1.5**	J	1.6	U
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**5.5**	J	**4.6**		**2.2**	J
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.7	U	1.7	U	1.6	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.7	U	1.7	U	1.6	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**6.2**		**2.1**		**1.8**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**1.5**	J	**1.2**	J	1.6	U
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**8.6**	J	**2.1**		**3.1**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**3.2**		**2.4**		**1.7**	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**7.4**	J	**9.5**		**13**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**16**	J	**10**		**2.8**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**4.9**		**1.2**	J	**3.9**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.8	UJ	1.7	U	1.6	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.7	U	1.7	U	1.6	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.7	U	1.7	U	1.6	U

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Appendix P
Site Inspection Laboratory Analytical Results - On Post Groundwater
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	AOPI 4 - Building 4230 - Former Fire Station		AOPI 6 - Building 6619 – Current Fire Station		AOPI 6 - Building 6619 – Current Fire Station	
			Location	FGGM-NW8		FGGM-MW-03R		FGGM-MW-05	
			Sample/Parent ID	FGGM-NW-8-081920		FGGM-MW-03R-081920		FGGM-MW-05-081920	
			Sample Date	08/19/2020		08/19/2020		08/19/2020	
			Sample Type	N		N		N	
			Matrix	Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.1	U	**640**		4.3	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.5	U	**190**		2.6	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.5	U	2.5	U	2.6	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.7	U	1.7	U	1.7	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**1.7**		**6.0**		**1.9**	
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**9.3**		**230**		**7.9**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.7	U	**95**		1.7	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.7	U	1.7	U	1.7	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**2.8**		**740**		**7.3**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**1.9**		**10**		**5.3**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**4.0**		**580**		**14**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**1.6**	J	**130**		**1.9**	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**7.8**		**120**		**18**	BJ+
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**8.9**		**400**		**16**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**3.8**		**700**		**12**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.7	U	1.7	UJ	1.7	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.7	U	1.7	U	1.7	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.7	U	1.7	U	1.7	U

Notes:

Qualifier

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Appendix P
Site Inspection Laboratory Analytical Results - On Post Groundwater
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Fort George G. Meade, Maryland

			AOPI	AOPI 7 - Closed Sanitary Landfill Cell 1		AOPI 7 - Closed Sanitary Landfill Cell 1		AOPI 7 - Closed Sanitary Landfill Cell 1	
			Location	FGGM-MW-14		FGGM-MW-18		FGGM-MW-19	
			Sample/Parent ID	FGGM-MW-14-081820		FGGM-MW-18-081820		FGGM-MW-19-081820	
			Sample Date	08/18/2020		08/18/2020		08/18/2020	
			Sample Type	N		N		N	
			Matrix	Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.2	U	**2.2**	J	4.3	UJ
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	**1.3**	J	2.6	U	2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.5	U	2.5	U	**10**	
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.7	U	1.7	U	**1.7**	
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**2.5**	J-	**7.8**		**7.2**	J+
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**17**		**6.2**		**68**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.7	U	1.7	U	1.7	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.7	U	1.7	UJ	1.7	UJ
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**6.4**		**11**		**18**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**8.3**		**3.6**		**23**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**18**		**26**		**96**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**2.1**		**4.9**		1.7	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**30**		**75**		**28**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**47**		**20**		**73**	J
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**7.0**		**21**		**20**	J+
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L		R		R	1.7	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.7	U	1.7	UJ	1.7	UJ
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.7	U	1.7	U	**0.94**	J

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Fort George G. Meade, Maryland

			AOPI	AOPI 7 - Closed Sanitary Landfill Cell 1		AOPI 8 - Closed Sanitary Landfill Cell 2		AOPI 9 - Closed Sanitary Landfill Cell 3	
			Location	FGGM-MW-2S		FGGM-MW-13S		FGGM-MW-06	
			Sample/Parent ID	FGGM-MW-2S-081820		FGGM-MW13S-082520		FGGM-MW-06-082520	
			Sample Date	08/18/2020		08/25/2020		08/25/2020	
			Sample Type	N		N		N	
			Matrix	Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.2	U	4.4	U	4.1	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.5	U	2.6	U	2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.5	U	2.6	U	**2.9**	
N-Methylperfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.7	U	1.8	U	1.6	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**1.7**		**2.6**	J-	**2.8**	J-
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**11**		**4.8**		**12**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.7	U	1.8	U	1.6	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.7	U	1.8	U	1.6	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**7.0**		**3.7**		**4.6**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**1.9**		**18**		**6.6**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**11**		**2.7**		**8.4**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**1.3**	J	1.8	U	**2.1**	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**7.2**		**4.7**		**66**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**12**		**30**		**27**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**11**		**1.5**	J-	**6.3**	J-
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.7	U	1.8	U	1.7	UJ
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.7	U	1.8	U	1.6	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.7	U	1.8	U	1.6	U

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			AOPI	AOPI 9 - Closed Sanitary Landfill Cell 3		OU4 Hydraulic Containment System		OU4 Hydraulic Containment System	
			Location	FGGM-MW-17		FGGM-HCS-EFF		FGGM-HCS-INF	
			Sample/Parent ID	FGGM-MW-17-082520		FGGM-HCS-EFF-110520		FGGM-HCS-INF-110520	
			Sample Date	08/25/2020		11/05/2020		11/05/2020	
			Sample Type	N		N		N	
			Matrix	Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.3	U	4.7	U	**2.2**	J
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.6	U	2.8	U	2.8	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.6	U	2.8	U	2.8	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.7	U	1.9	U	1.9	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**4.2**		1.9	U	**2.7**	
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**2.9**	J	4.7	U	**5.7**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.7	U	1.9	U	1.9	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.7	U	1.9	U	1.9	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**1.3**	J	1.9	U	**3.0**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**0.86**	J	1.9	U	**19**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**1.3**	J	1.9	U	**6.0**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**2.4**		1.9	U	**0.46**	J
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**12**		1.9	U	**19**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**5.0**		1.9	U	**6.0**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**0.99**	J	1.9	U	**4.4**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.7	U	1.9	U	1.9	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.7	U	1.9	U	1.9	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.7	U	1.9	U	1.9	U

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Site Inspection Laboratory Analytical Results - On Post Groundwater
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Fort George G. Meade, Maryland

			AOPI	Parade Ground Area		Railroad Avenue		Railroad Avenue	
			Location	FGGM-PGHL-1		FGGM-NW-11		FGGM-NW-12	
			Sample/Parent ID	FGGM-PGHL-1-GW-082120		FGGM-AOCNW-11-082620		FGGM-AOCNW-12-082620	
			Sample Date	08/21/2020		08/26/2020		08/26/2020	
			Sample Type	N		N		N	
			Matrix	Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.3	U	4.2	U	4.3	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.6	U	2.5	U	2.6	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.6	U	2.5	U	2.6	U
N-Methylperfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.7	U	1.7	U	1.7	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**3.8**		**1.0**	J	**1.3**	J
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**5.0**		**8.4**		**5.6**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	**4.8**		1.7	U	1.7	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.7	U	1.7	U	1.7	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**6.1**		**4.2**		**1.7**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**1.4**	J	**11**		**4.3**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**7.4**		**5.6**		**3.0**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**2.7**		**33**		**0.72**	J
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**6.3**		**90**		**3.9**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**12**		**5.5**		**5.5**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**4.2**		**5.3**		**2.1**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L		R	1.7	U	1.7	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.7	U	1.7	U	1.7	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.7	U	1.7	U	1.7	U

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			AOPI	Railroad Avenue		AOPI 3 - Salt Dome		AOPI 3 - Salt Dome	
			Location	FGGM-RAIL_AVE-1		FGGM-Salt_Dome-1		FGGM-Salt_Dome-2	
			Sample/Parent ID	FGGM-RRA-1-GW-082020		FGGM-SALT-DOME-1-GW-082020		FGGM-SALT-DOME-2-GW-082020	
			Sample Date	08/20/2020		08/20/2020		08/20/2020	
			Sample Type	N		N		N	
			Matrix	Ground Water		Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	5.0	U	4.9	U	4.2	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	3.0	U	2.9	U	2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	3.0	U	2.9	U	2.5	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	2.0	U	1.9	U	1.7	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**2.4**		**1.9**		**1.8**	
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**46**	J+	**14**		**4.2**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	**5.5**		1.9	U	1.7	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	2.0	U	1.9	U	1.7	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**66**	J+	**4.7**		**2.3**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**11**	J+	**4.9**		**2.5**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**83**	J+	**6.0**		**3.4**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**28**	J+	1.9	U	**4.3**	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**58**	J+	**8.1**	J	**13**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**72**	J+	**16**		**4.8**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**98**	J+	**2.6**		**3.1**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	2.0	U	1.9	U	1.7	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	2.0	U	1.9	U	1.7	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	2.0	U	1.9	U	1.7	U

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Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Grey shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September).

Acronyms/Abbreviations:
-- = not applicable
% = percent
AOPI = Area of Potential Interest
CAS = Chemical Abstracts Service number
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances

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.
J-	The result is an estimated quantity; the result may be biased low.
R	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Rejection of the data was decided by the project team and USACE chemist
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 imprecise.
BJ+	The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect and reported result may be biased high.

Appendix P
Site Inspection Laboratory Analytical Results - Soil
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	Area 2300 - Fire Equipment Testing Area		Area 2300 - Fire Equipment Testing Area		Area 2300 - Fire Equipment Testing Area		Area 900 - Fire Equipment Testing Area	
			Location	FGGM-2300A-1		FGGM-2300A-2		FGGM-2300A-2		FGGM-900A-1	
			Sample/Parent ID	FGGM-2300AREA-1-SO-(0-2)-082020		FGGM-2300AREA-2-SO-(0-2)-082020		FGGM-SO-DUP-01-(0-2)-082020 / FGGM-		FGGM-900AREA-1-SO-(0-2)-082120	
			Sample Date	08/20/2020		08/20/2020		08/20/2020		08/21/2020	
			Sample Type	N		N		FD		N	
			Matrix	Soil		Soil		Soil		Soil	
Analyte	CAS	OSD Risk Screening Level	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS											
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	mg/kg	0.0022	U	0.002	UJ	0.0021	U	0.0021	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	mg/kg	0.0033	U	0.0031	UJ	0.0031	U	0.0031	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	mg/kg	0.0022	U		R	0.0021	UJ	0.0021	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	mg/kg	0.0022	UJ		R		R	0.0021	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.9 (R) 25 (I/C)	mg/kg	0.0022	U	0.002	U	0.0021	U	0.0021	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	mg/kg	0.0022	U	0.002	U	0.0021	U	0.0021	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	0.00063	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	0.00063	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	0.00063	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	0.00063	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	0.00063	U
Perfluorononanoic acid (PFNA)	375-95-1	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	0.00063	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.13 (R) 1.6 (I/C)	mg/kg	**0.0022**		**0.00025**	J	0.00063	U	**0.0021**	
Perfluorooctanoic acid (PFOA)	335-67-1	0.13 (R) 1.6 (I/C)	mg/kg	0.00065	U	0.00061	U	**0.00021**	J	0.00063	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	**0.00021**	J
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	0.00063	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	0.00063	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	mg/kg	0.00065	U	0.00061	U	0.00063	U	0.00063	U
TOC											
Total Organic Carbon	--	--	mg/kg	**5730**	J-	**1750**	J-	**1770**	J-	**6450**	
Total Organic Carbon 1	--		mg/kg							**6450**	
Total Organic Carbon 2	--		mg/kg							**7830**	
Total Organic Carbon 3	--		mg/kg							**5980**	
Total Organic Carbon 4	--		mg/kg							**10500**	
Grain Size											
ARC-SIEVE 1.5, % passing	--	--	% passing							**100**	
ARC-SIEVE 3, % passing	--	--	% passing							**100**	
Clay	--	--	%							**8.5**	
Gravel	--	--	%							**19.3**	
HYDROMETER, READING 1	--	--	% passing							**20**	
HYDROMETER, READING 2	--	--	% passing							**17.5**	

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			AOPI	Area 2300 - Fire Equipment Testing Area		Area 2300 - Fire Equipment Testing Area		Area 2300 - Fire Equipment Testing Area		Area 900 - Fire Equipment Testing Area	
			Location	FGGM-2300A-1		FGGM-2300A-2		FGGM-2300A-2		FGGM-900A-1	
			Sample/Parent ID	FGGM-2300AREA-1-SO-(0-2)-082020		FGGM-2300AREA-2-SO-(0-2)-082020		FGGM-SO-DUP-01-(0-2)-082020 / FGGM-		FGGM-900AREA-1-SO-(0-2)-082120	
			Sample Date	08/20/2020		08/20/2020		08/20/2020		08/21/2020	
			Sample Type	N		N		FD		N	
			Matrix	Soil		Soil		Soil		Soil	
Analyte	CAS	OSD Risk Screening Level	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
HYDROMETER, READING 3	--	--	% passing							**14**	
HYDROMETER, READING 4	--	--	% passing							**8.5**	
HYDROMETER, READING 5	--	--	% passing							**5**	
HYDROMETER, READING 6	--	--	% passing							**3**	
Sand	--	--	%							**58.9**	
Sieve 19000 micron, % passing	--	--	% passing							**89.9**	
Sieve No. 100, % passing	--	--	% passing							**32.1**	
Sieve No. 16, % passing	--	--	% passing							**79**	
Sieve No. 200, % passing	--	--	% passing							**22**	
Sieve No. 30, % passing	--	--	% passing							**75.5**	
Sieve No. 4, % passing	--	--	% passing							**80.9**	
Sieve No. 50, % passing	--	--	% passing							**58.8**	
Sieve No. 6, % passing	--	--	% passing							**80.2**	
Sieve No. 8, % passing	--	--	% passing							**79.6**	
Silt	--	--	%							**13.5**	
General Chemistry											
pH	--	--	SU	**7.4**	J	**5.8**	J	**6**	J	**7.9**	J
Temperature	--	--	C	**20.4**		**20.6**		**20.7**		**19.6**	

Notes:

Qualifier

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.
R: The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and
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

Appendix P
Site Inspection Laboratory Analytical Results - Soil
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Fort George G. Meade, Maryland

			AOPI	Area 900 - Fire Equipment Testing Area		AOPI 11 - Buildings 3486 and 3488		AOPI 11 - Buildings 3486 and 3488		AOPI 11 - Buildings 3486 and 3488	
			Location	FGGM-900A-2		FGGM-B3486-1		FGGM-B3486-2		FGGM-B3486-3	
			Sample/Parent ID	FGGM-900AREA-2-SO-(0-2)-082120		FGGM-B3486-1-SO-(0-2)-082420		FGGM-B3486-2-SO-(0-2)-082420		FGGM-B3486-3-SO-(0-2)-082420	
			Sample Date	08/21/2020		08/24/2020		08/24/2020		08/24/2020	
			Sample Type	N		N		N		N	
			Matrix	Soil		Soil		Soil		Soil	
Analyte	CAS	OSD Risk Screening Level	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS											
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	mg/kg	0.0022	U	0.0023	U	0.0022	U	0.0027	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	mg/kg	0.0034	U	0.0035	U	0.0034	U	0.004	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	mg/kg	0.0022	UJ	0.0023	U	**0.00054**	J	0.0027	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	mg/kg	0.0022	UJ	0.0023	U	0.0022	U	0.0027	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.9 (R) 25 (I/C)	mg/kg	0.0022	U	0.0023	U	0.0022	U	0.0027	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	mg/kg	0.0022	U	0.0023	U	0.0022	U	0.0027	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	mg/kg	0.00067	U	0.0007	U	**0.0016**		0.0008	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	mg/kg	0.00067	U	0.0007	U	**0.0011**		0.0008	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	mg/kg	0.00067	U	0.0007	U	**0.00027**	J	0.0008	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	--	mg/kg	0.00067	U	0.0007	U	0.00067	U	0.0008	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	mg/kg	0.00067	U	0.0007	U	**0.00028**	J	**0.00037**	J
Perfluorononanoic acid (PFNA)	375-95-1	--	mg/kg	0.00067	U	0.0007	U	0.00067	U	0.0008	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.13 (R) 1.6 (I/C)	mg/kg	**0.00052**	J	**0.00071**		**0.013**		**0.0056**	
Perfluorooctanoic acid (PFOA)	335-67-1	0.13 (R) 1.6 (I/C)	mg/kg	0.00067	U	0.0007	U	**0.00048**	J	**0.00035**	J
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	mg/kg	0.00067	U	0.0007	U	**0.00049**	J	**0.00068**	J
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	mg/kg	0.00067	U	0.0007	U	0.00067	U	0.0008	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	mg/kg	0.00067	U	0.0007	U	0.00067	U	0.0008	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	mg/kg	0.00067	U	0.0007	U	0.00067	U	0.0008	U
TOC											
Total Organic Carbon	--	--	mg/kg			**27300**	J-				
Total Organic Carbon 1	--		mg/kg			**27300**					
Total Organic Carbon 2	--		mg/kg			**30300**					
Total Organic Carbon 3	--		mg/kg			**30200**					
Total Organic Carbon 4	--		mg/kg			**27400**					
Grain Size											
ARC-SIEVE 1.5, % passing	--	--	% passing			**100**					
ARC-SIEVE 3, % passing	--	--	% passing			**100**					
Clay	--	--	%			**3.5**					
Gravel	--	--	%			**8.5**					
HYDROMETER, READING 1	--	--	% passing			**13.5**					
HYDROMETER, READING 2	--	--	% passing			**11**					

			AOPI	Area 900 - Fire Equipment Testing Area		AOPI 11 - Buildings 3486 and 3488		AOPI 11 - Buildings 3486 and 3488		AOPI 11 - Buildings 3486 and 3488	
			Location	FGGM-900A-2		FGGM-B3486-1		FGGM-B3486-2		FGGM-B3486-3	
			Sample/Parent ID	FGGM-900AREA-2-SO-(0-2)-082120		FGGM-B3486-1-SO-(0-2)-082420		FGGM-B3486-2-SO-(0-2)-082420		FGGM-B3486-3-SO-(0-2)-082420	
			Sample Date	08/21/2020		08/24/2020		08/24/2020		08/24/2020	
			Sample Type	N		N		N		N	
			Matrix	Soil		Soil		Soil		Soil	
Analyte	CAS	OSD Risk Screening Level	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
HYDROMETER, READING 3	--	--	% passing			**6**					
HYDROMETER, READING 4	--	--	% passing			**3.5**					
HYDROMETER, READING 5	--	--	% passing			**2**					
HYDROMETER, READING 6	--	--	% passing			1	U				
Sand	--	--	%			**75.3**					
Sieve 19000 micron, % passing	--	--	% passing			**100**					
Sieve No. 100, % passing	--	--	% passing			**23.5**					
Sieve No. 16, % passing	--	--	% passing			**83.2**					
Sieve No. 200, % passing	--	--	% passing			**16.2**					
Sieve No. 30, % passing	--	--	% passing			**71.5**					
Sieve No. 4, % passing	--	--	% passing			**91.5**					
Sieve No. 50, % passing	--	--	% passing			**42.5**					
Sieve No. 6, % passing	--	--	% passing			**90.5**					
Sieve No. 8, % passing	--	--	% passing			**88.7**					
Silt	--	--	%			**12.7**					
General Chemistry											
pH	--	--	SU			**7.1**	J				
Temperature	--	--	C			**20.3**					

Notes:

Qualifier

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.
R: The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and
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

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Site Inspection Laboratory Analytical Results - Soil
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			AOPI	AOPI 4 - Building 4230 - Former Fire Station		AOPI 6 - Building 6619 – Current Fire Station		Parade Ground Area		Parade Ground Area	
			Location	FGGM-B4230-1		FGGM-B6619-1		FGGM-PGHL-1		FGGM-PGHL-2	
			Sample/Parent ID	FGGM-B4230-1-SO-(0-2)-082420		FGGM-B6619-SO-(0-2)-082420		FGGM-PGHL-1-SO-(0-2)-082120		FGGM-PGHL-2-SO-(0-2)-082120	
			Sample Date	08/24/2020		08/24/2020		08/21/2020		08/21/2020	
			Sample Type	N		N		N		N	
			Matrix	Soil		Soil		Soil		Soil	
Analyte	**CAS**	**OSD Risk Screening Level**	**Units**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS											
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	mg/kg	0.0022	U	0.0022	U	0.0023	U	0.002	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	mg/kg	0.0033	U	0.0033	U	0.0034	U	0.0031	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	mg/kg	0.0022	U	0.0022	U	0.0023	U	0.002	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	mg/kg	0.0022	U	0.0022	U	0.0023	U	0.002	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.9 (R) 25 (I/C)	mg/kg	0.0022	U	0.0022	U	0.0023	U	0.002	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	mg/kg	0.0022	U	0.0022	U	0.0023	U	0.002	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	mg/kg	0.00067	U	**0.0012**		0.00068	U	**0.0017**	
Perfluorododecanoic acid (PFDoA)	307-55-1	--	mg/kg	0.00067	U	0.00065	U	0.00068	U	**0.00074**	
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	mg/kg	0.00067	U	0.00065	U	0.00068	U	0.00061	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	--	mg/kg	**0.00027**	J	0.00065	U	0.00068	U	0.00061	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	mg/kg	0.00067	U	0.00065	U	0.00068	U	0.00061	U
Perfluorononanoic acid (PFNA)	375-95-1	--	mg/kg	0.00067	U	**0.00088**		0.00068	U	0.00061	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.13 (R) 1.6 (I/C)	mg/kg	**0.0014**		**0.00044**	J	**0.0003**	J	**0.0032**	
Perfluorooctanoic acid (PFOA)	335-67-1	0.13 (R) 1.6 (I/C)	mg/kg	0.00067	U	**0.00043**	J	0.00068	U	**0.00053**	J
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	mg/kg	0.00067	U	**0.00022**	J	0.00068	U	**0.00041**	J
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	mg/kg	0.00067	U	0.00065	U	0.00068	U	0.00061	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	mg/kg	0.00067	U	0.00065	U	0.00068	U	0.00061	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	mg/kg	0.00067	U	0.00065	U	0.00068	U	0.00061	U
TOC											
Total Organic Carbon	--	--	mg/kg	**9390**	J-	**17600**	J-	**4670**			
Total Organic Carbon 1	--		mg/kg	**9390**		**17600**		**4670**			
Total Organic Carbon 2	--		mg/kg	**10100**		**17900**		**3800**			
Total Organic Carbon 3	--		mg/kg	**10000**		**17800**		**4520**			
Total Organic Carbon 4	--		mg/kg	**9910**		**16000**		**3880**			
Grain Size											
ARC-SIEVE 1.5, % passing	--	--	% passing	**100**		**100**		**100**			
ARC-SIEVE 3, % passing	--	--	% passing	**100**		**100**		**100**			
Clay	--	--	%	**7.5**		**3**		**6**			
Gravel	--	--	%	**1.4**		**54.2**		**30.3**			
HYDROMETER, READING 1	--	--	% passing	**16.5**		**8**		**14.5**			
HYDROMETER, READING 2	--	--	% passing	**14.5**		**7**		**13**			

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			AOPI	AOPI 4 - Building 4230 - Former Fire Station		AOPI 6 - Building 6619 – Current Fire Station		Parade Ground Area		Parade Ground Area	
			Location	FGGM-B4230-1		FGGM-B6619-1		FGGM-PGHL-1		FGGM-PGHL-2	
			Sample/Parent ID	FGGM-B4230-1-SO-(0-2)-082420		FGGM-B6619-SO-(0-2)-082420		FGGM-PGHL-1-SO-(0-2)-082120		FGGM-PGHL-2-SO-(0-2)-082120	
			Sample Date	08/24/2020		08/24/2020		08/21/2020		08/21/2020	
			Sample Type	N		N		N		N	
			Matrix	Soil		Soil		Soil		Soil	
Analyte	**CAS**	**OSD Risk Screening Level**	**Units**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
HYDROMETER, READING 3	--	--	% passing	**11**		**5**		**10.5**			
HYDROMETER, READING 4	--	--	% passing	**7.5**		**3**		**6**			
HYDROMETER, READING 5	--	--	% passing	**5**		**1**		**5**			
HYDROMETER, READING 6	--	--	% passing	**4**		1	U	**4**			
Sand	--	--	%	**80.2**		**37.2**		**54.5**			
Sieve 19000 micron, % passing	--	--	% passing	**100**		**78.1**		**78.7**			
Sieve No. 100, % passing	--	--	% passing	**26.3**		**10.5**		**18.3**			
Sieve No. 16, % passing	--	--	% passing	**94.9**		**26.7**		**68.5**			
Sieve No. 200, % passing	--	--	% passing	**18.4**		**8.6**		**15.2**			
Sieve No. 30, % passing	--	--	% passing	**86.9**		**18.8**		**62.3**			
Sieve No. 4, % passing	--	--	% passing	**98.6**		**45.8**		**69.7**			
Sieve No. 50, % passing	--	--	% passing	**52.3**		**13.6**		**32.8**			
Sieve No. 6, % passing	--	--	% passing	**97.9**		**40.8**		**69.4**			
Sieve No. 8, % passing	--	--	% passing	**97.2**		**35.9**		**69**			
Silt	--	--	%	**10.9**		**5.6**		**9.2**			
General Chemistry											
pH	--	--	SU	**6.8**	J	**8.1**	J	**6**	J		
Temperature	--	--	C	**20.3**		**20.2**		**19.6**			

Notes:

Qualifier

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.
R: The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and
U: The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).
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			AOPI	Parade Ground Area		Railroad Avenue		AOPI 3 - Salt Dome		AOPI 3 - Salt Dome	
			Location	FGGM-PGHL-3		FGGM-RAIL_AVE-1		FGGM-Salt_Dome-1		FGGM-Salt_Dome-2	
			Sample/Parent ID	FGGM-PGHL-3-SO-(0-2)-082120		FGGM-RRA-1-SO-(0-2)-082020		FGGM-SALT-DOME-1-SO-(0-2)-082020		FGGM-SALT-DOME-2-SO-(0-2)-082020	
			Sample Date	08/21/2020		08/20/2020		08/20/2020		08/20/2020	
			Sample Type	N		N		N		N	
			Matrix	Soil		Soil		Soil		Soil	
Analyte	**CAS**	**OSD Risk Screening Level**	**Units**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS											
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	mg/kg	0.0022	U	0.0021	U	0.002	U	0.002	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	mg/kg	0.0032	U	0.0031	U	0.003	U	0.003	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	mg/kg	0.0022	U	0.0021	UJ	0.002	U	0.002	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	mg/kg	0.0022	UJ	0.0021	UJ	0.002	U	0.002	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.9 (R) 25 (I/C)	mg/kg	0.0022	U	0.0021	U	0.002	U	0.002	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	mg/kg	0.0022	U	0.0021	U	0.002	U	0.002	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	mg/kg	0.00065	U	0.00062	U	0.0006	U	0.00061	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	mg/kg	0.00065	U	0.00062	U	0.0006	U	0.00061	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	mg/kg	0.00065	U	0.00062	U	0.0006	U	0.00061	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	--	mg/kg	0.00065	U	0.00062	U	0.0006	U	0.00061	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	mg/kg	0.00065	U	**0.00021**	J	0.0006	U	0.00061	U
Perfluorononanoic acid (PFNA)	375-95-1	--	mg/kg	0.00065	U	0.00062	U	0.0006	U	0.00061	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.13 (R) 1.6 (I/C)	mg/kg	**0.00029**	J	**0.00048**	J	**0.00059**	J	0.00061	U
Perfluorooctanoic acid (PFOA)	335-67-1	0.13 (R) 1.6 (I/C)	mg/kg	0.00065	U	**0.00029**	J	0.0006	U	0.00061	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	mg/kg	0.00065	U	**0.00039**	J	0.0006	U	0.00061	U
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	mg/kg	0.00065	U	0.00062	U	0.0006	U	0.00061	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	mg/kg	0.00065	U	0.00062	U	0.0006	U	0.00061	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	mg/kg	0.00065	U	0.00062	U	0.0006	U	0.00061	U
TOC											
Total Organic Carbon	--	--	mg/kg			**46100**	J-	**304000**	J-	**14600**	J-
Total Organic Carbon 1	--		mg/kg								
Total Organic Carbon 2	--		mg/kg								
Total Organic Carbon 3	--		mg/kg								
Total Organic Carbon 4	--		mg/kg								
Grain Size											
ARC-SIEVE 1.5, % passing	--	--	% passing								
ARC-SIEVE 3, % passing	--	--	% passing								
Clay	--	--	%								
Gravel	--	--	%								
HYDROMETER, READING 1	--	--	% passing								
HYDROMETER, READING 2	--	--	% passing								

			AOPI	Parade Ground Area		Railroad Avenue		AOPI 3 - Salt Dome		AOPI 3 - Salt Dome	
			Location	FGGM-PGHL-3		FGGM-RAIL_AVE-1		FGGM-Salt_Dome-1		FGGM-Salt_Dome-2	
			Sample/Parent ID	FGGM-PGHL-3-SO-(0-2)-082120		FGGM-RRA-1-SO-(0-2)-082020		FGGM-SALT-DOME-1-SO-(0-2)-082020		FGGM-SALT-DOME-2-SO-(0-2)-082020	
			Sample Date	08/21/2020		08/20/2020		08/20/2020		08/20/2020	
			Sample Type	N		N		N		N	
			Matrix	Soil		Soil		Soil		Soil	
Analyte	CAS	OSD Risk Screening Level	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
HYDROMETER, READING 3	--	--	% passing								
HYDROMETER, READING 4	--	--	% passing								
HYDROMETER, READING 5	--	--	% passing								
HYDROMETER, READING 6	--	--	% passing								
Sand	--	--	%								
Sieve 19000 micron, % passing	--	--	% passing								
Sieve No. 100, % passing	--	--	% passing								
Sieve No. 16, % passing	--	--	% passing								
Sieve No. 200, % passing	--	--	% passing								
Sieve No. 30, % passing	--	--	% passing								
Sieve No. 4, % passing	--	--	% passing								
Sieve No. 50, % passing	--	--	% passing								
Sieve No. 6, % passing	--	--	% passing								
Sieve No. 8, % passing	--	--	% passing								
Silt	--	--	%								
General Chemistry											
pH	--	--	SU			**7.1**	J	**7.6**	J	**7.3**	J
Temperature	--	--	C			**20.4**		**20**		**20.2**	

Notes:

Qualifier

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.
R: The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and
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

Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection
2. All laboratory reported results in nanograms per gram (ng/g) were converted to milligrams per kilogram (mg/kg).
3. Data are compared to the 2021 Office of the Secretary of Defense (OSD) risk screening levels for the residential and commerical/industrial scenario, (OSD. 2021. Memorandum: Investigating Per and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program.September).
4. Grey shaded values indicate the result was detected greater than or equal to the OSD risk screening level for the residential scenario. Italicized values indicate the result was detected greater than the OSD risk screening level for the industrial/commercial and residential scenario.

Acronyms/Abbreviations:
-- = not applicable/not analyzed
% = percent
AOPI = Area of Potential Interest
CAS = Chemical Abstracts Service number
FD = field duplicate sample
I/C = industrial/commercial receptor scenario
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
R = residential receptor scenario

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 low.
R	The sample results (including non-detects) were affected by serious deficiencies in the ability to analyze the sample and to meet published method and project quality control criteria. The presence or absence of the analyte cannot be substantiated by the data provided. Rejection of the data was decided by the project team and USACE chemist.
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).
UJ	The analyte was analyzed for but was not detected. The limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise.

			AOPI	Area 2300 - Fire Equipment Testing Area		AOPI 6 - Building 6619 – Current Fire Station		AOPI 7 - Closed Sanitary Landfill Cell 1	
			Location	FGGM-2300A-1		FGGM-B6619-1		FGGM-CSL1-1	
			Sample/Parent ID	FGGM-2300AREA-1-SW-082020		FGGM-B6619-1-SW-082420		FGGM-CSL1-1-SW-082520	
			Sample Date	08/20/2020		08/24/2020		08/25/2020	
			Sample Type	N		N		N	
			Matrix	Surface Water		Surface Water		Surface Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.1	U	**23**		**2.3**	J
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.5	U	**18**		2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.5	U	2.5	U	2.5	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.6	U	1.7	U	1.7	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**2.1**		**1.1**	J	**18**	J-
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**9.5**		**18**		**12**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.6	U	1.7	U	**2.1**	
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.6	U		R	1.7	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**3.6**		**32**		**7.3**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**13**		**0.97**	J	**2.3**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**7.3**		**47**		**15**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**1.6**		**12**		**4.1**	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**30**		**5.4**		**18**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**13**		**31**		**17**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**4.7**		**45**		**13**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.6	U		R	1.7	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.6	U		R	1.7	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.6	U	1.7	UJ	1.7	U

Notes:

Qualifier

J: The analyte was positively identified; however the associated numerical value is an estimated concentration only
J-: The result is an estimated quantity; the result may be biased low.
U: The analyte was analyzed for but the result was not detected above 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 imprecise.

Appendix P
Site Inspection Laboratory Analytical Results - Surface Water
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	AOPI 7 - Closed Sanitary Landfill Cell 1		AOPI 8 - Closed Sanitary Landfill Cell 2		AOPI 9 - Closed Sanitary Landfill Cell 3	
			Location	FGGM-CSL1-1		FGGM-CSL2-1		FGGM-CSL3-1	
			Sample/Parent ID	FGGM-DUP-01-082520 / FGGM-CSL1-1-SW-082520		FGGM-CSL2-1-SW-082420		FGGM-CSL3-1-SW-082520	
			Sample Date	08/25/2020		08/24/2020		08/25/2020	
			Sample Type	FD		N		N	
			Matrix	Surface Water		Surface Water		Surface Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual	Result	Qual
PFAS									
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	**2.4**	J	4.1	U	4.1	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	**1.0**	J	2.5	U	2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.4	U	2.5	U	**0.56**	J
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.6	U	1.6	U	1.7	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**18**		**6.6**		**6.5**	J-
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**12**		**12**		**19**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.6	U	1.6	U	**1.6**	J
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.6	U	1.7	U	1.7	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**6.8**		**5.0**		**5.9**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**2.5**		**4.1**		**8.9**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**15**		**9.4**		**17**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**3.8**		**2.8**		**3.1**	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**18**		**18**		**79**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**16**		**13**		**24**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**13**		**9.1**		**9.6**	J-
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.6	U	1.7	UJ	1.7	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.6	U	1.7	U	1.7	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.6	U	1.7	U	1.7	U

Notes:

Qualifier

J: The analyte was positively identified; however the associated numerical value is an estimated concentration only
J-: The result is an estimated quantity; the result may be biased low.
U: The analyte was analyzed for but the result was not detected above 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 imprecise.

			AOPI	Railroad Avenue		AOPI 3 - Salt Dome	
			Location	FGGM-RAIL_AVE-1		FGGM-Salt_Dome-1	
			Sample/Parent ID	FGGM-RRA-1-SW-082020		FGGM-SALT-DOME-1-SW-082020	
			Sample Date	08/20/2020		08/20/2020	
			Sample Type	N		N	
			Matrix	Surface Water		Surface Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual
PFAS							
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	**110**		4.3	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	**50**		2.6	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.6	U	2.6	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.7	U	1.7	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**1.7**	J-	**3.3**	J-
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**360**		**5.9**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	**48**		1.7	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.7	UJ	1.7	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**530**		**2.2**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**1.7**		**5.1**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**590**		**3.2**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**160**		**1.8**	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**8.5**		**9.2**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**380**		**5.7**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**1300**		**2.7**	J-
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.7	U	1.7	UJ
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.7	UJ	1.7	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.7	UJ	1.7	U

Notes:

Qualifier

J: The analyte was positively identified; however the associated numerical value is an estimated concentration only
J-: The result is an estimated quantity; the result may be biased low.
U: The analyte was analyzed for but the result was not detected above 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 imprecise.

Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Grey shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September).

Acronyms/Abbreviations:
-- = not applicable
% = percent
AOPI = Area of Potential Interest
CAS = Chemical Abstracts Service number
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances

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 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 imprecise.

			AOPI	Area 2300 - Fire Equipment Testing Area		AOPI 11 - Buildings 3486 and 3488		AOPI 6 - Building 6619 – Current Fire Station		AOPI 7 - Closed Sanitary Landfill Cell 1	
			Location	FGGM-2300A-1		FGGM-B3486-1		FGGM-B6619-1		FGGM-CSL1-1	
			Sample/Parent ID	FGGM-2300AREA-1-SE-082020		FGGM-B3486-1-SE-082420		FGGM-B6619-1-SE-082420		FGGM-CSL1-1-SE-082520	
			Sample Date	08/20/2020		08/24/2020		08/24/2020		08/25/2020	
			Sample Type	N		N		N		N	
			Matrix	Sediment		Sediment		Sediment		Sediment	
Analyte	CAS	OSD Risk Screening Level	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS											
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	mg/kg	0.0025	U	0.0021	U	0.0027	U	0.0024	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	mg/kg	0.0038	U	0.0031	U	0.004	U	0.0036	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	mg/kg	0.0025	U	0.0021	U	0.0027	U	0.0024	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	mg/kg	0.0025	U	0.0021	U	0.0027	U	0.0024	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.9 (R) 25 (I/C)	mg/kg	0.0025	U	0.0021	U	0.0027	U	0.0024	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	mg/kg	0.0025	U	0.0021	U	0.0027	U	0.0024	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	mg/kg	0.00076	U	0.00062	U	0.0008	U	0.00071	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	mg/kg	0.00076	U	0.00062	U	0.0008	U	0.00071	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	mg/kg	0.00076	U	0.00062	U	0.0008	U	0.00071	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	--	mg/kg	0.00076	U	0.00062	U	0.0008	U	0.00071	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	mg/kg	0.00076	U	0.00062	U	0.0008	U	**0.0003**	J
Perfluorononanoic acid (PFNA)	375-95-1	--	mg/kg	0.00076	U	0.00062	U	0.0008	U	0.00071	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.13 (R) 1.6 (I/C)	mg/kg	**0.00048**	J	0.00062	U	**0.00062**	J	**0.00098**	
Perfluorooctanoic acid (PFOA)	335-67-1	0.13 (R) 1.6 (I/C)	mg/kg	0.00076	U	0.00062	U	0.0008	U	0.00071	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	mg/kg	**0.00025**	J	0.00062	U	0.0008	U	0.00071	U
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	mg/kg	0.00076	U	0.00062	U	0.0008	U	0.00071	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	mg/kg	0.00076	U	0.00062	U	0.0008	U	0.00071	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	mg/kg	0.00076	U	0.00062	U	0.0008	U	0.00071	U
TOC											
Total Organic Carbon	--	--	mg/kg	**4580**							
General Chemistry											
pH	--	--	SU	**7.3**	J						
Temperature	--	--	C	**20.6**							

Notes:

Qualifier

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

Appendix P
Site Inspection Laboratory Analytical Results - Sediment
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	AOPI 8 - Closed Sanitary Landfill Cell 2		AOPI 8 - Closed Sanitary Landfill Cell 2		AOPI 9 - Closed Sanitary Landfill Cell 3		Railroad Avenue	
			Location	FGGM-CSL2-1		FGGM-CSL2-1		FGGM-CSL3-1		FGGM-RAIL_AVE-1	
			Sample/Parent ID	FGGM-CSL2-1-SE-082420		FGGM-SE-DUP-01-082420 / FGGM-CSL2-1-SE-082420		FGGM-CSL3-1-SE-082520		FGGM-RRA-1-SE-082020	
			Sample Date	08/24/2020		08/24/2020		08/25/2020		08/20/2020	
			Sample Type	N		FD		N		N	
			Matrix	Sediment		Sediment		Sediment		Sediment	
Analyte	CAS	OSD Risk Screening Level	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS											
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	mg/kg	0.0025	U	0.0023	U	0.0035	U	**0.0012**	J
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	mg/kg	0.0038	U	0.0035	U	0.0053	U	**0.0074**	
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	mg/kg	0.0025	U	0.0023	U	0.0035	U	0.0029	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	mg/kg	0.0025	U	0.0023	U	0.0035	U	0.0029	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.9 (R) 25 (I/C)	mg/kg	0.0025	U	0.0023	U	0.0035	U	0.0029	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	mg/kg	0.0025	U	0.0023	U	0.0035	U	**0.0016**	J
Perfluorodecanoic acid (PFDA)	335-76-2	--	mg/kg	0.00076	U	0.00069	U	0.0011	U	**0.0084**	
Perfluorododecanoic acid (PFDoA)	307-55-1	--	mg/kg	0.00076	U	0.00069	U	0.0011	U	**0.0024**	
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	mg/kg	0.00076	U	0.00069	U	0.0011	U	**0.0036**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	--	mg/kg	0.00076	U	0.00069	U	0.0011	U	0.00088	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	mg/kg	0.00076	U	0.00069	U	0.0011	U	**0.0027**	
Perfluorononanoic acid (PFNA)	375-95-1	--	mg/kg	0.00076	U	0.00069	U	0.0011	U	**0.004**	
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.13 (R) 1.6 (I/C)	mg/kg	**0.00093**		**0.0019**		**0.002**		**0.0012**	
Perfluorooctanoic acid (PFOA)	335-67-1	0.13 (R) 1.6 (I/C)	mg/kg	0.00076	U	0.00069	U	0.0011	U	**0.0037**	
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	mg/kg	**0.00025**	J	0.00069	U	0.0011	U	**0.0055**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	mg/kg	0.00076	U	0.00069	U	0.0011	U	0.00088	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	mg/kg	0.00076	U	0.00069	U	0.0011	U	0.00088	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	mg/kg	0.00076	U	0.00069	U	0.0011	U	0.00088	U
TOC											
Total Organic Carbon	--	--	mg/kg							**26200**	
General Chemistry											
pH	--	--	SU			p				**7.8**	J
Temperature	--	--	C							**20.8**	

Notes:
Qualifier

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U: The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).

Appendix P
Site Inspection Laboratory Analytical Results - Sediment
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	AOPI 3 - Salt Dome	
			Location	FGGM-Salt_Dome-1	
			Sample/Parent ID	FGGM-SALT-DOME-1-SE-082020	
			Sample Date	08/20/2020	
			Sample Type	N	
			Matrix	Sediment	
Analyte	**CAS**	**OSD Risk Screening Level**	**Units**	**Result**	**Qual**
PFAS					
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	--	mg/kg	0.0031	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	--	mg/kg	0.0046	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	--	mg/kg	0.0031	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	--	mg/kg	0.0031	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	1.9 (R) 25 (I/C)	mg/kg	0.0031	U
Perfluorobutanoic acid (PFBA)	375-22-4	--	mg/kg	0.0031	U
Perfluorodecanoic acid (PFDA)	335-76-2	--	mg/kg	0.00092	U
Perfluorododecanoic acid (PFDoA)	307-55-1	--	mg/kg	0.00092	U
Perfluoroheptanoic acid (PFHpA)	375-85-9	--	mg/kg	0.00092	U
Perfluorohexane sulfonic acid (PFHxS)	355-46-4	--	mg/kg	0.00092	U
Perfluorohexanoic acid (PFHxA)	307-24-4	--	mg/kg	0.00092	U
Perfluorononanoic acid (PFNA)	375-95-1	--	mg/kg	0.00092	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	0.13 (R) 1.6 (I/C)	mg/kg	**0.00035**	J
Perfluorooctanoic acid (PFOA)	335-67-1	0.13 (R) 1.6 (I/C)	mg/kg	0.00092	U
Perfluoropentanoic acid (PFPeA)	2706-90-3	--	mg/kg	0.00092	U
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	--	mg/kg	0.00092	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	--	mg/kg	0.00092	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8	--	mg/kg	0.00092	U
TOC					
Total Organic Carbon	--	--	mg/kg	**64300**	
General Chemistry					
pH	--	--	SU	**6.7**	J
Temperature	--	--	C	**21**	

Notes:
Qualifier

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

Appendix P
Site Inspection Laboratory Analytical Results - Sediment
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection
2. All laboratory reported results in nanograms per gram (ng/g) were converted to milligrams per kilogram (mg/kg).
3. Data are compared to the 2021 Office of the Secretary of Defense (OSD) risk screening levels for the residential and commerical/industrial scenario, (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program.September).
4. Grey shaded values indicate the result was detected greater than or equal to the OSD risk screening level for the residential scenario. Italicized values indicate the result was detected greater than the OSD risk screening level for the industrial/commercial and residential scenario.

Acronyms/Abbreviations:
-- = not applicable/not analyzed
% = percent
AOPI = Area of Potential Interest
CAS = Chemical Abstracts Service number
FD = field duplicate sample
I/C = industrial/commercial receptor scenario
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
R = residential receptor scenario

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).

Appendix P
Site Inspection Laboratory Analytical Results - Off Post Groundwater
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	Off Post Wells		Off Post Wells	
			Location	FGGM-MW-105		FGGM-MW-106	
			Sample/Parent ID	MW-105(122920)		MW-106(122920)	
			Sample Date	12/29/2020		12/29/2020	
			Sample Type	N		N	
			Matrix	Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual
PFAS							
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.1	U	4.1	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.5	U	2.4	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.5	U	2.4	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.6	U	1.6	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**2.5**		**2.9**	
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**4.1**	J	**5.7**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.6	U	1.6	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.6	U	1.6	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**1.4**	J	**2.6**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**1.8**		**3.5**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**1.6**		**4.9**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	1.6	U	1.6	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**0.50**	J	1.6	U
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**4.1**		**5.5**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**1.4**	J	**3.4**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.6	U	1.6	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.6	U	1.6	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.6	U	1.6	U

Notes:
Qualifier

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

Appendix P
Site Inspection Laboratory Analytical Results - Off Post Groundwater
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	Off Post Wells		Off Post Wells	
			Location	FGGM-MW-106		FGGM-MW-107	
			Sample/Parent ID	DUP-01(122920) / MW-106(122920)		MW-107(122920)	
			Sample Date	12/29/2020		12/29/2020	
			Sample Type	FD		N	
			Matrix	Ground Water		Ground Water	
Analyte	**CAS**	**OSD Tapwater**	**Units**	**Result**	**Qual**	**Result**	**Qual**
PFAS							
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	4.4	U	**53**	
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.6	U	2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.6	U	2.5	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.8	U	1.7	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	**3.1**	J-	**1.7**	J
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**6.3**		**18**	
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.8	U	1.7	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.8	U	1.7	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**3.3**		**12**	
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**3.7**		**4.9**	
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**4.4**		**50**	
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	1.8	U	**0.97**	J
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**0.52**	J	**4.8**	
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**6.0**		**4.6**	
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**3.8**		**81**	
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.8	U	1.7	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.8	U	1.7	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.8	U	1.7	U

Notes:
Qualifier

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

Appendix P
Site Inspection Laboratory Analytical Results - Off Post Groundwater
USAEC PFAS Preliminary Assessment/Site Inspection
Fort George G. Meade, Maryland

			AOPI	Off Post Wells		Off Post Wells	
			Location	FGGM-MW-116D		FGGM-OU4-MW39	
			Sample/Parent ID	MW116D(122920)		OU4MW39(122920)	
			Sample Date	12/29/2020		12/29/2020	
			Sample Type	N		N	
			Matrix	Ground Water		Ground Water	
Analyte	CAS	OSD Tapwater	Units	Result	Qual	Result	Qual
PFAS							
6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2		ng/L	**4.6**		4.2	U
8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4		ng/L	2.5	U	2.5	U
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6		ng/L	2.5	U	2.5	U
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9		ng/L	1.7	U	1.7	U
Perfluorobutane sulfonic acid (PFBS)	375-73-5	600	ng/L	1.7	U	1.7	U
Perfluorobutanoic acid (PFBA)	375-22-4		ng/L	**1.8**	J	**4.2**	J
Perfluorodecanoic acid (PFDA)	335-76-2		ng/L	1.7	U	1.7	U
Perfluorododecanoic acid (PFDoA)	307-55-1		ng/L	1.7	U	1.7	U
Perfluoroheptanoic acid (PFHpA)	375-85-9		ng/L	**0.69**	J	**1.7**	J
Perfluorohexane sulfonic acid (PFHxS)	355-46-4		ng/L	**2.6**		1.7	U
Perfluorohexanoic acid (PFHxA)	307-24-4		ng/L	**1.4**	J	**1.3**	J
Perfluorononanoic acid (PFNA)	375-95-1		ng/L	**1.7**	J	1.7	U
Perfluorooctane sulfonic acid (PFOS)	1763-23-1	40	ng/L	**4.8**		**1.4**	J
Perfluorooctanoic acid (PFOA)	335-67-1	40	ng/L	**0.75**	J	**0.85**	J
Perfluoropentanoic acid (PFPeA)	2706-90-3		ng/L	**1.9**		**1.3**	J
Perfluorotetradecanoic acid (PFTeDA)	376-06-7		ng/L	1.7	U	1.7	U
Perfluorotridecanoic acid (PFTrDA)	72629-94-8		ng/L	1.7	U	1.7	U
Perfluoroundecanoic acid (PFUdA)	2058-94-8		ng/L	1.7	U	1.7	U

Notes:
Qualifier

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

Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Grey shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels, (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September).

Acronyms/Abbreviations:
-- = not applicable
% = percent
AOPI = Area of Potential Interest
CAS = Chemical Abstracts Service number
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances

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 low.
U	The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).

				SampleID	FGGM-EB-1-081920		FGGM-EB-2-082020		FGGM-EB-5-082020		FGGM-EB-4-082120		FGGM-EB-3-082120	
				Sample Date	08/19/2020		08/20/2020		08/20/2020		08/21/2020		08/21/2020	
				Sample Type	Equipment Blank		Equipment Blank		Equipment Blank		Equipment Blank		Equipment Blank	
				Equipment Type										
	Analyte	CAS	Units	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS	6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	ng/L	4.2	U	4.1	U	4.1	U	4.3	U	4.3	U
	8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	ng/L	2.5	U	2.5	U	2.5	U	2.6	U	2.6	U
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	ng/L	2.5	U	2.5	U	2.5	U	2.6	U	2.6	U
	N-Methylperfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorobutane sulfonic acid (PFBS)	375-73-5	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorobutanoic acid (PFBA)	375-22-4	ng/L	4.2	U	4.1	U	4.1	U	4.3	U	4.3	U
	Perfluorodecanoic acid (PFDA)	335-76-2	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorododecanoic acid (PFDoA)	307-55-1	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorohexanoic acid (PFHxA)	307-24-4	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorononanoic acid (PFNA)	375-95-1	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorooctanoic acid (PFOA)	335-67-1	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluoropentanoic acid (PFPeA)	2706-90-3	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluorotridecanoic acid (PFTrDA)	72629-94-8	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U
	Perfluoroundecanoic acid (PFUdA)	2058-94-8	ng/L	1.7	U	1.6	U	1.7	U	1.7	U	1.7	U

				SampleID	FGGM-EB-6-082620		EB-01(122920)		FGGM-AOPI2-FB-081820		FGGM-AOPI7-FB-081820		FGGM-AOPI6-FB-081920	
				Sample Date	08/26/2020		12/29/2020		08/18/2020		08/18/2020		08/19/2020	
				Sample Type	Equipment Blank		Equipment Blank		Field Blank		Field Blank		Field Blank	
				Equipment Type										
	Analyte	CAS	Units		Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS	6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	ng/L		4.3	U	4.3	U	4.3	U	4.3	U	4.5	U
	8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	ng/L		2.6	U	2.6	U	2.6	U	2.6	U	2.7	U
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	ng/L		2.6	U	2.6	U	2.6	U	2.6	U	2.7	U
	N-Methylperfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluorobutane sulfonic acid (PFBS)	375-73-5	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluorobutanoic acid (PFBA)	375-22-4	ng/L		4.3	U	4.3	U	4.3	U	4.3	U	4.5	U
	Perfluorodecanoic acid (PFDA)	335-76-2	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluorododecanoic acid (PFDoA)	307-55-1	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	**0.83**	J
	Perfluorohexanoic acid (PFHxA)	307-24-4	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluorononanoic acid (PFNA)	375-95-1	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	**18**	
	Perfluorooctanoic acid (PFOA)	335-67-1	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluoropentanoic acid (PFPeA)	2706-90-3	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluorotridecanoic acid (PFTrDA)	72629-94-8	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
	Perfluoroundecanoic acid (PFUdA)	2058-94-8	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.8	U

				SampleID	FGGM-AOPI4-FB-081920		FGGM-AOPI11-FB-081920		FGGM-AOPI13-FB-082020		FGGM-AOPI10-FB-082120		FGGM-AOP17-FB-082620	
				Sample Date	08/19/2020		08/19/2020		08/20/2020		08/21/2020		08/26/2020	
				Sample Type	Field Blank		Field Blank		Field Blank		Field Blank		Field Blank	
				Equipment Type										
	Analyte	CAS	Units		Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS	6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	ng/L		4.3	U	4.2	U	4.2	U	4.1	U	4.1	U
	8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	ng/L		2.6	U	2.5	U	2.5	U	2.5	U	2.4	U
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	ng/L		2.6	U	2.5	U	2.5	U	2.5	U	2.4	U
	N-Methylperfluorooctane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorobutane sulfonic acid (PFBS)	375-73-5	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorobutanoic acid (PFBA)	375-22-4	ng/L		4.3	U	4.2	U	4.2	U	4.1	U	4.1	U
	Perfluorodecanoic acid (PFDA)	335-76-2	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorododecanoic acid (PFDoA)	307-55-1	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorohexanoic acid (PFHxA)	307-24-4	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorononanoic acid (PFNA)	375-95-1	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorooctanoic acid (PFOA)	335-67-1	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluoropentanoic acid (PFPeA)	2706-90-3	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluorotridecanoic acid (PFTrDA)	72629-94-8	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U
	Perfluoroundecanoic acid (PFUdA)	2058-94-8	ng/L		1.7	U	1.7	U	1.7	U	1.7	U	1.6	U

				SampleID	FB-01(122920)		FGGM-SB-1-082020		FGGM-SB-2-082120	
				Sample Date	12/29/2020		08/20/2020		08/21/2020	
				Sample Type	Field Blank		Source Blank		Source Blank	
				Equipment Type						
	Analyte	CAS	Units	Result	Qual	Result	Qual	Result	Qual
PFAS	6:2 Fluorotelomer sulfonic acid (6:2 FTSA)	27619-97-2	ng/L	4.1	U	4.8	U	4.2	U
	8:2 Fluorotelomer sulfonic acid (8:2 FTSA)	39108-34-4	ng/L	2.4	U	2.9	U	2.5	U
	N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	2991-50-6	ng/L	2.4	U	2.9	U	2.5	U
	N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	2355-31-9	ng/L	1.6	U	1.9	U	1.7	U
	Perfluorobutane sulfonic acid (PFBS)	375-73-5	ng/L	1.6	U	1.9	U	1.7	U
	Perfluorobutanoic acid (PFBA)	375-22-4	ng/L	4.1	U	4.8	U	4.2	U
	Perfluorodecanoic acid (PFDA)	335-76-2	ng/L	1.6	U	1.9	U	1.7	U
	Perfluorododecanoic acid (PFDoA)	307-55-1	ng/L	1.6	U	1.9	U	1.7	U
	Perfluoroheptanoic acid (PFHpA)	375-85-9	ng/L	1.6	U	**0.59**	J	1.7	U
	Perfluorohexane sulfonic acid (PFHxS)	355-46-4	ng/L	1.6	U	1.9	U	1.7	U
	Perfluorohexanoic acid (PFHxA)	307-24-4	ng/L	1.6	U	**1.1**	J	**1.1**	J
	Perfluorononanoic acid (PFNA)	375-95-1	ng/L	1.6	U	1.9	U	1.7	U
	Perfluorooctane sulfonic acid (PFOS)	1763-23-1	ng/L	1.6	U	1.9	U	1.7	U
	Perfluorooctanoic acid (PFOA)	335-67-1	ng/L	1.6	U	**1.5**	J	**1.4**	J
	Perfluoropentanoic acid (PFPeA)	2706-90-3	ng/L	1.6	U	**2.1**		**1.8**	
	Perfluorotetradecanoic acid (PFTeA)	376-06-7	ng/L	1.6	U	1.9	U	1.7	UJ
	Perfluorotridecanoic acid (PFTrDA)	72629-94-8	ng/L	1.6	U	1.9	U	1.7	U
	Perfluoroundecanoic acid (PFUdA)	2058-94-8	ng/L	1.6	U	1.9	U	1.7	U

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

Acronyms/Abbreviations:
-- = not applicable
% = percent
CAS = Chemical Abstracts Service number
HDPE = high-density polyethylene
ID = identification
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances

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 method detection limit.
UJ	The analyte was analyzed for but was not detected. The reported reporting limit (RL) is approximate and may be inaccurate or imprecise.