FINAL
Preliminary Assessment Report
Former PR Nike Battery 99
North Smithfield, Rhode Island

Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

February 2020

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Table of Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
°F	degrees Fahrenheit
FTA	fire training area
HA	Health Advisory
IED	Installations & Environment Division
ITRC	Interstate Technology Regulatory Council
L&RR	Landfill & Resource Recovery, Inc
msl	mean sea level
ng/l	nanograms per liter
NPL	National Priorities List
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
ppt	parts per trillion
PR	Providence Defense Area
RIANG	Rhode Island Air National Guard
RIARNG	Rhode Island Army National Guard
RIDEM	Rhode Island Department of Environmental Management
ROD	Record of Decision
SDS	Safety Data Sheet
SI	Site Inspection
UCMR 3	Unregulated Contaminant Monitoring Rule 3
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

Executive Summary

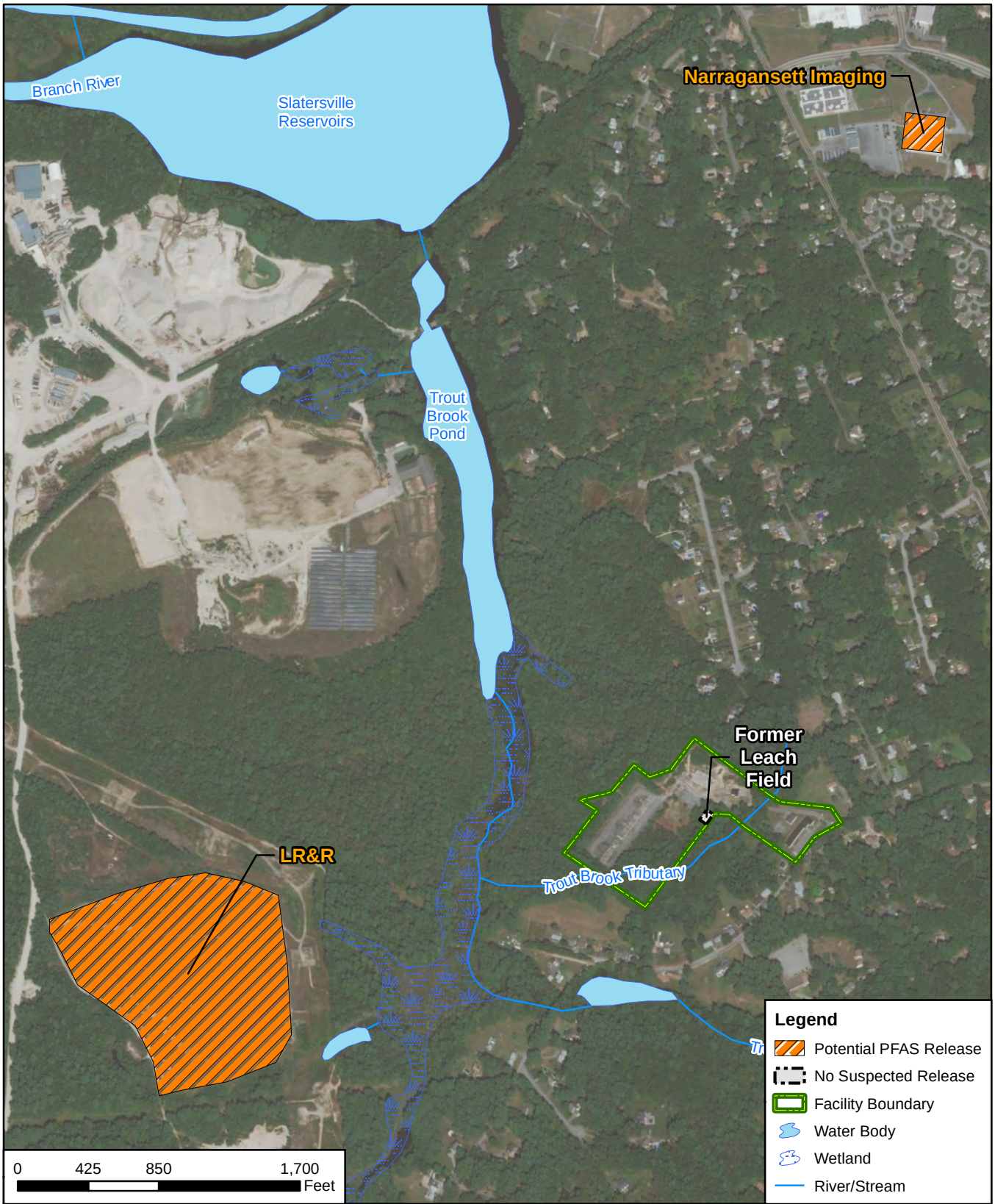
The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division (IED), Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide*. The ARNG is assessing potential effects on human health related to processes at facilities that used per- and polyfluoroalkyl substances (PFAS), primarily in the form of aqueous film forming foam (AFFF) released as part of firefighting activities, although other PFAS sources are possible.

AECOM completed a PA for PFAS at the Former Providence Defense Area (PR) Nike Battery 99 (referred to as the "Site") in North Smithfield, Rhode Island to assess potential PFAS release areas and exposure pathways to receptors. The Former PR Nike Battery 99 is constructed on several parcels of land that have been continuously operated by the US Army, Rhode Island Air National Guard, and Rhode Island ARNG (RIARNG) since 1956. The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit 25 September 2019
- Interviewed current RIARNG personnel
- Completed visual site inspections (VSI) at known or suspected potential PFAS release locations and documented with photographs

Based on a review of the USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR 3) data, the nearest municipal drinking water supply that sampled for PFAS was in the Town of Cumberland, but no PFAS were detected above the USEPA Lifetime Health Advisory (HA).

Based on a review performed by the USACE, it was determined that the operational history of Nike facilities did not coincide with the widespread distribution of AFFF for fire training or fire suppression systems (USACE, 2019). Furthermore, no conclusive evidence of a release of PFAS-containing materials at the Former PR Nike Battery 99 were found during the document review performed as part of this PA. As a result, there is no potential for exposure to PFAS contamination in media at or near the Site, and no Area of Interests were identified during the PA. The Former PR Nike Battery 99 will not move forward in the CERCLA process.



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Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	12/2/2019

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Summary of Findings

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Figure ES-1

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1. Introduction

1.1 Authority and Purpose

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division (IED), Cleanup Branch contracted AECOM Technical Services (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide* under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017. The ARNG is assessing potential effects on human health related to processes at facilities that used per- and polyfluoroalkyl substances (PFAS), primarily in the form of aqueous film forming foam (AFFF) released as part of firefighting activities, although other PFAS sources are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. PFAS formulations contain highly diverse mixtures of compounds. Thus, the fate of PFAS compounds in the environment varies. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued a Drinking Water Lifetime Health Advisory (HA) for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water. In the absence of federal maximum contaminant levels, some states have adopted their own drinking water standards for PFAS. As of 2017, the Rhode Island Department of Environmental Management (RIDEM) has established groundwater quality standards for PFOA, PFOS, or a combination of PFOA and PFOS of 70 parts per trillion (ppt) (RIDEM, 2017).

This report presents the findings of a PA for PFAS at the Former Providence Defense Area (PR) Nike Battery 99 (Site) in North Smithfield, Rhode Island, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; USEPA, 1980), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300; USEPA, 1994), and USACE requirements and guidance.

This PA documents the known locations where PFAS may have been released into the environment at the Former PR Nike Battery 99. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components of AFFF.

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit 25 September 2019
- Interviewed current Rhode Island ARNG (RIARNG) personnel
- Completed visual site inspections at known or suspected potential PFAS release locations and documented with photographs
- Developed a preliminary conceptual site model (CSM) to outline the potential release and pathway of PFAS for the Area of Interest (AOI) and the Site

1.3 Report Organization

This report has been prepared in accordance with the USEPA *Guidance for Performing Preliminary Assessments under CERCLA* (USEPA, 1991). The report sections and descriptions of each are:

- **Section 1** – **Introduction:** identifies the project purpose and authority and describes the Site location, environmental setting, and methods used to complete the PA
- **Section 2** – **Fire Training Areas:** describes the fire training areas (FTAs) at the Site identified during the site visit
- **Section 3** – **Non-Fire Training Areas:** describes other locations of potential PFAS releases at the Site identified during the site visit
- **Section 4** – **Emergency Response Areas:** describes areas of potential PFAS release at the Site, specifically in response to emergency situations
- **Section 5** – **Adjacent Sources:** describes sources of potential PFAS release adjacent to the Site that are not under the control of ARNG
- **Section 6** – **Preliminary Conceptual Site Model:** describes the pathways of PFAS transport and receptors for the AOI(s) and the Site
- **Section 7** –**Conclusions:** summarizes the data findings and presents the conclusions of the PA
- **Section 8** – **References:** provides the references used to develop this document
- **Appendix A** – Data Resources
- **Appendix B** – Preliminary Assessment Documentation
- **Appendix C** – Photographic Log

1.4 Site Location and Description

The Former PR Nike Battery 99 is located in Providence County, approximately 2 miles southeast of Slatersville, Rhode Island and approximately 14 miles northwest of Providence, Rhode Island (**Figure 1-1**). The Site is bounded by Black Plain Hill to the southeast and Ridge Hill to the southwest. Trout Brook and Trout Brook Pond extend to the west and northwest. The Site is accessible from Pound Hill Road.

The Former PR Nike Battery 99 is located on a several parcels of land, totaling 23.9 acres, that have been continuously operated by the US Army, Rhode Island Air National Guard (RIANG), and RIARNG since 1956 (**Appendix A**). From 1956 to July 1971, the Site was the property of the US Army and used as one of five Nike missile launch sites located within the State of Rhode Island (RAI, 1992). During this time, the Site contained three missile launch pads capable of launching Nike Ajax and Hercules missiles as part of a nationwide surface-to-air defense system (USAEHA, 1994). The Site also maintained quarters, a mess hall, and recreational facilities supporting both the launch and control areas, as well as a maintenance/generator shop, paint shed, missile fueling area, and missile/warhead assembly and testing buildings to support the operation of the missile site.

In 1971, the launch area was deactivated and leased by the US Army to the RIANG (**Appendix A**). Although Former PR Nike Battery 99 was licensed for RIANG use, the RIARNG occupied the Site and used it for vehicle/equipment storage and as a maintenance area. In 1976, the RIANG consolidated their operations to the control area of Former PR Nike Battery 99 (located

approximately 0.80 miles to the south), and the RIARNG obtained the license for use of the Site. The RIARNG has continually occupied the Site since 1978 as a readiness center for administration and training of a field artillery unit and more recently for storing military vehicles, equipment, and civil defense equipment (APHC, 2019).

1.5 Site Environmental Setting

The Site is characteristic of a northern Rhode Island setting with gentle hills and valleys. The topography across the Site slopes from east to west, towards the Trout Brook Pond and the surrounding wetlands (EA Engineering, 2010). Ground surface elevations ranges from 250 to 305 feet above mean sea level (msl). The surrounding area is hummocky with several wetland features in the valleys between the various named hills. A tributary to Trout Brook originates east of the Site and flows between the administration area (i.e.: barracks, mess hall) and the former operations areas (i.e.: launch pad, maintenance area). State-identified wetlands are located along the course of the tributary and against the southern and western edge of the property boundary (APHC, 2019).

1.5.1 Geology

The bedrock geology beneath the Site is composed of the Esmond Igneous Suite and the Blackstone Group (**Figure 1-2**). The Esmond Igneous Suite is predominantly a granite unit composed of gray, tan, greenish, or pale-pink medium to coarse-grained equigranular rock; it is late-Proterozoic in age and contains microcline, perthite, plagioclase, quartz, and other accessory minerals (EA Engineering, 2010). The Esmond Suite is principally massive but has been found to be foliated and lineated in places. The Blackstone Group in the area of the Site is a quartzite unit that contains gray, medium-grained, massive to thinly-bedded quartzite. This region of the Blackstone Group is Proterozoic in age and is often tectonically interleaved with other units of the Blackstone Group (EA Engineering, 2010). The top of bedrock is composed of highly weathered bedrock and ranges in thickness from 10 to 20 feet. The depth to competent bedrock ranges between 25 to 60 feet below ground surface (bgs).

The surficial geology above the bedrock is dominated by recessional glacial processes. The majority of the Former PR Nike Battery 99 is mapped as kame terrace deposits (EA Engineering, 2010). These deposits are well-sorted sand and pebble to cobble sized gravel. The glacial deposits range in thickness from 15 to 40 feet before transitioning to weathered bedrock. Typically, these unconsolidated materials are yellowish brown and have moderately rapid to rapid permeability (APHC, 2019).

1.5.2 Hydrogeology

The subsurface underlying the Site can be divided into three hydrogeologic water bearing units (USAEHA, 1994). The most superficial of these units is found within the unconsolidated glacial deposits. This unit is unconfined and can be found as shallow as three feet bgs (especially in close proximity to the surrounding wetlands). The saturated thickness of the aquifer can extend the entire length of the unconsolidated unit. Groundwater flow direction within this unit generally is largely influenced by Trout Brook and the surrounding wetlands to the west (**Figure 1-2**). As a result, groundwater flows east to west across the Site (EA Engineering, 2010; APHC, 2019).

The weathered bedrock unit beneath the unconfined overburden provides a thin water-bearing unit surrounding the Site (RAI, 1992). Groundwater flow direction is likely in the same direction as the overburden aquifer above.

Groundwater is also found within the fractures of the competent bedrock of the Esmond Igneous Suite and Blackstone Group (**Section 1.5.1**). The fracture density and width within this water

bearing unit decreases and become very sparse at 200 feet and below (USAEHA, 1994). Groundwater flow within this unit is west-southwest toward Trout Brook. The groundwater features of the Site and surrounding area are shown in **Figure 1-2**.

An evaluation of the water use surrounding the Site indicated one private water supply well exists within a 1-mile radius of the Site and is located upgradient (**Appendix A**). There is no public water supply in the area, and private wells likely exist at the surrounding residential properties; however, specific records or information regarding additional water supply wells were not found during the PA. Additional monitoring wells were identified in the federal well database but were not determined to be drinking water supply wells. Potable water for the Site is provided by an onsite water supply well located on the extreme upgradient (eastern) side. The water supply well is approximately 260 feet deep and obtains water solely from the bedrock aquifer (Weston, 1998). Currently, there is no power supplied to the pump within the well.

PFAS sampling from this water supply well was performed under the direction of the ARNG in April 2017 to assess the potential presence of PFAS in this drinking water source. A bailer sample was collected and analyzed using USEPA Method 537 Modified. Results are provided in the table below (**Table 1-1**). A total of 18 PFAS compounds were sampled, and 10 PFAS compounds had detections. The highest detections were for PFOA and PFOS (4.62 J nanograms per liter [ng/L] and 4.05 J ng/L, respectively), but were below the USEPA and RIDEM groundwater quality standards of 70 ng/L.

Table 1-1: April 2017 ARNG PFAS Drinking Water Sampling Results

Analyte	Result (ng/L)
6:2FTS	9.02 U
8:2FTS	9.02 U
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	13.5 U
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	13.5 U
Perfluorooctanoic acid (PFOA)	4.65 J M
Perfluorobutanesulfonic acid (PFBS)	3.03 J M
Perfluorobutanoic acid (PFBA)	1.35 J
Perfluorodecanoic acid (PFDA)	0.902 U
Perfluorododecanoic acid (PFDoA)	1.8 U
Perfluoroheptanoic acid (PFHpA)	3.27 J
Perfluorohexanesulfonic acid (PFHxS)	2.36 J
Perfluorohexanoic acid (PFHxA)	2.49 J M
Perfluorononanoic acid (PFNA)	1.8 U
Perfluorooctanesulfonic acid (PFOS)	4.05 J M
Perfluoropentanoic acid (PFPeA)	2.7 J M
Perfluorotetradecanoic acid (PFTeA)	3.02 J
Perfluorotridecanoic Acid (PFTriA)	0.709 J
Perfluoroundecanoic acid (PFUnA)	1.8 U

U - The analyte was not detected above the Limit of Detection (LOD).
J - The analyte was positively identified and the result is usable; however, the analyte concentration is an estimated concentration.
M - Manual integrated compound.

Furthermore, based on a review of the USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR 3) data, the nearest municipal drinking water supply that sampled for PFAS was in the Town of Cumberland, but no PFAS were detected above the USEPA HA. All relevant PFAS data collected from the surrounding area has been included in **Appendix A**.

1.5.3 Hydrology

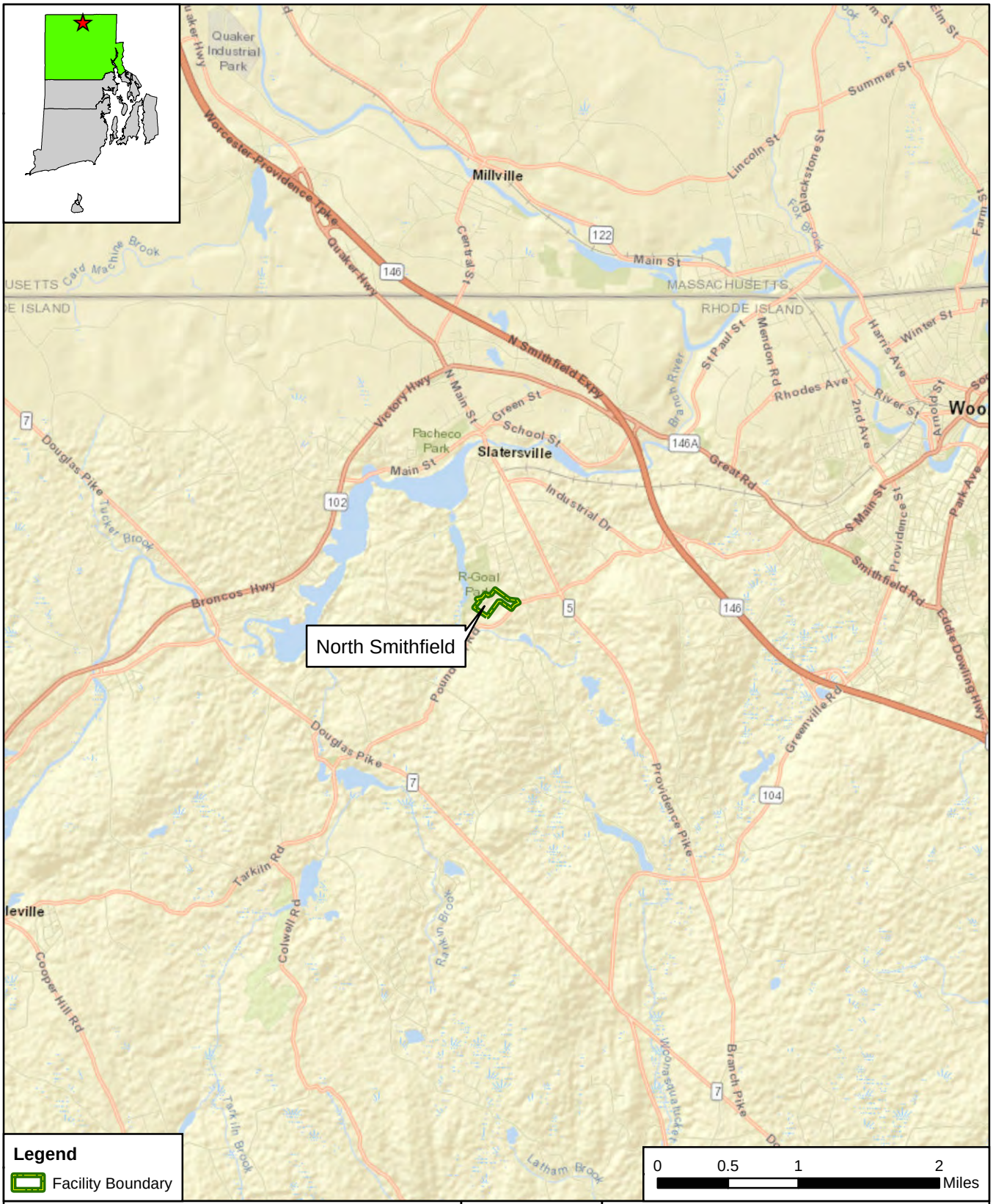
A tributary of Trout Brook is located onsite and flows east to west across the Site. The tributary originates east of the facility property boundary and flows between the administration building and former operational side of the Site (**Figure 1-3**). Wetlands exist on either side of the tributary and expand into a larger, state-mapped and regulated wetland (EA Engineering, 2010). Any overland flow across the Site eventually flows into the Trout Brook tributary or the surrounding wetland to the west of the Site.

1.5.4 Climate

The climate at the Site consists of four clearly separated seasons, with predominant weather movement from west to east. Temperatures vary from average highs of 60.3 degrees Fahrenheit (°F) to average lows of 39.4 °F. Average precipitation is 51.41 inches of rain with 37 inches of snowfall during winter months (US Climate Data, 2019).

1.5.5 Current and Future Land Use

Currently, the Former PR Nike Battery 99 is a controlled access site used as a readiness center by the RIARNG. The mission of the readiness center is to provide training support and armory facilities for the storage, administrative, and assigned vehicle requirements for the RIARNG. Most of the buildings and infrastructure associated with the former battery have been removed. The former barracks/mess hall building is now the Armory; however, it is not actively occupied on a regular basis. Several other buildings are located within the operations area and are used for storage. Future land use is not expected to change.



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Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	11/18/2019

Facility Location

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Figure 1-1

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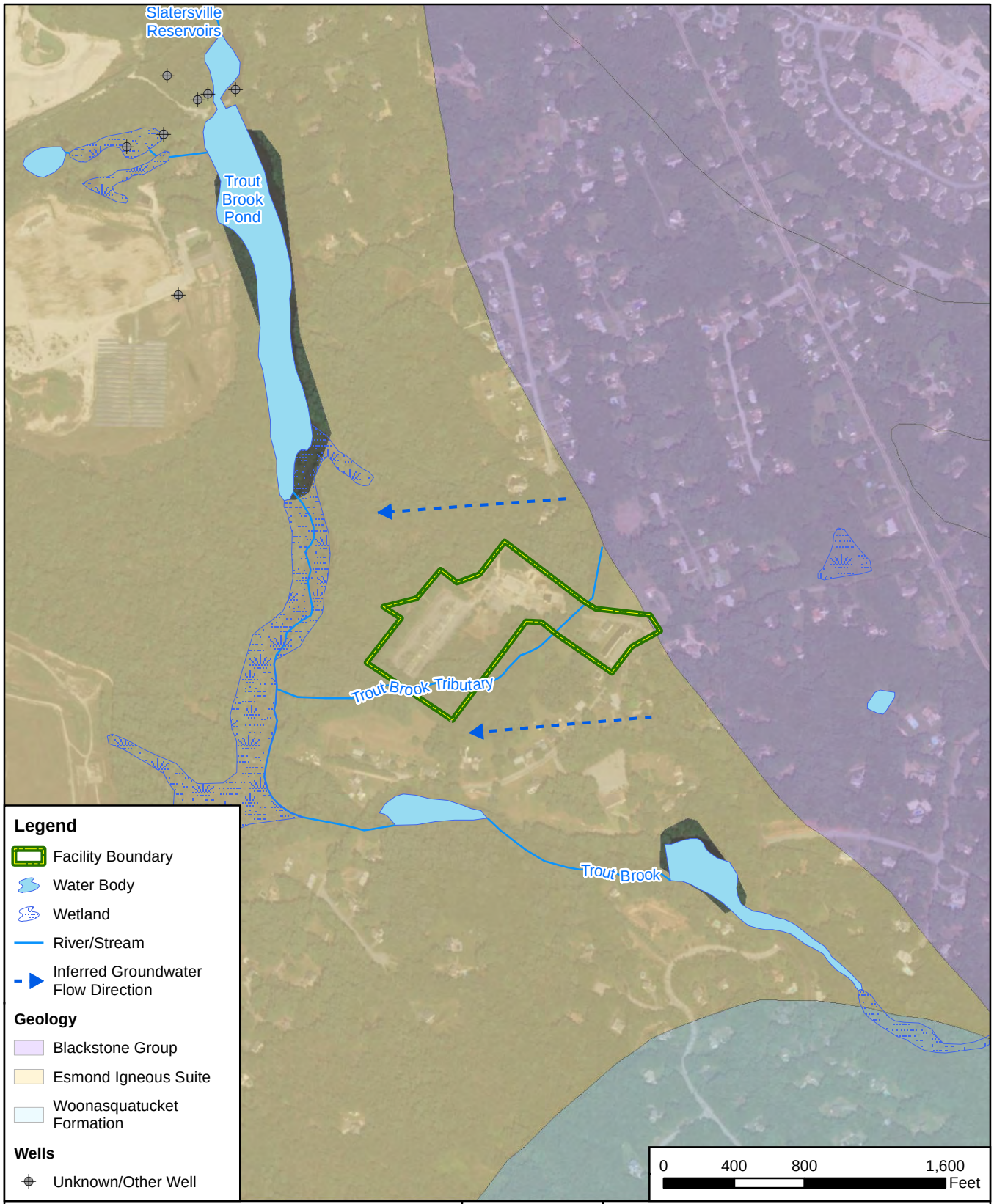

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Groundwater Features

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Figure 1-2

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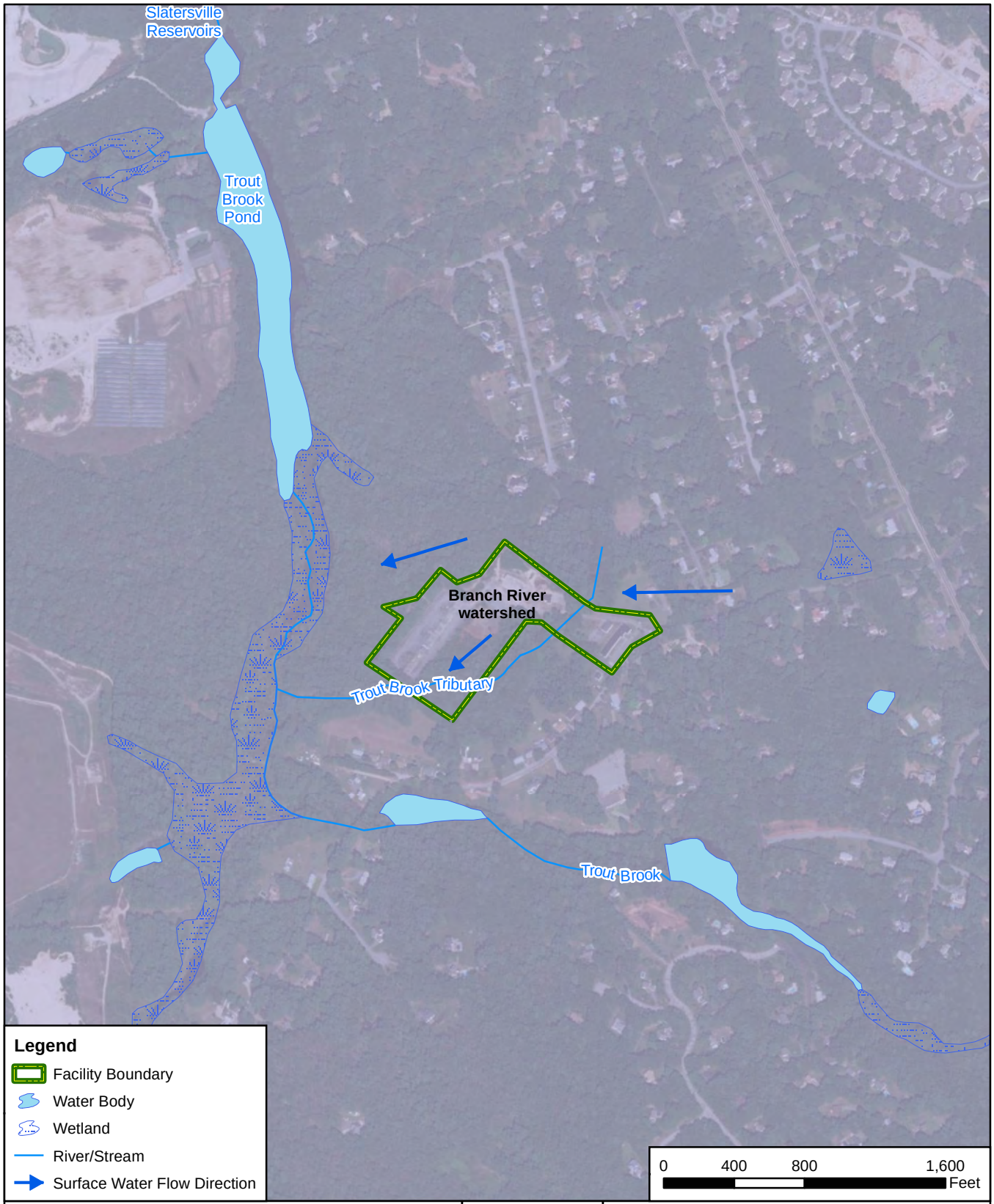

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Surface Water Features

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Figure 1-3

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2. Fire Training Areas

No FTAs were identified within Former PR Nike Battery 99 during the PA through interviews or document review. The North Smithfield municipal fire department provides emergency services at the Site, but it did not find any record of fire training or emergency response occurring the at the Site (**Appendix B**).

Under this contract, a review of historic documents and project-specific preliminary assessments was performed to determine the use or acquisition of AFFF for former Nike or Atlas missile sites across the country. After reviewing the historical timeline of AFFF production and distribution, it was determined that most Nike/Atlas Ajax missile sites were operationally closed and/or dismantled by 1965. Based on the period of use and the limited availability of AFFF prior to 1965, it was determined Atlas sites would not be a potential source of PFAS (USACE, 2019).

Nike/Atlas Hercules missiles were introduced later and gradually replaced Nike/Atlas Ajax missiles. Most Hercules missile sites were deactivated by 1974. Since the sites were constructed prior to the wide availability of the AFFF systems, it was thought unlikely that these sites would be reconfigured to use AFFF in lieu of older firefighting or fire suppression materials. Based on this timeline, it is not expected that any FTAs or fire suppression systems would have used AFFF at the Site.

3. Non-Fire Training Areas

One non-FTA was identified during the PA. A description of the non-FTA is presented below and its location is shown on **Figure 3-1**. Historic as-builts and photographs of the non-FTA appears in **Appendix A** and **C**.

3.1 Former Leach Field

The leach field and associated infrastructure (distribution box and septic tank) are located in a wooded area west of the Armory and within the operations area (**Figure 3-1**). The leach field, distribution box, and septic tank were constructed in 1956 and were only connected to the Armory, which served as barracks, a mess hall, and administration building for the launch area during the time of operation. The septic system did not connect to any of the buildings located within the operations Area (buildings associated with the operation of the Nike missiles and launch pad). The wastewater discharged to the leach field originated from shower/bathroom drains, sinks, and toilets.

During the site walk, four floor drains were observed within two separate latrines within the Armory (**Appendix C**). These floor drains were located within the shower stalls and in the center of the latrines between the sinks and toilets. First-hand accounts of day-to-day activities at the Former PR Nike Battery 99 were not found prior to or after the site visits. As a result, specific information regarding the use of floor polish and cleaning solution disposal is not known at the Site. It has been documented that some floor polishes contain PFAS (Interstate Technology Regulatory Council [ITRC], 2017); however, this cannot be substantiated without a Safety Data Sheet (SDS) or other documentation.

The kitchen in the Armory did have an Ansul wet fire suppression system over the flat-top cooking surface (**Appendix C**); however, this system was a non- AFFF fire suppression.

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Non-Fire Training Area

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Figure 3-1

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4. Emergency Response Areas

No emergency response areas were identified within the Former PR Nike Battery 99 during the PA through document review. The Town of North Smithfield would handle any potential fire or emergency response at the Site. The North Smithfield Fire Department had no records of any emergency response at the Site (**Section 2.0**).

5. Adjacent Sources

Two potential offsite sources of PFAS located within 1-mile of the Former PR Nike Battery 99 were identified during the PA. Descriptions of the offsite sources are presented below, and the areas are shown on **Figure 5-1**.

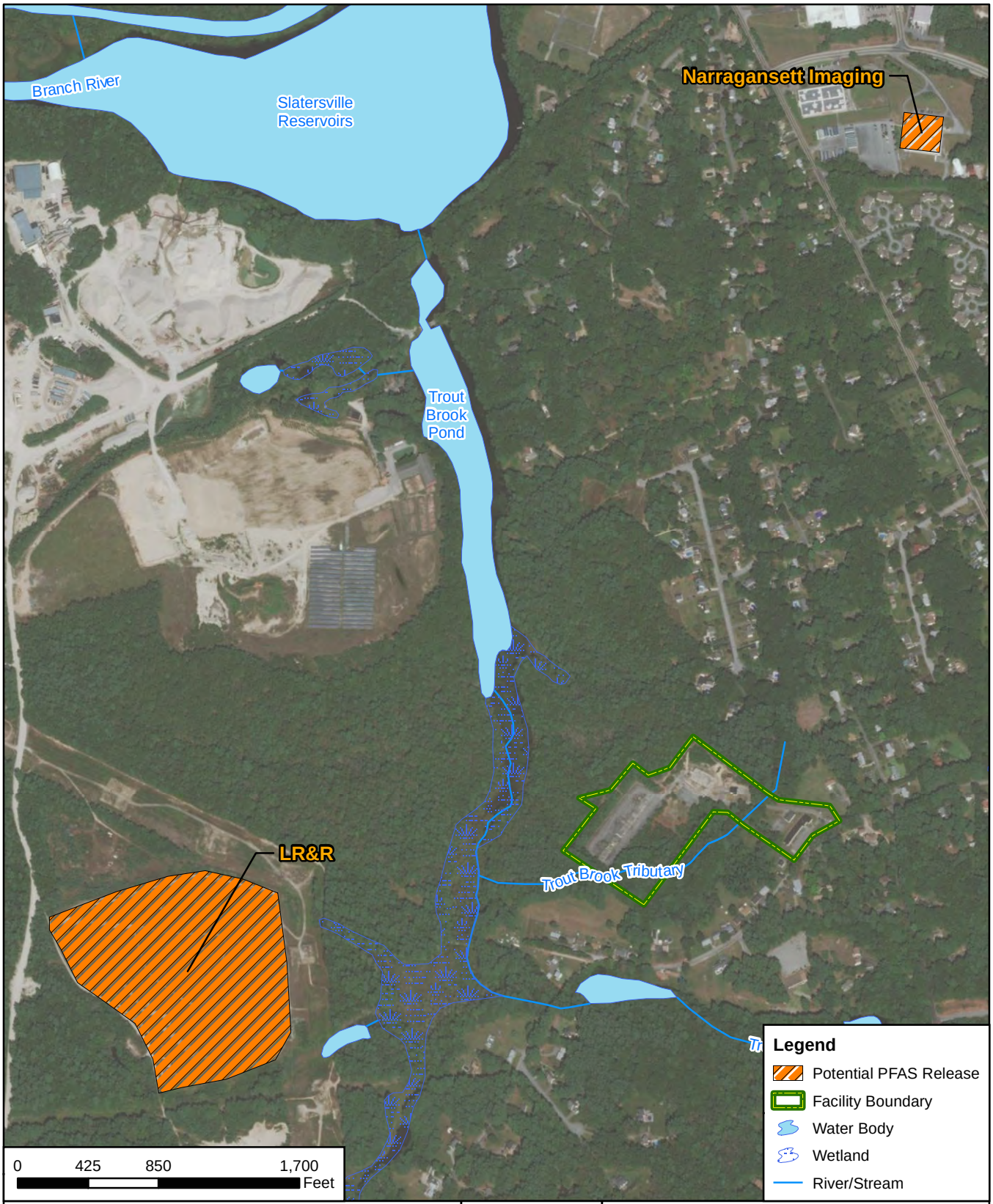
5.1 Landfill & Resource Recovery, Inc

The Landfill & Resource Recovery, Inc (L&RR) is located approximately 0.5 miles to the west of the Site, on Oxford Road, North Smithfield, Rhode Island. The L&RR is a 28-acre landfill that was listed on the National Priorities List (NPL) in September 1983. L&RR was originally a sand and gravel pit used for small-scale disposal from 1927 to 1974. In 1974, the landfill was sold and developed into a large-scale disposal facility accepting commercial, municipal, and industrial wastes. An estimated one million gallons of hazardous waste were accepted and disposed of with other wastes in the center of the landfill. The landfill closed in 1985. The remedy was documented in the 1988 Record of Decision (ROD), and remedial activities and monitoring are on-going.

There is no documented evidence of AFFF- or PFAS-containing material disposal at L&RR; however, given the years of operation and the wide variety of waste disposed at the landfill, it has been identified as a potential offsite PFAS source area. According to RIDEM, PFAS sampling was recently conducted at L&RR, and PFAS were detected above HA and RIDEM standards. The report is still in draft form, and groundwater results are not available for public distribution. **Figure 5-1** shows the location of the L&RR in relation to the Site.

5.2 Narragansett Imaging

The former Narragansett Imaging facility was located approximately 1-mile to the northwest of the Site, on Industrial Drive, in North Smithfield, Rhode Island. The exact history of the facility is not known; however, it is an identified hazardous waste site by the State of Rhode Island. Based on information obtained during the PA; spent cyanide plating bath solution from electroplating operations was an identified waste. No specific information regarding chrome plating was found during the PA, but the facility is identified as a potential offsite PFAS source area. **Figure 5-1** shows the location of the former Narragansett Imaging facility in relation to the Site.



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Adjacent Sources

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Figure 5-1

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6. Preliminary Conceptual Site Model

Based on the PA findings, no release areas at the Former PR Nike Battery 99 were identified as AOIs. A CSM identifies three components necessary for potentially complete exposure pathways related to a site: 1) source, 2) pathway, and 3) receptor. If any of these elements are missing, the pathway is considered incomplete. Based on the findings of this PA, use of AFFF was ruled out based on the history of the Site and the distribution of AFFF in the late-1960s and early-1970s. Furthermore, the document review performed found no clear PFAS-containing chemical used, stored, or handled at the Former PR Nike Battery 99. Use of floor polish within the Armory is likely to have occurred; however, no documentation regarding the type of floor polish or frequency of use was found during the PA. Additionally, limited occupancy and use of the Armory after closure of the Site would likely limit the use of polish and the potential for PFAS-containing chemicals from entering the leach field from floor drains in the Armory.

An evaluation of the water use surrounding the site indicated that only one private water supply well exists within a 1-mile radius of the Site and is located upgradient (**Appendix A**). However, more may exist at the surrounding residential properties. Additional monitoring wells were identified in the federal well database but were not determined to be drinking water supply wells. One drinking water well does exist on the Site and provides water to the Armory. PFAS sampling performed by the ARNG detected concentrations of PFAS, but results were below the USEPA HA and RIDEM groundwater quality standards. Additionally, this drinking water well is not currently used and does not have power supplied to it. As a result of this investigation, no complete exposure pathway for PFAS was identified at the Site, and no AOIs were identified at the Former PR Nike Battery 99.

7. Conclusions

This report presents a summary of available information gathered during the PA on the use and storage of AFFF and other PFAS-containing chemicals at the Former PR Nike Battery 99. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

No AOIs related to PFAS releases were identified at Former PR Nike Battery 99 based on the findings of the PA. Based on the absence of AFFF and limited evidence of PFAS-containing chemical use at the Site, evidence does not support the potential for PFAS contamination in soil, groundwater, surface water, or sediment for any receptor.

A summary of PA findings is presented in **Figure 7-1**.

7.2 Uncertainties

A number of information sources were investigated during this PA to determine the potential for PFAS-containing materials to have been present, used, or released at the Site. Historically, documentation of PFAS use was not required because PFAS were considered benign. Therefore, records were not typically kept by the facility or available during the PA on the use of PFAS in training, firefighting, or other non-traditional activities, or on its disposition.

The conclusions of this PA are predominantly based on information found in historic reports and limited information obtained through interviews. Gathered information has a degree of uncertainty due to the absence of specific documentation relative to the use of materials potentially containing PFAS. Inaccuracies may arise in potential PFAS release locations, dates of release, and volume of releases. There is also a possibility the PA has missed a source of PFAS, as the science of how PFAS may enter the environment continually evolves.

In order to minimize the level of uncertainty, readily available data regarding the use and storage of PFAS were reviewed, and potential source areas were visually inspected. **Table 7-1** summarizes the uncertainties associated with the PA.

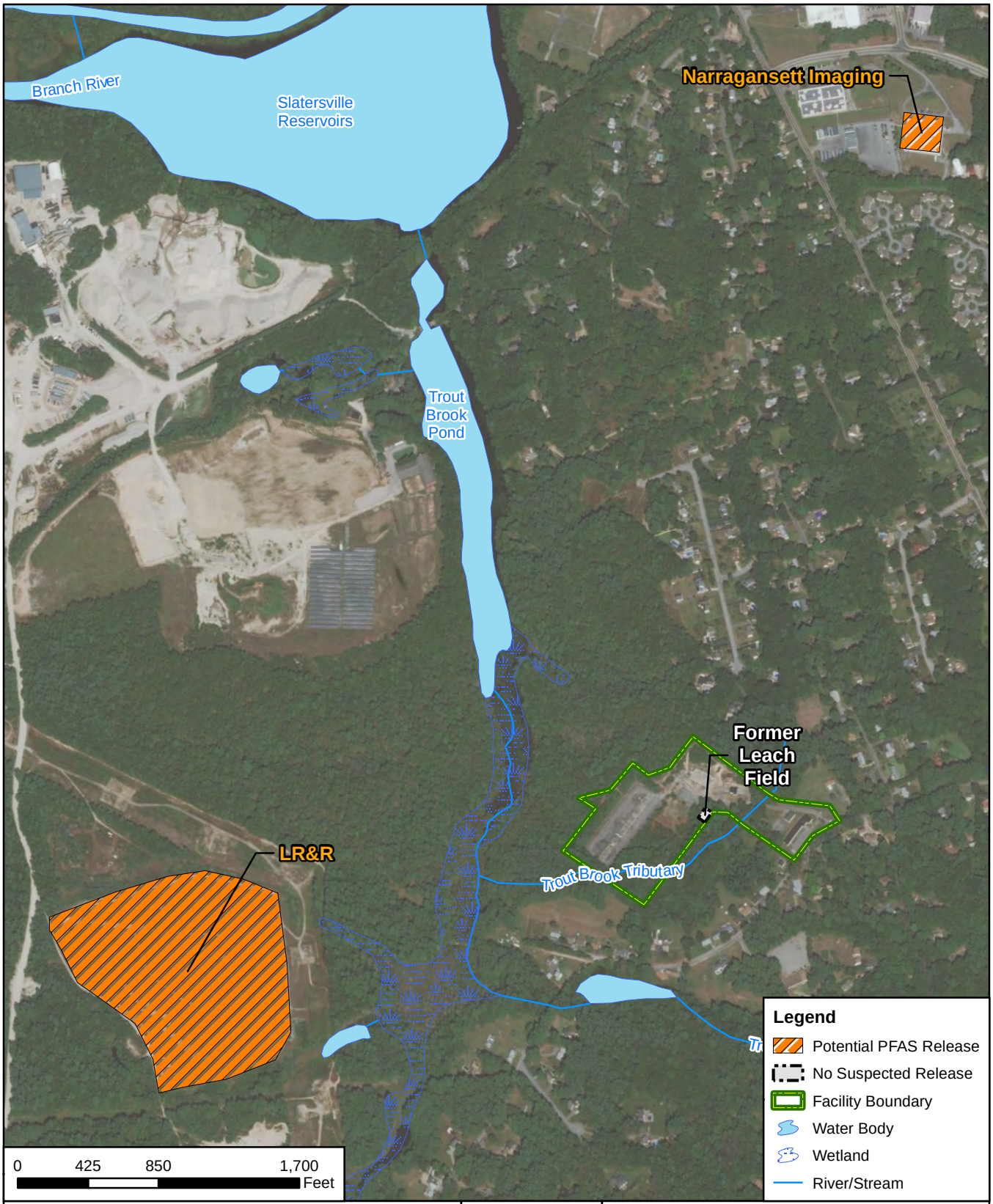
Table 7-1: Uncertainties

Area of Interest	Source of Uncertainty
Former Leach Field	No documentation was found confirming the type of floor polish used or the frequency of application.
	With limited first-hand accounts (i.e.: interviews), a complete understanding of the activities and operations is incomplete. There is a potential that other PFAS-containing chemicals may have been used, stored, or handled.

7.3 Potential Future Actions

No AOIs were identified during the PA based on the absence of AFFF use, storage, or handling and release of PFAS-containing chemicals at the Former PR Nike Battery 99. Evidence does not

indicate that current or former ARNG activities contributed PFAS contamination to soil, groundwater, surface water, or sediment at the Site or adjacent areas. The Former PR Nike Battery 99 will not move forward in the CERCLA process.



CLIENT	ARNG			
Preliminary Assessment for PFAS at North Smithfield, RI				
REVISED	12/2/2019	GIS BY	MS	12/2/2019
SCALE	1:10,200	CHK BY	AB	12/2/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	12/2/2019

N

Summary of Findings

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 7-1

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8. References

EA Engineering, Science, and Technology. 2010. *Phase I Environmental Site Assessment 1189 Pound Hill Road, Plat 007, Lot 058, North Smithfield, Rhode Island*. August.

ITRC, 2017. *History and Use of Per- and Polyfluoroalkyl Substances (PFAS)*. PFAS Fact Sheets. Accessed May 16 2019 at https://pfas-1.itrcweb.org/fact-sheets/. November.

Resource Applications, Inc. (RAI). 1992. *Site Screening Inspection (SSI) for Launcher Area, Former U.S. Army North Smithfield, RI NIKE Site*. October.

RIDEM. 2017. *Rhode Island Department of Environmental Management Determination of a Groundwater Quality Standard for: Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS)*. October.

United States Army Corps of Engineers (USACE). 2019. *Operational History Review: Potential Usage of Aqueous Film Forming Foam (AFFF)/Perfluorooctanoic Acid (PFOA)/Perfluorooctane Sulfonate (PFOS) at Nike and Atlas Missile Sites*.

United States Environmental Protection Agency (USEPA), 1980. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*.

US Army Environmental Health Agency (USAEHA). 1994. *Geohydrologic Study No 38-26-0277-95, Expanded Site Inspection North Smithfield Former Nike Launch Site, North Smithfield, Rhode Island*. November.

US Army Public Health Center (APHC). 2019. *Environmental Health Engineering Environmental Baseline Survey No. S.0064416.16-10, Rhode Island Army National Guard, North Smithfield Readiness Center, North Smithfield, Providence Country, Rhode Island*. May.

US Climate Data. 2019. Available at https://www.usclimatedata.com/climate/woonsocket/rhode-island/united-states/usri0113 (Accessed October 1, 2019).

USEPA, 1991. *Guidance for Performing Preliminary Assessments under CERCLA.* September.

USEPA, 1994. *National Oil and Hazardous Substances Pollution Contingency Plan (Final Rule)*. 40 CFR Part 300; 59 Federal Register 47384. September.

US Geological Survey (USGS). 2019. *USGS Water-Quality Daily Data for Georgia.* April.

Weston, 1998. *Final Site Inspection Prioritization Report for North Smithfield Nike Launcher Area, North Smithfield, Rhode Island*. September.

Appendix A
Data Resources

Data resources will be provided separately on CD. Data resources for the Former PR Nike Battery 99 include:

Environmental Data Resources Report

- 2019 The EDR Radius Map™ Report with GeoCheck®; Aerial Photo Decade Package; and Certified Sanborn® Map Report; Former PR Nike Battery 99, 1189 Pound Hill Road, North Smithfield, RI 02876. Request October 3, 2019.
- 2019 The EDR Radius Map™ Report with GeoCheck®; Narragansett Imaging, 51B Industrial Drive, North Smithfield, RI 02896.

Previous Investigations

- APHC, 2019. Environmental Health Engineering, Environmental Baseline Survey No S0064416.16-19, Rhode Island Army National Guard, North Smithfield Readiness Center, North Smithfield, Providence County, Rhode Island. May.
- EA Engineering, 2010. Phase 1 Environmental Site Assessment, 1189 Pound Hill Road, Plat 007, Lot 058, North Smithfield, Rhode Island. August.
- RIARNG, 1991. Preliminary Assessment Screening Report, North Smithfield Armory, Rhode Island Army National Guard. September.
- Tetra Tech, 2017. Sampling and Analysis for PFOS and PFOA, Army National Guard-Owned/Operated Drinking Water System. September.
- USACE, 2019. Operational History Review: Potential Usage of Aqueous Film Forming Foam (AFFF)/Perfluorooactanoic Acid (PFOA)/Perfluorooctane Sulfonate (PFOS) at Nike and Atlas Missile Sites.
- USAEHA, 1993. Geohydrologic Study No. 38-26-K1Z2-94, Site Inspection of North Smithfield Former Nike Site, North Smithfield, Rhode Island. October.
- USAEHA, 1995. Geohydrologic Study No. 38-26-0277-95, Expanded Site Inspection, North Smithfield Former Nike Launch Site, North Smithfield, Rhode Island. November.
- Weston, Inc., 1998. Final Site Inspection Prioritization Report for North Smithfield Nike Launcher Area, North Smithfield Rhode Island. September.

Real Estate Documents

- 1976 License No. DACA 51-3-77-133, Providence Defense Area PR-99, No. Smithfield, R.I. to State of Rhode Island (RIARNG).
- 1976 License No. DACA 51-3-77-133, Providence Defense Area PR-99, North Smithfield, RI (launcher area) and License No. DACA 51-3-72-55 (Control Area)
- 1981 Department of the Air Force License for National Guard Purposes to use Property on Providence Defense Area, North Smithfield, Rhode Island.
- 1981 Department of the Air Force License for Nation Guard Purposes to use Property on Providence Defense Area, North Smithfield, Rhode Island. Supplemental Agreement No. 2 License No. DACA 51-3-81-449.
- 1986 Department of the Army Permit to other Federal Government Depart or Agency to use Property on Providence Defense Area North Smithfield, Rhode Island. Amendment No. 2. Permit No. DACA 51-4-87-90.
- 1990 Transfer and Acceptance of Military Real Property.

Regulations, Advisories, and Orders

- RIDEM, 2017. Rhode Island Department of Environmental Management Determination of a Groundwater Quality Standard for Perfluorooctanoic Acid (PFOA) and Perfluorooctane Sulfonate (PFOS). October.

Drawings

- Historic North Smithfield Site Plan. Unknown date.

Appendix B
Preliminary Assessment Documentation

Appendix B.1
Interview Records

PA Interview Questionnaire - Other

[redacted] AKB 1/7/20

Facility: ~~Eglin~~ North Smithfield
Interviewer: A. Borden
Date/Time: 9/24/19 1615

Interviewee: [redacted] **Title:** **Phone Number:** **Email:**	Can your name/role be used in the PA Report? Y or N Can you recommend anyone we can interview? Y or N

Roles or activities with the Facility/Years working at the Facility:

Environmental Program Manger for State RI
5yrs
12 Delta Env. lead

PFAS Use: Identify accidental/intentional release locations, time frame of release, frequency of releases, storage container size (maintenance, fire training, firefighting, buildings with suppression systems (as builts), fueling stations, crash sites, pest management, recreational, dining facilities, metals plating, or waterproofing). How are materials ordered/purchased/disposed/shared with others?

Current Use
B battery FF chilled was an armory
water system too small to be licensed
by the state
likely floor waxed inside Admin Bldg
during use 1955-197
no laundry
no wash rack for car wash
have to check to see if the well is
still open

Known Uses	
Use	
Procurement	
Disposition	
Storage (Mixed)	
Storage (Solution)	
Inventory, Off-Spec	
Containment	
SOP on Filling	
Leaking Vehicles	
Nozzle and Suppression System Testing	
Dining Facilities	
Vehicle Washing	
Ramp Washing	
Fuel Spill Washing and Fueling Stations	
Chrome Plating or Waterproofing	

Borden, Andrew

From: [redacted]
Sent: Friday, October 25, 2019 2:36 PM
To: Borden, Andrew
Subject: FW: Use of PFAS Fire Fighting Foam at or near the RI Army National Guard Base

Hi Andrew,

I received this response from the North Smithfield Fire Chief. Hope it is helpful.

[redacted]

-----Original Message-----
From: [redacted]
Sent: Friday, October 25, 2019 2:12 PM
To: [redacted]
Subject: [Non-DoD Source] RE: Use of PFAS Fire Fighting Foam at or near the RI Army National Guard Base

Good afternoon [redacted],

After speaking with my Deputy Chief and researching what records we can retrieve, We have not found any evidence of ever having a fire at 1189 Pound Hill Rd in which we used firefighting foam. I hope this helps and should you need anything else, please let me know. Thank you.

Chief [redacted]

[redacted]
Fire Chief
North Smithfield Fire & Rescue Service, Inc.

- Phone: [redacted]
- Mobile: [redacted]
- Address: [redacted]

-----Original Message-----
From: [redacted]
Sent: Thursday, October 17, 2019 8:22 AM
To: [redacted]
Subject: Use of PFAS Fire Fighting Foam at or near the RI Army National Guard Base

Good morning Chief,

As a follow-up to our conversation yesterday, the National Guard Bureau is in the process of conducting a preliminary assessment of our facility at

[redacted], to determine if PFAS containing firefighting foam was ever used either at or near our facility. You indicated that you did not recollect any such activity by your Department, but that you would check with your Deputy Chief and get back to me. Any information you can provide would be appreciated!

Thank you,

[redacted]

[redacted]
Supervising Environmental Scientist
Rhode Island Army National Guard
FMO-Environmental Branch
[redacted]

Office: [redacted]
Cell: [redacted]

Appendix B.2
Visual Site Inspection Checklists

Visual Survey Inspection Log

Recorded by: A. Borden
ARNG Contact: [redacted]
Date: 9/25/19

Source/Release Information

Site Name / Area Name / Unique ID: North Smith Field Nike Battery B
Site / Area Acreage:
Historic Site Use (Brief Description): Former Nike Battery, 1950-1971; ANG/ARNG storage area
Current Site Use (Brief Description):

1. Was AFFF used (or spilled) at the site/area? Y (N)
   1a. If yes, document how AFFF was used and usage time (e.g., fire fighting training 2001 to 2014): NA
2. Has usage been documented? Y (N)
   2a. If yes, keep a record (place electronic files on a disk): NA
3. What types of businesses are located near the site? (Industrial) / (Commercial) / Plating / Waterproofing / (Residential)
   3a. Indicate what businesses are located near the site: industry and commercial ~ 0.75-1 mile away
4. Is this site located at an airport/flightline? Y (N)
   4a. If yes, provide a description of the airport/flightline tenants: NA

Other Significant Site Features:

1. Does the facility have a fire suppression system? (Y) / N
   1a. If yes, indicate which type of AFFF has been used: Ansul Wet suppression in kitchen – no AFFF see photos
   1b. If yes, describe maintenance schedule/leaks: NA
   1c. If yes, how often is the AFFF replaced: NA
   1d. If yes, does the facility have floor drains and where do they lead? Can we obtain an as built drawing? Yes – 4 drains in two latrines – north side of bldg.

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation? (Y) N
   1a. If so, note observation and location: tributary cuts site in half (Trout Brook) SW@2 storm flow E-W, leach field @ flow to offsite wetland
2. Is there channelized flow within the site/area? (Y) N
   2a. If so, please note observation and location: Trout Brook
3. Are monitoring or drinking water wells located near the site? (Y) N
   3a. If so, please note the location: 3 MWs @ 1 DW well – DW well upgradient 3 MWs downgradient
4. Are surface water intakes located near the site? Y (N)
   4a. If so, please note the location: NA

Significant Topographical Features:

1. Has the infrastructure changed at the site/area? (Y) N
   1a. If so, please describe change (ex. Structures no longer exist): nearly all original Nike Battery B buildings demolished, new building CHP destroyed in snow storm
2. Is the site/area vegetated? (Y) N
   2a. If not vegetated, briefly describe the site/area composition:
3. Does the site or area exhibit evidence of erosion? (Y) N
   3a. If yes, describe the location and extent of the erosion: along northern boundary, sand/gravel slope w/ extensive erosion
4. Does the site/area exhibit any areas of ponding or standing water? Y (N)

Visual Survey Inspection Log

4a. If yes, describe the location and extent of the ponding: NA

Receptor Information

1. Is access to the site restricted? (Y) / N
   1a. If so, please note to what extent: fencing along entire perimeter
2. Who can access the site? (Site Workers) / Construction Workers / (Trespassers) / Residential / Recreational Users / Ecological
   2a. Circle all that apply, note any not covered above: trespassers only if they hop fence
3. Are residential areas located near the site? (Y) N
   3a. If so, please note the location/distance: site in close proximity to residential homes along East side on Pond Hill Rd
4. Are any schools/day care centers located near the site? Y (N)
   4a. If so, please note the location/distance/type:
5. Are any wetlands located near the site? (Y) / N
   5a. If so, please note the location/distance/type: wetland within or close to site boundary flows to Trout Brook / Trout Brook Pond

Additional Notes

Leaching Field within heavily vegetated area

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
AOI001	1/1/2018	Building 500, on flightline, looking south, NE Corner Fire Suppression System
1	9/26/19	drill hall
2		↓
3		↓
4		Ansul fire suppression system in kitchen none AFFF
5		Ansul label
6		Inspection label
7&8		latrine floor drain
9&10		DW well head
11&12		Armory/ Leach field distribution box, heavily vegetated
13		MW-1
14		MW-2
15&16		MW-3

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: North Smithfield Nike Battery B

Why has this location been identified as a site?

Nike sites are not considered potential AFFF sites; however, other sources may exist

Are there any other activities nearby that could also impact this location?

Industrial operations ~0.75 miles NE

Training Events

Have any training events with AFFF occurred at this site? No

If so, how often? NA

How much material was used? Is it documented? NA

Identify Potential Pathways: Do we have enough information to fully understand over land surface water flow, groundwater flow, and geological formations on and around the facility? Any direct pathways to larger water bodies? Yes

Surface Water:

Surface water flow direction? SW – SSW

Average rainfall?

Any flooding during rainy season? potentially – tributary flowing to wetland

Direct or indirect pathway to ditches? None

Direct or indirect pathway to larger bodies of water? Direct – Trout Brook to TB Pond

Does surface water pond any place on site? None

Any impoundment areas or retention ponds? None

Any NPDES location points near the site?

How does surface water drain on and around the flight line? No flight line – water flows to tributary from north, flows into wetland along SW side

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? SW across site, flowing towards tributary

Depth to groundwater? ~20'

Uses (agricultural, drinking water, irrigation)? drinking water – rarely used - no power

Any groundwater treatment systems? No

Any groundwater monitoring well locations near the site? 3 onsite MWs

Is groundwater used for drinking water? Yes - but no power to pump

Are there drinking water supply wells on installation? Yes

Do they serve off-post populations? No

Are there off-post drinking water wells downgradient potentially - need to investigate more

Waste Water Treatment Plant:

Has the installation ever had a WWTP, past or present? Yes

If so, do we understand the process and which water is/was treated at the plant? leach field

Do we understand the fate of sludge waste? No

Is surface water from potential contaminated sites treated? No

Equipment Rinse Water

1. Is firefighting equipment washed? Where does the rinse water go?

NA

2. Are nozzles tested? How often are nozzles tested? Where are nozzles tested? Are nozzles cleaned after use? Where does the rinse water flow after cleaning nozzles?

NA

3. Other? NA

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker Yes

Construction Worker No

Recreational User No

Residential Yes

Child Yes

Ecological Yes

Note what is located near by the site (e.g. daycare, schools, hospitals, churches, agricultural, livestock)?

industry and private residence

Documentation

Ask for Engineering drawings (if applicable).

Has there been a reconstruction or changes to the drainage system? When did that occur?

Appendix C
Photographic Log

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Former PR Nike Battery 99	North Smithfield, Rhode Island

Photograph No. 01

Date 9/25/2019
Time 9:22

Description
Armory Building (former Barracks and Mess Hall).

Orientation:
Northwest

Photograph No. 02

Date 9/25/2019
Time 9:14

Description
Drill floor inside Armory Building.

Orientation:
Southwest

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Former PR Nike Battery 99	North Smithfield, Rhode Island

Photograph No. 03

Date 9/25/2019

Time 9:14

Description

Drill floor inside Armory Building.

Orientation:

Northwest

Photograph No. 04

Date 9/25/2019

Time 9:14

Description

Drill floor inside Armory Building.

Orientation:

West

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Former PR Nike Battery 99	North Smithfield, Rhode Island

Photograph No. 05

Date 9/25/2019

Time 9:15

Description

Ansul wet-fire suppression system associated with kitchen hood and cooking surface. Non-AFFF system.

Orientation:

North

Photograph No. 06

Date 9/25/2019

Time 9:15

Description

Service tag for the kitchen wet-fire suppression system.

Orientation:

North

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Former PR Nike Battery 99	North Smithfield, Rhode Island

Photograph No. 07

Date 9/25/2019

Time 9:17

Description

Example of floor drain in latrines. Several other similar floor drains were located in each latrine.

Orientation:

West

Photograph No. 08

Date 9/25/2019

Time 9:21

Description

Wellhead for Site drinking water well.

Orientation:

South

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Former PR Nike Battery 99	North Smithfield, Rhode Island

Photograph No. 09

Date 9/25/2019

Time 9:32

Description

Approximate location of the former distribution box and start of the former leach field. The direction of effluent flow would have been into the picture.

Orientation:

Northwest

Photograph No. 10

Date 9/25/2019

Time 9:40

Description

Site monitoring well MW-1.

Orientation:

West

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Former PR Nike Battery 99	North Smithfield, Rhode Island

Photograph No. 11

Date 9/25/2019
Time 9:50

Description
Site monitoring well MW-2.

Orientation:
North

Photograph No. 12

Date 9/25/2019
Time 10:00

Description
Site monitoring well MW-3.

Orientation:
North