FINAL
Preliminary Assessment Report
Duncan Armory AASF,
New Castle, Delaware

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

June 2020

Prepared for:

Army National Guard Headquarters
111 S. George Mason Drive
Arlington, VA 22204

UNCLASSIFIED

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Acronyms and Abbreviations

ºF	Degrees Fahrenheit
µg/L	Micrograms per Liter
AECOM	AECOM Technical Services, Inc.
AFFF	Aqueous Film Forming Foam
AOI	Area of Interest
amsl	Above Mean Sea Level
ANG	Air National Guard
ARNG	Army National Guard
bmsl	Below Mean Sea Level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	Conceptual Site Model
DAASF	Duncan Armory Army Aviation Support Facility
DANG	Delaware Air National Guard
DEARNG	Delaware Army National Guard
DGS	Delaware Geological Survey
DNREC	Delaware Department of Natural Resources and Environmental Control
DRBC	Delaware River Basin Commission
DoD	Department of Defense
EDR™	Environmental Data Resources, Inc.™
FD	Fire Department
FTA	Fire Training Area
HA	USEPA's Lifetime Health Advisory
NCCDE	New Castle County Delaware
PA	Preliminary Assessment
PFAS	Per- and Poly-Fluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
SI	Site Inspection
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VSI	Visual Site Inspection

Executive Summary

The Army National Guard (ARNG) is performing Prelimnary Assessments (PAs) and Site Inspections (SIs) for Perfulorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide. A PA for per- and polyfluoroalkyl substances (PFAS)-containing materials was completed for Duncan Armory Army Aviation Support Facility (DAASF; also referred to as the "facility") in New Castle, Delaware, to assess potential PFAS release areas and exposure pathways to receptors. DAASF is constructed on a parcel of land owned by the Transportation Board for New Castle County and leased to DAASF. According to the lease document, the lease to DAASF began in 1973 and will be in effect for 50 years.

The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)^{TM} report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- Conducted a site visit on 6 August 2019 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current DAASF personnel including environmental managers and operations staff during the site visit;
- Identified areas of interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential PFAS source-pathway-receptor linkages for each AOI

One AOI (referred to as "AOI 1") related to potential PFAS release was identified at DAASF during the PA. Aqueous film forming foam (AFFF) may have been used to extinguish a fire at an emergency response location. AOI 1 comprises the location at DAASF where a helicopter crashed, and the resultant fire was extinguished using foam. It is unknown if the foam utilized were AFFF, as firsthand interviewee knowledge begins in 1991. The AOI is shown on **Figure ES-1** and described in **Table ES-1** below. The preliminary CSM for DAASF is presented in **Figure ES-2**.

Table ES-1: AOIs at DAASF

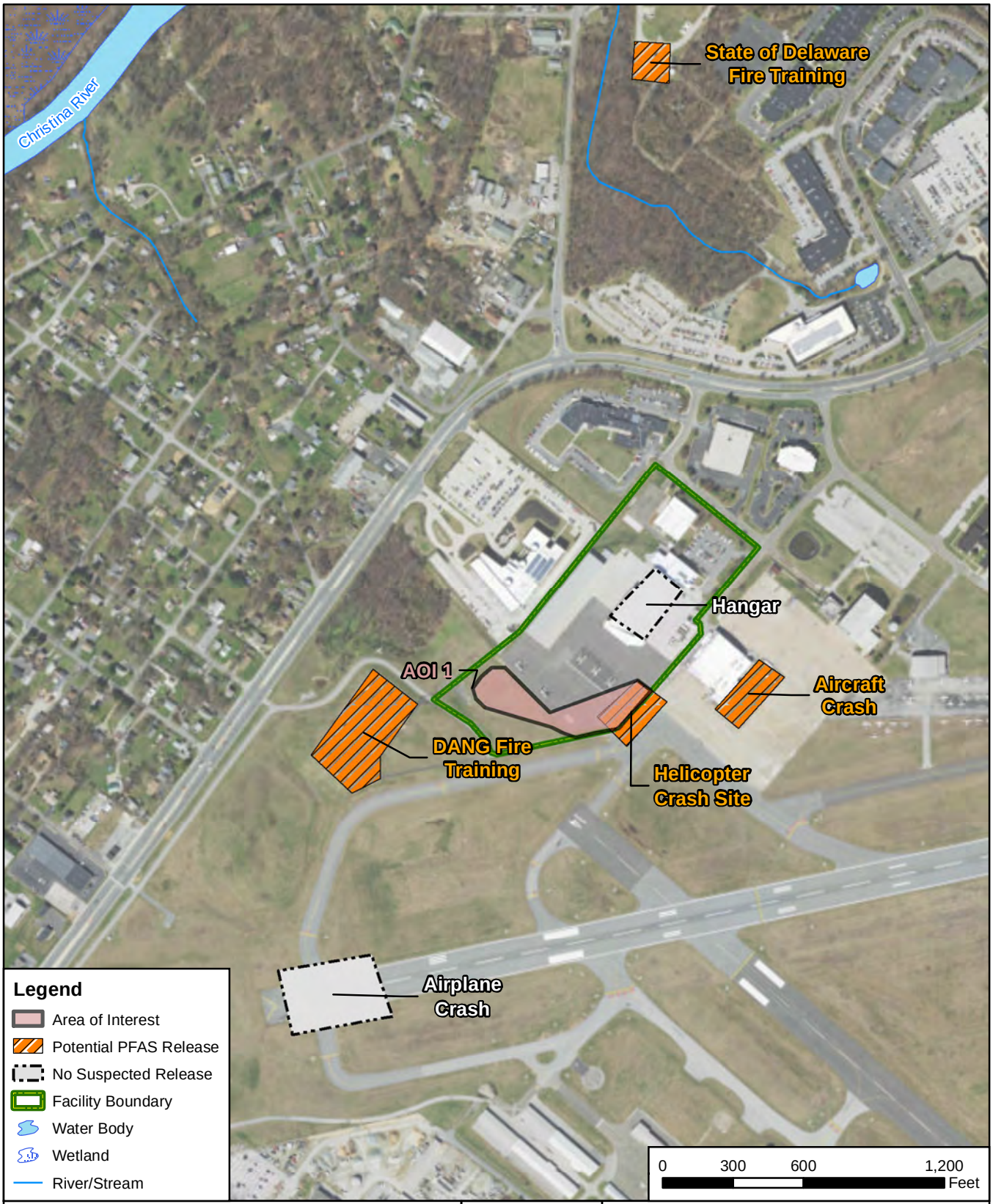
Area of Interest	Name	Used by	Potential Release Date
AOI 1	Helicopter Crash	Municipal fire department (FD)	1970s

The area where the aircraft crashed and caught fire is located at the southern border of DAASF, near adjacent airport taxiways. Municipal fire response reportedly used firefighting foam to control and extinguish the fire at DAASF. It is unknown what types of foam were used by the FD. Potential PFAS contamination that may have resulted from fire response at the accident location (AOI 1) may have traveled across paved and unpaved ground to a retention basin in the southwest corner of the facility.

A section of New Castle Airport is located upgradient of DAASF, along the southern and eastern boundaries, and is a potential off-facility source of PFAS. Additionally, a PFAS investigation is ongoing by the Air National Guard (ANG) at the adjacent New Castle ANG Base, located approximately 0.8 miles east of the eastern boundary of DAASF. This site has reported both groundwater and surface water screening criteria exceedances (AFW, 2019). Based on the US Environmental Protection Agency (USEPA) Unregulated Contaminant Monitoring Rule 3 data, it was indicated that PFAS were detected in a public water system above the USEPA Health Advisory (HA) level within 20 miles of the facility (**Appendix A**). The HA is 70 parts per trillion for

PFOS and PFOA, individually or combined. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.

Based on a potential PFAS release at the AOI, there is potential for exposure to PFAS contamination in airborne soil particulates, surface soil, surface water and sediments to site workers, construction workers, and trespassers via ingestion and inhalation; subsurface soil to construction workers via ingestion; and groundwater to construction workers and off-facility residents.



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SCALE	1:7,200	CHK BY	GC	10/8/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	10/8/2019

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Summary of Findings

AECOM
12420 Milestone Center Drive
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Figure ES-1

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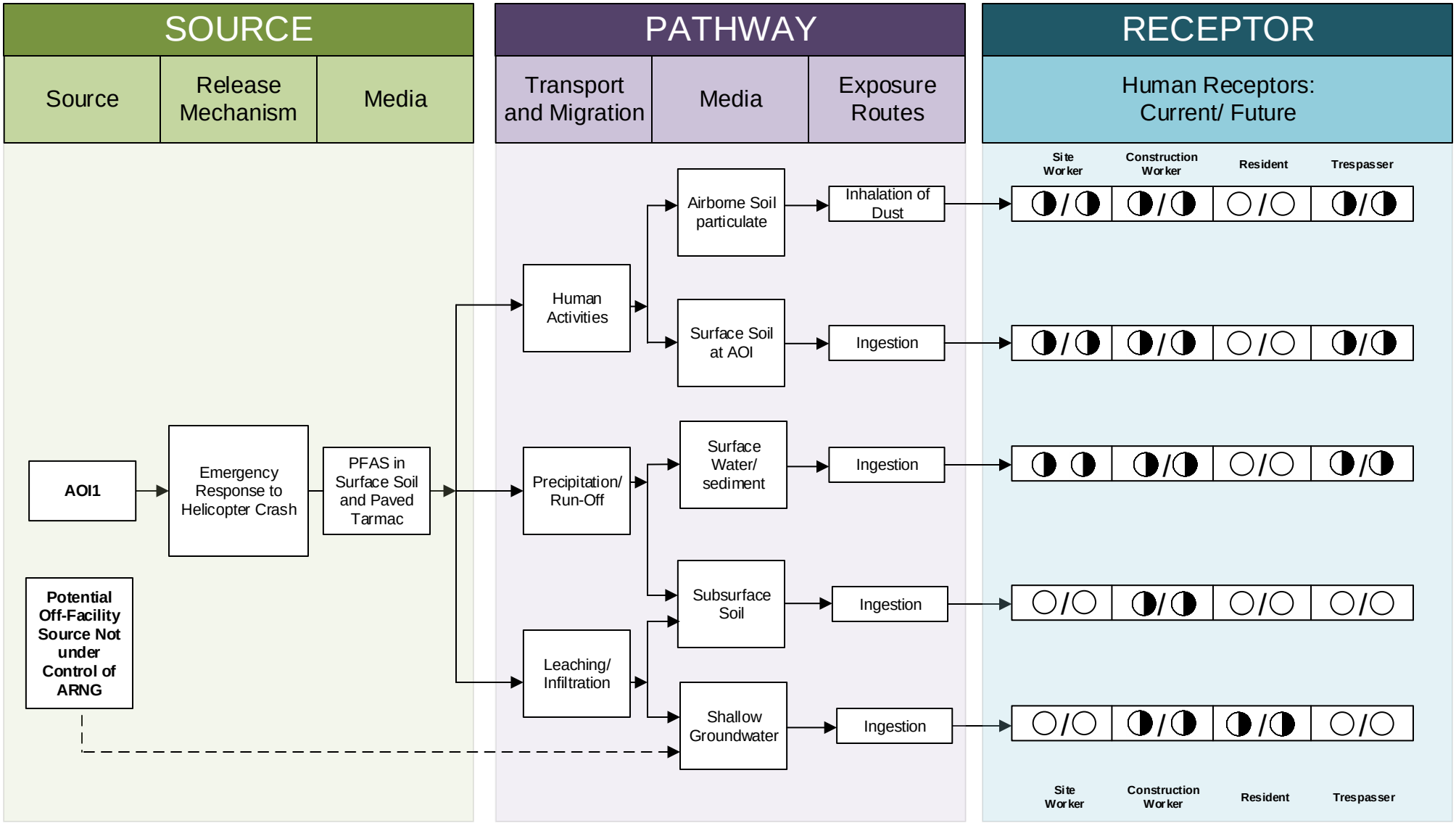


LEGEND

- Flow-Chart Stops
- Flow-Chart Continues
- Partial / Possible Flow
- Incomplete Pathway
- Potentially Complete Pathway
- Complete Pathway

Notes:
1. The residential receptor refers to an off-facility receptor.
2. Human consumption of agricultural products potentially affected by PFAS is possible

Figure ES-2
Preliminary Conceptual Site Model
Duncan Armory AASF, Delaware

1. Introduction

1.1 Authority and Purpose

The Army National Guard (ARNG)- Installations & Environment Division is the lead agency in performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluoroocatesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites at ARNG Facilities Nationwide.* This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor AECOM Technical Services, Inc. (AECOM) 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 poly-fluoroalkyl 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 Drinking Water Health Advisories (HA) for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water. The HA is 70 parts per trillion for PFOS and PFOA, individually or combined.

This report presents the findings of a PA for PFAS-containing materials at Duncan Armory AASF (DAASF; also referred to as the “facility”) in New Castle, Delaware, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300), and Army requirements and guidance.

This PA documents potential locations where PFAS may have been released into the environment at DAASF. 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 available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- Conducted a site visit on 6 August 2019 and completed visual site inspections (VSIs) at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current DAASF personnel including environmental managers and operations staff during the site visit;
- Identified areas of interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential PFAS source-pathway-receptor linkages for each AOI.

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 as follows:

- **Section 1** – **Introduction:** identifies the project purpose and authority and describes the facility location, environmental setting, and methods used to complete the PA.
- **Section 2** – **Fire Training Areas:** describes the fire training areas (FTAs) at the facility identified during the site visit.
- **Section 3** – **Non-Fire Training Areas:** describes other locations of potential PFAS releases at the facility identified during the site visit.
- **Section 4** – **Emergency Response Areas:** describes areas of potential PFAS release at the facility, specifically in response to emergency situations.
- **Section 5** – **Adjacent Sources:** describes sources of potential PFAS release adjacent to the facility that are not under the control of ARNG.
- **Section 6** – **Preliminary Conceptual Site Model:** describes the pathways of PFAS transport and receptors for the AOIs and the facility.
- **Section 7** – **Conclusions:** summarizes the data findings and presents the conclusions and uncertainties 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 Facility Location and Description

DAASF occupies 17.3 acres in New Castle, Delaware (**Figure 1-1**). The facility is located adjacent to New Castle Airport. Delaware's Air National Guard (ANG) base is across airport taxiways to the east. The nearest metropolitan area is Wilmington, Delaware, 5.6 miles from the facility. Properties surrounding DAASF are primarily zoned for single-family homes and businesses (New Castle County Delaware [NCCDE], 2018).

DAASF is located on a portion of land the Delaware National Guard leased from New Castle Airport for a term of 50 years. DAASF has been used as an active military facility since the lease signing in 1973. Currently and historically, the facility has been used for aircraft maintenance as well as administrative duties. The facility includes an aircraft hangar to house machinery, administrative offices, and helicopter landing pads. Directly outside of the facility boundary are airport runways and taxiways. Access to the facility is via a guarded gate.

1.5 Facility Environmental Setting

The facility is located in northern New Castle County, Delaware, southwest of Wilmington, Delaware and is approximately 64 feet above mean sea level (amsl). Major geographic features include the Christina River, which flows generally northeast, into the Delaware River, and is part of the Christina River basin reaching into Pennsylvania (Delaware Watersheds). The Delaware River flows south to the Delaware Bay. Buildings, asphalt, and concrete cover much of the facility, but green space exists around the parking lot and on the southwestern corner of the property surrounding the stormwater retention basin. DAASF lies within the Coastal Plain region of

Delaware, which is composed of variegated silts and clays and is a predominantly low, flat area about 100 feet amsl **(Figure 1-2)**. This region of Delaware has two fluvial geologic formations: the Columbia and the Potomac (AFW, 2019). The Potomac formation occurs in a fluvial setting in tropical to subtropical climates (Delaware Geological Survey [DGS], 2019).

Little environmental work has been performed at DAASF; therefore, information in the following sections has been drawn primarily for the Final Site Inspection Report for the nearby Delaware ANG (DANG) in New Castle, Delaware (AFW, 2019).

1.5.1 Geology

Based on the available data from US Geological Survey (USGS) maps, the facility lies within the Coastal Plain Delaware Bay Group (USGS, 2005). Soil type within this group, and subsequently within the boundary of DAASF, consists of medium to medium-to-coarse sands above fine-to-medium to fine sandy silt **(Figure 1-2)**. The sands of this group are primarily quartzose, with varying quantities of feldspar. Deposits in this group are vertically and laterally heterogeneous, with an upward fining of sediment texture (DGS, 2019).

1.5.2 Hydrogeology

New Castle County, Delaware has two aquifers: the Columbia and Potomac. The Columbia is the surficial aquifer in this area and can either be perched or act as a hydrologic unit with the Potomac aquifer. A previous investigation was conducted by the ANG approximately one mile from DAASF. Due to the proximity of this study, it is inferred that the geologic information provided is similar to that at DAASF. The study indicated that the Columbia formation in this area is predominantly dry, with perched water tables present. The Potomac aquifer consists of two independent (Upper and Middle), laterally continuous sand bodies within the water-bearing zones of the Potomac formation. The water table under normal conditions sits at an elevation of approximately 20 to 30 feet amsl.

The Upper Potomac Aquifer lies in both the shallow and intermediate groundwater-bearing zones. The shallow zone extends from 0 to 30 feet amsl, and there is no clear distinction between the surficial Columbia aquifer and the Upper Potomac Aquifer. Separated from the shallow zone by a semi-confining layer of clay, the intermediate groundwater-bearing zone ranges from 1 to 20 feet thick, extends approximately 50 feet below mean sea level (bmsl), and is considered to be part of the Upper Potomac aquifer. Results of groundwater elevation data from a previous investigation at the adjacent ANG facility suggest that the shallow and intermediate zones are interconnected, as they show similar trends. The ANG groundwater gauging also determined that groundwater in both zones of the Upper Potomac Aquifer as well as the Columbia Aquifer is inferred to flow generally to the north **(Figure 1-2)**.

The Middle Potomac Aquifer is considered the deep groundwater-bearing zone and is separated from the Upper Potomac Aquifer by a layer of clay 60 to 80 feet thick; it does not vertically transmit water. Below the clay layer, the aquifer's water-bearing sands extend from 120 to 130 feet bmsl. Groundwater levels are about 5 to 10 feet bmsl, suggesting that the groundwater is confined, and there is little transmission of water vertically between the Upper and Middle Potomac Aquifers. Groundwater in the Middle Potomac Aquifer flows to the south-southeast **(Figure 1-2)**.

In New Castle County, south of the Chesapeake and Delaware Canal, approximately 10 miles south of the facility, nearly all drinking water is from groundwater provided by public and private wells. However, north of the canal in northern New Castle County, where DAASF is located, groundwater supplies only 30% of drinking water (DGS, 2019).

Based on the USEPA Unregulated Contaminant Monitoring Rule 3 data, it was indicated that PFAS were detected in a public water system above the HA within 20 miles of the facility

(**Appendix A**). The HA is 70 parts per trillion for PFOS and PFOA, individually or combined. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today. The Delaware Department of Natural Resources and Environmental Control (DNREC) reported that Artesian Water Company, a primary drinking water provider in the area, and the City of New Castle Municipal Services Commission detected PFAS in public water supply wells in the area of DAASF. The area of contamination is approximately 7 square miles and is bounded to the north by Interstate 295, the Delaware River to the east, Route 273 to the south, and Route 13 and New Castle Airport to the West. This area of PFAS contamination includes New Castle County Airport, DAASF property, and surrounding residential areas. The public water supply is treated for PFAS contamination before distribution (DNREC, 2019); however, there are 8 private domestic groundwater supply wells within 1 mile of the facility (EDR™, 2019). An EDR™ report conducted a well search for a 1-mile radius surrounding the facility (**Appendix A**). Using additional online resources, such as state and local geographic information system (GIS) databases, wells were researched to a 4-mile radius of the facility. According to data from the state of Delaware, the majority of wells to the southeast of the facility, deep groundwater's downgradient direction, are monitoring wells (Delaware Open Data, 2020). A 2019 USEPA report figure shows four Artesian public water supply wells located 3 miles south of the facility (USEPA, 2019). North of the facility, shallow groundwater's downgradient direction to the Christina River, there are a combination of monitoring and domestic groundwater wells. Well locations shown on **Figure 1-2** are approximate (**Appendix A**).

The adjacent ANG base has undergone an SI for PFAS, and results of the study show HA exceedances for PFAS in groundwater and surface water samples (AFW, 2019). Of the groundwater sample locations, eight locations had results above the HA, and one of two surface water sample locations had results above the HA (AFW, 2019).

1.5.3 Hydrology

North of DAASF is the Christina River, a part of the Christina River Basin that extends from Pennsylvania through New Castle County, Delaware. The Christina River Basin is characterized by dendritic interconnected rivers, streams, and wetlands, with outflow to the Delaware River **(Figure 1-3)**. The Christina River is in the southernmost area of the basin and flows northeast, into the Delaware River. Surface water accounts for 70% of New Castle County's water supply. The majority of which comes from the Christina River Basin, which provides 60% of New Castle County's water overall (NCCDE, 2018). The majority of Christina River is in New Castle County, with headwaters in Maryland. The Christina River is tidal from just south of the town of Christiana to its convergence with the Delaware River. This section of the Christina lies approximately one mile west of the facility and tidal freshwater wetlands occur throughout the area (Delaware Watersheds).

DAASF sits on the Lower Christina River Watershed, at the edge of the Christina Basin, with wetlands lying north of the facility. On facility grounds, runoff flows away from the paved areas and structures into a retention basin on the southern end of the property, where runoff will infiltrate or evaporate. However, surrounding the facility, general surface water flow is north into the Christina River and Nonesuch Creek, which converge downstream and continue northeast to the Delaware River **(Figure 1-3)**.

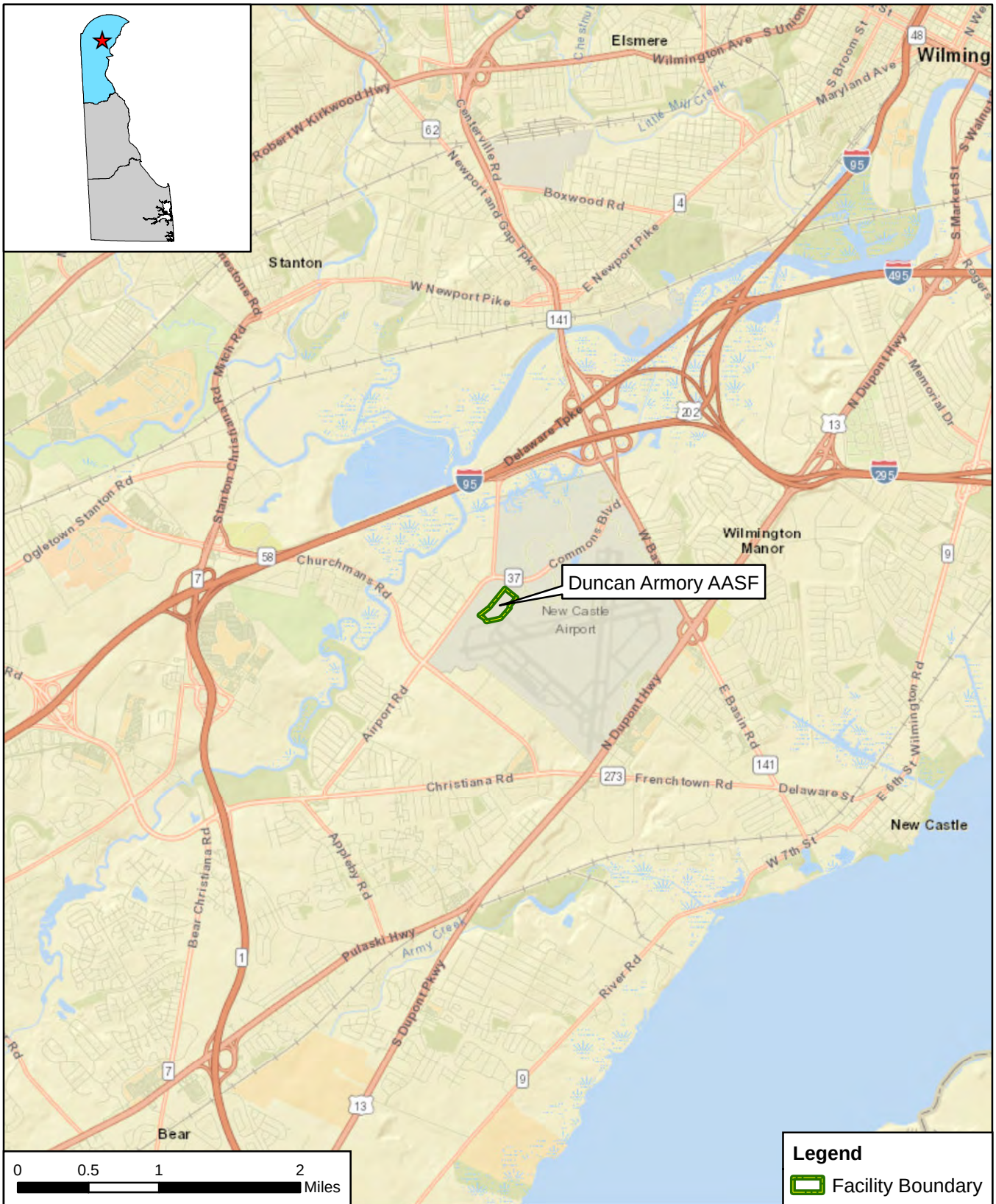
The facility is closest to the 68-mile marker of the Delaware River (Delaware River Basin Commission [DRBC], 2011). A presentation from the Delaware River Basin Commission provides 2009 PFAS concentration data for media tested along the Delaware river. PFAS were detected in surface water in the section closest to the facility, between river miles 68 and 70 (DRBC, 2012). The 2009 PFOA concentration at river mile 68.1 was 0.0277 micrograms per liter (µg/L), and the PFOS concentration was 0.00575 µg/L (DRBC, 2012).

1.5.4 Climate

The climate at DAASF is humid continental. The Delaware Bay and Atlantic Ocean to the east and south, and the Chesapeake Bay to the west moderate temperature extremes in the winter and summer months. Although the extremes are lessened, the climate at DAASF is still continental with hot summers, cold winters, and precipitation throughout the year (AFW, 2019). Mean annual temperature in New Castle is 54 degrees Fahrenheit (°F). Average annual high temperature for Wilmington, Delaware in New Castle County, is 64.1°F and average annual low temperature is 45.8°F. Annual precipitation for Wilmington is approximately 43 inches of rain and 19 inches of snowfall (US Climate Data, 2019).

1.5.5 Current and Future Land Use

The DAASF currently resides on a portion of land leased from the New Castle Airport under the terms of a 50-year lease. It has been an active military facility since the signing of the lease in December 1973. The facility is currently used for aircraft maintenance and administrative activities. Future land use is not anticipated to change.



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Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	8/21/2019

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Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-1

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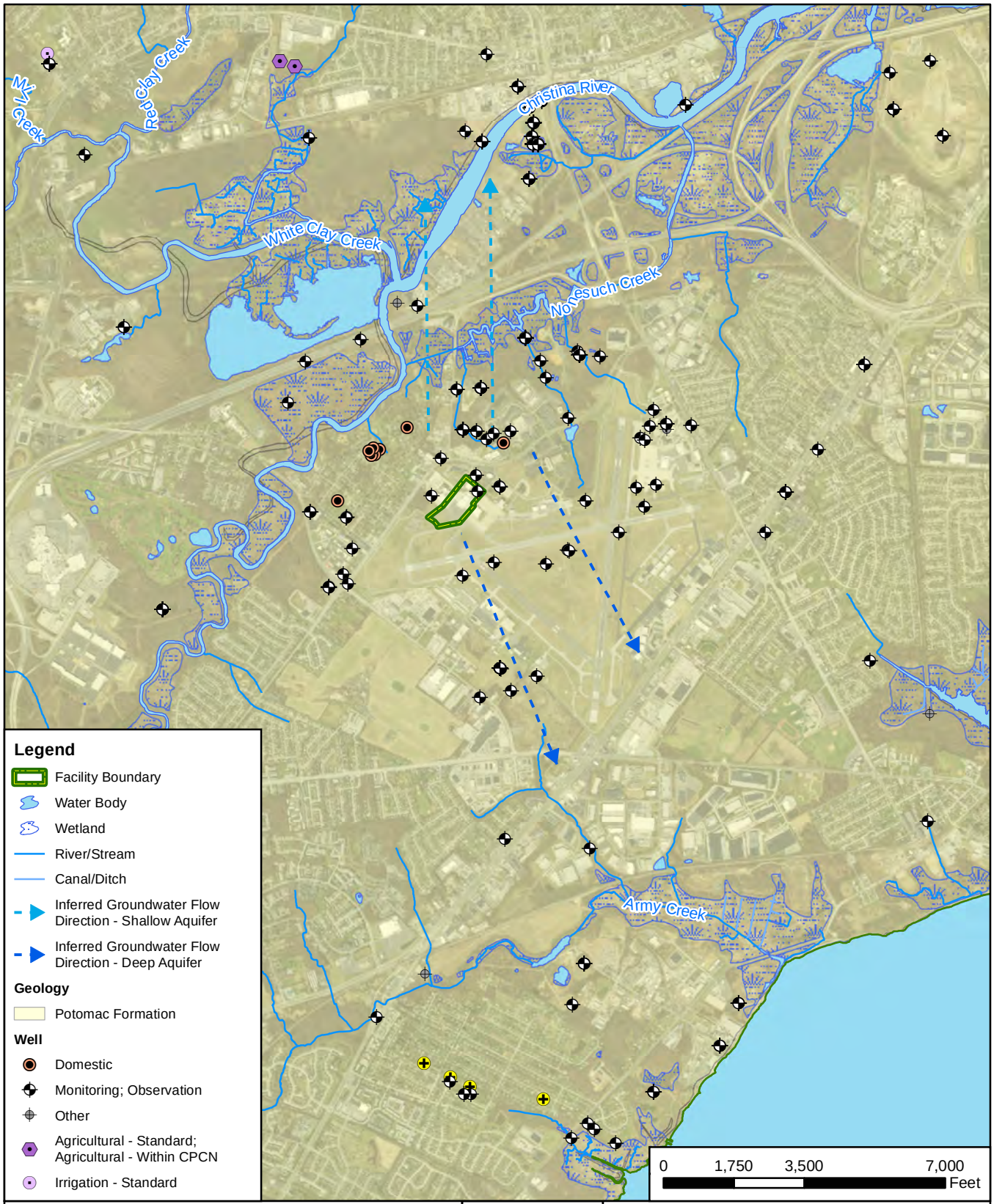

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Groundwater Features

AECOM
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Figure 1-2

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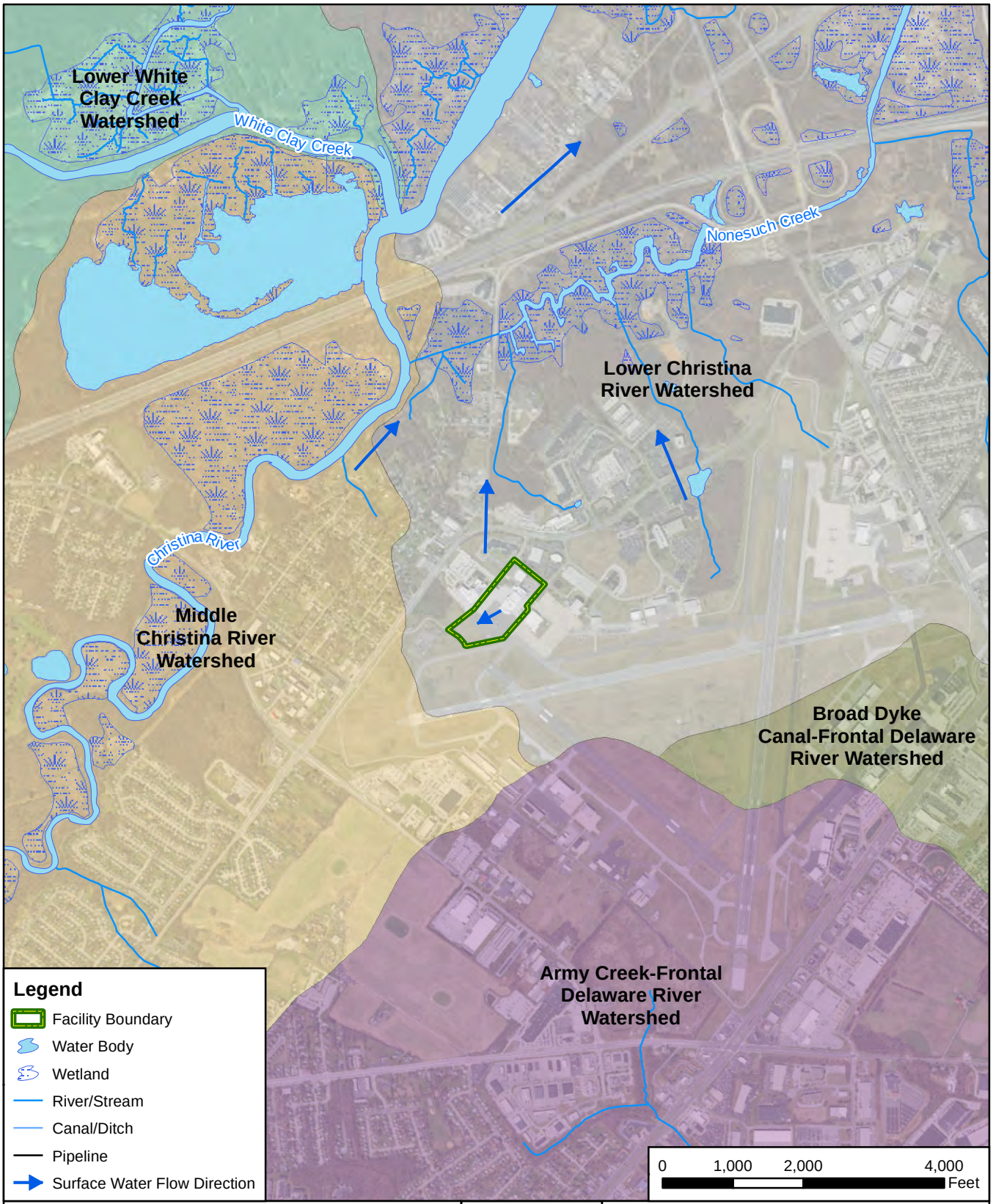

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Surface Water Features

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Figure 1-3

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2. Fire Training Areas

No FTAs were identified within DAASF during the PA through interviews. Firsthand knowledge of interviewees reaches back to 1991, and there is no primary source information between 1969, the year the Department of Defense (DoD) started using AFFF, and 1990 (**Appendix A**).

3. Non-Fire Training Areas

In addition to FTAs, the PA evaluated areas where PFAS-containing materials may have been broadly used, stored, or disposed. This may include buildings with fire suppression systems, paint booths, AFFF storage areas, and areas of compliance demonstrations. Information on these features obtained during the PA are included in **Appendices A** and **B**. One non-FTA where a fire suppression system potentially contains AFFF was identified during the PA. A description of the non-FTA is presented below, and the non-FTA is shown on **Figure 3-1**.

3.1 Hangar

The hangar is located in the center of the DAASF facility; the geographic coordinates are 39°40’57.095”N; 75°39’56.959”W (**Figure 3-1**). According to interviewees, at the completion of construction of the new hangar and administrative wing in 2011, the existing fire suppression system in the hangar was retrofitted with a Jet-X 2% high expansion foam concentrate system. During retrofitting, the previous system was discharged with an aqueous soap and water solution to test functionality before Jet-X was placed in the system. Prior to the installation of the Jet-X deluge system, the fire suppression system was equipped with a non-PFAS foam, though interviewees do not remember the type, and firsthand interviewee knowledge only extends back to 1991. The storage tank for the current deluge system is located inside the fire suppression equipment room, which is accessible from outside of the building. The foam deluge system, automatic sprinkler system, and dry pipe sprinkler system are all checked on a quarterly basis by Allegiant Fire Protection. Though PFAS are not included in the Hazardous Materials Identification System Information for Jet-X, the full contents are a trade secret and not disclosed. As a result, the ARNG is conservatively operating under the potential for Jet-X to be PFAS-containing. There is no suspected release at this location on the DAASF facility.

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Duncan Armory AASF, DE			
REVISED	8/21/2019	GIS BY	MS	8/21/2019
SCALE	1:3,600	CHK BY	GC	8/21/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	8/21/2019

Non-Fire Training Areas

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Figure 3-1

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4. Emergency Response Areas

One emergency response area was identified within DAASF during the PA through interviews. A description is presented below, and the area is shown on **Figure 4-1**.

4.1 Helicopter Crash Site

In the 1970s, an ARNG helicopter crashed on the boundary between the DAASF facility and New Castle Airport properties; the geographic coordinates are 39°40’53.789”N; 75°36’56.487”W (**Figure 4-1**). Interviewees with secondhand knowledge of the event indicated that the municipal fire department (FD) responded to the scene using a foam fire suppressant. It is unknown whether the aqueous foam used was AFFF. The released foam likely followed on-site surface water pathways to the retention basin at the southern end of the facility. Surface water runoff from the facility collects in this basin until it evaporates or infiltrates the subsurface. The crash location is a potential PFAS release.

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Duncan Armory AASF, DE			
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SCALE	1:3,600	CHK BY	GC	11/1/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	11/1/2019

Emergency Response Area

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Figure 4-1

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5. Adjacent Sources

Five potential off-facility sources of PFAS located adjacent to DAASF, not under the control of ARNG, were identified during the PA through interviews and news reports. A description of each adjacent source is presented below, and the adjacent sources are shown on **Figure 5-1**.

5.1 Delaware Auto Salvage Fire

In July 2018, a fire of unknown origin broke out at Delaware Auto Salvage, located approximately 1.3 miles from DAASF. Emergency response units were called from surrounding cities to assist in controlling the fire. It was estimated that nearly 400 vehicles ignited, and news agencies reported that water was used to control the flames. This location has no suspected PFAS release because there are no reports or interviewee accounts of foam being used to control the fire (ABC, 2018). Emergency response personnel were not interviewed during the PA because the focus of the assessment was to evaluate potential PFAS related activities and sources at Delaware ARNG (DEARNG) properties. **Figure 5-1** shows the location of the Delaware Auto Salvage Fire.

5.2 Delaware State Fire School

Approximately 0.5 miles north of the facility is the Delaware State Fire School New Castle. Activities on this campus include exercises with live fires and firefighting foam. The type of foam used is uncertain, but there is a potential for PFAS release at this location. Delaware State Fire School personnel were not interviewed during the PA because the focus of the assessment was to evaluate potential PFAS related activities and sources at DEARNG properties. **Figure 5-1** shows the location of the Delaware State Fire School.

5.3 Aircraft Crash Site

In June 1991, a military aircraft tilted while on a test flight, and its wing hit the ground, igniting a small fire which was then extinguished by the DANG FD. It is unknown whether AFFF were used to extinguish the fire; however, the DANG FD is known to use AFFF for fire suppression. Because the use of AFFF at the crash site cannot be confirmed, the crash site has been identified as a potential PFAS release area. DANG personnel were not interviewed during the PA because the focus of the assessment was to evaluate potential PFAS related activities and sources at DEARNG properties. **Figure 5-1** shows the location of the Aircraft Crash.

5.4 DANG Fire Training Area

Approximately 80 feet southwest of the southwestern corner of DAASF property is the location of DANG's FTA. This location is DANG's current operational FTA. Interviewees noted training with fire suppressing foam does occur on this site, but they are unsure whether the foam is AFFF. Because of this uncertainty, the DANG FTA has been identified as a potential PFAS release area. DANG personnel were not interviewed during the PA because the focus of the assessment was to evaluate potential PFAS related activities and sources at DEARNG properties. **Figure 5-1** shows the location of the DANG FTA.

5.5 Airplane Crash Site

In November of 2018, a crash was reported at the adjacent ANG base. According to interviews and news reports, the aircraft's landing gear malfunctioned, causing it to land nose-gear up with no anterior wheel. No action from emergency response units present was required, as the airplane came to an abrupt halt with no fires igniting and only minimal sparking. Due to no emergency action being necessary, this area has been identified as a location with no suspected PFAS release.

CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Duncan Armory AASF, DE			
REVISED	9/27/2019	GIS BY	MS	9/27/2019
SCALE	1:14,400	CHK BY	GC	9/27/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	9/27/2019

N

Adjacent Sources

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

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6. Preliminary Conceptual Site Model

Based on the PA findings, one AOI was identified at DAASF: AOI 1 is the helicopter crash site and foam drainage pathway. The AOI location is shown on **Figure 6-1**. The following sections describe the CSM components and the specific preliminary CSM developed for AOI 1. The CSM identifies the three components necessary for a potentially complete exposure pathway: (1) source, (2) pathway, (3) receptor. If any of these elements are missing, the pathway is considered incomplete.

In general, the potential PFAS exposure pathways are ingestion and inhalation. Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways is sparse and continues to be the subject of PFAS toxicological study. Receptors at DAASF include site workers, construction workers, trespassers, and off-site residents. The preliminary CSM for DAASF indicates which specific receptors could potentially be exposed to PFAS (**Figure 6-2**).

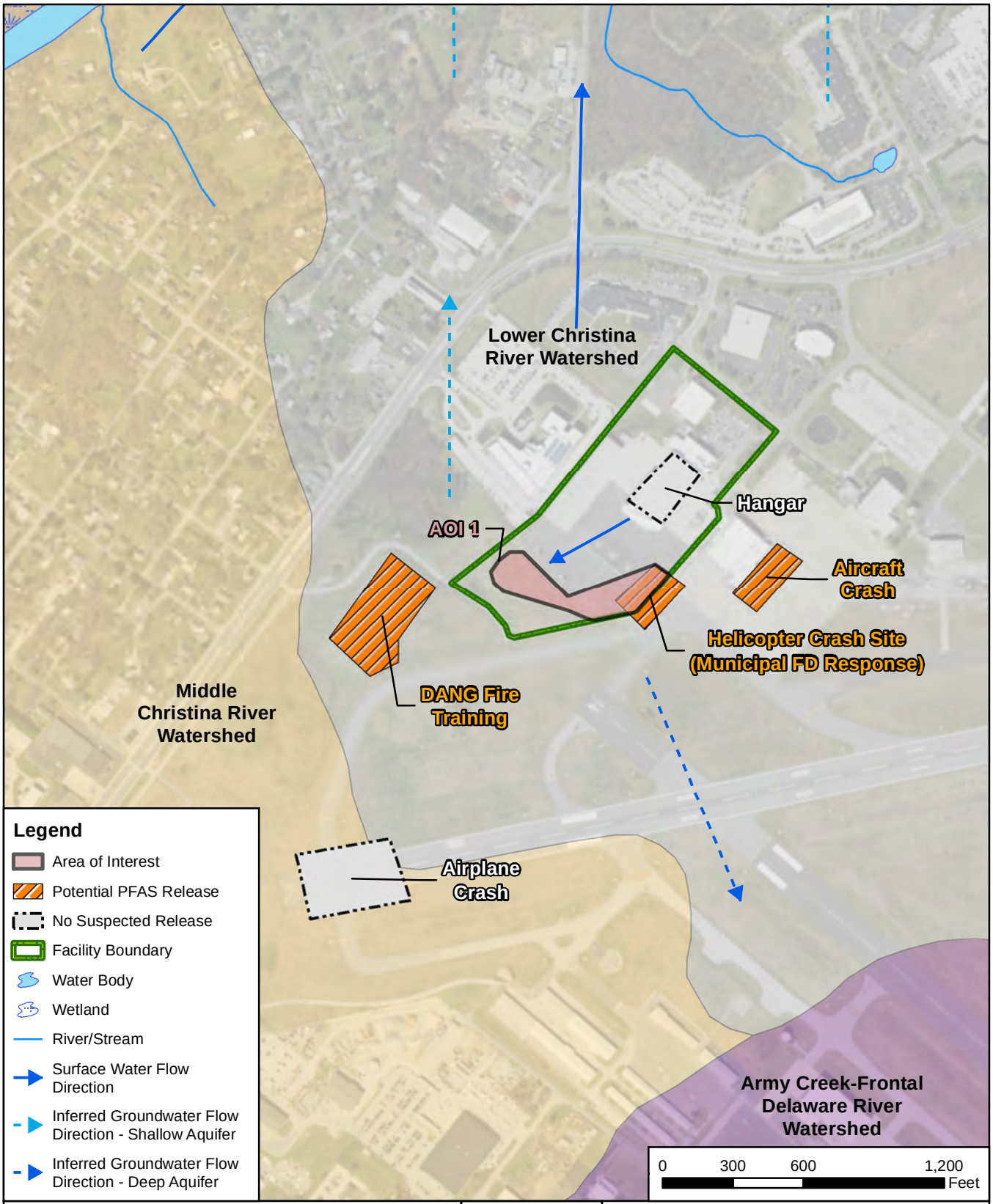
6.1 AOI 1 Helicopter Crash Site

AOI 1 consists of the general location of the 1970s ARNG helicopter crash site, including the runoff path and retention basin where AFFF may have accumulated. Historical knowledge from interviews suggests the municipal FD responded to the scene and used foam to suppress the fire. Though the type of foam used is unknown, the municipal FD is known to use AFFF to extinguish fires.

If used, residual fire-fighting foam may have flowed via the surface water drainage ditch from the crash site to the retention basin in the southwest corner of the facility. Ingestion of surface water or sediments is possible along the drainage path from the crash site as well as the retention basin, considering the foam likely settled there. As a result, there are potentially complete surface water and sediment pathways for site workers, construction workers, and trespassers. Exposure to PFAS via inhalation of airborne soil particulates and ingestion of surface soil may occur at this facility, as contaminated runoff from the crash site likely would have migrated across both paved and unpaved areas on route to the retention basin. Site workers, construction workers, and trespassers may be exposed to soil across this area. PFAS contamination of subsurface soil and shallow groundwater may have occurred, as PFAS can infiltrate subsurface soil and leach into groundwater. PFAS exposure to construction workers via subsurface soil is potentially complete.

PFAS contamination from the potential source area may have infiltrated to groundwater from the retention basin and along the path of foam migration from the crash site. Shallow groundwater is inferred to flow north, towards the Christina River, and deep groundwater is inferred to flow southeast, towards the Delaware River. While no potable water wells are located within DAASF, there are public water supply wells within 3.5 miles of the facility, located in the Public Wells Groundwater Plume Site. The approximate locations of the public wells were included in a 2019 EPA report and found to be south of the facility. DNREC's community fact sheet in **Appendix A** provides an outlined area of the Public Wells Groundwater Plume Site that encompasses the area of these four public wells. This public well plume site, as described previously, encompasses the New Castle County Airport, DAASF property, and surrounding residential areas (DNREC, 2019). These public wells are treated for PFAS contamination by Artesian Water Company, Inc.

The EDR™ report indicates there are also eight domestic, private wells that are located within 1 mile of the facility (EDR™, 2019). A potentially complete groundwater ingestion pathway exists for off-facility residents using these private wells. The ingestion pathway for groundwater to construction workers is also potentially complete. The preliminary CSM for AOI 1 is shown on **Figure 6-2**.



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Duncan Armory AASF, DE			
REVISED	1/9/2020	GIS BY	MS	1/9/2020
SCALE	1:7,200	CHK BY	GC	1/9/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	1/9/2020

Area of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1

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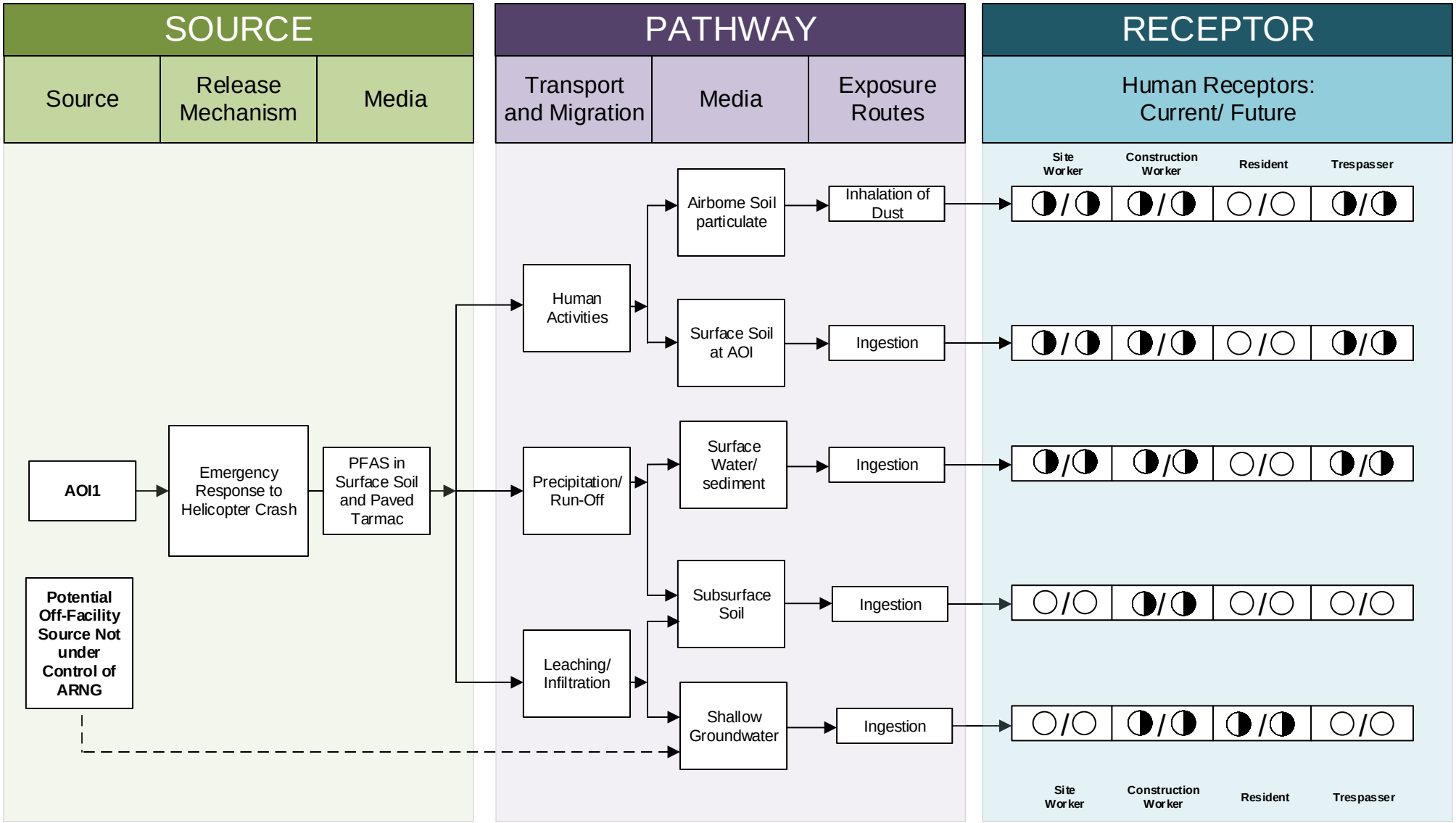


LEGEND

- Flow-Chart Stops
- Flow-Chart Continues
- Partial / Possible Flow
- Incomplete Pathway
- Potentially Complete Pathway
- Complete Pathway

Notes:
1. The residential receptor refers to an off-facility receptor.
2. Human consumption of agricultural products potentially affected by PFAS is possible

Figure 6-2
Preliminary Conceptual Site Model
Duncan Armory AASF, Delaware

7. Conclusions

This report presents a summary of available information gathered during the PA on the use of AFFF at DAASF. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

One AOI related to potential PFAS release (**Table 7-1**) was identified at DAASF during the PA through interviews with facility personnel (**Figure 7-1**).

Table 7-1 AOIs at DAASF

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	Helicopter Crash	Municipal FD	1970s

Based on a potential PFAS release at the AOI, there is potential for exposure to PFAS contamination in airborne soil particulates, surface soil, surface water and sediments to site workers, construction workers, and trespassers via ingestion and inhalation; subsurface soil to construction workers via ingestion; and groundwater to construction workers and off-facility residents.

The following areas shown in **Table 7-2** and discussed in **Section 3** were determined to have no suspected release.

Table 7-2 No Suspected Release Areas

No Suspected Release Area	Used by	Rationale for No Suspected Release Determination
Hangar	DAASF	The fire suppression system has not been discharged since it was retrofitted with Jet-X, a potentially PFAS-containing foam.

Several adjacent sources of PFAS exist near DAASF. These sources include the location of DANG's FTA as well as the State of Delaware Fire Training School. Both FTAs are known to use fire-suppressing foam in exercises that may include AFFF. Excess foam could travel downgradient from DANG property to the retention basin at DAASF. The aircraft crash is another potential off-facility source of PFAS. If AFFF was used to suppress the fire at this location, PFAS could have traveled via runoff or groundwater flow onto DAASF property.

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 facility. 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 based on all available information, including: previous environmental reports, EDRs™, observations made during the VSI, and interviews. Interviews of personnel with direct knowledge of a facility generally provided the most useful insights regarding a facility's historical and current PFAS-containing materials. Sometimes, the provided information

was vague. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge due to staffing changes, the time passed since PFAS were first used (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS release locations, dates of release, volume of releases, and the concentration of AFFF used. 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, retired and current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected. **Table 7-3** summarizes the uncertainties associated with the PA.

Table 7-3 Uncertainties

Area of Interest	Source of Uncertainty
AOI 1: Helicopter Crash	Due to the date of the crash and staffing turnover, it is not known what type, quantity, or concentration of foam was used at the crash location, nor the exact year of the crash. The firefighting foam used could potentially have been AFFF.
General	A data gap exists between 1969 (when DoD began using AFFF) and 1991. Firsthand knowledge of activities that occurred at DAASF dates back to 1991.
General	Due to trade secrets, the full contents of Jet-X foam, used in the hangar's fire suppression system, are unknown and could contain PFAS.

It is also unknown whether or to what degree the potential adjacent off-facility PFAS release areas associated with the DANG Base or the New Castle Airport may affect DAASF.

7.3 Potential Future Actions

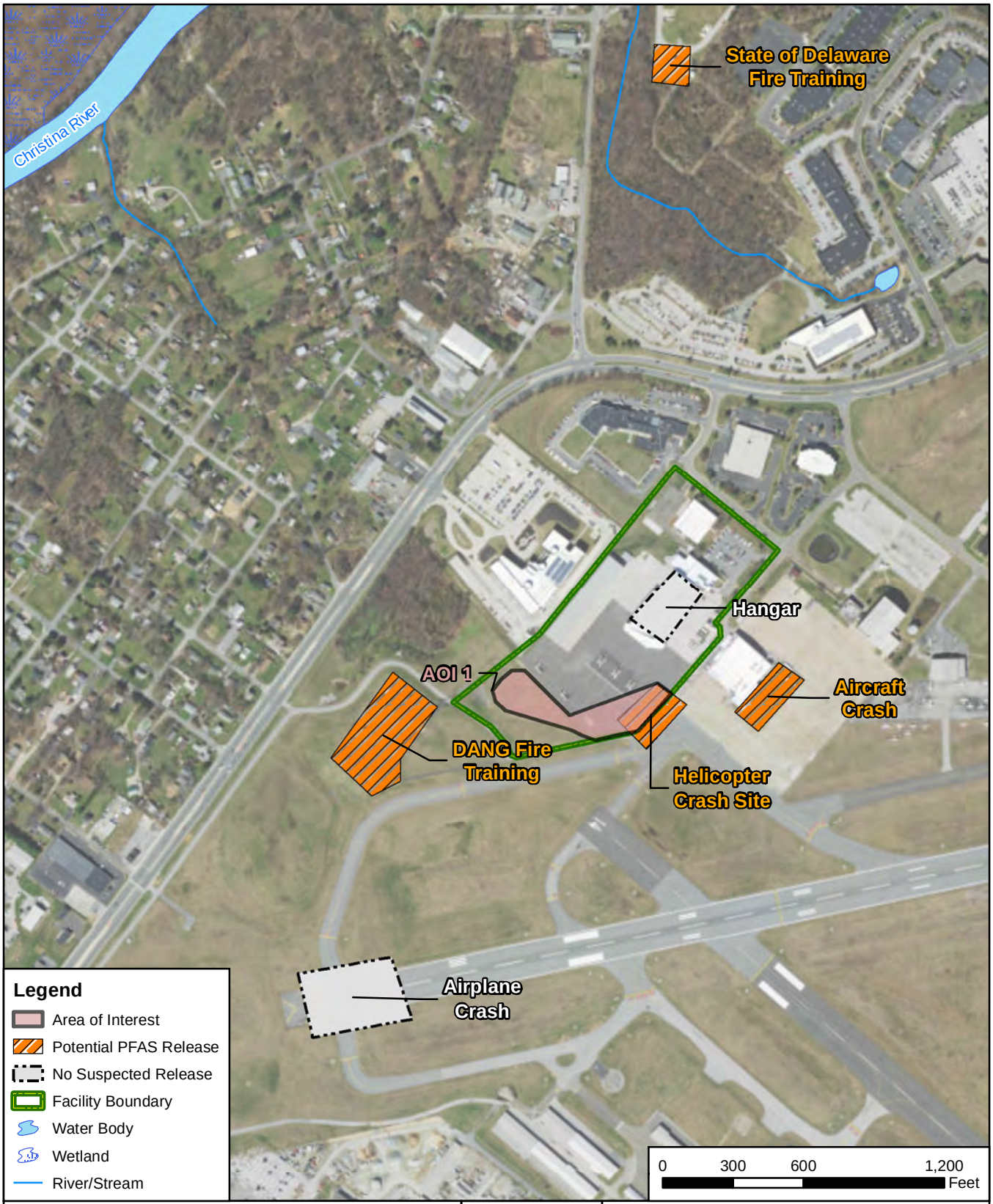
Based on the absence (1991-present) of the release of PFAS-containing materials in the hangar, evidence does not indicate that current or former DEARNG activities in this area contributed PFAS contamination to soil, groundwater, surface water, or sediment at DAASF. This area will not move forward in the CERCLA process.

Interviews (covering 1990s to present) indicate that emergency response activities associated with the AOI may have introduced PFAS into the environment, thus, there is potential for receptors to be exposed to PFAS as shown in the preliminary CSM in **Section 6**. **Table 7-4** summarizes the rationale used to determine if the AOI should be considered for further investigation under the CERCLA process and undergo an SI.

ARNG will evaluate the need for an SI at DAASF based on the potential receptors, the potential migration of PFAS contamination off the facility, and the availability of resources.

Table 7-4 PA Findings Summary

Area of Interest	AOI Location	Rationale	Potential Future Action
AOI 1 Helicopter Crash	39°40'53.30"N; 75°36'55.79"W	The helicopter crash fire was contained with an unknown foam, and residual foam may have been released to the ground and migrated to the retention basin on-site.	Proceed to an SI, focus on soil, surface water, sediment, and groundwater



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Duncan Armory AASF, DE			
REVISED	10/8/2019	GIS BY	MS	10/8/2019
SCALE	1:7,200	CHK BY	GC	10/8/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	10/8/2019

N

Summary of Findings

AECOM
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Germantown, MD 20876

Figure 7-1

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Appendix A
Data Resources

Data Resources will be provided separately on CD. Data Resources for Duncan Armory AASF includes:

Duncan AASF Previous Site Investigations

- 2019, Final Report FY16 Phase 1 Regional Site Inspections for Perfluorinated Compounds, Amec Foster Wheeler
- Delaware Department of Natural Resources and Environmental Control's New Castle County Airport Area Fact Sheet, PFOS/PFOA Detected in Ground Water from New Castle Public Wells

Duncan AASF Site Background Documents

- 2005, USGS Geologic Map of New Castle County, Delaware, Kelvin W. Ramsey
- 2019, Hoopes Fire Prevention, Inc. & Allegiant Fire Protection Inspection Notes
- 2017, Jet-X 2% High Expansion Foam Concentrate Data Sheet
- 2013, Contaminants of Emerging Concern in the Tidal Delaware River: Pilot Monitoring Survey 2007-2009
- 2019, Fifth Five-Year Review Report for Army Creek Landfill Superfund Site New Castle County, Delaware

Duncan AASF Site Property Documents

- 1973, Duncan Army Aviation Support Facility Lease Agreement

Environmental Data Resources Reports, Inc.™

- 2019, Aerial Photo Decade Package, Environmental Data Resources, Inc.™
- 2019, Certified Sanborn Map Report, Environmental Data Resources, Inc.™
- 2019, Radius Map Report with Geocheck, Environmental Data Resources, Inc.™

Appendix B
Preliminary Assessment Documentation

Appendix B.1
Interview Records

1984

PA Interview Questionnaire - Environmental Manager

Facility: Duncan AASF
Interviewer: [redacted]
Date/Time: 8/6/19

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

1. Roles or activities with the Facility/years working at the Facility.
   Environmental program manager - 10 years (DAASF is one of the locations under their watch)
   At facility total of 28 years
   another local

2. Where can I find previous facility ownership information?
   CPT [redacted] - Lease Agreements/Real Property
   Point of Contact

3. What can you tell us about the history of PFAS including aqueous film forming foam (AFFF) at the Facility? Was it used for any of the following activities, circle all that apply and indicate years of active use, if known? Identify these locations on a facility map.

   Maintenance Hoopes - Annually
   Fire Training Areas None
   Firefighting (Active Fire) in 70's
   Crash 1 on-site in 70s, 2 off-site
   Fire Suppression Systems (Hangers/Dining Facilities) Hanger AFFF system-no release
   Fire Protection at Fueling Stations BC
   Non-Technical/Recreational/ Pest Management None
   Metals Plating Facility None
   Waterproofing Uniforms (Laundry Facilities) None
   Other

4. Fill out CSM Information worksheet with the Environmental Manager.

5. Are any current buildings constructed with AFFF dispensing systems or fire suppression systems? What are the AFFF/suppression system test requirements? What is the frequency of testing the AFFF/suppression system? Do you have "As Built" drawings for the buildings?
   The hangar has AFFF fire suppression system. Inspected yearly by Hoopes - no release.

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

6. Are fire suppression systems currently charged with AFFF or have they been retrofitted for use of high expansion foam? If retrofitted, when was that done?

   Currently charged with AFFF - switched to AFFF in 2011

7. How is AFFF procured? Do you have an inventory/procurement system that tracks use?

   Hoopes - Supplier

8. What type of AFFF has been/is being used (3%, 6%, Mil Spec Mil-F-24385, High Expansion)? Manufacturer (3M, Dupont, Ansul, National Foam, Angus, Chemguard, Buckeye, Fire Service Plus)?

9. Where is the AFFF stored? How is it stored (tanks, 55-gallon drums, 5-gallon buckets)? What size are the storage tanks? Is the AFFF stored as a mixed solution (3% or 6%) or concentrated material?

   tank

10. How many FTAs are/were on this facility and where are they? Locate on a map. How many FTAs are active and inactive? For inactive FTAs, when was the last time that fire training using AFFF was conducted at them?

    No AFFF fire training

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

11. When a release of AFFF occurs during a fire training exercise, now and in the past, how is the AFFF cleaned and disposed of? Were retention ponds built to store discharged AFFF? Was the AFFF trickled to the sanitary sewer or left in the pond to infiltrate?

N/A

12. Can you recall specific times when city, county, and/or state personnel came on-post for training? If so, please state which state/county agency or military entity? Do you have any records, including photographs to share with us?

N/A

13. Did military routinely or occasionally fire train off-post? List the units that you can recall used/trained at various areas.

DE Air Nat'l guard's fire training area directly west of post.

14. Did individual units come with their own safety personnel, did they also bring their own AFFF? Was training with AFFF part of these exercises? How were emergencies handled under these circumstances?

No AFFF training on-site

15. Are there specific emergency response incident reports (i.e., aircraft or vehicle crash sites and fires)? If so, may we please copy these reports? Who (entity) was the responder?

Find incident reports for 3 crashes

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

16. Do you have records of fuel spill logs? Was it common practice to wash away fuel spills with AFFF? Is/was AFFF used as a precaution in response to fuel releases or emergency runway landings to prevent fires?

No AFF used for fuel spill

17. Was AFFF used for forest fires or fire management on-post/off-post? If so, please describe what happened and who was involved?

No

18. Are there mutual aid/use agreements between county, city, and local fire department? Please list, even if informal. If formalized, may we have a copy of the agreement?

Local fire dept. responds to emergencies on-post

19. Can you provide any other locations where AFFF has been stored, released, or used (i.e. hangars, buildings, fire stations, firefighting equipment testing and maintenance areas, emergency response sites, storm water/surface water, waste treatment plants, and AFFF ponds)?

Emergency response sites:
On-site: Helicopter crash in 1970s
Off-site: • Aircraft crash in 90s
• Plane "belly up" on runway - local fire dept responded, but no release of water or foam. No resultant fire from crash

20. Are you aware of any other creative uses of AFFF? If so, how was AFFF used? What entities were involved?

None

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

21. Are there past studies you are aware of with environmental information on plants/animals/ groundwater/soil types, etc., such as Integrated Cultural Resources Management Plans or Integrated Natural Resources Management Plans?

22. What other records might be helpful to us (environmental compliance, investigation records, admin record) and where can we find them?

23. Do you have or did you have a chrome plating shop on base? What were/are the years of operation of that chrome plating shop?

None

24. Do you know whether the shop has/had a foam blanket mist suppression system or used a fume hood for emissions control? If foam blanket mist suppression was used, where was the foam stored, mixed, applied, etc.?

None

25. How is off-spec AFFF disposed (used for training, turned in, or given to a local Fire Station)? If applicable, do you know the name of the vendor that removes off-spec AFFF? Do you have copies of the manifest or B/L?

Hoopes comes to dispose of it.

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

26. Do you recommend anyone else we can interview? If so, do you have contact information for them?

PA Interview Questionnaire - Other

Facility: Duncan Armory AASF
Interviewer: [redacted]
Date/Time: 8/6/19 0900

Interviewee: [redacted] **Title:** Sergeant Major **Phone Number:** **Email:** [redacted]	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:

DE Army National Guard since 1995 (July)
- General staff Officer 1995-Present
- Construction Plans and Programing Supervisor

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?

	Known Uses
- Fire suppression system retrofitted with AFFF in 2011.	Use
- Non-PFAS Hangar release in 2011 (Soap solution)	Procurement
- Annually inspected by Hoopes - no release	Disposition
- ANG has trucks + storage for AFFF	Storage (Mixed)
- Junkyard fire: early 2018	Storage (Solution)
- No fueling station at facility	Inventory, Off-Spec
- Off-site crash in early 90s: ANG used firetruck °unknown if AFF used	Containment
- Fire extinguishers at each pad (helicopter) - all BC	SOP on Filling
- On domestic/public water	Leaking Vehicles
- Waste water treatment plant	Nozzle and Suppression System Testing
- AFFF for hangar FSS stored in tank in mechanical closet of Admin building	Dining Facilities
- No AFFF fire training areas on-site	Vehicle Washing
- FTA directly west of site (foam used - not sure if AFFF)	Ramp Washing
- Helicopter crash partially on-site in 1970s (actual date not known)	Fuel Spill Washing and Fueling Stations
	Chrome Plating or Waterproofing

Appendix B.2
Visual Site Inspection Checklists

Visual Site Inspection Checklist

Names(s) of people performing VSI: [redacted]

Recorded by:

ARNG Contact: LTC Brian Nichols

Date and Time: 5/6/19

Method of visit (walking, driving, adjacent): Walking

Source/Release Information

Site Name / Area Name / Unique ID: Duncan Armory AASF

Site / Area Acreage:

Historic Site Use (Brief Description): New Castle Airport - leased to ARNG

Current Site Use (Brief Description): AASF

Physical barriers or access restrictions: Fence, guard posts

1. Was PFAS used (or spilled) at the site/area? **Y / N**

1a. If yes, document how PFAS was used and usage time (e.g., fire fighting training 2001 to 2014):

Potentially for fire fighting (1970s)

2. Has usage been documented? **Y / N**

2a. If yes, keep a record (place electronic files on a disk):

Reached out for incident reports

3. What types of businesses are located near the site? **Industrial / Commercial / Plating / Waterproofing / Residential**

3a. Indicate what businesses are located near the site

4. Is this site located at an airport/flightline? **(Y) / N**

4a. If yes, provide a description of the airport/flightline tenants:

Airport adjacent to ARNG site (New Castle County airport + Air Nat'l guard base)

Visual Survey Inspection Log

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:

PFAS-containing AFFF supplied by Hcopes

1b. If yes, describe maintenance schedule/leaks:

No leaks, tested annually, but contained at testing

1c. If yes, how often is the AFFF replaced:

~10 years?

1d. If yes, does the facility have floor drains and where do they lead? Can we obtain an as built drawing?

Not sure

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation? (Y) / N

1a. If so, note observation and location:

Yes, stormwater retention pond directly SW of site

2. Is there channelized flow within the site/area? (Y) / N

2a. If so, please note observation and location:

Drains on asphalt

3. Are monitoring or drinking water wells located near the site? Not sure Y / N

3a. If so, please note the location:

4. Are surface water intakes located near the site? Y / N

4a. If so, please note the location: Christiana River - NW of site

5. Can wind dispersion information be obtained? Y / N

5a. If so, please note and observe the location.

6. Does an adjacent non-ARNG PFAS source exist? (Y) / N

6a. If so, please note the source and location. aircraft crashes adjacent to site, Air Nat'l guard fire training & DE state fire training

6b. Will off-site reconnaissance be conducted? Y / N

Visual Survey Inspection Log

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):

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:

4. Does the site/area exhibit any areas of ponding or standing water? Y / (N)

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

potential of it w/ stormwater retention pond

Receptor Information

1. Is access to the site restricted? (Y) / N

1a. If so, please note to what extent:

ID shown @ guard house. Otherwise restricted to employees

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:

3. Are residential areas located near the site? (Y) / N

3a. If so, please note the location/distance:

West of site (.2 miles) East 1.23 North 1.95 South 1.52

4. Are any schools/day care centers located near the site? Y / N

4a. If so, please note the location/distance/type:

Pleasant Hill ES (1.8 mi), Wilmington Manor (1.67mi), George Read MS (1.62 mi)

5. Are any wetlands located near the site? Y / N

5a. If so, please note the location/distance/type:

Yes, NW of site, Swamp/Marsh (0.607 mi)

Visual Survey Inspection Log

Additional Notes

Photographic Log

Photo ID/Name	Date & Location	Photograph Description

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Duncan Armory AASF

Why has this location been identified as a site?

A potential for historical PFAS release has been identified.

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

Air Nat'l guard property, New Castle County Airport, Delaware State Fire training area

Training Events

Have any training events with AFFF occurred at this site? Not within installation boundaries

If so, how often? N/A

How much material was used? Is it documented? N/A

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?

Surface Water:

Surface water flow direction? Presumably North, on-site goes to water retention pond

Average rainfall? 43.08 (Annual)

Any flooding during rainy season? Not in floodplain

Direct or indirect pathway to ditches? direct path to retention pond

Direct or indirect pathway to larger bodies of water? Runoff → christina river → delaware river

Does surface water pond any place on site? in retention pond

Any impoundment areas or retention ponds? Yes

Any NPDES location points near the site?

How does surface water drain on and around the flight line? There are some ditches to allow SW to infiltrate, but if not in these or retention pond, SW flows toward christina river

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? SW-shallow SE-deep

Depth to groundwater?

Uses (agricultural, drinking water, irrigation)?

Any groundwater treatment systems?

Any groundwater monitoring well locations near the site? Can't find info. No EDR?

Is groundwater used for drinking water? municipal water

Are there drinking water supply wells on installation? No → municipal water

Do they serve off-post populations?

Are there off-post drinking water wells downgradient No down-gradient off-post drinking water wells according to EDR

Waste Water Treatment Plant:

Has the installation ever had a WWTP, past or present? No

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

Do we understand the fate of sludge waste? N/A

Is surface water from potential contaminated sites treated? N/A.

Equipment Rinse Water

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

Not on-site

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?

Equipment cleaned and rinsed @ Air Nat'l Guard site & NE Fire training center respectively

3. Other?

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker SW Runoff, Soil

Construction Worker SW Runoff, Soil

Recreational User

Residential SW runoff, Soil, groundwater

Child

Ecological – SW runoff, soil, groundwater

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

Schools - GW

Documentation

Ask for Engineering drawings (if applicable).

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

No

Appendix C
Photographic Log

APPENDIX C – Photographic Log

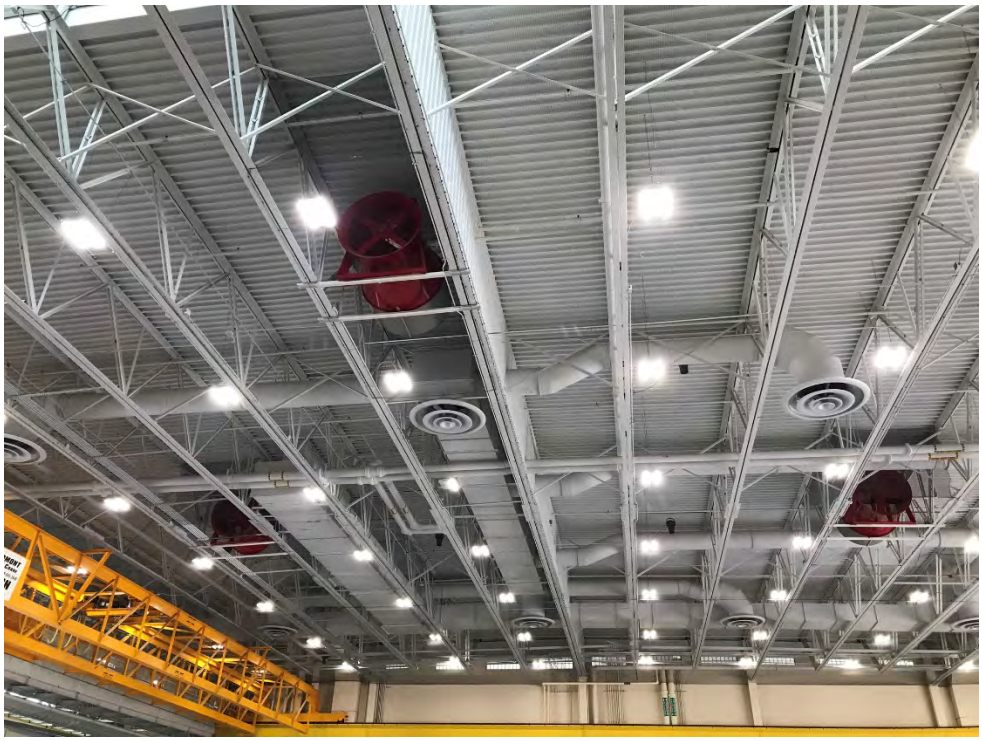
Army National Guard, Preliminary Assessment for PFAS	Duncan Armory AASF	New Castle, Delaware

Photograph No. 1

Description:

Duncan AASF AFFF fire suppression system fans

Photo Date: 8/6/2019



Photograph No. 2

Description:

AFFF foam suppression system activation switch.

Photo Date: 8/6/2019

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Duncan Armory AASF	New Castle, Delaware

Photograph No. 3

Description:

Tank housed in Fire Suppression Room. Possible AFFF fluid for fire suppression system.

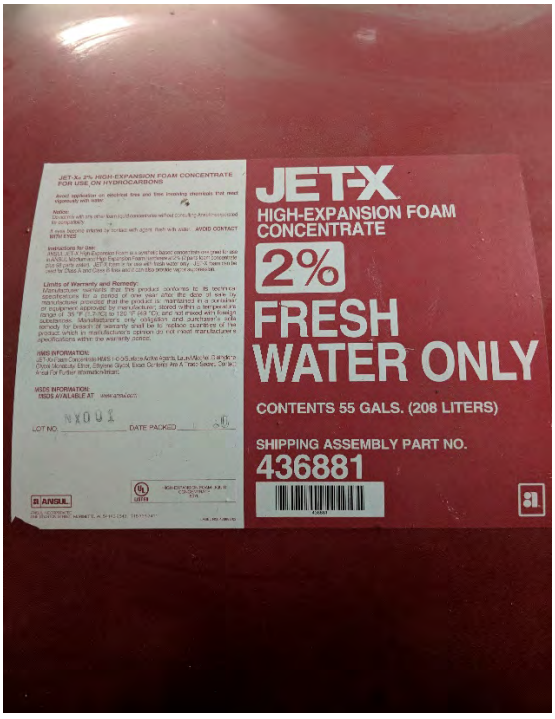
Photo Date: 12/9/2019

Photograph No. 4

Description:

Images of Jet-X tank labels

Photo Date: 12/9/2019



APPENDIX C – Photographic Log

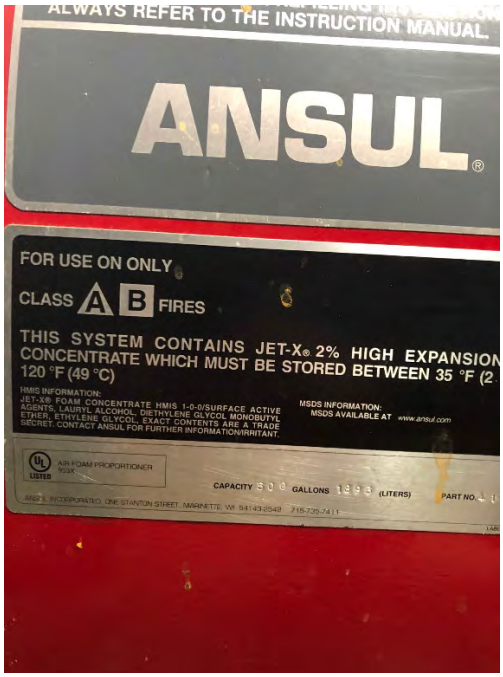
Army National Guard, Preliminary Assessment for PFAS	Duncan Armory AASF	New Castle, Delaware

Photograph No. 5

Description:

Image of informational placard on Jet-X tank.

Photo Date: 12/9/2019



Photograph No. 6

Description:

Image of handheld ABC fire extinguisher identical to others posted throughout the installation.

Photo Date: 8/6/2019

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Duncan Armory AASF	New Castle, Delaware

Photograph No. 7

Description:

Inspection tag from handheld ABC fire extinguisher in facility.

Photo Date: 8/6/2019