# FINAL
# Preliminary Assessment Report McEntire Army Aviation Support Facility, 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 |
| AASF | Army Aviation Support Facility |
| AECOM | AECOM Technical Services, Inc. |
| AFFF | aqueous film forming foam |
| ANG | Air National Guard |
| AOI | area of interest |
| APU | Auxiliary Power Unit |
| ARNG | Army National Guard |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CSM | conceptual site model |
| EDR™ | Environmental Data Resources, Inc.™ |
| FTA | fire training area |
| HA | Health Advisory |
| JNGB | Joint National Guard Base |
| PA | Preliminary Assessment |
| PFAS | per- and poly-fluoroalkyl substances |
| PFOA | perfluorooctanoic acid |
| PFOS | perfluorooctanesulfonic acid |
| SCARNG | South Carolina Army National Guard |
| SCDNR | South Carolina Department of Natural Resources |
| 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 the McEntire Army Aviation Support Facility (AASF) (also referred to as the "facility") in Eastover, South Carolina to assess potential PFAS release areas and exposure pathways to receptors. 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 1-day site visit on 03 December 2019 and completed visual site inspections (VSIs) at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed McEntire AASF personnel during the site visit, including South Carolina ARNG (SCARNG) environmental managers and McEntire AASF operations staff; and
- 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.

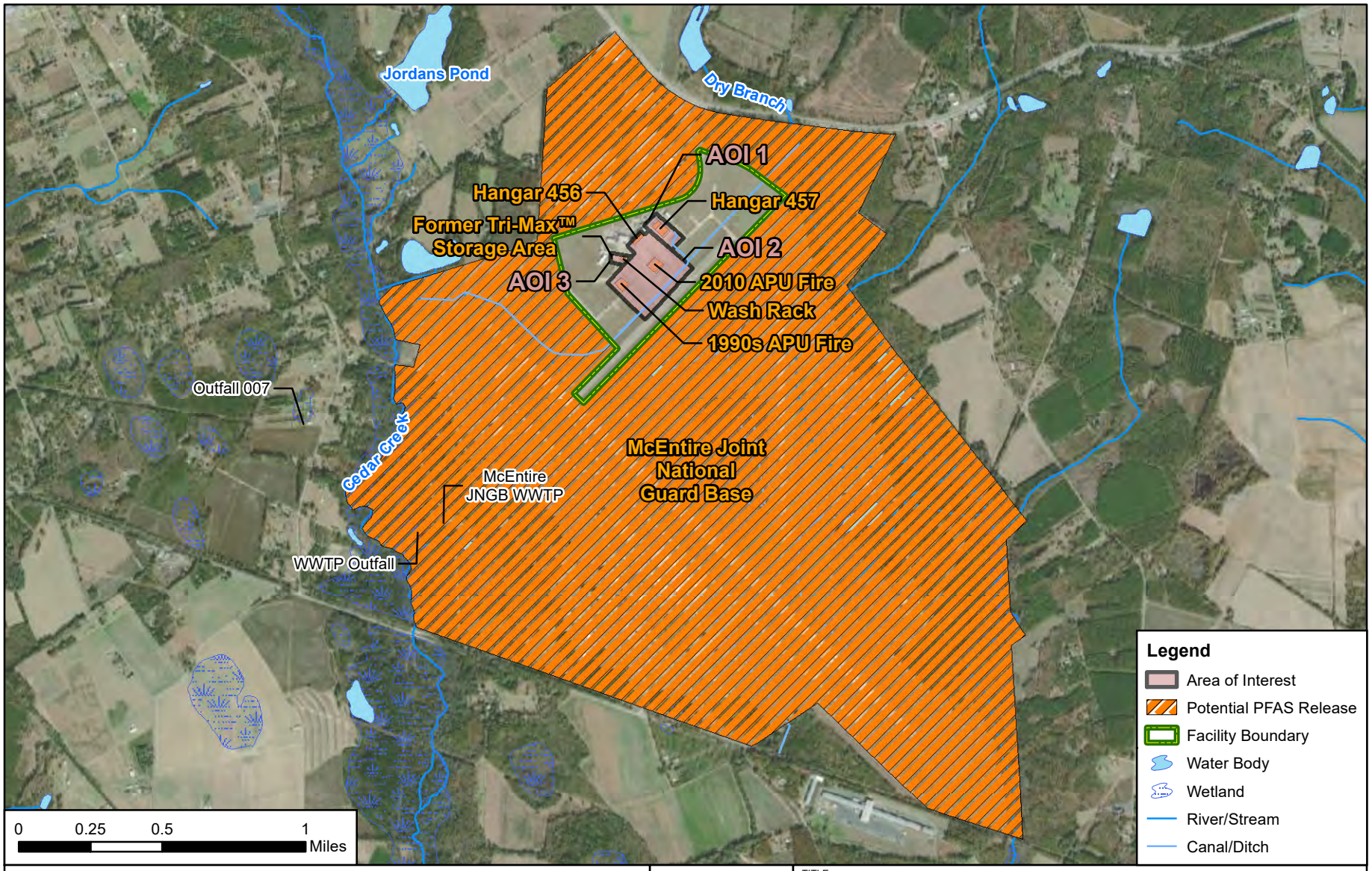
Three AOIs related to PFAS releases were identified at the McEntire AASF during the PA. The AOIs are shown on **Figure ES-1** and described in **Table ES-1** below:

**Table ES-1: AOIs at McEntire AASF**

| Area of Interest | Name | Used by | Potential Release Dates |
|---|---|---|---|
| AOI 1 | Hangar 457 | SCARNG | 2013 |
| AOI 2 | Helicopter Apron & Hangar 456 | SCARNG | 1990s/2010/2015 |
| AOI 3 | Building 467 & Wash Rack | SCARNG | 1990s-2000s |

Based on the potential PFAS releases at the AOIs, there is potential for exposure to PFAS contamination in media at or near the facility. Potential off-facility PFAS release areas exist adjacent to the McEntire AASF at the McEntire Air National Guard (ANG) Station, where a PFAS SI was performed in 2018 (Leidos, 2019). These release areas include property crossgradient and downgradient of the facility, so it is unlikely that the off-facility sources affect the McEntire AASF. The preliminary CSM for the McEntire AASF is shown on **Figure ES-2.**

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 USEPA's lifetime Health Advisories (HAs) 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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| PROJECT | Preliminary Assessment for PFAS at McEntire AASF, SC | | | |
| REVISED | 7/21/2020 | GIS BY | MS | 7/21/2020 |
| SCALE | 1:31,680 | CHK BY | ST | 7/21/2020 |
| Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community | | PM | RG | 7/21/2020 |

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**Summary of Findings**

AECOM

12420 Milestone Center Drive
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**Figure ES-1**

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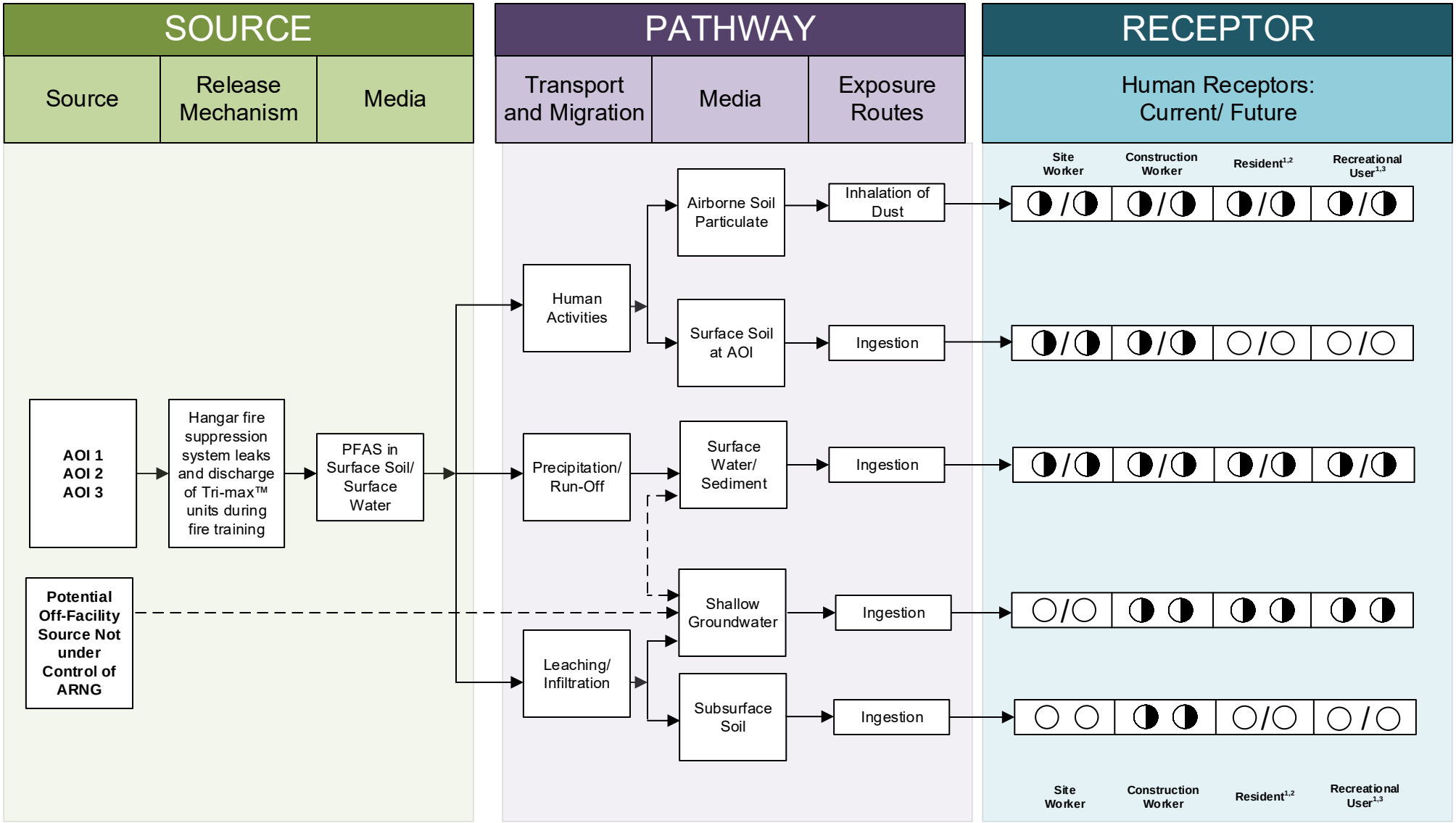



**LEGEND**

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

**Notes:**

1. The resident and recreational user receptors refer to an 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
McEntire AASF, Eastover, 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 their facilities that used per- and polyfluoroalkyl substances (PFAS) (a suite of related chemicals), primarily releases of aqueous film forming foam (AFFF), although other sources of PFAS 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 these PFAS compounds in the environment will vary. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued Drinking Water Lifetime 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 findings of a PA for PFAS-containing materials at the McEntire Army Aviation Support Facility (AASF) (also referred to as the “facility”) in Eastover, South Carolina, 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 Part 300), and Army requirements and guidance.

This PA documents the known fire training areas (FTAs) as well as additional locations where PFAS may have been released into the environment at the McEntire AASF. 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 1-day site visit on 03 December 2019 and completed visual site inspections (VSIs) at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed McEntire AASF personnel during the site visit, including South Carolina ARNG (SCARNG) environmental managers and McEntire AASF operations staff; and

- 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 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 FTAs at the facility identified during the site visit.
- **Section 3** – **Non-Fire Training Areas:** describes other locations of PFAS releases at the facility identified during the site visit.
- **Section 4** – **Emergency Response Areas:** describes areas of AFFF release at the facility, specifically in response to emergency situations.
- **Section 5** – **Adjacent Sources:** describes sources of PFAS release adjacent to the facility that are not under the control of ARNG.
- **Section 6** – **Preliminary Conceptual Site Model:** describes the pathways of potential PFAS transport and receptors at each AOI.
- **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

The McEntire AASF is an enclave of the McEntire Joint National Guard Base (JNGB), which is owned by the US Air Force and affiliated with the South Carolina Air National Guard (ANG). The facility is located in Eastover, Richland County, South Carolina, near the geographical center of the state and roughly 12 miles southeast of the City of Columbia. The facility was built in 1961 and has undergone several additions and modifications since then. Building 465, erected in 1961, was the original hangar and flight operations building. A second hangar (Building 456) was added in 1991, and a third hangar (Building 457) was constructed in 2012. Presently, the three hangars are located adjacent to one another, along the aircraft apron. The 172.27-acre facility consists of these three hangars, an aircraft apron, flight operations offices, ground support equipment buildings, and a wash rack.

## 1.5 Facility Environmental Setting

The facility is located on the eastern edge of the “Central Midlands” within the Coastal Plain between the northeastern valley wall and the Congaree River floodplain (Leidos, 2019). The coastal plain consists of two significantly different landscapes, an inner belt and outer belt. The innerbelt is predominately composed of cropland, with forest limited to small patches and

hardwood “stringers” along creeks. An outer belt, sometimes called the “flatwoods”, is primarily pine-dominated forest. Major floodplains bisect both belts, which are largely forested.

The facility has an elevation from 250 to 260 feet above mean sea level, and there are several retention ponds around the facility. The facility property consists of impervious surfaces, such as the helicopter apron, along with a mixture of grassy areas and drainage swales. The surrounding area is mostly agricultural, with residential areas and commercial establishments spread throughout.

### 1.5.1 Geology

McEntire JNGB is situated on top of Pleistocene- and Pliocene-aged deposits. The surficial geology in the northern part of the facility consists of the Pliocene-aged Duplin Formation. The Duplin Formation is composed of red to brown to yellow, poorly sorted, medium-grained quartz sand to quartz granules with interstitial clay (Shelley, 2007). The central and southern areas of the facility are underlain by the Congaree River Valley terrace complex, which is a series of estuarine and fluvial deposits composed primarily of poorly to moderately sorted, medium to very coarse sand with varying amounts of clay grading upward to red clay and sandy clay. These deposits range up to around 50 feet in thickness in the vicinity of the facility (Shelley, 2007).

Sand and clay surficial alluvial deposits are present to the east and west of the facility, near Cedar Creek and Dry Branch. Additionally, Pleistocene-aged Carolina bays are locally interspersed at McEntire JNGB and are characterized as rounded depressions containing 3-5 feet of dark sandy clay to clayey sand (Shelley, 2007). Underlying the Cenozoic deposits are southwesterly dipping Cretaceous deposits that contain the regional aquifers (US Geological Survey [USGS], 2010). Generalized geologic features are presented on **Figure 1-2**.

### 1.5.2 Hydrogeology

The hydrogeology at McEntire JNGB is characterized by a sequence of aquifers. The uppermost aquifer is generally described as the surficial aquifer and is situated within permeable Quaternary sediments throughout the coastal plain (Aucott, 1996; USGS, 2010). The surficial aquifer near the facility is unconfined and approximately 10 feet thick. Consequently, groundwater moves laterally to surface water bodies and vertically to underlying hydrogeologic units (USGS, 2010). According to historical investigations at McEntire JNGB, shallow, unconfined groundwater has been encountered at depths between 27 and 47 feet below ground surface, with groundwater flow in the southwest direction towards Cedar Creek and Dry Branch (Leidos, 2019).

The Crouch Branch aquifer (also referred to as Black Creek aquifer) underlies the Pleistocene- and Pliocene-aged deposits but is unconfined at the facility due to the absence of the Lang Syne and Sawdust Landing formations (Shelley, 2007; USGS, 2010). The aquifer is situated within the late Cretaceous-aged clayey sands of the Peedee, Donoho Creek, and Bladen formations. Near the facility, the Crouch Branch aquifer ranges in thickness from approximately 200 to 300 feet. The top altitude of the aquifer is about 200 feet above mean sea level (USGS, 2010).

The McQueen Branch confining unit underlies the Crouch Branch aquifer and comprises various clay, calcareous clay, and carbonaceous clay formations, with thicknesses around 50 feet. The McQueen Branch aquifer (also referred to as Middendorf and Tuscaloosa aquifer in other studies) underlies the confining unit. The McQueen Branch aquifer is situated within late Cretaceous-aged units characterized by poorly sorted sand, clayey sand, and gravel. Near the facility, the McQueen Branch aquifer ranges in thickness from approximately 100 to 200 feet. The top altitude of the aquifer is around 0 to -200 feet above mean sea level. The Gramling confining unit confines the bottom of the McQueen Branch aquifer (USGS, 2010).

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. There are no drinking water wells at the McEntire AASF; drinking water is provided by the City of Columbia. The City of Columbia sources its water from the Broad River Diversion Canal, located approximately 13 miles northwest of the facility (City of Columbia, 2014). Two former public supply wells exist at the ANG facility downgradient from the AASF. However, the ANG facility, and all JNGB buildings, are currently supplied by municipal water. Additional public supply, industrial, irrigation, and domestic wells are located within a 4-mile radius of the facility. Four domestic wells and four public supply wells are located potentially downgradient from the facility, based on the inferred southwestern groundwater flow direction (**Figure 1-2**). 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 HAs within 20 miles of the McEntire AASF. 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

The Wateree River and Congaree River are major waterways that flow to the east and the south of the facility, where they eventually meet up to make the southeastern point of Richland County. The facility is located within two small drainage basins (**Figure 1-3**) that are part of the Congaree River drainage basin. This basin is part of the larger Santee River Basin, which incorporates major metropolitan areas in the Carolinas such as Charlotte, Spartanburg, Greenville, Columbia, and Charleston (USGS, 2010).

Surface water on the facility drains via Dry Branch to the south and southwest through a series of retention ponds and swales that surround the facility. The swales and stormwater infrastructure discharge through Outfall #007, to the southwest of the facility. The outfall is a concrete pipe crossing South Carolina Road near the Church Gate exit of the JNGB. The total area draining to Outfall #007 is 305 acres with 35% impervious area, including all 172.27 acres of the facility. To the west of the facility, a small unnamed pond exists downgradient from the stormwater outfall (Leidos, 2019)

A wastewater treatment plant (WWTP) exists at the ANG facility that is part of the McEntire JNGB. The plant treats wastewater from the ANG and AASF sanitary sewer system and discharges treated effluent to an unnamed channel that leads to Cedar Creek (Leidos, 2019). Surface water features are shown on **Figure 1-3**.

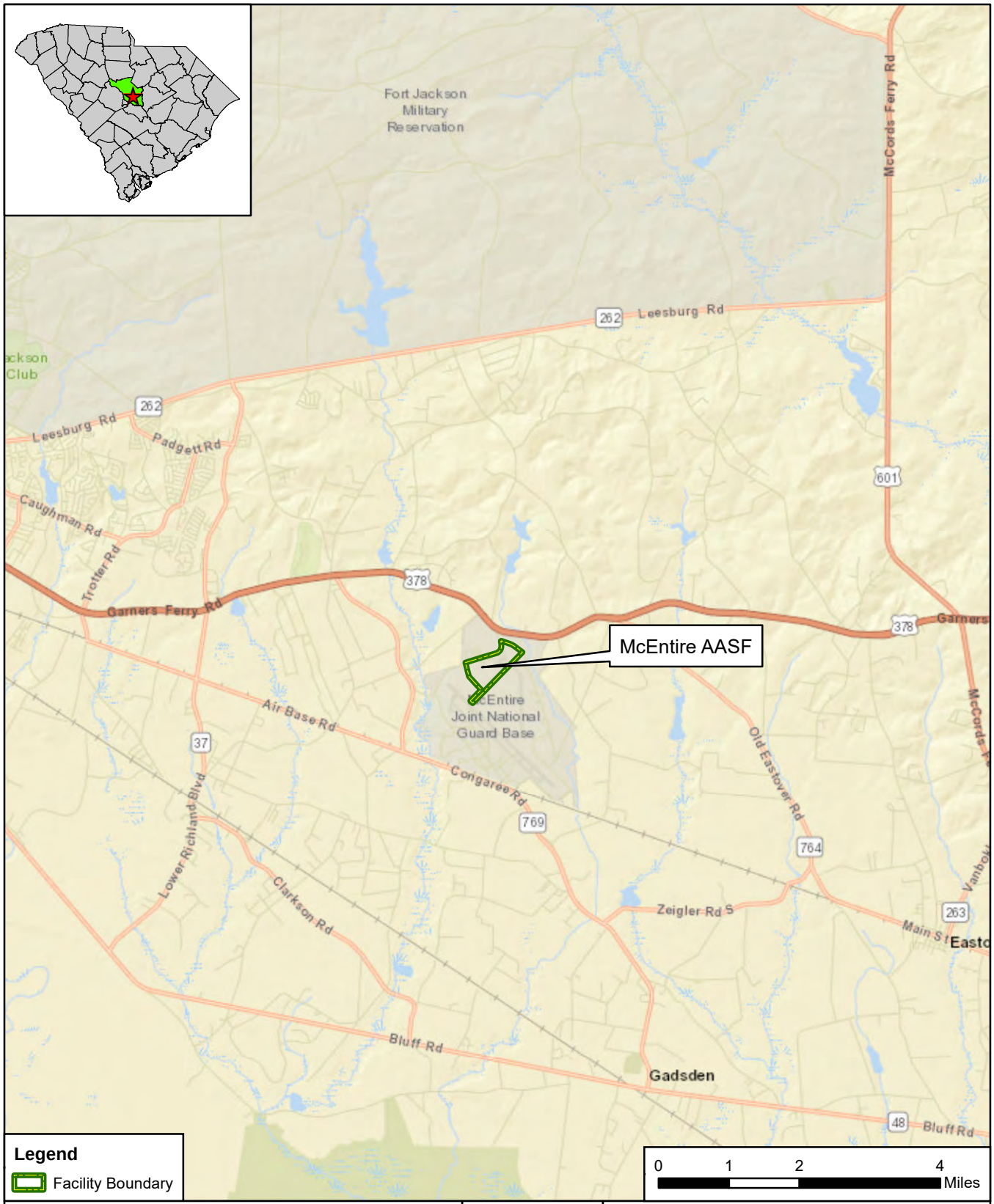
### 1.5.4 Climate

The climate of Eastover, South Carolina is characterized by short, mild winters with little to no snowfall. Summers tend to be long and hot, with abundant rainfall. The normal annual precipitation is 44.6 inches. Summer temperatures peak in July, with an average high of 93 degrees Fahrenheit (°F) and an average low of 72 °F. Winter temperatures are lowest in January, with an average high of 56 °F and an average low of 34 °F. Snowfall is rare, and the region typically receives only about 1.5 inches of snowfall annually (National Weather Service Forecast Office, 2018).

### 1.5.5 Current and Future Land Use

The McEntire AASF is currently a controlled access facility as part of the McEntire JNGB. The AASF supports rotary aircraft operations and includes hangar space, a parking apron, flight ramp, wash rack, armory building, operations and maintenance support buildings, and taxiway

connecting to the ANG runway. The area surrounding the facility is rural and residential, with mostly agricultural land use. Reasonably anticipated future land use is not expected to change from the current land use described here.

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| SCALE | 1:126,720 | CHK BY | ST | 5/20/2020 |
| Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, | | PM | RG | 5/20/2020 |

**Facility Location**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 1-1**

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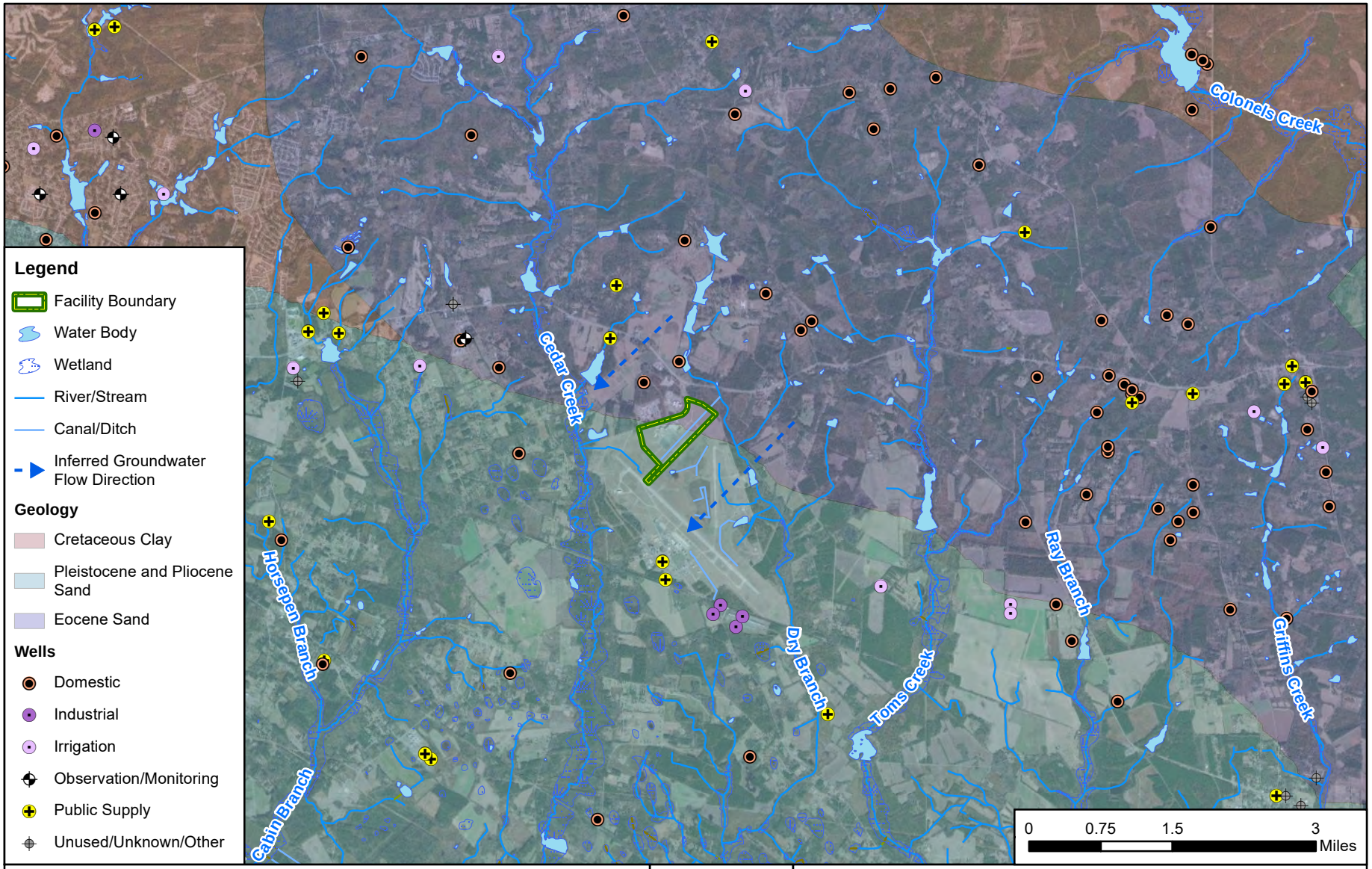


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| Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community | | PM | RG | 7/21/2020 |

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**Groundwater Features**

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**Figure 1-2**

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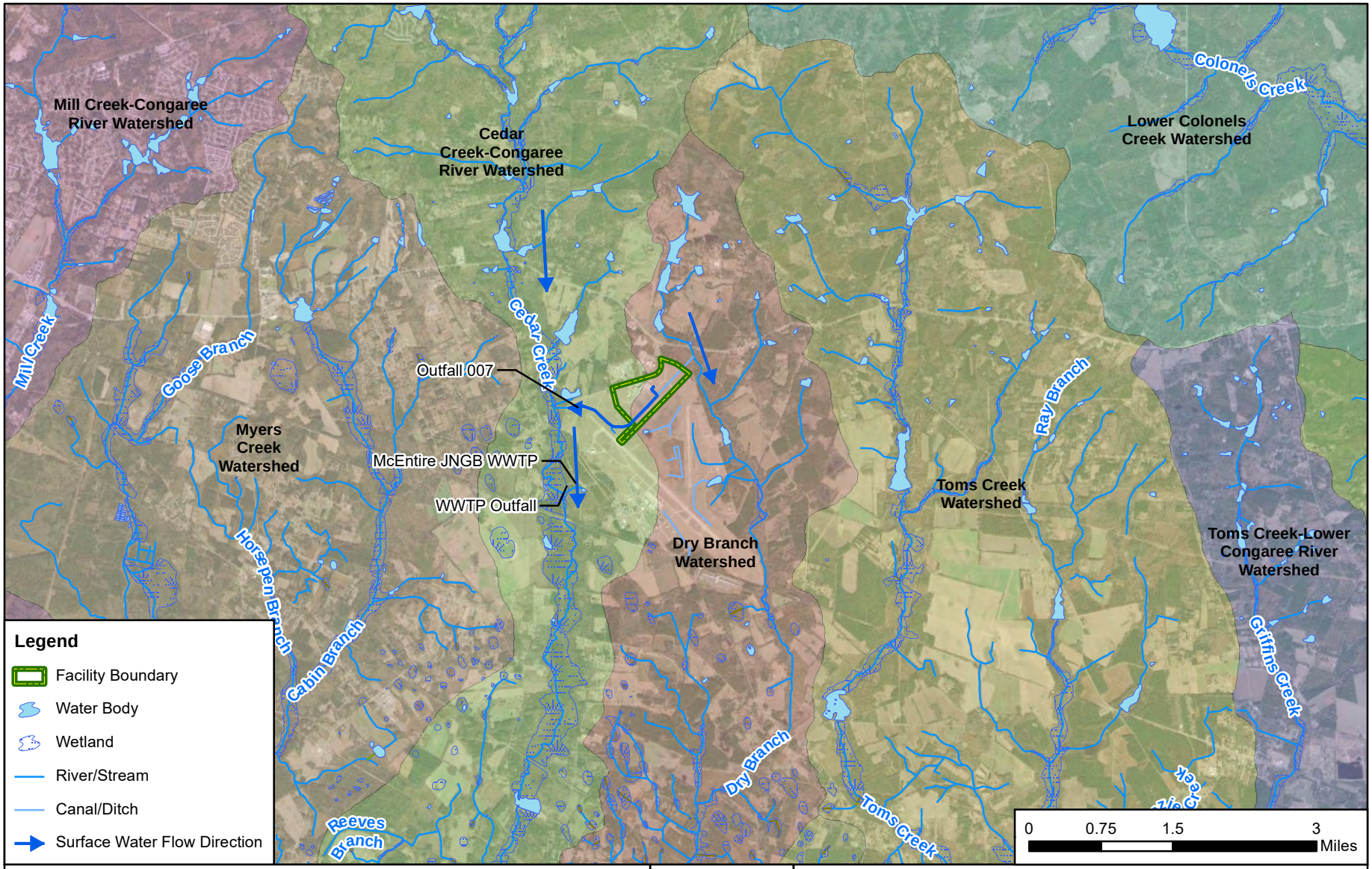


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## Surface Water Features

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**Figure 1-3**

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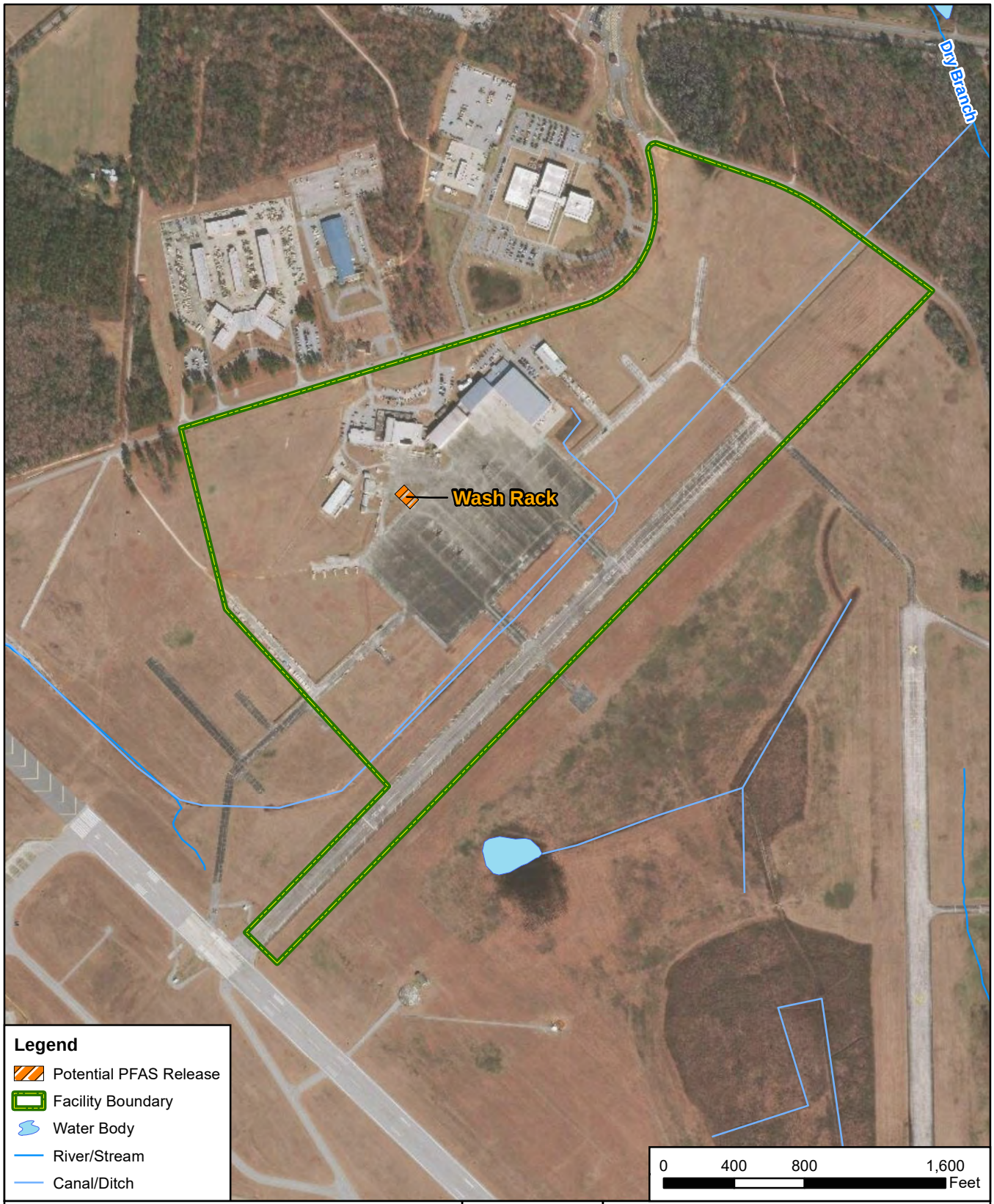
# 2. Fire Training Areas

One FTA was identified at the McEntire AASF during the PA. A description of the FTA is presented below, and the location is shown on **Figure 2-1.** Photographs of the FTA appear in **Appendix C**.

## 2.1 Wash Rack

Based on PA interviews, the wash rack was formerly used as an FTA from the 1990s to sometime in the 2000s, possibly as late as 2010. Interviewees with tenure going back to 1991 confirmed that this was the only FTA associated with the AASF to their knowledge. During the active timeframe of the FTA, the FTA was used between one and three times per year. Each event consisted of fully discharging one Tri-Max™ 30 cart until it was empty. Trainees each took a turn operating the Tri-Max™ and took part in simulated egress and rescue activities during the training events at the wash rack. No live-fire training took place at the FTA. No outside entities came to the facility for fire training; the FTA was only used by SCARNG AASF personnel. The releases occurred directly to the asphalt in the wash rack and drained through a storm grate before entering a diversion structure where the position of a valve determines the fate of the drain water. During the AFFF releases, the valve diverted the water to the sanitary sewer after passing through an oil-water separator. While the wash rack is inactive, the valve is set to divert water to the stormwater outfall (Outfall #007). During equipment washing, the wash rack water is diverted to the sanitary sewer. If oil and grease are mixed with the drained water, the water is diverted to a holding tank and later pumped out by a contractor. Sometime in July 2015, helicopters and tools located in Hangar 456 were washed in the wash rack after being covered in AFFF due to a malfunction of the suppression system in the hangar. The AFFF rinsate drained through the grate at the wash rack and was diverted to the sanitary sewer. Due to the AFFF releases at the wash rack, it is possible that residual PFAS on the asphalt in the wash rack were inadvertently transported with other drain water to the stormwater outfall, sanitary sewer, and holding tank. The geographic coordinates of the FTA are 33° 55' 56.77”N; 80° 48' 18.93”W.

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| Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, | | PM | RG | 5/20/2020 |

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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 may have been 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.** Photographs of the non-FTAs appear in **Appendix C**.

## 3.1 Hangar 457

Hangar 457 is a hangar located along the northeast border of the aircraft apron, at approximate geographic coordinates 33° 56' 2.19”N; 80° 48' 10.32”W, and it was constructed in 2012 with an AFFF suppression system that is currently charged with 3% AFFF.

To the interviewees’ knowledge, four separate AFFF releases are associated with this hangar. In 2013, a contractor performed a flow test of the system and released an unknown amount of AFFF from an exterior door to the asphalt located outside the northern wall of the hangar. This release drained to a storm grate approximately 100 feet southeast of the discharge, where it was diverted to the stormwater retention pond. A separate incident in 2013 resulted in an AFFF release of 5 gallons when one of the nozzle heads in the hangar suppression system malfunctioned. The AFFF was pushed outside the hangar with squeegees and drained into the stormwater trench drain to the southwest of the hangar doors. Sometime after 2013, two leaks occurred in the suppression system and caused AFFF releases to the utility room floor and through an exterior pipe outside the building. An unknown volume of AFFF was released to the utility room floor, which drained to the sanitary sewer through a floor drain. It is also possible that some volume of the AFFF was mopped up and discharged outside of the same location as the flow test. The leak outside the building was estimated to be no more than 5 gallons and was discharged to the grass.

## 3.2 Hangar 456

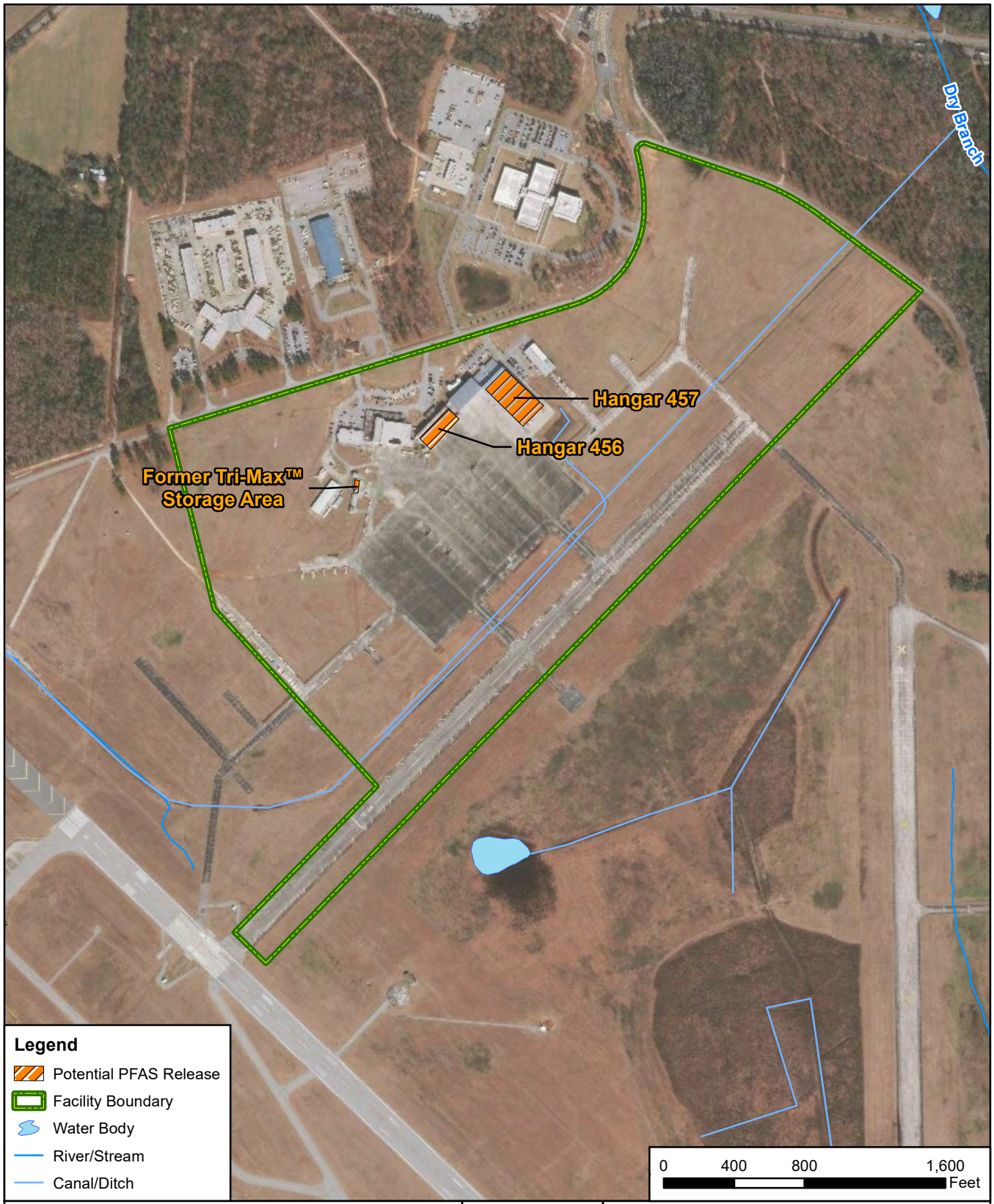
Hangar 456 is a hangar located along the northwestern border, directly east from the flight operations building, at approximate geographic coordinates 33° 56' 0.44”N; 80° 48' 15.34”W; it was constructed in 1991 with an AFFF suppression system that is currently charged with 700 gallons of 3% AFFF. One 5-gallon bucket of 3M Light Water 3% AFFF was also located in the utility room of the building.

To the interviewees’ knowledge, a malfunction of the system in July 2015 caused a release of an unknown volume of AFFF from one of the nozzles in the hangar. The AFFF under the nozzle was reportedly confined to a small area of the hangar, with some small spherical pieces of foam blowing out of the hangar. The AFFF was pushed outside the hangar and was allowed to drain onto the surrounding storm grates. The AFFF had also coated three helicopters and several tools, which were rinsed in the wash rack. The wash rack water was drained to the sanitary sewer. No other known releases were associated with the suppression system in Hangar 456, including scheduled maintenance and testing activities.

## 3.3 Former Tri-Max™ Storage Area

The former Tri-Max™ Storage Area (Building 467) is a shed-like structure that houses ground support equipment, located just to the northwest of the wash rack. The approximate geographic coordinates are 33° 55' 57.19”N and 80° 48' 20.96”W.

In the past, the building housed four Tri-Max™ 30 carts, which were all turned into the state in 2010. To the interviewees' knowledge, no other AFFF was stored in the building; however, it is unknown where the AFFF was stored for the Tri-Max™ units. No known leaks or spills have occurred in the building, but none of the interviewees have direct experience with maintaining the Tri-Max™ units. Former AASF personnel were responsible for maintaining the ground support equipment and were unavailable for interview. It is reasonable to assume that all AFFF filling and transfers of the Tri-Max™ units were performed in or near this building. Historically, a bambi-bucket had been stored in the building along with an old firetruck that only carried water. An unknown type of firefighting gel had also been formerly stored in the building, but it is unknown whether the agent contained PFAS.

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| CLIENT | ARNG | | | |
| Preliminary Assessment for PFAS at McEntire AASF, SC | | | | |
| REVISED | 5/20/2020 | GIS BY | HO | 5/20/2020 |
| SCALE | 1:9,600 | CHK BY | ST | 5/20/2020 |
| Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, | | PM | RG | 5/20/2020 |

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**Non-Fire Training Areas**

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**Figure 3-1**

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# 4. Emergency Response Areas

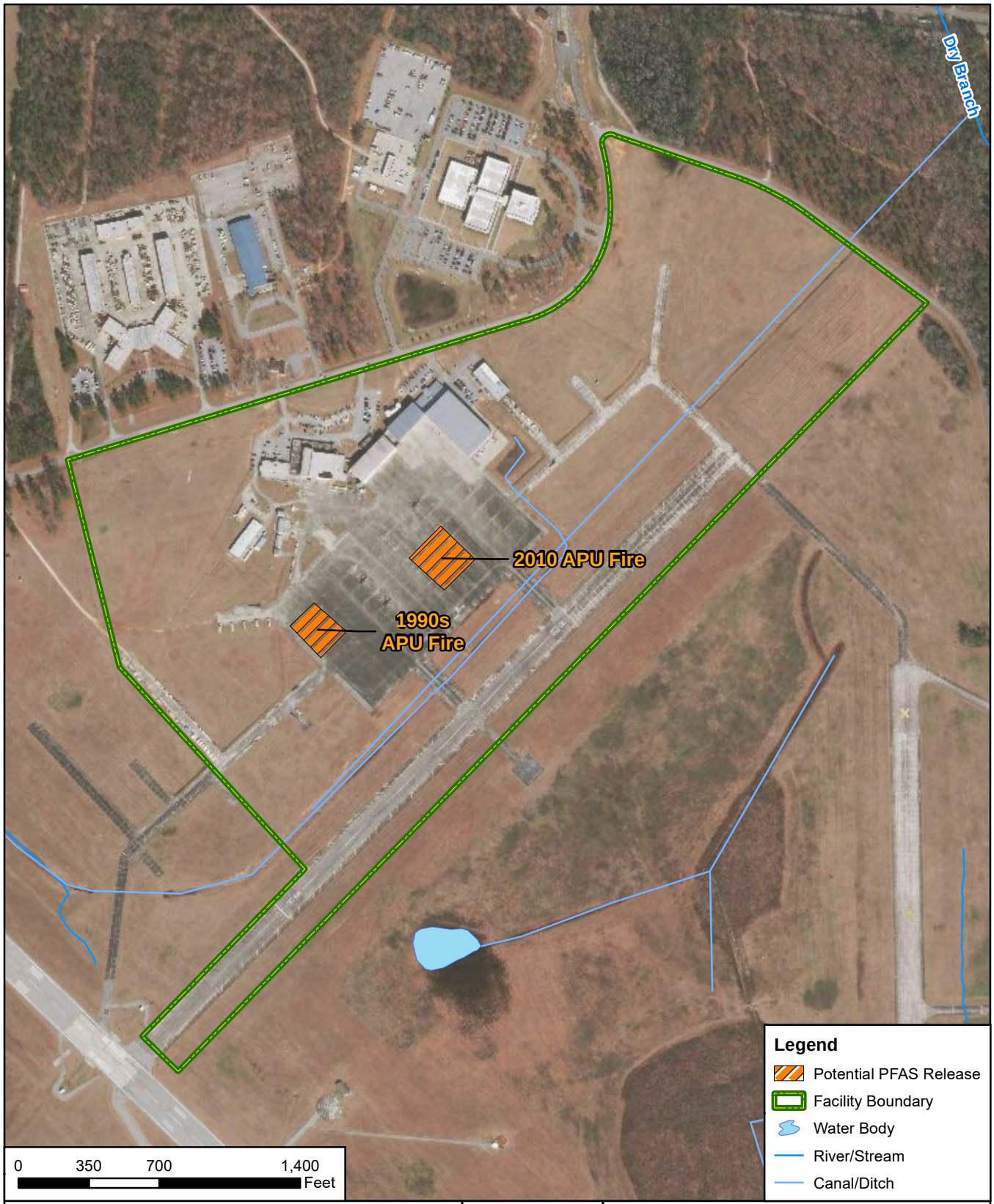
Two emergency response areas were identified within the current AASF facility during the PA through interviews.

## 4.1 1990s Auxiliary Power Unit (APU) Fire

Sometime in the 1990s, the auxiliary power unit (APU) on a helicopter parked on the apron caught fire and was extinguished by AASF personnel using AFFF dispensed from a Tri-Max™ 30 unit. The entire 30-gallon capacity of one Tri-Max™ unit was used to extinguish the fire. The incident occurred near the southwestern edge of the helicopter apron. The approximate geographic coordinates of the AFFF release are 33°55'51.56"N; 80°48'18.91"W.

## 4.2 2010 APU Fire

In 2010, another APU fire occurred on a helicopter parked on the apron. The fire was extinguished by AASF personnel using AFFF dispensed from a Tri-Max™ 30 unit, and the total estimated volume of AFFF released during the incident was 5 gallons. The emergency response occurred near the center of the helicopter apron. The approximate geographic coordinates of the AFFF release are 33°55'55.35"N; 80°48'11.54"W.

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| CLIENT | ARNG | | | |
| Preliminary Assessment for PFAS at McEntire AASF, SC | | | | |
| REVISED | 5/20/2020 | GIS BY | MS | 5/20/2020 |
| SCALE | 1:8,400 | CHK BY | ST | 5/20/2020 |
| Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, | | PM | RG | 5/20/2020 |

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# Emergency Response Areas

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**Figure 4-1**

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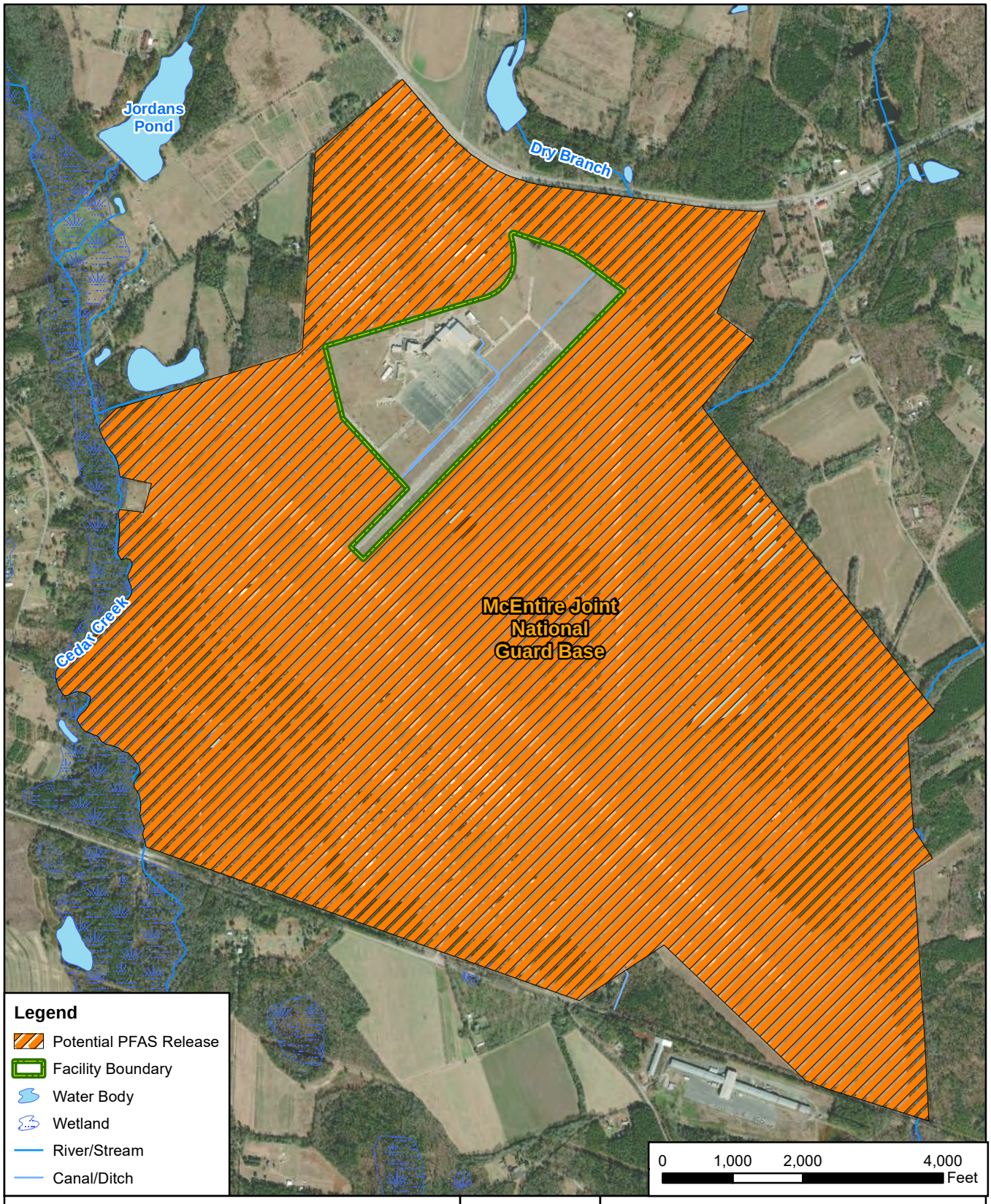
# 5. Adjacent Sources

One potential off-facility PFAS source was identified adjacent to the McEntire AASF during the PA. The location of potential off-facility source area is shown on **Figure 5-1**.

## 5.1 McEntire JNGB

The McEntire AASF is an enclave of McEntire JNGB, with the remaining areas affiliated with the South Carolina ANG. The ANG Firefighting unit provides mutual aid to the AASF; however, AASF personnel confirmed that the ANG firefighters never applied AFFF on the AASF property. The ANG fire station is located to the northwest of the control tower and currently stores AFFF and AFFF-charged equipment. An SI for PFAS was performed at the McEntire JNGB in 2018. The SI investigated 17 potential release locations affiliated with ANG activities and identified exceedances of the screening criteria for PFOS/PFOA for groundwater or surface water at 11 potential release locations (Leidos, 2019). The PFAS SI report for McEntire JNGB is included in **Appendix A**.

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| CLIENT | ARNG | | | |
| Preliminary Assessment for PFAS at McEntire AASF, SC | | | | |
| REVISED | 5/20/2020 | GIS BY | MS | 5/20/2020 |
| SCALE | 1:24,000 | CHK BY | ST | 5/20/2020 |
| Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, | | PM | RG | 5/20/2020 |

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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 AOIs were identified at the McEntire AASF facility. Locations of the AOIs are shown on **Figure 6-1**. 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 compete exposure pathway: (1) source, (2) pathway, (3) receptor. If any of these elements are missing, the pathway is considered incomplete.

## 6.1 Pathways

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 are sparse and continue to be the subject of PFAS toxicological study (National Ground Water Association, 2018).

Known and potential AFFF releases identified at the McEntire AASF facility occurred on both surface soil and paved surfaces. Releases to the paved surfaces could have migrated a short distance onto the surrounding surface soil. Ground-disturbing activities in these grassy areas as well as beneath the pavement may result in potential exposure to surface soils via ingestion and inhalation of dust particles. AFFF releases to the paved surfaces could have infiltrated the subsurface via cracks in the pavement or joints between areas that are paved with different materials. Ground-disturbing activities may result in potential exposure to subsurface soils and groundwater via ingestion.

PFAS are water soluble and can migrate readily from soil to groundwater via leaching; however, drinking water at the McEntire AASF is provided by the City of Columbia. There are no drinking water wells located on the Base. Water resources within a 1-mile radius of the Base have largely remained undeveloped due to the scarcity of residential, industrial, and agricultural establishments. However, because there is a lack of city water lines in most of the areas surrounding the Base, many homes use private wells as a potable water supply. The few nearby small farms primarily rely on groundwater to supply their daily water requirements. The South Carolina Department of Natural Resources (SCDNR) well inventory shows that there are a few public supply wells and industrial wells south the facility beyond the McEntire JNGB boundary (SCDNR, 2019); this is also shown on **Figure 1-2**. Potentially impacted groundwater from the facility could migrate to these wells.

Surface water runoff at the McEntire AASF facility drains to the southwest. The facility is located within a single stormwater drainage basin that is diverted to Outfall #007, which then drains into Cedar Creek. It is possible that PFAS could migrate to Cedar Creek, which then drains into the Congaree River. This possible migration of PFAS could result in potential exposure via ingestion of surface water and sediment, or by secondary ingestion of contaminated fish from the Congaree River, which is a popular location for recreational fishing. There is also potential for groundwater/ surface water interaction due to the possible outcropping of the McQueen Branch aquifer near the facility (USGS, 2010); thus, off-facility recreational users are potentially impacted through ingestion of shallow groundwater.

## 6.2 Receptors

Receptors at the McEntire AASF include site workers, construction workers, off-facility recreational users, and off-facility residents. These receptors, as they pertain to the facility, are described below:

- Site workers typically work at or use the site and may come into contact with the surface soils. Site workers may also come into contact with surface water in the facility drainage channel, the helicopter apron, or wash rack.
- Construction workers are considered workers who represent a utility worker or other worker who would be exposed to surface and/or subsurface conditions through ground-disturbing activities.
- Off-facility recreational users typically identify a person who may recreationally use an off-facility area that may be affected by a PFAS release from the facility. Off-facility recreational users could be exposed to sediment and surface water during recreational use.
- Off-facility residents identify receptors who occupy properties outside of the McEntire AASF. Off-facility residents may come into contact with groundwater using unregistered, private, domestic wells. Additionally, off-facility residents may use the surrounding area for recreation and may come into contact with surface water.

The preliminary CSM for the McEntire AASF indicates which specific receptors could potentially be exposed to PFAS. The preliminary CSM for AOIs 1, 2, and 3 are shown on **Figure 6-2.**

## 6.3 AOI 1: Hangar 457

AOI 1 encompasses the areas associated with the AFFF fire suppression system within the hangar and utility room. To the interviewees' knowledge, four separate AFFF releases occurred in 2013 and are associated with AOI 1. The AFFF releases resulted from a flow test of the fire suppression system, a nozzle head malfunction, and leakages from the system. The releases occurred both within and outside the hangar, and cleanup efforts also facilitated the movement of released AFFF into outside storm drains. The storm drains lead to a stormwater retention pond before being discharged to Outfall #007. The AFFF leaks within the utility room discharged to a floor drain that leads to sanitary sewer. Potential PFAS exposure pathways resulting from releases at AOI 1 are described in **Table 6-1.**

**Table 6-1: Exposure Pathways at AOI 1, AOI 2, and AOI 3**

| Pathway | Receptor |
|---|---|
| Surface Soil | Considered a potentially complete pathway to site workers and construction workers via ingestion. Considered a potentially complete pathway to all receptors via inhalation of dust. |
| Subsurface Soil | Considered a potentially complete pathway to construction workers via ingestion or inhalation of dust. |
| Surface Water and Sediment | Considered a potentially complete pathway to all receptors via ingestion. |
| Groundwater | Considered a potentially complete pathway to construction workers, off-facility residents, and off-facility recreational users via ingestion. |

## 6.4 AOI 2: Helicopter Apron & Hangar 456

AOI 2 encompasses the Helicopter Apron and the area associated with the AFFF suppression system in Hangar 456.

A malfunction of the system in July 2015 caused a release of an unknown volume of AFFF from one of the nozzles in the hangar. The AFFF was pushed outside the hangar and was allowed to drain through the surrounding storm grates. This water would have drained to the stormwater swales where it would have infiltrated or have been transported to Outfall #007. The AFFF had

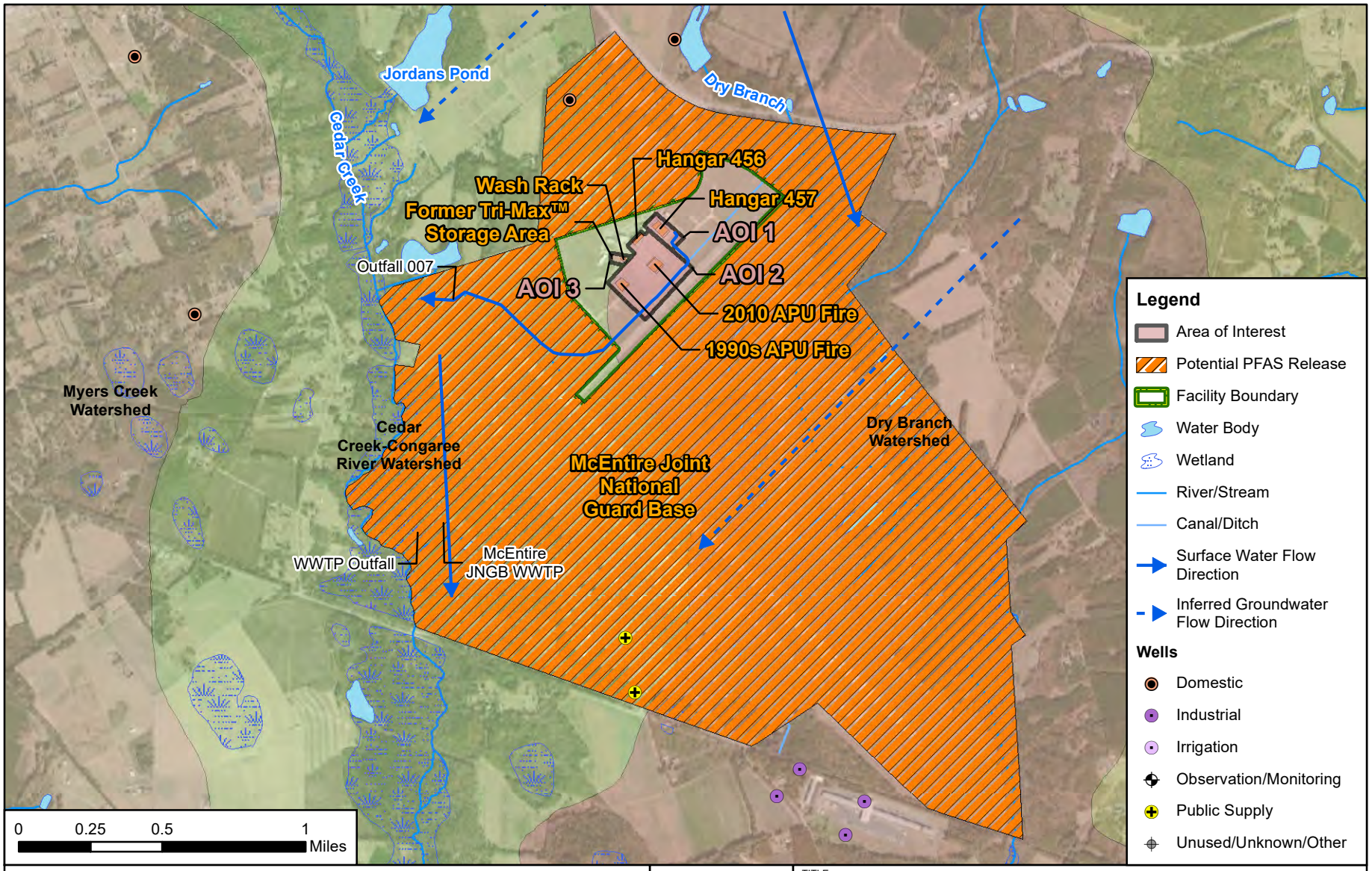
also gotten onto three of the helicopters and several tools, which were rinsed in the wash rack. The wash rack water was drained to the sanitary sewer.

Two emergencies on the helicopter apron were responded to with AFFF, resulting in approximately 30-gallon and 5-gallon AFFF releases. Sheet flow from the helicopter apron goes toward the southeast, to the series of stormwater swales where it can infiltrate or be discharged to Outfall #007. Potential PFAS exposure pathways resulting from releases at AOI 2 are described in **Table 6-1.**

## 6.5 AOI 3: Building 467 and Wash Rack

AOI 3 encompasses Building 467 and the Wash Rack. Building 467 is a shed-like structure that stored four Tri-Max™ 30 carts from the 1990s until 2010. AFFF filling and transfers to the Tri-Max™ 30 carts may have occurred in Building 467 and resulted in spills or leaks. The building does not have any floor drains, and surface drainage would have been captured by surrounding stormwater drains and the wash rack drain. The stormwater drains are connected to the series of swales, where the water will either infiltrate or discharge from Outfall #007.

The wash rack was formerly used on an annual basis as an FTA from the 1990s to sometime in the 2000s, possibly as late as 2010. The releases occurred directly to the asphalt in the wash rack and drained through a storm grate before entering a diversion structure where the position of a valve determines the fate of the drain water. During the AFFF releases, the valve diverted the water to the sanitary sewer after passing through an oil-water separator. Sometime in July 2015, helicopters and tools located in Hangar 456 were washed in the wash rack after being covered in AFFF due to a malfunction of the suppression system in the hangar. The AFFF rinsate was diverted to the sanitary sewer. Due to the AFFF releases at the wash rack, it is possible that residual PFAS on the asphalt in the wash rack was inadvertently transported with other drain water to the stormwater outfall, sanitary sewer, and holding tank. Potential PFAS exposure pathways resulting from releases at AOI 3 are described in **Table 6-1.**

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| CLIENT | ARNG | | | |
| PROJECT | Preliminary Assessment for PFAS at McEntire AASF, SC | | | |
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| SCALE | 1:31,680 | CHK BY | ST | 7/21/2020 |
| Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community | | PM | RG | 7/21/2020 |

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**Area of Interest**

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**Figure 6-1**

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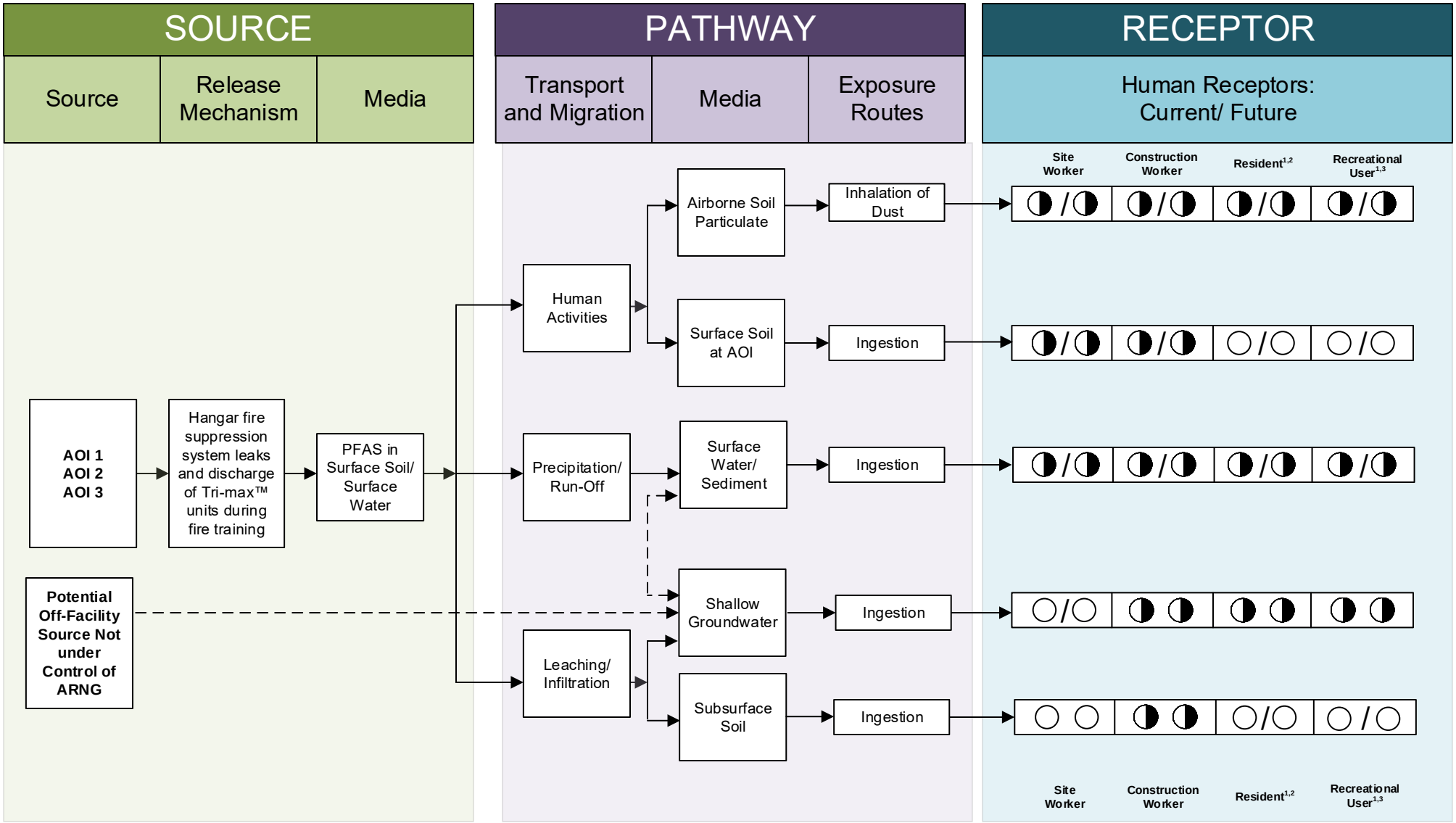



**LEGEND**

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

**Notes:**

1. The resident and recreational user receptors refer to an 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
McEntire AASF, Eastover, 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 McEntire AASF. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

## 7.1 Findings

Three AOIs related to a potential PFAS release were identified at the McEntire AASF during the PA (**Figure 7-1**) and are shown in **Table 7-1** below:

**Table 7-1: AOIs at McEntire AASF**

| Area of Interest | Name | Used by | Potential Release Dates |
|---|---|---|---|
| AOI 1 | Hangar 457 | SCARNG | 2013 |
| AOI 2 | Helicopter Apron & Hangar 456 | SCARNG | 1990s/2010/2015 |
| AOI 3 | Building 467 & Wash Rack | SCARNG | 1990s-2000s |

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

## 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, 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, current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected.

**Table 7-2** summarizes the uncertainties associated with the PA:

**Table 7-2: Summary of Uncertainties**

| Area of Interest | Source of Uncertainty |
|---|---|
| AOIs 1-3 | The McEntire AASF facility was constructed circa 1961, and SCARNG personnel did not have firsthand knowledge of the facility prior to 1991. |
| AOI 1 Hangar 457 | The amount of AFFF released inside the hangar and the utility room is unknown. There is also some uncertainty about the method of clean up that was used for all releases in Hangar 467. It is questioned on what exactly the method of cleaning up AFFF was for one of the spills. All three methods are assumed to have some of the AFFF pushed outside to drain in the storm drain. |
| AOI 2 Helicopter Apron & Hangar 456 | The amount of AFFF released inside the hangar in 2015 is unknown. The fate of small pieces of foam that travelled outside of the hangar and blew across the aircraft apron is unknown. |
| AOI 3 Building 467 & Wash Rack | Building 467 was constructed circa 1961, and SCARNG personnel did not have firsthand knowledge of the facility prior to 1991. Little is known of historical firefighting activities that may have used this building. Interviewees confirmed that no AFFF was stored in the building other than the Tri-Max™ carts themselves. The past storage location of the AFFF used in the Tri-Max™ carts, in buckets or otherwise, is unknown.<br>Building 467 stored Tri-Max™ 30 carts, but uncertain if the AFFF for the carts were stored in there as well. Also, there were no reports of leaks or residue from the Tri-Max™ carts.<br><br>Uncertainties exist with the fate of the wash rack drain water, as it is dependent on the position of the drain valve. It is possible that PFAS were inadvertently released to other drainage pathways due to improper position of the valve or residual leaching of PFAS from the wash rack area. |

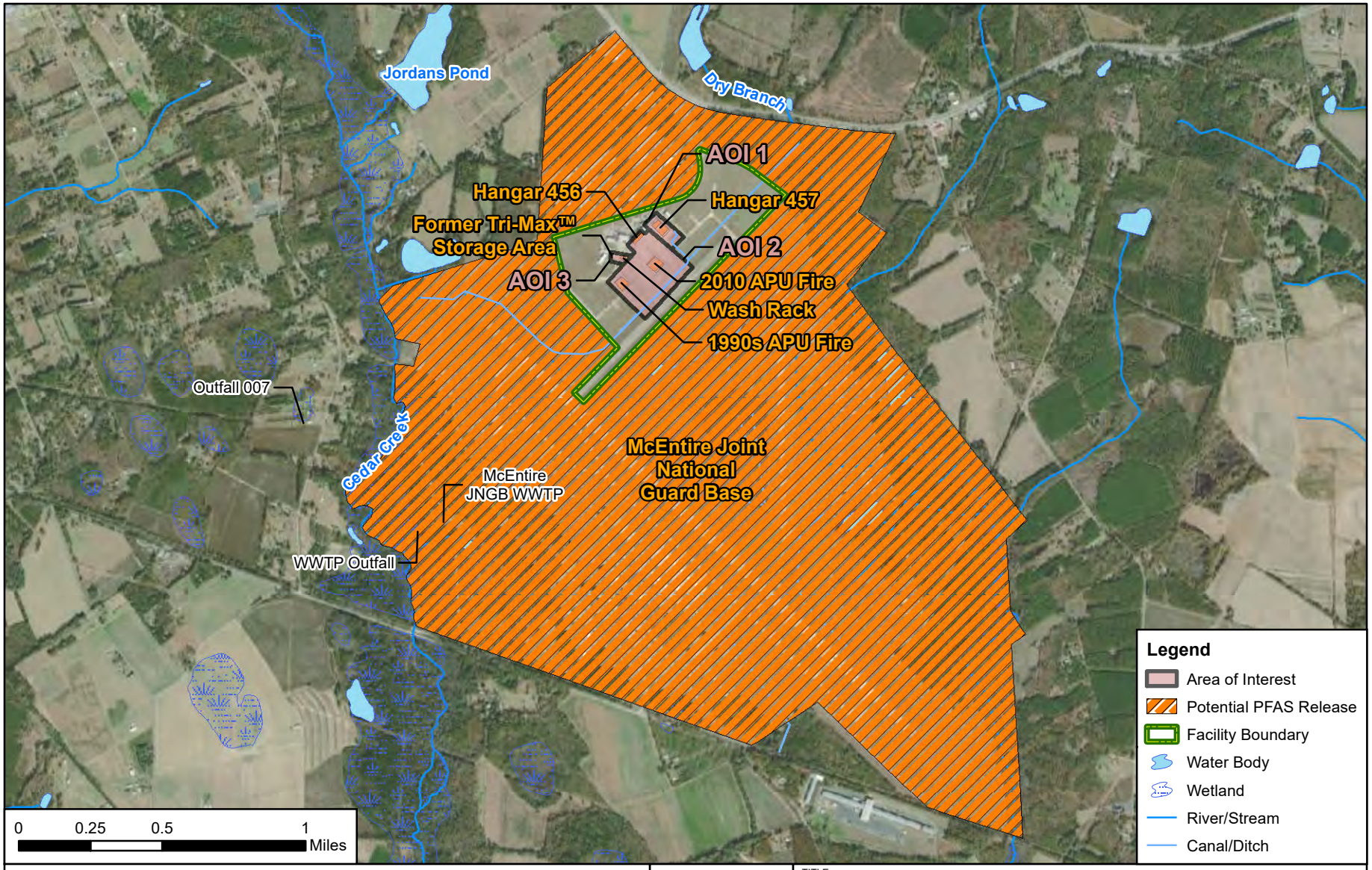
## 7.3 Potential Future Actions

Interviews with personnel whose knowledge of the facility date back to 1991 indicate that SCARNG activity may have resulted in potential PFAS releases at the McEntire AASF. Based on the preliminary CSMs developed for the AOIs, there is potential for receptors to be exposed to PFAS contamination in soil, groundwater, sediment, and surface water at these AOIs. **Table 7-3** summarizes the rationale used to determine if the AOI should be considered for further investigation under the CERCLA process and undergo an SI.

**Table 7-3: PA Findings Summary**

| Area of Interest | AOI Location | Rationale | Potential Future Action |
|---|---|---|---|
| AOI 1 Hangar 457 | 33° 56' 2.19”N and 80° 48' 10.32”W | Four separate AFFF release events have occurred in and around Hangar 457 including the hangar, the utility room, and the immediate area around the building. | Proceed to an SI, focus on soil, groundwater, surface water, and sediment. |
| AOI 2 Helicopter Apron & Hangar 456 | 33° 56' 0.44”N and 80° 48' 15.34”W | AFFF was applied during two emergency responses on the helicopter apron. In 2015, the AFFF suppression system in the hangar malfunctioned resulting in a release. | Proceed to an SI, focus on soil, groundwater, surface water, and sediment. |
| AOI 3 Building 467 & Wash Rack | 33° 55' 57.19”N and 80° 48' 20.96”W | Four Tri-Max™ 30 carts were stored in Building 467. Fire training with AFFF and washing of equipment with AFFF foam occurred in the Wash Rack. | Proceed to an SI, focus on soil, groundwater, surface water, and sediment. |

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

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| CLIENT | ARNG | | | |
| PROJECT | Preliminary Assessment for PFAS at McEntire AASF, SC | | | |
| REVISED | 7/21/2020 | GIS BY | MS | 7/21/2020 |
| SCALE | 1:31,680 | CHK BY | ST | 7/21/2020 |
| Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community | | PM | RG | 7/21/2020 |

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**Summary of Findings**

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**Figure 7-1**

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# Appendix A
# Data Resources

Data Resources will be provided separately on CD. Data Resources for the McEntire AASF include:

## McEntire AASF Leases, Licenses, and Permits

- Original and Supplemental Leases between SCARNG and Gary/Chicago International Airport Authority

## McEntire AASF EDR™ Report

- 2019 McEntire AASF EDR™ Report

## McEntire JNGB Environmental Reports

- 2016 Final Perfluorinated Compounds Preliminary Assessment Site Visit Report, McEntire Joint National Guard Base, Eastover, South Carolina
- 2018 Final Annual Long-Term Monitoring Report, Site 3 Landfill, McEntire Joint National Guard Base
- 2019 Site Inspection Report for Perfluorooctane Sulfonic and Perfluorooctanoic Acid at McEntire Joint National Guard Base, Eastover, South Carolina

# Appendix B

# Preliminary Assessment Documentation

# Appendix B.1
# Interview Records

**PA Interview Questionnaire - Environmental Manager**

**Facility:_McEntire AASF_**
**Interviewer:_____[redacted]_____**
**Date/Time:__12/3/19 0900___**

| | |
|---|---|
| **Interviewee:___Group_____**<br>**Title:_____Various_____**<br>**Phone Number:_____[redacted]_____**<br>**Email:_____NA_____** | Can your name/role be used in the PA Report?<br>**Y** or N<br>Can you recommend anyone we can interview?<br>Y or **N** _____ |

1. Roles or activities with the Facility/years working at the Facility.
   - CW3 [redacted]; Facility Maintenance – 29 Years
   - SSG [redacted]g; Production Control – 6 years
   - SSG [redacted]; Floor Mechanic – 17 years
   - SGT [redacted]; Floor Mechanic – 9 years
   - SGT [redacted]; Floor Mechanic – 17 years
   - SSG [redacted]; Avionics Mechanic – 15 years
   - 1SGT [redacted]; Maintenance Supervisor – 21 years
   - SGT [redacted]; QA – 7 years
   - SGT [redacted]; QA – 13 years

2. Where can I find previous facility ownership information?

   Lease has been provided by SCARNG Headquarters. Facility was built in 1961, with one hangar at the time for flight operations (#465). Second Hangar (#456) built in 1991. Third Hangar (#457) built in 2012/2013.

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 – None.
   Fire Training Areas – One FTA at Wash Rack
   Firefighting (Active Fire) – Two auxiliary power unit (APU) fire responses with Tri-Max 30s.
   Crash – None.
   Fire Suppression Systems – Two systems – Hangar 456 and Hangar 457. Both have AFFF releases associated with them.
   Fire Protection at Fueling Stations – None.
   Non-Technical/Recreational/ Pest Management – None.
   Metals Plating Facility – N/A.
   Waterproofing Uniforms (Laundry Facilities) – N/A
   Other – Tri-Max carts formerly stored in "firehouse" building 467.

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

**PA Interview Questionnaire - Environmental Manager**

**Facility:_McEntire AASF_**
**Interviewer:_____[redacted]_____**
**Date/Time:__12/3/19 0900___**

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?

   Hangar 456- Constructed in 1991 with a "dry" AFFF suppression system, meaning that the lines are not constantly under water pressure. A contractor services it, but it has never been discharged during testing to their knowledge. It has leaked water in the past from the service line valve, but never AFFF. A malfunction in July 2015 caused it to release a moderate amount of AFFF in the hangar, the exact volume is unknown but under the malfunctioning nozzle the blob of foam was approximately 4 feet high. AFFF foam got on all the tools and 3 helicopters in the hangar. Tools were cleaned, helicopters were washed in the wash rack, wash water went to the sanitary sewer. AFFF in the hangar was pushed outside into the drains on the flightline.

   Hangar 457 – constructed in 2012 with a "wet" AFFF suppression system, meaning that the lines are under constant water pressure. Three releases are associated with this system. A flow test was performed in 2013 where AFFF was discharged by a contractor out of the door on the northern side of the hangar and allowed to drain to the storm drain located southeast from the discharge area. Two leaks of the suppression system in the utility room since 2013. Unknown quantity leaked in the utility room, but would have gone down the sanitary sewer drain. During one of the leaks, foam was seen coming out of the outside drain pipe on the exterior wall in the northwest corner of the hangar. Estimate 5 gallons of foam came out of the drain pipe. In 2013, one of the sensors malfunctioned and approx. 5 gallons of AFFF was released from one of the nozzles. Valve was turned off before any more was released. Foam was pushed outside the hangar with squeegees and drained into the long stormwater drain to the southwest of the hangar doors.

**PA Interview Questionnaire - Environmental Manager**

**Facility: McEntire AASF**
**Interviewer: [redacted]**
**Date/Time: 12/3/19 0900**

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 3% AFFF.

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

No tracking system. Procurement is done through the state.

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)?

Unsure of the brand. One 5-gallon buck of "Light Water" 3M 3% AFFF was found in hangar 456 next to the AFFF suppression system tank.

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?

No AFFF is stored at the facility besides what is in the suppression system tanks and the one 5-gallons bucket in the utility room of hangar 456. Tri-Max carts were formerly stored in building 467 ("the firehouse") but no knowledge of any AFFF being stored then in 5 gallons buckets or otherwise. The suppression systems each have a 700 gallon AFFF 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?

One FTA at the AASF, located at the Wash Rack. The FTA is not currently active, the last use was sometime in the 2000s. It was used up to 3 times a year, with one Tri-Max 30 discharged until empty each time. The Tri-Max carts were turned in to the state in 2010.

**PA Interview Questionnaire - Environmental Manager**

**Facility: McEntire AASF**
**Interviewer: [redacted]**
**Date/Time: 12/3/19 0900**

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?

It was allowed to drain into the grate at the wash rack. A nearby valve determined where it went from there. The valve was most likely set to send it to the sanitary sewer but could have also sent it to the storm drain.

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 fire training occurs at the AASF with outside units to their knowledge.

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

No, they don't have a fire battalion.

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?

The units that come to the facility don't bring their own firefighting equipment. No AFFF training with outside units or fire training of any kind.

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?

No major emergency responses with firefighting at the AASF. Two small incidents with auxiliary power unit (APU) fires. One APU fire in the 1990s (see map) where one entire Tri-Max (30 gallons) was discharged. Another APU response around 2010 (see map), where about 5 gallons were released.

**PA Interview Questionnaire - Environmental Manager**

**Facility: McEntire AASF**
**Interviewer: [redacted]**
**Date/Time: 12/3/19 0900**

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?

AFFF was never applied to fuel spills to their knowledge. The ANG would have been called for large spills. Never saw them applying foam at the AASF.

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?

AASF has no firefighting equipment now. Only have mutual aid with ANG.

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)?
    - Hangar 457
    - Hangar 456
    - Building 467 ("firehouse")

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

No creative uses.

**PA Interview Questionnaire - Environmental Manager**

**Facility:_McEntire AASF_**
**Interviewer:_____[redacted]_____**
**Date/Time:__12/3/19 0900___**

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?

SCARNG environmental staff will look into it.

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

SCARNG will send SWPPP.

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 chrome plating or related activities.

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.?

N/A

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?

Tri-Max 30s (4) were turned in to the state sometime around 2010. Expired/off-spec would have been turned in. Can't recall disposing of off-spec or expired AFFF, but could have been used in fire training exercises.

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:** [redacted]

**ARNG Contact:** CW4 [redacted]; CW3 [redacted]

**Date and Time:** 12/3/2019 0900

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

## *Source/Release Information*

**Site Name / Area Name / Unique ID:** McEntire AASF

**Site / Area Acreage:** Site: Approx 160 acres

**Historic Site Use (Brief Description):** Historically the area was undeveloped, surrounded by agriculture and residential areas

**Current Site Use (Brief Description):** The current AASF was constructed in 1961 and services/maintains military helicopters. The AASF is part of the larger Joint National Guard Base, consisting of the McEntire ANG Air Station to the south of the AASF.

**Physical barriers or access restrictions:** Access to the area is restricted to AASF personnel. Access gates and fences

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 is presently charged in two hangars (Building 456 and 457). Building 456 has had AFFF suppression since 1991 and building 457 has had AFFF suppression since 2012. Both have discharges associated with them. Tri-Max 30 carts were used from the 1990s to roughly 2010 in training and emergency response. The wash rack was used as an FTA during that time.

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

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

Usage has not been documented.

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

3a. Indicate what businesses are located near the site

Several retail businesses and a recyling center.

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

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

It is part of the McEntire Joint National Guard Base and is situated north of the ANG runway/flightline.

# 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, 3M Light Water used in building 456. Unclear of AFFF type in building 457 but presumed to be similar.

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

No maintenance schedule known; A contractor services both systems. The system in building 457 had developed a leak which was repaired by a contractor around 2013.

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

Unknown

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

As built drawings were not provided. Floor drains in the utility room go to the sanitary sewer. Floor drains in Hangar 457 go to a holding tank. No floor drains in Hangary 456.

## *Transport / Pathway Information*

**Migration Potential:**

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

1a. If so, note observation and location:

Drainage ditches/channels surround the facility, draining at Outfall #007 (per SWPPP). Migration from outfall

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

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

Only for stormwater; drainage ditches

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

3a. If so, please note the location:

No known drinking water wells. Monitoring wells located throughout the JNGB.

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.

McEntire JNGB may be able to provide this information.

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

6a. If so, please note the source and location.

AFFF Dicharges at the Air National Guard (ANG) fire station and potentially other areas of the JNGB.

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):

Several structures have been added since the original construction of the AASF, including the two hangars with AFFF suppression systems.

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:

To the east of the Building 457 there is a swale with standing water

## *Receptor Information*

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

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

The AASF shares the same site restrictions as the JNGB. The JNGB property boundary is fenced with controlled access points.

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:

Small residential areas are located thoughout the area surrounding the site. The more densely populated area of Columbia, SC is approximately 14 miles northwest of the AASF.

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

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

Several churches are located near the AASF, and can conservatively be assumed to provide childcare services. No schools or full-time day care centers were identified.

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

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

Several wetland areas are located within one mile of the AASF. To the west, wetlands surround Cedar Creek which is downgradient from stormwater outfall #007, encompassing all surface drainage from the AASF. To the east, wetlands surround the Dry Branch creek upgradient from the site.

## 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: McEntire AASF**

**Why has this location been identified as a site?**

Two hangars a the AASF are currently charged with AFFF. Both systems have had AFFF releases in the past. Tri-Max 30 units were stored and used at the site until 2010. The wash rack was used as a fire training area for the Tri-Max units during that time.

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

Yes, McEntire Air National Guard Station occupying the southern portion of the Joint National Guard Base

**Training Events**

Have any training events with AFFF occurred at this site? Yes

If so, how often? Between 2 and 3 times annually, during the 2000s

How much material was used? Is it documented? Not documented, but one Tri-Max 30 was emptied During each training event.

**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? Southwest

Average rainfall? 48 inches

Any flooding during rainy season? No

Direct or indirect pathway to ditches? Direct stormwater pathway to ditches

Direct or indirect pathway to larger bodies of water? Indirect pathway to Cedar Creek

Does surface water pond any place on site? Wet swale/retention pond on the eastern portion of the AASF, adjacent to Building 457 (Hangar)

Any impoundment areas or retention ponds? Yes

Any NPDES location points near the site? Yes, all surface drainage at the AASF is conveyed through Outfall #007 to the west of the AASF (as stated in SWPPP).

How does surface water drain on and around the flight line?

Drainages have been diverted around the AASF through a series of swales toward Outfall 007

# Preliminary Assessment – Conceptual Site Model Information

**Groundwater:**

Groundwater flow direction? Southwest

Depth to groundwater? Shallow; approx. 10-30ft

Uses (agricultural, drinking water, irrigation)? Two domestic wells are located to the north, upgradient from the site. The area surrounding the site is mostly agricultural, but no other wells for drinking water or irrigation were identified.

Any groundwater treatment systems? No.

Any groundwater monitoring well locations near the site? No active monitoring wells identified.

Is groundwater used for drinking water? Not at the site.

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. Only two wells within 1 mile radius, both located upgradient of the site.

**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

Note: The ANG Station to the south of the AASF has a WWTP that treats sanitary sewer drainage from the AASF. Treated effluent is discharged to an unnamed channel before entering Cedar Creek.

**Equipment Rinse Water**

1. Is firefighting equipment washed? Where does the rinse water go? N/A – fire fighting services are provided by ANG.

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?

This would be conducted at the ANG Station.

3. Other?

Helicopters and other equipment are washed at the wash rack. After accidental AFFF release in Hangar 456, equipment and helicopters were rinsed at the wash rack. Wash water was diverted to the OWS and sanitary sewer

# Preliminary Assessment – Conceptual Site Model Information

**Identify Potential Receptors:**

Site Worker: Y

Construction Worker : Y

Recreational User: Y

Residential: Y (for surface water only)

Child: N

Ecological: Y

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

**Documentation**

Ask for Engineering drawings (if applicable). **No drawings available.**

Has there been a reconstruction or changes to the drainage system? When did that occur?
Some changes may have occurred with several additions made to the facility since its original construction.

# Appendix C
# Photographic Log

# APPENDIX C – Photographic Log

| Army National Guard, Preliminary Assessment for PFAS | McEntire AASF | Hopkins, South Carolina |
|---|---|---|

**Photograph No. 1**

**Description:**

AFFF suppression system tank located in the utility room of Hangar 456.

Date Taken:

03 December 2019

**Photograph No. 2**

**Description:**

Five-gallon bucket of 3% AFFF, 3M Light Water. Located in the utility room next to the suppression system tank.

Date Taken:

03 December 2019

# APPENDIX C – Photographic Log

| Army National Guard, Preliminary Assessment for PFAS | McEntire AASF | Hopkins, South Carolina |
|---|---|---|

**Photograph No. 3**

**Description:**

Hangar 457 AFFF suppression system tank located in the utility room in the northwest corner of the building.

Date Taken:

03 December 2019


**Photograph No. 4**

**Description:**

Staining, associated with a past leak under the AFFF system plumbing in the utility room of Hangar 457.

Date Taken:

03 December 2019

# APPENDIX C – Photographic Log

| Army National Guard, Preliminary Assessment for PFAS | McEntire AASF | Hopkins, South Carolina |
|---|---|---|

**Photograph No. 5**

**Description:**

Floor drain servicing the Hangar 457 utility room.

Date Taken:

03 December 2019

**Photograph No. 6**

**Description:**

Site personnel standing in the approximate spot where AFFF was released during flow testing of the Hangar 457 suppression system. The direction of flow goes toward a storm drain in the background.

Date Taken:

03 December 2019

# APPENDIX C – Photographic Log

| Army National Guard, Preliminary Assessment for PFAS | McEntire AASF | Hopkins, South Carolina |
|---|---|---|

**Photograph No. 7**

**Description:**

Storm drain affected by flow test of Hangar 457 AFFF suppression system.

Date Taken:

03 December 2019

**Photograph No. 8**

**Description:**

Exterior drain pipe where foam was seen after the AFFF leak in the Hangar 457 utility room. Staining can be seen around the pipe.

Date Taken:

03 December 2019

# APPENDIX C – Photographic Log

| Army National Guard, Preliminary Assessment for PFAS | McEntire AASF | Hopkins, South Carolina |
|---|---|---|

**Photograph No. 9**

**Description:**

Outfall leading to stormwater retention pond in the northeastern portion of the site.

Date Taken:

03 December 2019

**Photograph No. 10**

**Description:**

Looking south at the extent of the retention pond.

Date Taken:

03 December 2019

# APPENDIX C – Photographic Log

| Army National Guard, Preliminary Assessment for PFAS | McEntire AASF | Hopkins, South Carolina |
|---|---|---|

**Photograph No. 11**

**Description:**

Looking northwest at the doors of Hangar 457.

Date Taken:

03 December 2019

**Photograph No. 12**

**Description:**

Looking north, from the area of the drainage swales at Hangar 456.

Date Taken:

03 December 2019

# APPENDIX C – Photographic Log

| Army National Guard, Preliminary Assessment for PFAS | McEntire AASF | Hopkins, South Carolina |
|---|---|---|

**Photograph No. 13**

**Description:**

Looking north, the wash rack is shown in the foreground.

Date Taken:

03 December 2019

**Photograph No. 14**

**Description:**

Looking southeast, at the wash rack drain and extent of the wash rack.

Date Taken:

03 December 2019

# APPENDIX C – Photographic Log

| Army National Guard, Preliminary Assessment for PFAS | McEntire AASF | Hopkins, South Carolina |
|---|---|---|

**Photograph No. 15**

**Description:**

Looking northwest, Building 467 is pictured where four Tri-Max carts were formerly housed.

Date Taken:

03 December 2019