FINAL
Preliminary Assessment Report
Army Aviation Support Facility Upstate, Greenville, South Carolina

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

October 2020

Prepared for:

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

UNCLASSIFIED

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
amsl	above mean sea level
AOI	Area of Interest
ARNG	Army National Guard
AASF	Army Aviation Support Facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
EDR™	Environmental Data Resources, Inc.™
FAA	Federal Aviation Administration
ft	feet
FTA	fire training area
HA	Health Advisory
IBC	Intermediate bulk container
OWS	oil water separator
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
POTW	publicly owned treatment works
SC	South Carolina
SCARNG	South Carolina Army National Guard
SCTAC	South Carolina Technology and Aviation Center
SI	Site Inspection
UCMR3	Unregulated Contaminant Monitoring Rule 3
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 *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic 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 Army Aviation Support Facility (AASF) Upstate (also referred to as the "facility") in Greenville, South Carolina (SC), to assess potential PFAS release areas and exposure pathways to receptors. The AASF Upstate is located on property owned by the County/City of Greenville and leased to the South Carolina ARNG (SCARNG) since 3 September 2009. SCARNG operations officially began in 19 February 2014, and the leasing agreement is set to expire on 3 September 2034 but may be extended for up to two consecutive 25-year leasing terms. The performance of this PA included the following tasks:

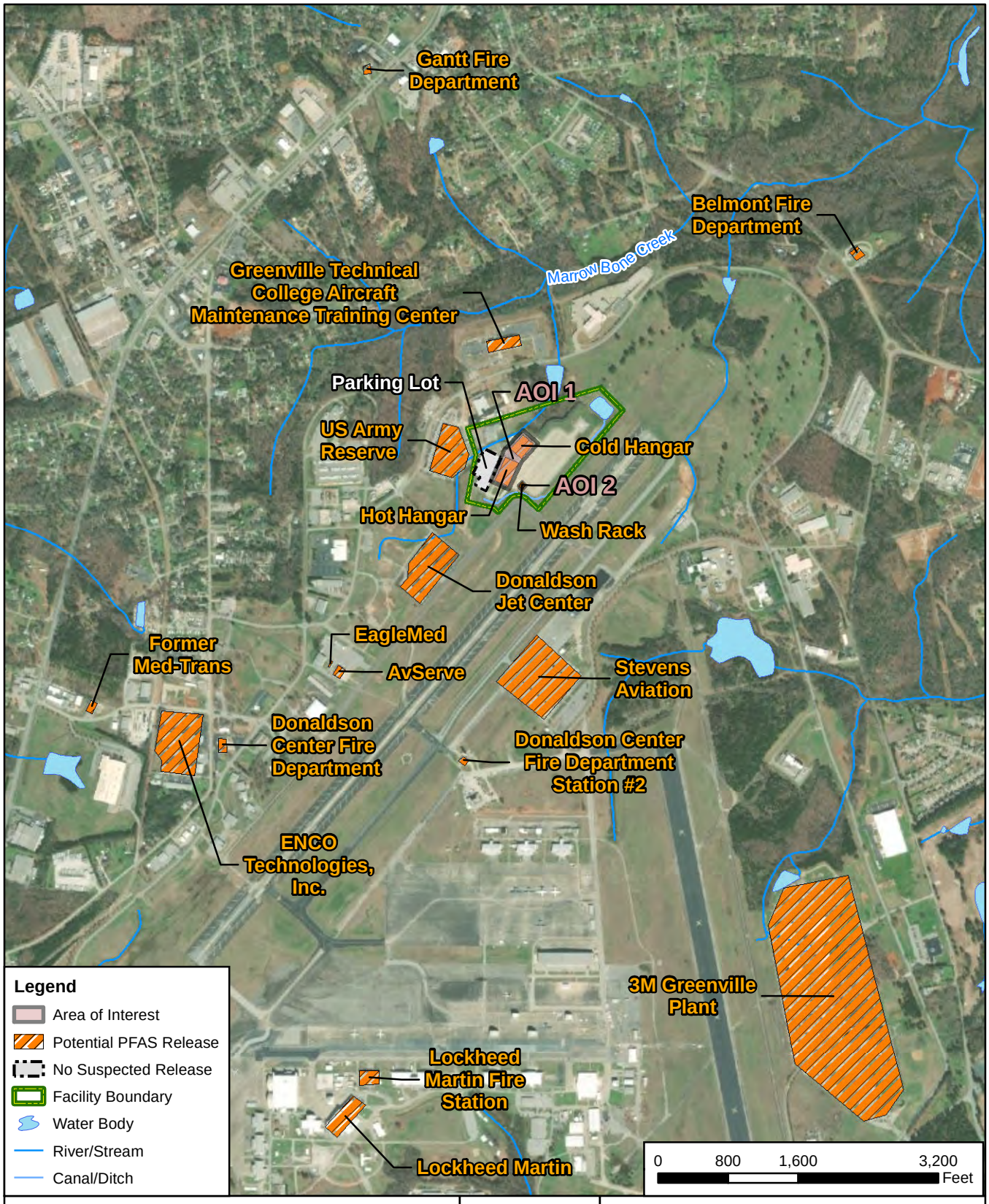
- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- Conducted a site visit on 3 October 2019 and completed visual site inspections (VSIs) at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current SCARNG AASF Upstate personnel during the site visit;
- Identified area(s) of interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment for each AOI.

Two AOIs related to a potential PFAS release were identified at the AASF Upstate during the PA. The AOIs are shown on **Figure ES-1** and in **Table ES-1** below:

Table ES-1: AOIs at AASF Upstate

Area of Interest	Name	Used by	Potential Release Date
AOI 1	Hot and Cold Hangars	SCARNG	2014 and 2019
AOI 2	Wash Rack	SCARNG	2019

Based on potential PFAS releases at the AOIs, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for AASF Upstate is shown on **Figure ES-2**, which presents the potential receptors and media impacted. Based on the United States (US) Environmental Protection Agency (USEPA) Unregulated Contaminant Monitoring Rule 3 (UCMR3) data, it was indicated that no PFAS were detected in a public water system above the United States Environmental Protection Agency lifetime Health Advisory (HA) values within 20 miles of the facility. 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.



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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	7/9/2020

Summary of Findings

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Figure ES-1

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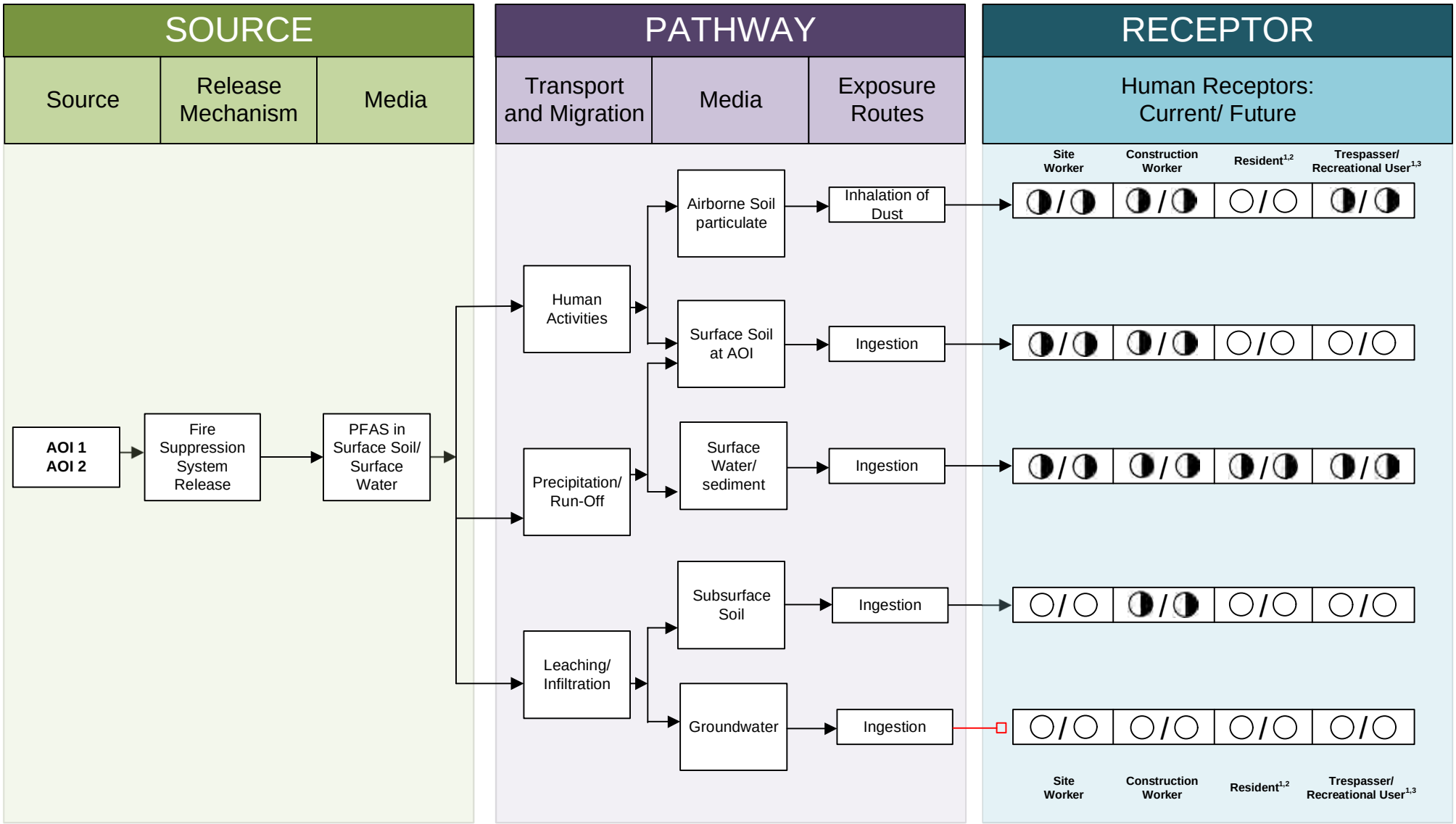


LEGEND

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

NOTES

1. The resident and recreational users refer to off-site receptors.
2. Inhalation of dust for off-site receptors is likely insignificant.
3. Human consumption of fish potentially affected by PFAS is possible.

Figure ES-2
Preliminary Conceptual Site Model
AASF Upstate, SC

1. Introduction

1.1 Authority and Purpose

The Army National Guard (ARNG)-G9 is the lead agency in performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic 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) (a suite of related chemicals), 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 (HAs) 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 the Army Aviation Support Facility (AASF) Upstate (also referred to as the “facility”) in Greenville, South Carolina (SC), 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 the known fire training areas (FTAs) as well as other locations where PFAS may have been released into the environment at the AASF Upstate. 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 3 October 2019 and completed visual site inspections (VSIs) at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current South Carolina ARNG (SCARNG) AASF Upstate personnel during the site visit;

- Identified area(s) of interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment 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:

- **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 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 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

AASF Upstate occupies approximately 34 acres in the northern portion of SC Technology and Aviation Center (SCTAC) (formerly known as the “Donaldson Center Industrial Park”), the public airport park belonging to the County/City of Greenville, South Carolina. AASF Upstate and the encompassing SCTAC are within a portion of land, previously occupied by the former Donaldson Air Force Base, that was acquired by the County/City of Greenville from the US Air Force in 1964 (ENSR Corporation, 2008). The facility is located approximately 6 miles south of the City of Greenville and is situated along the northern point of Donaldson Center Airport. The main gate is accessible along Connecticut Court near Perimeter Road. **Figure 1-1** illustrates the location of the AASF Upstate.

AASF Upstate is a SCARNG maintenance facility for aircraft; the property has been leased from the County/City of Greenville since 3 September 2009. Construction activities for the facility began in 2011, and AASF Upstate operations officially began in 19 February 2014. The leasing

agreement is set to expire on 3 September 2034 but may be extended for up to two consecutive 25-year leasing terms. The leasing agreement is included in **Appendix A**.

1.5 Facility Environmental Setting

AASF Upstate sits within the Piedmont Physiographic Province of SC, a region characterized by rolling hills situated at the foot of the Appalachian Mountains (Cain et al., 2000). The topography slopes to the north/northeast direction towards an unnamed pond that drains into Marrow Bone Creek. The aircraft ramp sits on relatively flat terrain at an elevation of 920 feet (ft) above mean sea level (amsl), separated from the pond by an approximately 40-ft retaining wall. Overall surface elevations at the facility range from 886 to 925 ft amsl.

1.5.1 Geology

AASF Upstate is located within the Piedmont Physiographic Province, which is made up of allochthonous, extensively fractured, and deformed igneous and metamorphic crystalline rocks that are overlain by red, clayey saprolite, a product of deep in-situ chemical weathering of bedrock. Less developed saprolite can sometimes retain features of the original rock, such as foliation. The thickness of the saprolite varies across the region, generally depending on the susceptibility of the underlying bedrock to weathering (**Figure 1-2**). Rivers in this area are erosional and are confined to narrow valleys (Cain et al., 2000).

According to the US Department of Agriculture Natural Resources Conservation Service Web Soil Survey, soils within the facility boundary belong to the Cecil-Urban Land complex, an equal mixture of Cecil soils and Urban Land soils. Cecil soils are clayey residuum from weathered granite and gneiss and are characterized by well-drained sandy loams, clay, and sandy clay loams. Urban Land soils are described as human-transported soils (Web Soil Survey, 2019). According to interviews with AASF Upstate personnel, the facility resides on approximately 70 ft of fill. The fill was brought in for the facility construction activities, but the origins of the fill are otherwise unknown.

1.5.2 Hydrogeology

Groundwater at AASF Upstate resides in the saprolite and fractured bedrock, the aquifers of which are hydraulically connected. Though the saprolite is clayey, groundwater still moves through it. Groundwater movement is dictated by primary porosity features as well as secondary features, including fracturing, faulting, and degree of weathering. The groundwater flow direction likely follows the topographic gradient (trending north to northeast). Groundwater features are presented on **Figure 1-2**.

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 databases, wells were researched to a 4-mile radius of the facility. Multiple monitoring wells are located in the surrounding area. Groundwater level measurements for the monitoring wells screened in the bedrock of the Piedmont and Blue Ridge crystalline-rock aquifer are between 20 to 22 ft below ground surface. (US Geological Survey [USGS], 2019). There are no water supply wells within the facility, and potable water is supplied by Greenville Water (ENSR Corporation, 2008). Greenville Water has surface water intakes at Table Rock Reservoir, North Saluda Reservoir, and Lake Keowee (Greenville Water, 2020). All three drinking water intakes are located between 25 and 30 miles from the facility. One public water supply well is located cross-gradient of the facility, approximately 3.5 miles to the south. Based on the USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR3) data, it was indicated that no PFAS were detected in a public water system above the HA values within 20 miles of the facility. 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.

1.5.3 Hydrology

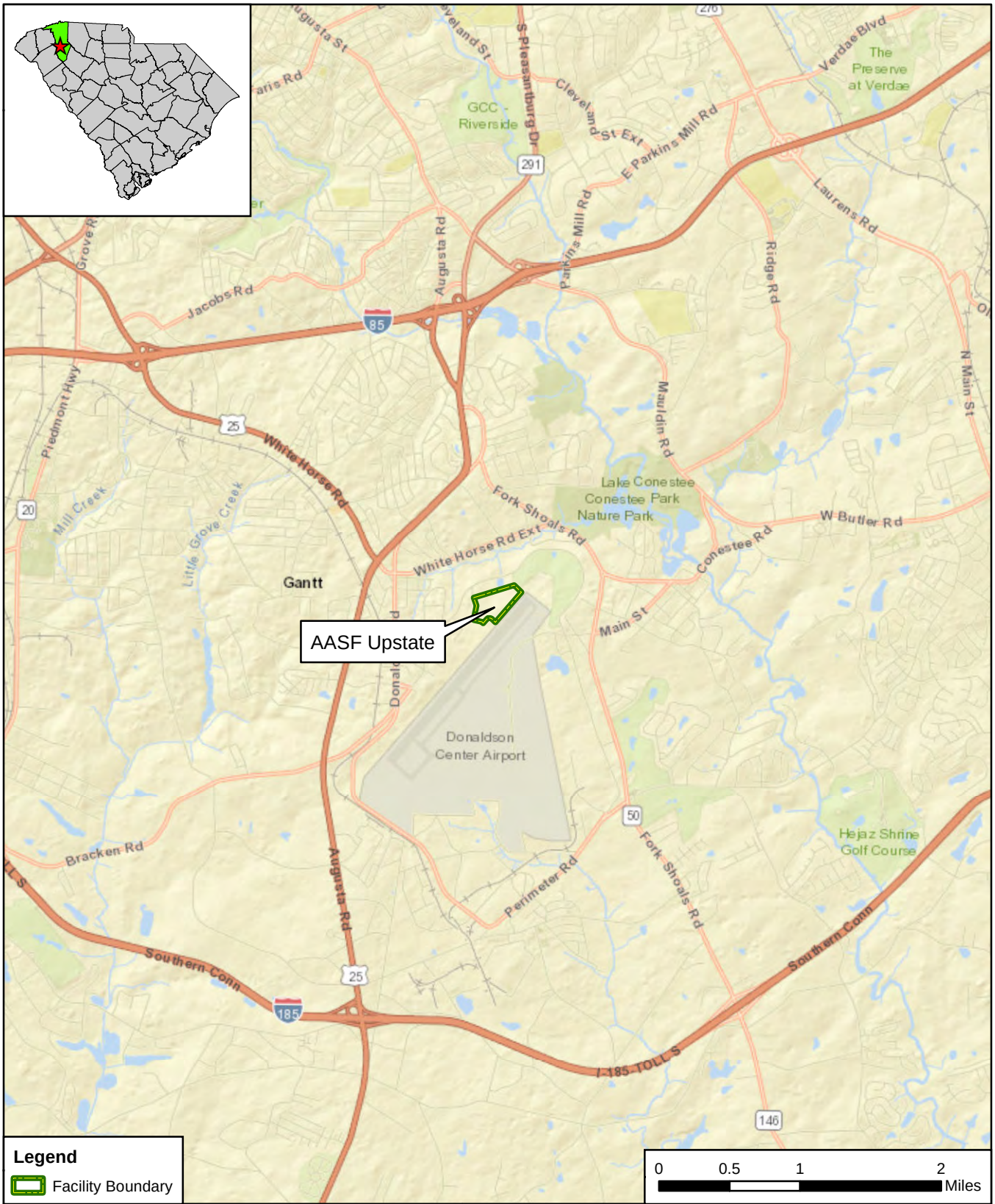
AASF Upstate is located in the Brushy Creek-Reedy River Watershed. A stormwater drainage system carries stormwater from the parking lot, aircraft ramp, and nearby grassy areas and discharges below a retaining wall into an unnamed pond, located north of the aircraft ramp. The pond is connected to an unnamed tributary of Marrow Bone Creek. A drainage ditch also bounds the southern and eastern end of the aircraft ramp and carries stormwater into an on-facility retention basin, located directly northeast of the helipad. The retention basin is not expected to discharge into the adjacent pond, except during major storm events (SynTerra, 2016). Surface water that is not captured by the stormwater drainage system follows the topographic gradient and flows north/northeast towards either the pond or retention basin. Marrow Bone Creek is located approximately 800 ft north of the pond and flows northeast before connecting to the Reedy River, approximately 1.2 miles east of the facility. Surface water features are presented on **Figure 1-3**.

1.5.4 Climate

AASF Upstate is in a humid, subtropical climate zone characterized by long and warm summers and short and mild winters. Rainfall is generally greater during the summer months but otherwise well distributed year-round, with a normal annual precipitation of 47.1 inches. Summer temperatures peak in July, with an average temperature of 80 degrees Fahrenheit (°F). Winter temperatures are lowest in January, with an average temperature of 42 °F. The region typically receives about 4.7 inches of snowfall annually (National Weather Service Forecast Office, 2019).

1.5.5 Current and Future Land Use

The facility is used by SCARNG for aviation maintenance of rotor-wing aircraft, flight instruction, and evaluation of aviation units (SynTerra, 2016). Related infrastructure includes two hangars separated by an administrative building, fuel storage, oil storage, a wash rack, aircraft ramp, and a helipad. Reasonably anticipated future land use is not expected to change from the current land use.



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Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	1/17/2020

Facility Location

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Figure 1-1

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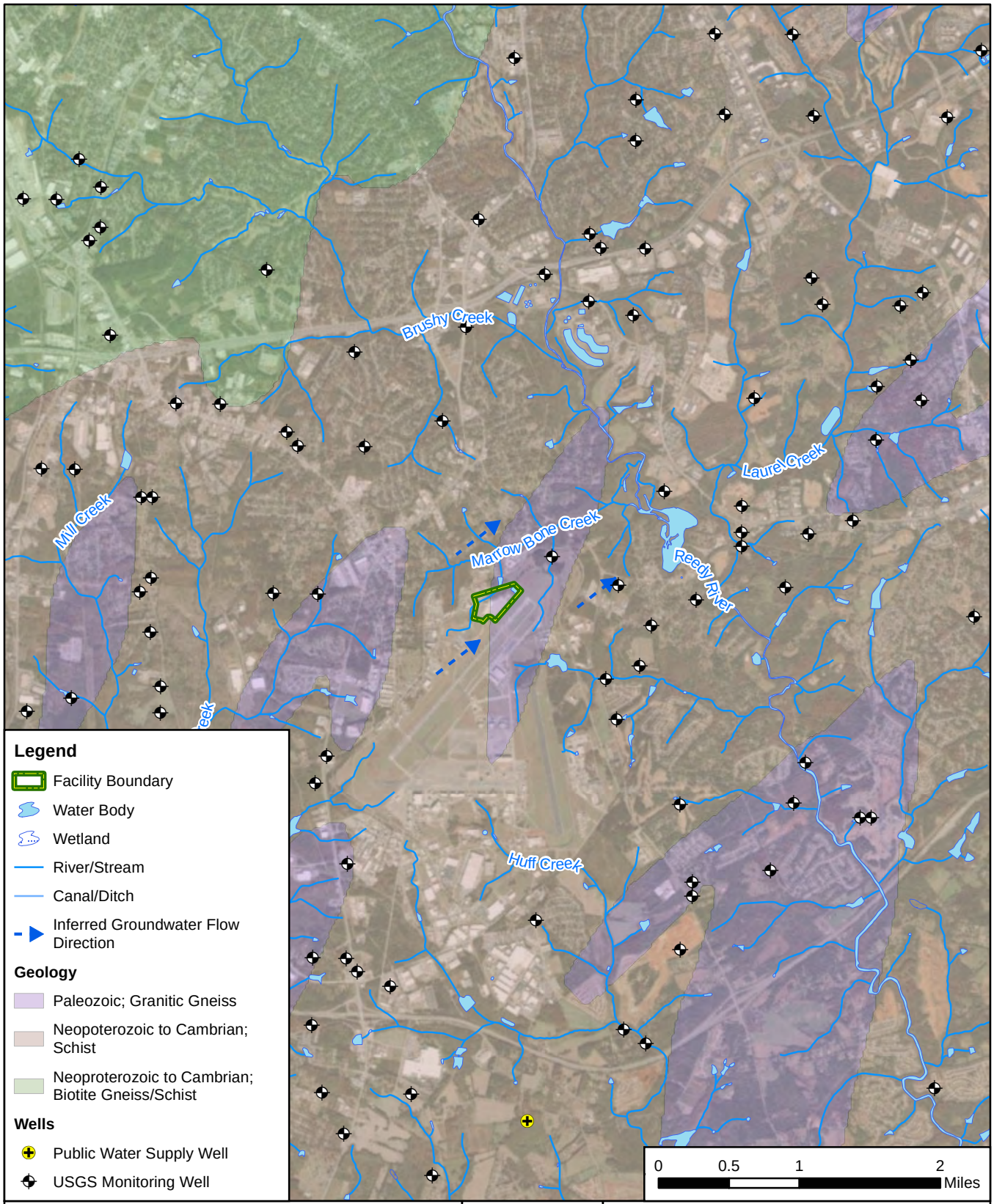

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Groundwater Features

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Figure 1-2

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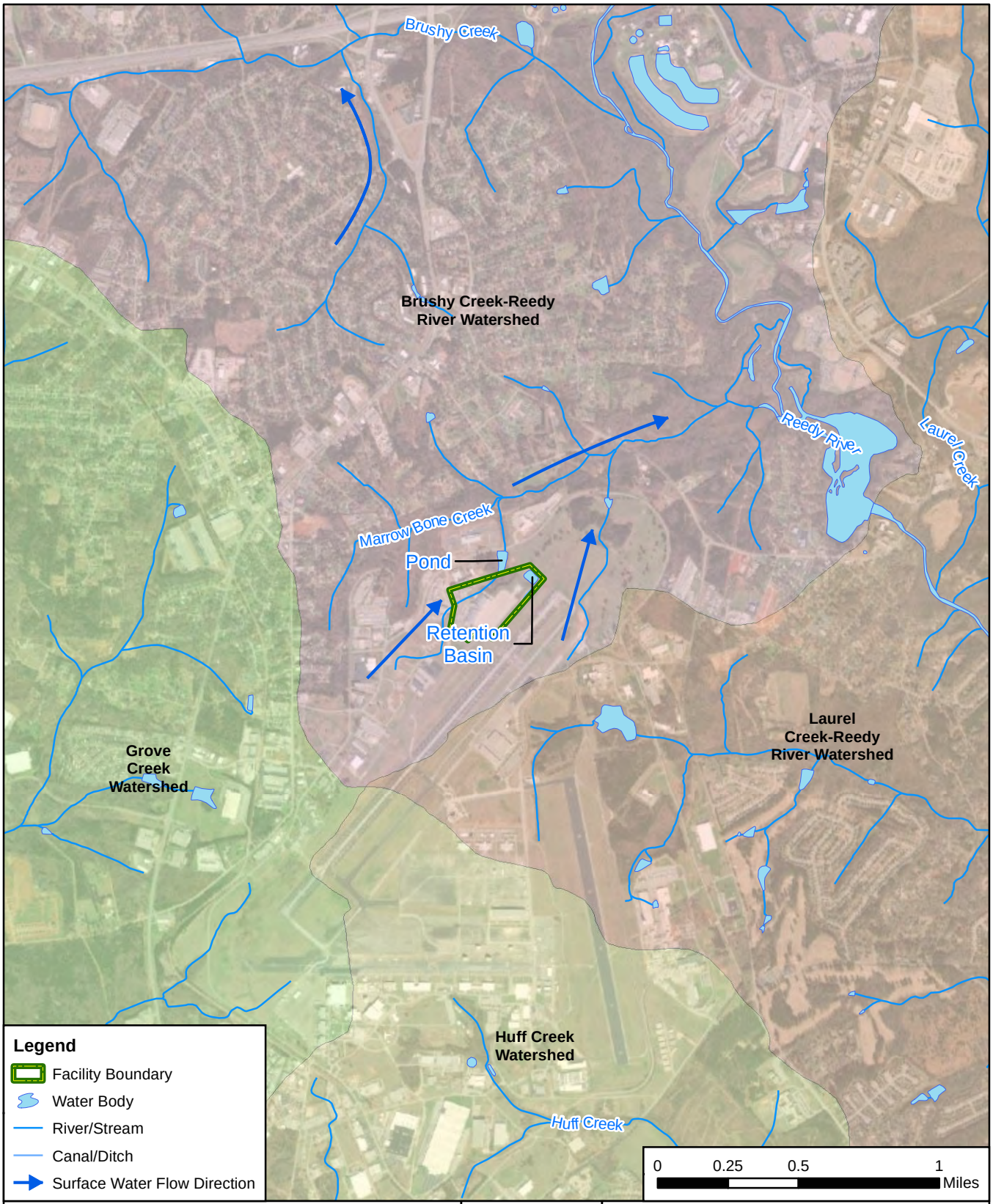

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Suface Water Features

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Figure 1-3

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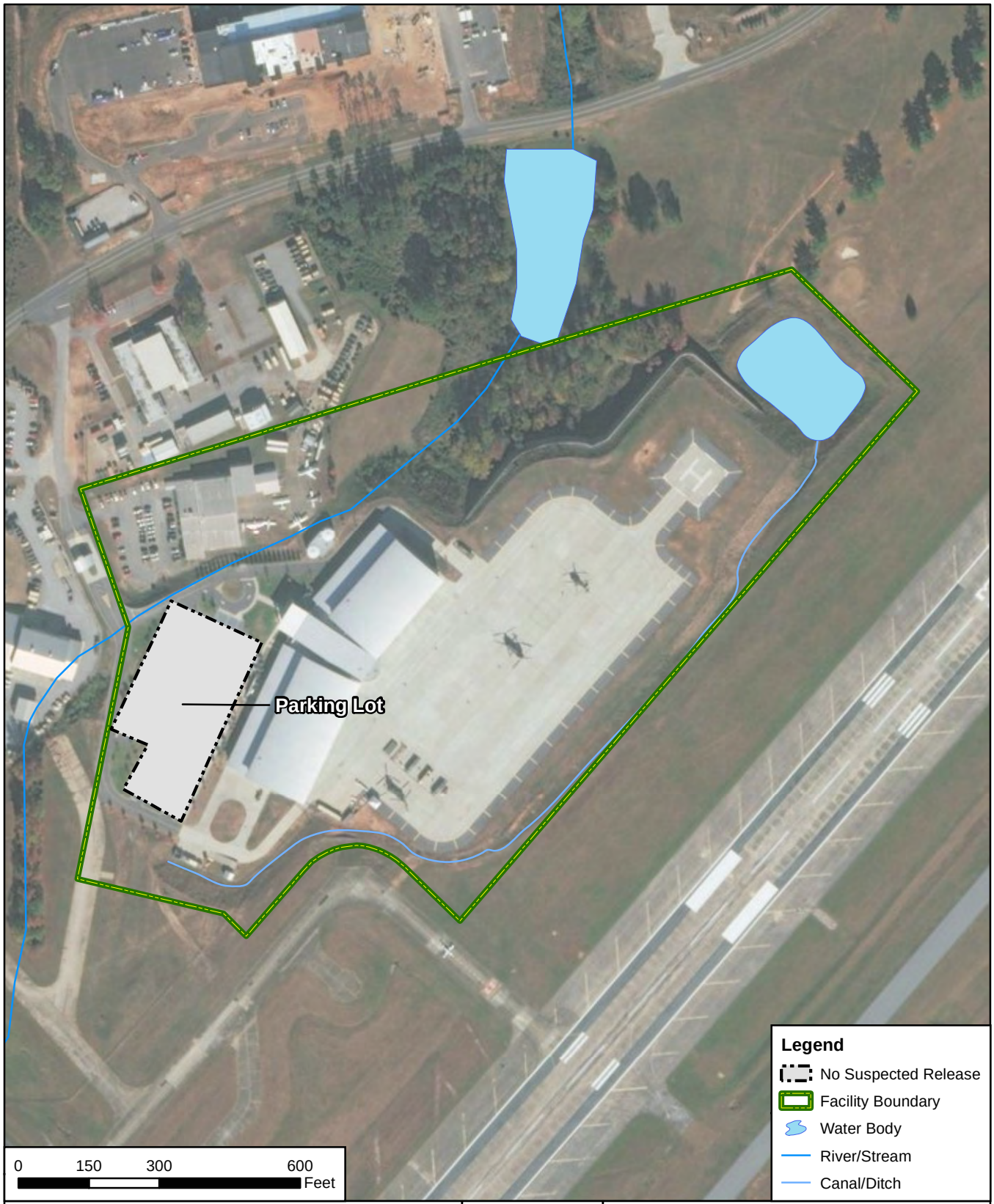
2. Fire Training Areas

One FTA was identified through record reviews and interviews during the PA and is described below. The FTA is shown on **Figure 2-1**.

2.1 Parking Lot

The parking lot of the facility is used for fire training exercises. The training is facilitated by the Donaldson Center Fire Department; no live fire is used during training. According to AASF Upstate interviewees, training includes the use of large metal fire extinguishers that are first filled with water and pressurized air, then discharged onto the parking lot. These exercises are conducted approximately annually at the facility and upon request for any tenants at SCTAC by the Donaldson Center Fire Department.



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Fire Training Area

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Figure 2-1

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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**. Three non-FTAs where AFFF was stored and/or potentially released were identified during the PA. A description of each non-FTA is presented below, and the non-FTAs are shown on **Figure 3-1**.

3.1 Cold Hangar

The Cold Hangar (also known as the "North Hangar") is an unheated aircraft hangar located north of the Hot Hangar. The hangar was built in 2014 and contains a fire suppression system connected to both a 55-gallon tank of Ansulite 3% AFFF and a 55-gallon tank of JET-X 2%. The AFFF and JET-X tanks are both housed in a tank room within the Cold Hangar, and both tanks supply the fire suppression systems of the Cold Hangar and Hot Hangar. The AFFF tank is connected to the fire hoses mounted on the wall of the hangars, and the JET-X tank is connected to the overhead foam generators. The Safety Data Sheet for the Ansul JET-X 2% High Expansion Foam Concentrate product stored in the tank room (**Appendix A**) does not mention PFAS in its composition and states that the product uses a hydrocarbon surfactant. In accordance with ARNG programmatic decisions, alternative foam products are considered potential PFAS sources, thus the presence of JET-X on the facility is treated as such.

A contractor conducted a test of both the Cold and Hot Hangar's overhead fire suppression systems in April 2014. It is unknown if the AFFF handlines were also tested during this event. According to interviews with AASF Upstate personnel, the Cold Hangar was filled with foam up to approximately one-third of the hangar's capacity. The foam was then hosed down the trench drains located on the perimeter of the hangar floor. Photos of the fire suppression system testing event are included in **Appendix C** and show a plastic sheet used to contain the foam from escaping the hangars as well as JET-X foam being released from the overhead foam generators. Following the fire suppression system testing, the foam tanks were topped off. The amount of JET-X product dispensed is unknown.

During quarterly inspection of system valves and pumps in July 2019, a contractor accidentally tripped a valve and triggered a release of an unknown amount of foam from one overhead foam generator. The foam, presumably JET-X, puddled on top of an aircraft, and the aircraft was taken to the wash rack for washing. The remaining release on the hangar floor was mopped up, and the rinse water was placed into the wash rack's waste intermediate bulk container (IBC) totes. AASF Upstate personnel speculated that the release originated from leftover foam in the fire suppression system piping after the April 2014 testing.

A VSI of the tank room observed corrosion and staining on the top of the AFFF tank. AASF Upstate personnel stated that this condition has been observed on the tank since 2014 and is likely attributed to the contractor spilling AFFF while refilling the tank. It is unknown if the tank room inside the Cold Hangar is heated.

3.2 Hot Hangar

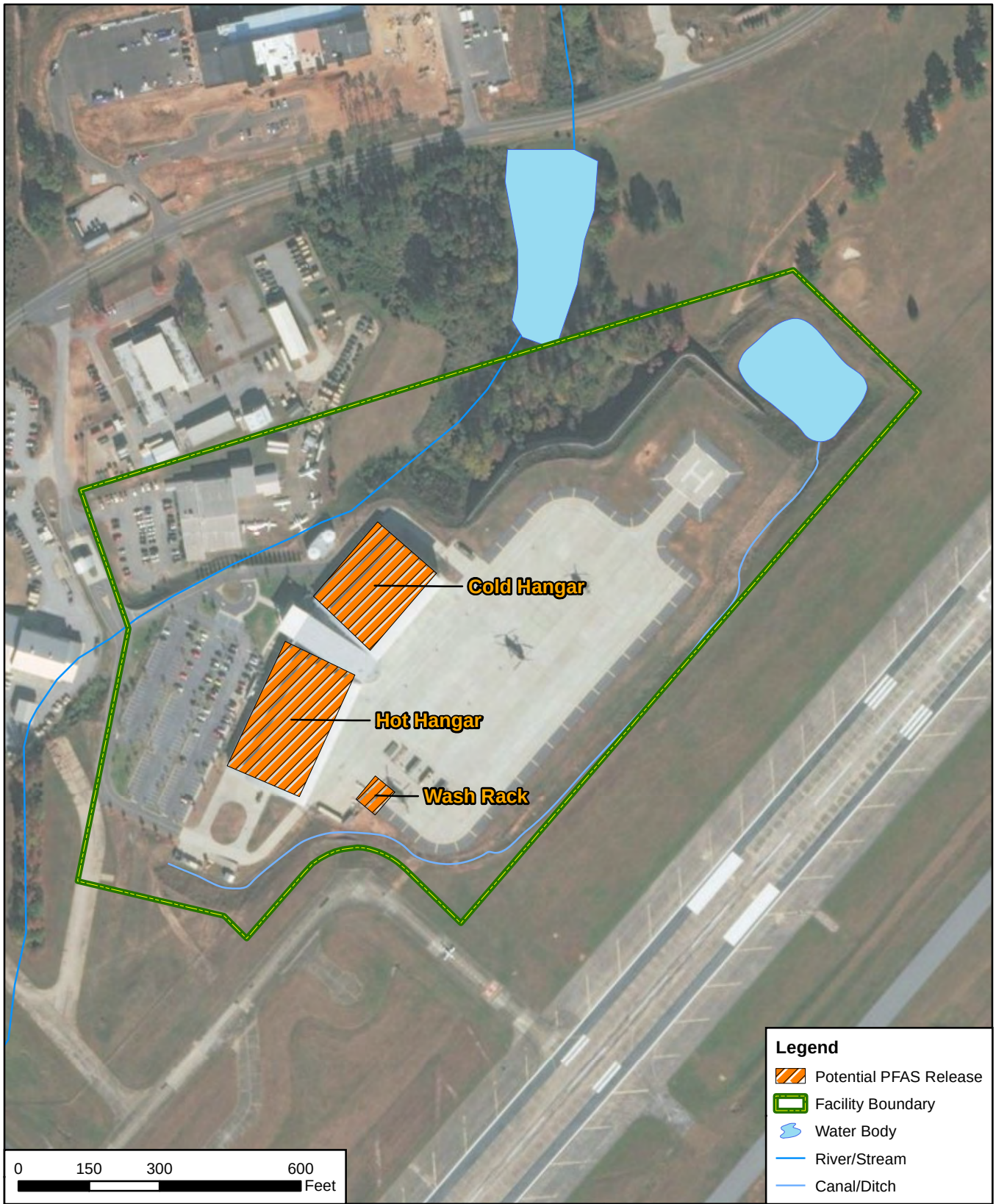
The Hot Hangar (also known as the "South Hangar") is a heated aircraft hangar located immediately south of the Cold Hangar. The hangar was built in 2014 and is connected to the same AFFF and JET-X fire suppression system that is housed in the Cold Hangar. Similar to the Cold Hangar, the AFFF tank is connected to the fire hoses mounted on the wall of hangar, and the JET-X tank is connected to the overhead foam generators.

A contractor conducted a test of both the Cold and Hot Hangar's overhead fire suppression systems in April 2014. It is unknown if the AFFF handlines were also tested during this event. According to interviews with AASF Upstate personnel, the Hot Hangar was also filled with foam up to approximately one-third of the hangar's capacity. The foam was then hosed down the trench drains located on the perimeter of the hangar floor in the same manner as the Cold Hangar. Photos of the fire suppression system testing event are included in **Appendix C** and show a plastic sheet used to contain the foam from escaping the hangars as well as foam being released from the overhead foam generators. The amount of JET-X product dispensed is unknown.

3.3 Wash Rack

The wash rack is located within the southern portion of the aircraft ramp in front of the Hot Hangar and is used as a wash down area for aircraft. The drains of the wash rack lead to an oil water separator (OWS). Although the wash rack was designed to be closed system, the local water authority has not allowed for discharges from the OWS into publicly owned treatment works (POTW). Therefore, the water from the OWS is pumped out and stored in IBC totes for disposal by an approved disposal contractor (SynTerra, 2016). Additional details regarding the disposal destination of the IBC totes were not available. The IBC totes are stored adjacent to the wash rack.

In July 2019, foam was accidentally released from overhead generators onto an aircraft following the quarterly system inspection at the Cold Hangar (**Section 3.1**). The foam released is presumed to be JET-X high expansion foam. The affected aircraft was brought to the wash rack and washed thoroughly to remove the foam. The remaining release on the hangar floor was mopped up, and the rinse water was placed into the wash rack's waste IBC totes. It is assumed that wash water from the wash rack was also transferred to the IBC totes as standard procedure. It is unknown if wash water containing residual foam was discharged to adjacent unpaved areas during washing or if any spills occurred during transfer to or from IBC totes.



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Non-Fire Training Areas

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Figure 3-1

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4. Emergency Response Areas

Emergency responses to crashes sometimes require flame suppression, which may result in the release of PFAS to the environment in the form of AFFF. No emergency response areas were identified within the AASF Upstate facility during the PA through interviews with AASF Upstate personnel. An informal agreement exists with the Donaldson Center Fire Department to respond to emergencies at the facility according to facility personnel.

5. Adjacent Sources

Multiple potential PFAS sources located adjacent to the AASF Upstate were identified during the PA. These possible sources are off-facility and not under the control of SCARNG. A description of each adjacent source is presented below, and the adjacent sources are shown on **Figure 5-1**.

5.1 Private Aviation and Industrial Companies at SCTAC

A number of private aviation and industrial companies are present at SCTAC. At none of the companies could the use or storage of AFFF and/or the use of PFAS in industrial applications be determined during the PA. These adjacent sources are conservatively considered potential PFAS releases and are listed below.

- Stevens Aviation is located at 600 Delaware Street, Greenville, SC 29605. The company is a fixed-base operator and provides maintenance, repair, and operations services. Stevens Aviation is located hydraulically upgradient from the facility, approximately 0.5 miles to the southeast.
- Donaldson Jet Center is a fixed-base operator located at 126 Club Loop, Greenville, SC 29605. Donaldson Jet Center is located hydraulically upgradient from the facility, approximately 0.3 miles to the southwest.
- AvServe is a fixed-base operator located at 522 Perimeter Road, Greenville, SC 29605. AvServe is located hydraulically upgradient from the facility, approximately 0.6 miles to the southwest.
- EagleMed provides air medical transport services and is located at 552 Perimeter Road, Greenville SC 29605. EagleMed is located hydraulically upgradient from the facility, approximately 0.6 miles to the southwest.
- The former location of Med-Trans, an air medical transport service, is located on 9 Ad Asbury Road, Greenville, SC 29605. It is unknown what business currently resides at the location. The former Med-Trans is located hydraulically upgradient from the facility approximately, 1 mile to the southwest.
- Lockheed Martin is an aerospace and defense company located at 244 Terminal Road, Greenville, SC 29605. According to the company's website, "the Greenville facility provides nose-to-tail aircraft sustainment services, such as maintenance, modification, repair, and overhaul, and is the new home of the F-16 Fighting Falcon production line" (Lockheed Martin Aeronautics Company, 2019). AASF Upstate personnel also indicated that the company has a fire station located northeast of the main Lockheed Martin building. Lockheed Martin is located hydraulically upgradient from the facility, approximately 1.3 miles to the south.
- ENCO Technologies is a metal plating facility located at 1222 Donaldson Road, Greenville, SC 29605. Electroless nickel plating services are provided at the facility, which may involve the usage of some PFAS polymers (National Association for Surface Finishing, 2019). ENCO Technologies is located hydraulically upgradient from the facility, approximately 0.9 miles to the southwest.
- The 3M Greenville Plant is located at 1400 Perimeter Road, Greenville, SC 29605. The 3M Greenville Plant specializes in the manufacturing of film, industrial adhesives, and tapes. It cannot be confirmed if PFAS has been or is currently involved in manufacturing processes at the 3M Greenville Plant; however, 3M has historically manufactured AFFF and other PFAS-containing products (3M, 2020). The 3M Greenville Plant is located hydraulically cross-gradient to the facility, approximately 1.3 miles to the southeast.

5.2 US Army Reserve

A US Army Reserve facility is located at 814 Perimeter Road, Greenville, SC 29605. AASF Upstate personnel indicated that the facility was used for vehicle maintenance; however, it is unknown if AFFF is stored or used at the facility, so the facility is conservatively considered a potential PFAS release area. The US Army Reserve facility is located hydraulically cross-gradient to the facility, approximately 0.2 miles to the west.

5.3 Greenville Technical College Aircraft Maintenance Training Center

Greenville Technical College maintains an aircraft maintenance training center located at 915 Perimeter Road, Greenville, SC 29605. The previous location of the Greenville Technical College aircraft maintenance training center was listed at 111 Connecticut Court, Greenville, SC 29605, which is now property belonging to the AASF Upstate. It is unknown if AFFF is stored or used at the current location of the training center, so the training center is conservatively considered a potential PFAS release area. The Greenville Technical College is downgradient from the facility, approximately 0.3 miles to the northwest.

5.4 Donaldson Center Fire Department

The Donaldson Center Fire Department maintains two fire stations within SCTAC. The fire stations are located at 2291 Perimeter Road, Greenville, SC 29605 and along Old Taxi Way next to the airport control tower. The fire department provides emergency fire and rescue services for all facilities at SCTAC.

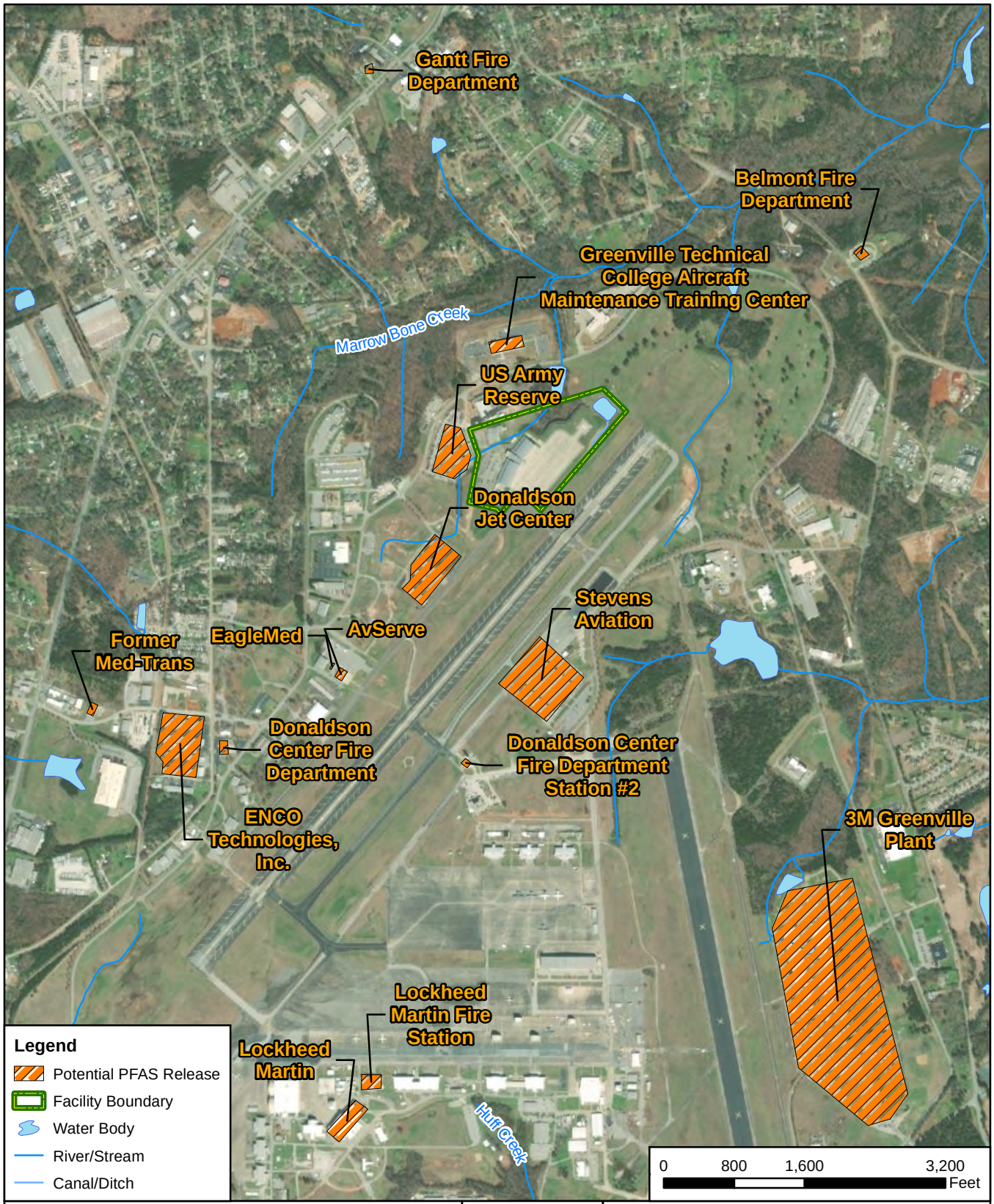
It is unknown if Donaldson Airport currently or has historically used or stored AFFF. As a civil airport, Donaldson Airport operates under the purview of Federal Aviation Administration (FAA) guidance; it is also unknown if training events or compliance demonstrations have been performed at the airport under FAA guidance. Based on this uncertainty, the Donaldson Center Fire Department fire stations are conservatively considered a potential PFAS release area. Both fire stations are located hydraulically upgradient from the facility, approximately 1 mile to the southwest.

5.5 Belmont Fire Department

The Belmont Fire Department operates out of a fire station located at 701 Fork Shoals Road, Greenville, SC 29605. It is unknown if AFFF is stored or used at the fire station, so the fire station is conservatively considered a potential PFAS release area. The Belmont Fire Department is located hydraulically downgradient from the facility, approximately 0.9 miles to the northeast.

5.6 Gantt Fire Department

The Gantt Fire Department operates out of a fire station located at 5604 Augusta Road, Greenville, SC 29605. It is unknown if AFFF is stored or used at the fire station, so the fire station is conservatively considered a potential PFAS release area. The Gant Department is located hydraulically cross-gradient from the facility, approximately 0.9 miles to the northwest.



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SCALE	1:19,200	CHK BY	ST	7/9/2020
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	7/9/2020

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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, three non-FTAs where PFAS-containing materials may have been incidentally spilled or discharged to the ground surface were identified. The three non-FTAs were grouped into two AOIs. As such, these AOIs may be potential PFAS source areas. The AOIs and preliminary CSMs for the AOIs are shown on **Figure 6-1** and **Figure 6-2**, respectively, and summarized below.

The following AOIs were identified as a potential PFAS source area:

- AOI 1 – Hot and Cold Hangars
- AOI 2 – Wash Rack

The following sections describe the CSM components and the specific preliminary CSMs developed for each AOI. 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.

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 are sparse and continue to be the subject of PFAS toxicological study (National Ground Water Association, 2018). Receptors for AASF Upstate include site workers, construction workers, recreational users, and trespassers. The preliminary CSMs for each AOI indicate which specific receptors could potentially be exposed to PFAS.

6.1 AOI 1: Hot and Cold Hangars

AOI 1 is the Hot Hangar and the Cold Hangar, where system testing resulted in a release of foam from the fire suppression systems in both hangars in 2014. In addition, a second smaller release occurred in 2019 in the Cold Hangar following inspection activities.

The Hot and Cold Hangars have trench drains located along the perimeter of the hangar floor, where released foam from the fire suppression systems was primarily directed. The trench drains are connected to two OWSs located in front of the hangars. The OWSs have 2,000- and 3,000-gallon capacities and discharge to a concrete reservoir, located east of the hangars, which then discharges to a POTW (SynTerra, 2016). The exact location of the concrete reservoir is unknown.

Any foam not captured by the trench drains may have migrated out onto the parking ramp and subsequently flowed downgradient to an unnamed pond via overland flow or stormwater drainage. The pond is located immediately off-facility and eventually drains to Reedy River via Marrow Bone Creek. Site workers, construction workers, and trespassers may be exposed to potentially PFAS-laden surface water and sediment/surface soil during maintenance activities to the stormwater system including the outfalls located below the retention wall. Off-facility residents may be similarly exposed to surface water and sediment within Marrow Bone Creek and Reedy River via ingestion. Consumption of fish affected by PFAS is also possible.

AOI 1 is surrounded by both paved and unpaved surfaces. PFAS releases carried by run-off into surface soil may have infiltrated the subsurface soil. PFAS releases may have also infiltrated the subsurface soil via cracks in the pavement or in seems between areas that are paved with different materials. Ground-disturbing activities to soil at AOI 1 could result in construction worker exposure to potential PFAS contamination via inhalation of dust or ingestion of surface and subsurface soil. Inhalation of dust or ingestion of surface soil may also occur during the routine activities of site workers, and the inhalation of dust by trespassers at the facility is possible.

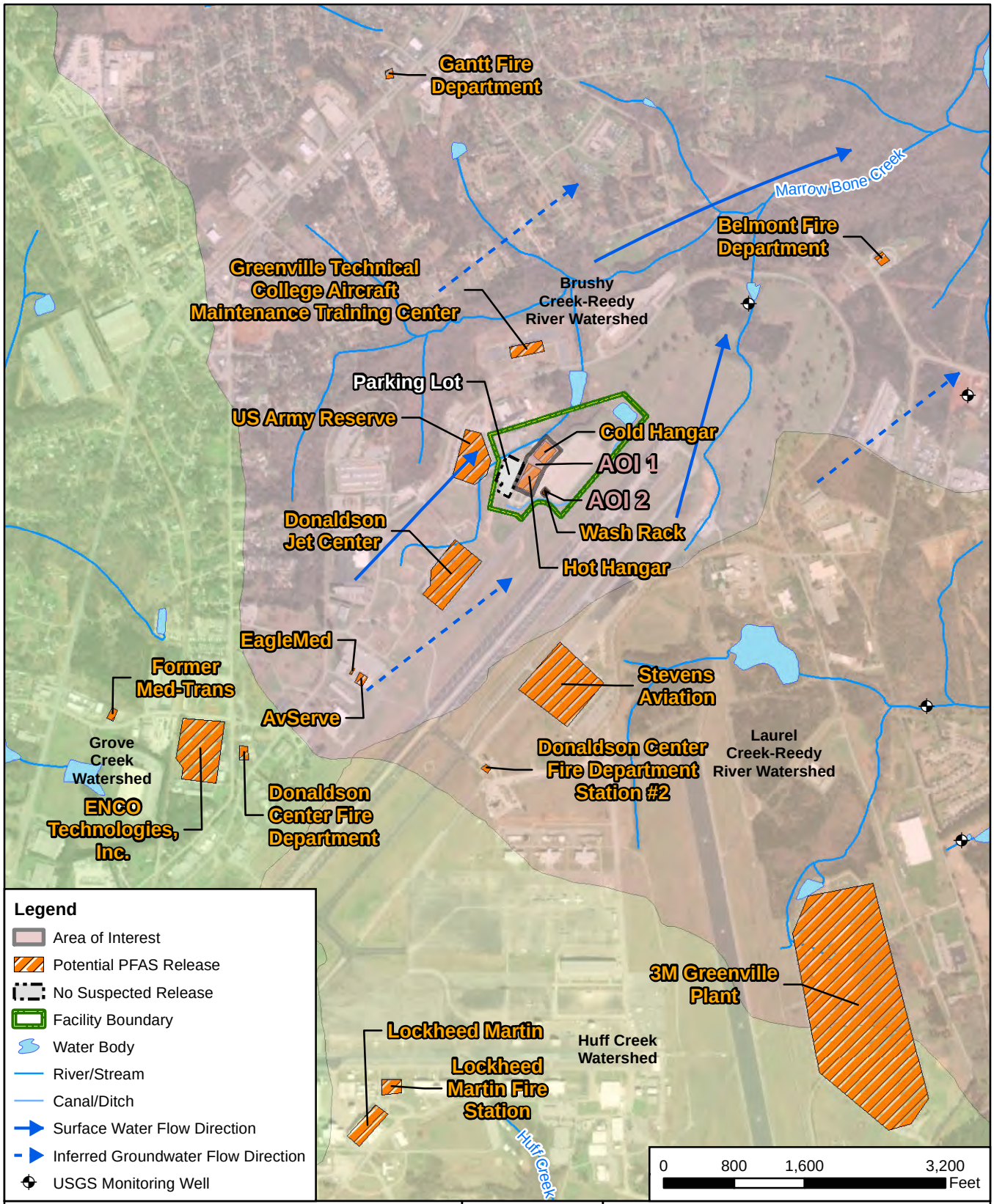
Therefore, the inhalation and ingestion pathways for these receptors are considered potentially complete.

PFAS are water soluble and can migrate readily from soil to groundwater via leaching. No groundwater wells exist at AASF Upstate. The facility receives potable water from several reservoirs, which are unlikely impacted due to distance from the facility, located 25- to 30-miles away. There is one public water supply well located approximately 3.5 miles south of the facility, which is hydraulically cross-gradient to the facility based on inferred groundwater flow direction. The public water system serves a population of 21 people (MyTapWater.org, 2020); based on the inferred groundwater flow direction, it is unlikely impacted by facility activities. No other public water supply wells or domestic wells were identified within a 4-mile radius of the facility, and groundwater was measured at 20 to 22 ft below ground surface in monitoring wells situated close to the facility (USGS, 2019). Because there are no receptors, the groundwater ingestion pathway is incomplete. The preliminary CSM for AOI 1 is shown on **Figure 6-2**.

6.2 AOI 2: Wash Rack

AOI 2 is the wash rack, where rinse water from the 2019 accidental release of JET-X foam in the Cold Hangar was directed. As the composition of JET-X is unknown, the presence and release of JET-X is treated as a potential PFAS release in accordance with ARNG programmatic decisions.

Wash water from the wash rack drains to an OWS and is subsequently pumped out and stored in IBC totes for disposal by an approved disposal contractor (SynTerra, 2016). It is possible that residual foam in wash water was incidentally discharged to adjacent unpaved areas during washing activities as well as during transfer to or from IBC totes. PFAS may have migrated into surrounding soil and subsurface soil. PFAS in run-off from the wash rack may have also migrated into the drainage ditch leading into the retention basin. The retention basin discharges to the unnamed pond during major storm events; however, runoff typically evaporates or infiltrates into the ground (SynTerra, 2016). The pathways and receptors for AOI 2 are the same as described in **Section 6.1**. Site workers and construction workers may additionally be exposed via ingestion of surface soil and subsurface soil (construction worker only) at AOI 2 and the drainage ditch that runs along the eastern edge of the facility boundary. The preliminary CSM for AOI 2 is shown on **Figure 6-2**.



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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	7/9/2020

Areas of Interest

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Figure 6-1

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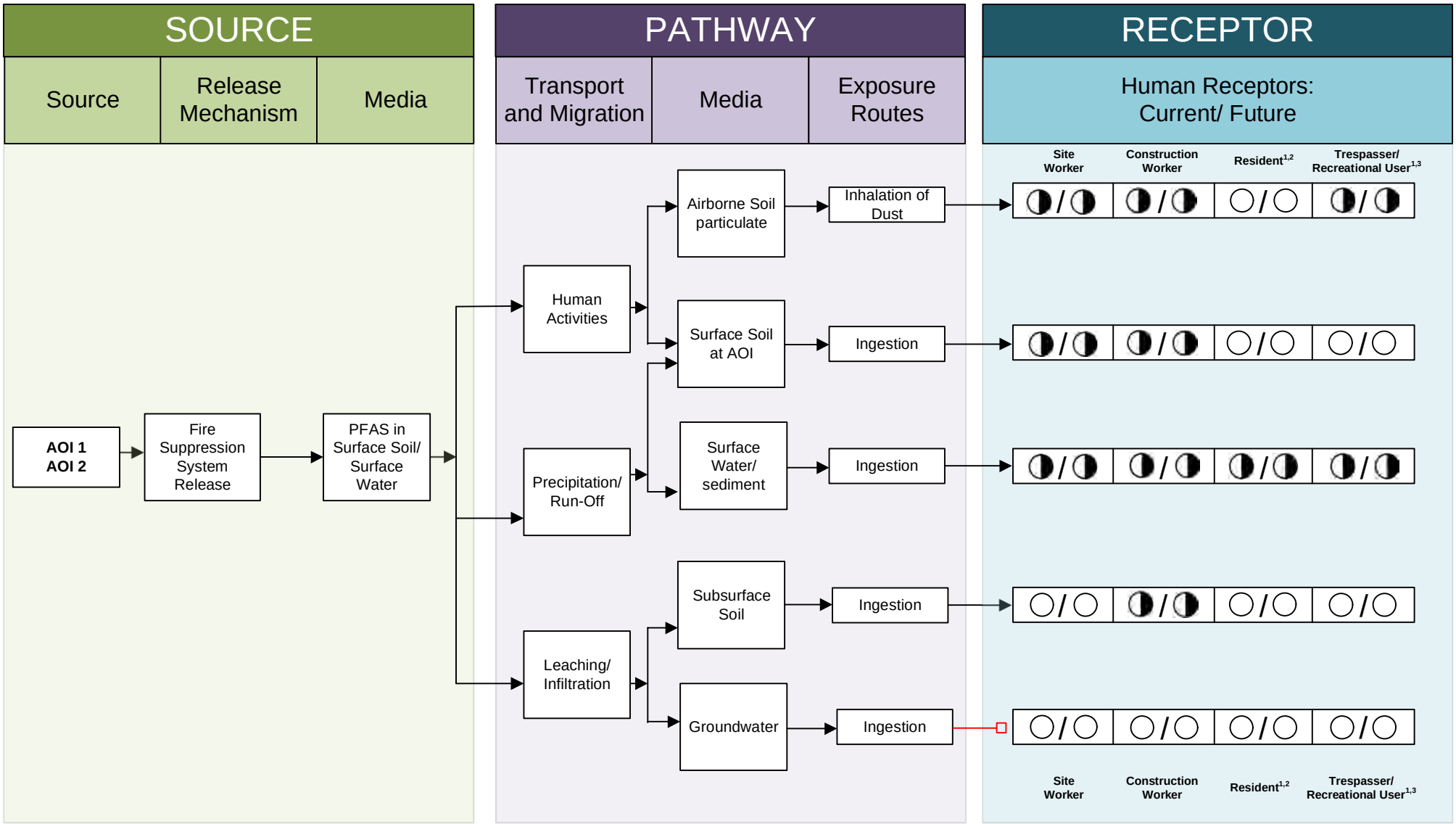


LEGEND

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

NOTES

1. The resident and recreational users refer to off-site receptors.
2. Inhalation of dust for off-site receptors is likely insignificant.
3. Human consumption of fish potentially affected by PFAS is possible.

Figure 6-2
Preliminary Conceptual Site Model
AASF Upstate, SC

7. Conclusions

This report presents a summary of available information gathered during the PA on the use and storage of AFFF and other PFAS-related activities at the AASF Upstate. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

Two AOIs related to potential PFAS release were identified (**Table 7-1**) at the AASF Upstate during the PA (**Figure 7-1**):

Table 7-1: AOIs at AASF Upstate

Area of Interest	Name	Used by	Potential Release Date
AOI 1	Hot and Cold Hangars	SCARNG	2014 and 2019
AOI 2	Wash Rack	SCARNG	2019

Based on potential PFAS releases at the AOIs, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for AASF Upstate is shown on **Figure 6-2**, which presents the potential receptors and media impacted.

The following area, discussed in **Section 2**, was determined to have no suspected release:

Table 7-2: No Suspected Releases, AASF Upstate

No Suspected Release Area	Used by	Rationale for No Suspected Release Determination
Parking Lot	SCARNG	Only water, not AFFF, is used for annual training exercises.

Multiple potential off-facility sources of PFAS were considered in the local area surrounding the AASF Upstate through personnel interviews or review of previous environmental investigations. The majority of the off-facility sources are located in the inferred upgradient groundwater and surface water flow path from the facility. A few off-facility sources are located in the cross-gradient and downgradient groundwater and surface water flow path.

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 or conflicted with site observations. 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 containing materials were reviewed, current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected.

The following **Table 7-3** summarizes the uncertainties associated with the PA:

Table 7-3: Summary of Uncertainties

Area of Interest	Source of Uncertainty
AOI 1: Hot and Cold Hangars	The amount of JET-X product dispensed from the overhead foam generators during the 2014 fire suppression system testing is unknown. It is unknown if the AFFF system were also tested during this event. It is also unknown if AFFF and/or JET-X could have escaped via run-off or on the feet of staff during the disposal effort following the system release. The 2016 Storm Water Pollution Prevention Plan referred to the presence of a concrete reservoir located east of the hangars, which captures drainage from the two OWSs and has a capacity of 41,490-gallons (SynTerra, 2016). The exact location of this reservoir is unknown.
AOI 2: Wash Rack	It is unknown where the disposal contractor disposes of the waste media generated by the wash rack OWS. It is also unknown if AFFF and/or JET-X could have escaped via run-off or on the feet of staff during the disposal effort following the system release or if wash water was incidentally spilled during washing or transfer into IBC totes.
General	Although JET-X does not list PFAS on its Safety Data Sheet, the sheet only lists hazardous components and does not definitively state that it does not contain PFAS.

7.3 Potential Future Actions

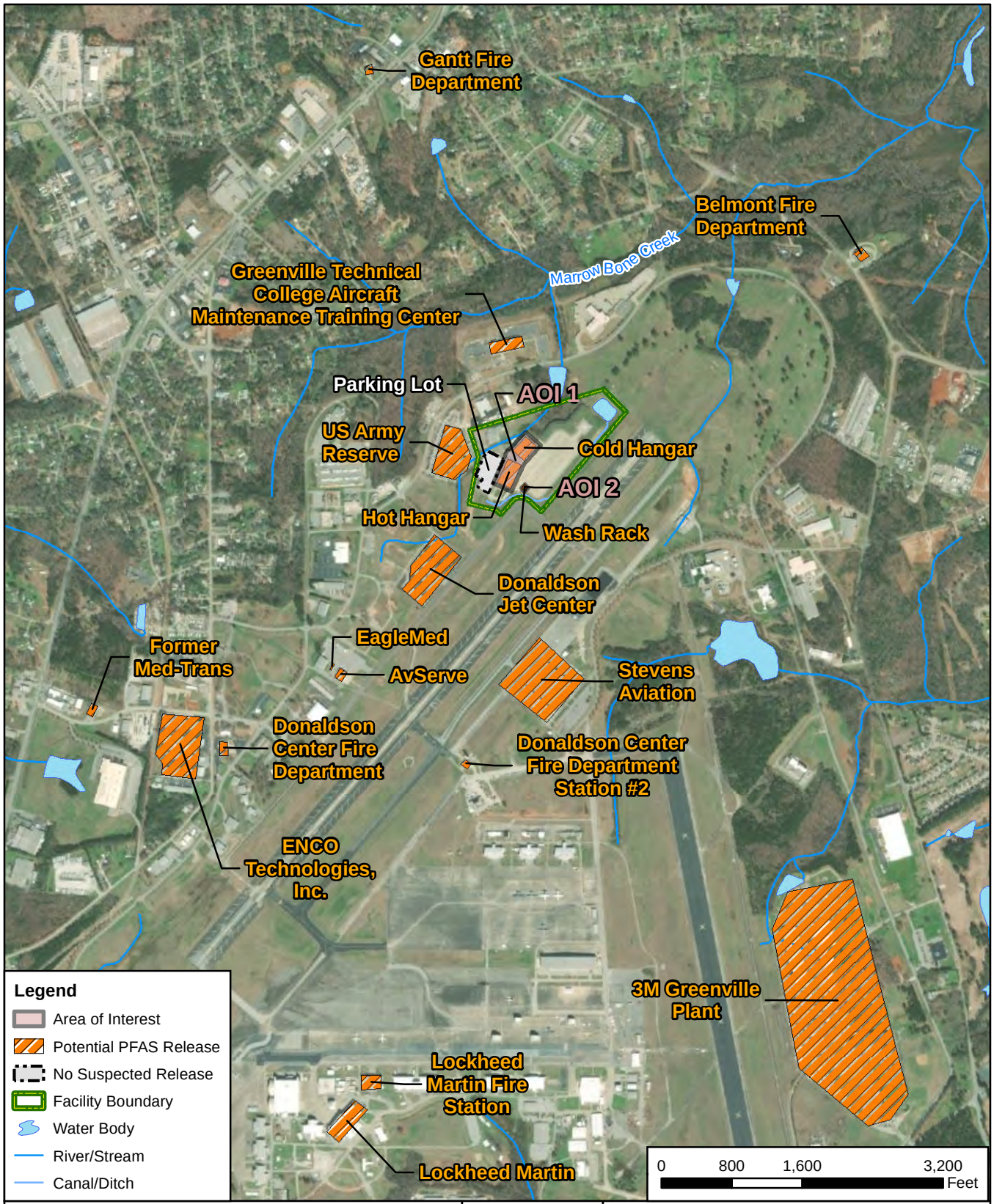
Based on the documented absence of the use or release of AFFF from the parking lot since the beginning of the AASF Upstate occupation (2014 to present), evidence does not indicate that current or former ARNG activities having contributed PFAS contamination to soil, groundwater, surface water, or sediment at this location. The parking lot will not move forward in the CERCLA process.

Interviews and records (covering 2014 to present) indicate that current or former ARNG activities may have resulted in potential PFAS releases at the two AOIs identified during the PA. Based on the preliminary CSM developed for the AOIs, there is potential for receptors to be exposed to PFAS contamination in soil, surface water, and sediment at the AOI. **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.

Table 7-4: PA Findings Summary

Area of Interest	AOI Location	Rationale	Potential Future Action
AOI 1: Hot and Cold Hangars	34°45'57.5" N; 82°22'23.3" W	Releases from the fire suppression systems through testing and an accidental valve release	Proceed to an SI, focus on soil, surface water, sediment
AOI 2: Wash Rack	34°45'54.1" N; 82°22'21.8" W	Captured rinse water from the 2019 Cold Hangar release and subsequent aircraft washing	Proceed to an SI, focus on soil, surface water, sediment

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



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SCALE	1:19,200	CHK BY	ST	7/9/2020
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	7/9/2020

Summary of Findings

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Figure 7-1

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8. References

3M, 2020. *3M Greenville Plant.* https://www.3m.com/3M/en_US/plant-locations-us/greenville/ (Accessed January 2020).

Cain, P. W., Wagner, J. R., & Berry, J. B. 2000. *South Carolina Maps and Aerial Photographic Systems (Sc Maps) Teaching Manual* (4th ed.).

Greenville Water, 2020. *Quality Water: Source to Tap.* https://www.greenvillewater.com/our-water/quality-water-from-source-to-tap/ (Accessed January 2020).

ENSR Corporation, 2008. *Environmental Baseline Study Donaldson Center Industrial Air Park Parcel, 2 Exchange Street, Greenville, South Carolina 29605, Document No.: 09440-026-0100.* May.

Lockheed Martin Aeronautics Company, 2019. *Lockheed Martin Celebrates 35 Years in Greenville, South Carolina Site Positioned for Growth with New F-16 Production Line.* https://news.lockheedmartin.com/2019-08-28-Lockheed-Martin-Celebrates-35-Years-in-Greenville-South-Carolina-Site-positioned-for-growth-with-new-F-16-production-line (Accessed January 2020).

MyTapWater.org, 2020. *Public Water System: Orchard View Meat (sc2330803).* https://mytapwater.org/pws/sc2330803/orchard-view-meat-sc2330803/greenville-sc/ (Accessed January 2020).

National Association for Surface Finishing, 2019. *Per- and Polyfluoroalkyl Substances PFAS – Background Information.* https://nasf.org/wp-content/uploads/2019/04/Background-Information-on-PFAS.pdf (Accessed January 2020).

National Ground Water Association, 2018. *Groundwater and PFAS: State of Knowledge and Practice*. January.

National Weather Service Forecast Office, 2019. *Greenville/Spartanburg Area Detailed Climate Information.* https://www.weather.gov/gsp/gspcli (Accessed January 2020).

SynTerra, 2016. *Storm Water Pollution Prevention Plan (SWPP), Army Aviation Support Facility 2 (AASF 2), Donaldson Center, South Carolina Army National Guard.* January.

United States Environmental Protection Agency (USEPA). 1991. *Guidance for Performing Preliminary Assessments under CERCLA.* September.

United States Geological Survey (USGS), 2019. National Water Information System: Mapper. https://maps.waterdata.usgs.gov/mapper/index.html (Accessed July 2020).

Web Soil Survey, 2019. Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm (Accessed January 2020).

Appendix A
Data Resources

Data resources will be provided separately on CD. Data resources for AASF Upstate include:

Environmental Data Resources, Inc. Geocheck Report

- 2019 Environmental Data Resources, Inc. Geocheck Report for AASF #2, South Carolina

Miscellaneous Information

- 2008 Environmental Baseline Study, Donaldson Center Industrial Air Park Parcel, 2 Exchange Street, Greenville, South Carolina 29605
- 2016 Storm Water Pollution Prevention Plan (SWPP), Army Aviation Support Facility 2 (AASF 2), Donaldson Center, South Carolina Army National Guard
- 2019 Army Aviation at Donaldson SC Email from Barkley, James Bradshaw CW2 (SCARNG) to Hess, Pamela CPT (NGB)

Safety Data Sheet

- 2013 Data Sheet Ansul Ansulite ARC 3% or 6% AR-AFFF Concentrate
- 2017 Data Sheet Ansul JET-X 2% High-Expansion Foam Concentration

SCARNG Leasing Information

- 2009 South Carolina Technology and Aviation Center Land Lease Agreement

Appendix B
Preliminary Assessment Documentation

Appendix B.1
Interview Records

PA Interview Questionnaire - Environmental Manager

Facility:__AASF Upstate_____
Interviewer:__[redacted]_____
Date/Time:____10/3/19_____

Interviewee:__(see below)_____ **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** _____

1. Roles or activities with the Facility/years working at the Facility.

CW3 [redacted] – Environmental Officer and Maintenance Test Pilot; part-time at AASF Upstate since 2014 and full-time since 2018
[redacted]

CW2 [redacted] – Safety Officer and CH47 Pilot, at AASF Upstate since 2017, prior to that was at AASF #1 for 26 years
([redacted]

2. Where can I find previous facility ownership information?

AASF Upstate was constructed in 2014. Interviewees believe the lease is a 100-year lease from the civil airport. The property used to be a swamp ground next to an old golf course. Prior to that, it was part of an old AFB (before 1969 and back in the 1930s). AASF Upstate is on top of ~70 ft of fill. It is unknown where the fill originated from. AASF Upstate started because AASF #1 at McEntire was undergoing BRAC and also ARNG wanted access to a larger recruiting pool.

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
   Fire Training Areas
   Firefighting (Active Fire)
   Crash
   Fire Suppression Systems (Hangers/Dining Facilities)
   Fire Protection at Fueling Stations
   Non-Technical/Recreational/ Pest Management
   Metals Plating Facility
   Waterproofing Uniforms (Laundry Facilities)
   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?

Two hangars have AFFF fire suppression systems and were tested once when built in April 2014. This was before occupation and was performed by a contractor. The hangars were filled 1/3 full with AFFF. The doors were closed and then the AFFF was hosed down the drains of the hangars. Drains lead to oil water separators, which are pumped and water goes into a sanitary septic system.

During quarterly inspection of valves and pumps of the system, the contractor accidentally tripped a valve, which led to an accidental release about 3 months ago. The release was puddled on top and under a Chinook in the Cold Hangar. CW3 Hall believes the release wasn't pure AFFF concentrate but rather leftover residue in the piping system from the first testing event. The AFFF fire suppression system was not triggered. The aircraft went into the wash rack and was washed for the whole day. The wash rack is a closed system, although it was designed to recycle the water. However, there was an engineering failure and the local water authority has not allowed release into the sanitary sewer system. Therefore, the water is physically pumped from the OWS, placed in totes, and a contractor comes and hauls it away. The remaining release in the hangar was mopped up and the rinse water was poured into the same totes used for the OWS.

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?

Hangars were built with fire suppression systems. The AFFF was topped off in the tanks after the contractor tested the fire suppression systems the first time.

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

Not known

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)?

Anusl 3%

Purple K extinguishers are only stored on the airfield and there are 12 of them.

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?

Size of tank is unknown. Stored as concentrate.

PA Interview Questionnaire - Environmental Manager

Facility:__AASF Upstate_____
Interviewer:__[redacted]_____
Date/Time:____10/3/19_____

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?

They will use the parking lot to train ~annually but they only use water. The civilian FD for the airport will supervise and teach the trainees. No live fire is involved.

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?

No

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

No

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?

N/A

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?

Not known if there are any emergency responses

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

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?

Informal agreement with Donaldson AARF, who will respond to emergencies at the facility

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)?

Only areas pointed out are two hangars and wash rack on facility

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

No

PA Interview Questionnaire - Environmental Manager

Facility:__AASF Upstate_____
Interviewer:__[redacted]_____
Date/Time:____10/3/19_____

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?

Cultural Resources Management Plan and NEPA available

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?

No

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.?

No

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?

N/A

PA Interview Questionnaire - Environmental Manager

Facility:__AASF Upstate_____
Interviewer:__[redacted]_____
Date/Time:____10/3/19_____

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

No

Appendix B.2
Visual Site Inspection Checklists

Visual Site Inspection Checklist

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

Recorded by:

ARNG Contact:

Date and Time: 10/3/19 @ 1300

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

Source/Release Information

Site Name / Area Name / Unique ID: Cold Hangar & Hot Hangar, AASF #2

Site / Area Acreage:

Historic Site Use (Brief Description): ~~test~~ ST aircraft maintenance & storage, aircraft washing in Hot Hangar during winter, Hot Hangar has heating & Cold Hangar does not

Current Site Use (Brief Description):

Physical barriers or access restrictions: AASF perimeter fence

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):

~~AFFF~~ Fire Supression System testing in April 2014 shortly after both in both hangars, Cold hangar had a valve trip ~3 month ago (August 2019)

2. Has usage been documented? (Y) / N

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

picture of valve trip in Cold hangar documented w/ pictures

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:

Lockheed Martin, Air Force, Marines, multiple FBOs

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:

3% AFFF Ansul

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

Quarterly inspection of valves & pipes by outside contractor

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

topped off once after April 2014 testing

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

leads to separate OWS, and drains to sanitary septic system

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

outfalls go northeast and into a retention pond

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

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

3. Are monitoring or drinking water wells located near the site? Y / N

3a. If so, please note the location:

unknown, none on facility

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

4a. If so, please note the location:

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.

multiple from airport tenants, all upgradient

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):

Constructed in 2014

2. Is the site/area vegetated? (Y) / N

2a. If not vegetated, briefly describe the site/area composition:

just grassy areas

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:

Receptor Information

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

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

MSF perimeter fence

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:

east, west, and north within 1 mile

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:

Stormwater retention pond adjacent at northeast border

Visual Survey Inspection Log

Additional Notes

Cold Hangar Contains AFFF pump room, which services both hangars

pump room was previously flooded due to backup of drains; corrosion observed on AFFF tank since 2014 likely due to contractor spilling AFFF after tanks were topped off

Photographic Log

Photo ID/Name	Date & Location	Photograph Description

Visual Site Inspection Checklist

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

Recorded by:

ARNG Contact:

Date and Time: 10/3/19 @ 1300

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

Source/Release Information

Site Name / Area Name / Unique ID: wash rack, AASF #2

Site / Area Acreage:

Historic Site Use (Brief Description): used for aircraft washing an airfield

Current Site Use (Brief Description): same as above

Physical barriers or access restrictions: AASF perimeter fence

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):

~~After~~ Cold hangar valve trip, AFFF was released on top of an aircraft. Aircraft was brought to wash rack and washed off for a whole day.

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

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

pictures were taken of affected aircraft at spill scene

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:

Lockheed Martin, Air Force, Marines, multiple FBOs

Visual Survey Inspection Log

Other Significant Site Features:

1. Does the facility have a fire suppression system? (Y) / N — see other VSI form

1a. If yes, indicate which type of AFFF has been used:

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

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

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

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Outfalls go northeast and into a retention pond

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

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

3. Are monitoring or drinking water wells located near the site? Y / N

3a. If so, please note the location:

Unknown, none on facility

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

4a. If so, please note the location:

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.

multiple from airport tenants, all upgradient

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):

Constructed in 2014

2. Is the site/area vegetated? (Y) / N

2a. If not vegetated, briefly describe the site/area composition:

grassy areas

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:

Receptor Information

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

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

ANSF perimeter fence

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:

East, west, and north within 1 mile

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:

Stormwater retention pond adjacent at northeast border

Visual Survey Inspection Log

Additional Notes

Wash rack is supposed to be hooked up to sanitary sewer. However, local water authority has not allowed this; therefore, the GWS connected to wash rack is pumped off and then containerized in large totes. A contractor comes and hauls the totes away. Totes are not treated as characteristic waste (supposedly).

Photographic Log

Photo ID/Name	Date & Location	Photograph Description

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Army Aviation Support Facility Upstate

Why has this location been identified as a site?

Facility contains an AASF and fire suppression systems at two hangars

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

Located near Donaldson Airport

Training Events

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

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? Northeast towards drainage features

Average rainfall? 46.1 inches yearly

Any flooding during rainy season? No

Direct or indirect pathway to ditches? Direct pathway to ditch surrounding ramp

Direct or indirect pathway to larger bodies of water? Direct pathway to pond

Does surface water pond any place on site? Yes, in pond and retention basin

Any impoundment areas or retention ponds? Yes

Any NPDES location points near the site? No

How does surface water drain on and around the flight line? Towards ditch or captured in drains leading into pond

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? Most likely following topographic gradient (northeast)

Depth to groundwater? > 15 ft bgs

Uses (agricultural, drinking water, irrigation)? Public water supply well within 4 mile radius

Any groundwater treatment systems? No

Any groundwater monitoring well locations near the site? No

Is groundwater used for drinking water? No

Are there drinking water supply wells on installation? No

Do they serve off-post populations? No

Are there off-post drinking water wells downgradient

No, but potentially cross-gradient there is a public water supply well

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?

N/A

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?

N/A

3. Other?

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker - Yes

Construction Worker - Yes

Recreational User – Yes

Residential - Yes

Child – Yes

Ecological - Yes

Note what is located near by the site (e.g. daycare, schools, hospitals, churches, agricultural, livestock)?
Industrial and aviation related businesses, residential area located to north

Documentation

Ask for Engineering drawings (if applicable).

Has there been a reconstruction or changes to the drainage system? When did that occur?
OWS for wash rack is pumped out for disposal instead of draining into POTW

Appendix C
Photographic Log

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	AASF Upstate	Greenville, South Carolina

Photograph No. 1

Date 4/10/2014

Time 9:09

Description:

Photo of the AASF Upstate fire suppression system testing.

Source: SCARNG Aviation Pictorial History

Orientation:

Not available

Photograph No. 2

Date 4/10/2014

Time 9:11

Description:

Photo of the AASF Upstate fire suppression system testing.

Source: SCARNG Aviation Pictorial History

Orientation:

Not available

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	AASF Upstate	Greenville, South Carolina

Photograph No. 3

Date 4/10/2014

Time 9:15

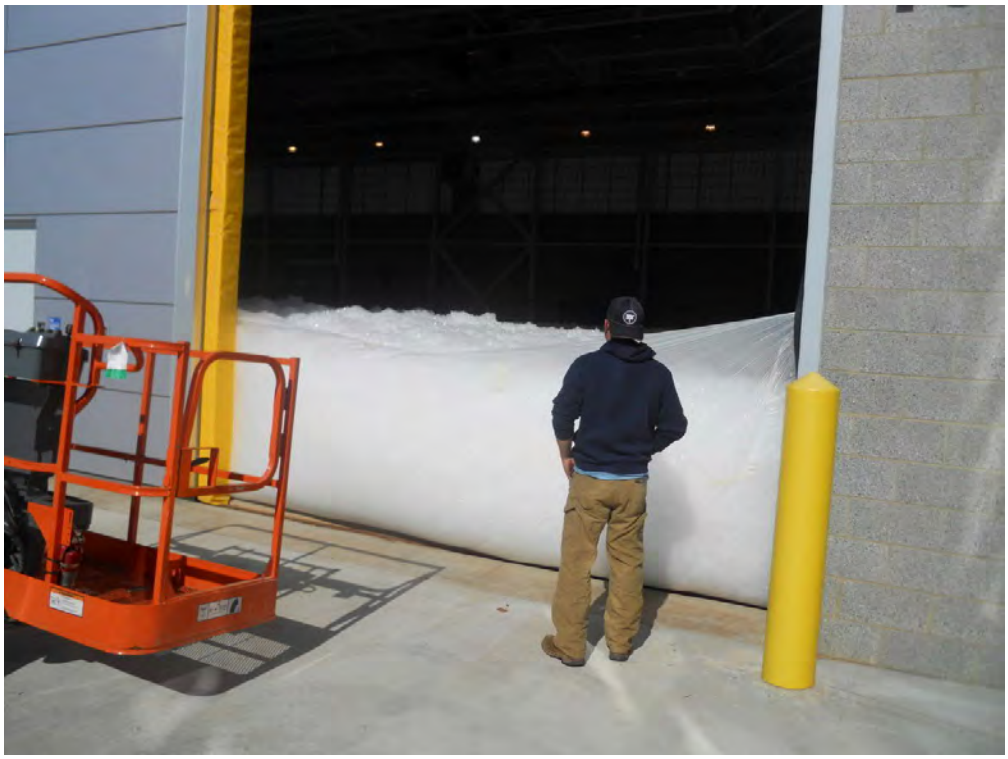
Description:

The foam from the fire suppression system testing is contained within the hangar with plastic sheeting.

Source: SCARNG Aviation Pictorial History

Orientation:

Not available



Photograph No. 4

Date 10/3/2019

Time 13:06

Description:

The overhead foam generator is shown in the picture. The generator is connected to a JET-X tank.

Orientation:

Northwest

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	AASF Upstate	Greenville, South Carolina

Photograph No. 5

Date 10/3/2019

Time 12:52

Description:

Trench drains surround the perimeter of the hangar floor.

Orientation:

Southwest

Photograph No. 6

Date 10/3/2019

Time 12:55

Description:

The drain of the wash rack is shown. The wash rack drain leads into an oil water separator, and the discharge water is pumped out by a disposal contractor.

Orientation:

Southeast

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	AASF Upstate	Greenville, South Carolina

Photograph No. 7

Date 10/3/2019

Time 13:18

Description:

The JET-X 2% 55-gallon tank is shown in the tank room of the Cold Hangar. The JET-X tank is connected to the over-head foam generators in both the Cold and Hot Hangars.

Orientation:

South

Photograph No. 8

Date 10/3/2019

Time 13:19

Description:

The Ansulite 3% AFFF 55-gallon tank is shown in the tank room of the Cold Hangar. The AFFF tank is connected to the fire hoses mounted on the wall in both the Cold and Hot Hangars.

Orientation:

East

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	AASF Upstate	Greenville, South Carolina

Photograph No. 9

Date 10/3/2019

Time 13:03

Description:

The pond is northeast of the facility and captures the majority of surface water and storm water drainage from the facility. The pond connects to an unnamed tributary of Marrow Bone Creek.

Orientation:

Northeast