FINAL
Preliminary Assessment Report
Camp McCain
Grenada, Mississippi

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

September 2020

Prepared for:

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

Table of Contents

Tables

Figures

Appendices

Acronyms and Abbreviations

°F	degrees Fahrenheit
%	percent
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	area of interest
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
DFAC	dining facility
ft	feet/foot
FTA	fire training area
MDEQ	Mississippi Department of Environmental Quality
MIST	Minimum Impact Suppression Techniques
MS	Mississippi
MSARNG	Mississippi Army National Guard
NOAA	National Oceanic Atmospheric Administration
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFTeA	perfluorotetradecanoic acid
SI	Site Inspection
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VSI	visual site inspection
WWTP	wastewater treatment plant

Executive Summary

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG) G9 Division, Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide*. The ARNG is assessing potential effects on human health related to processes at facilities that used per- and poly-fluoroalkyl substances (PFAS), primarily in the form of aqueous film forming foam released as part of firefighting activities, although other PFAS sources are possible.

AECOM completed a PA for PFAS at Camp McCain in Grenada, Mississippi, to assess potential PFAS release areas and exposure pathways to receptors. Camp McCain includes approximately 13,027 acres licensed to the State of Mississippi for year-round use in support of the National Guard. The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit on 6 March 2019
- Interviewed current Camp McCain personnel and operations staff during the site visit
- Completed visual site inspections at known or suspected PFAS release locations and documented with photographs
- Developed a preliminary conceptual site model (CSM) to outline the potential release and pathway of PFAS for the area(s) of interest (AOIs) and the facility (**Figure ES-1**)

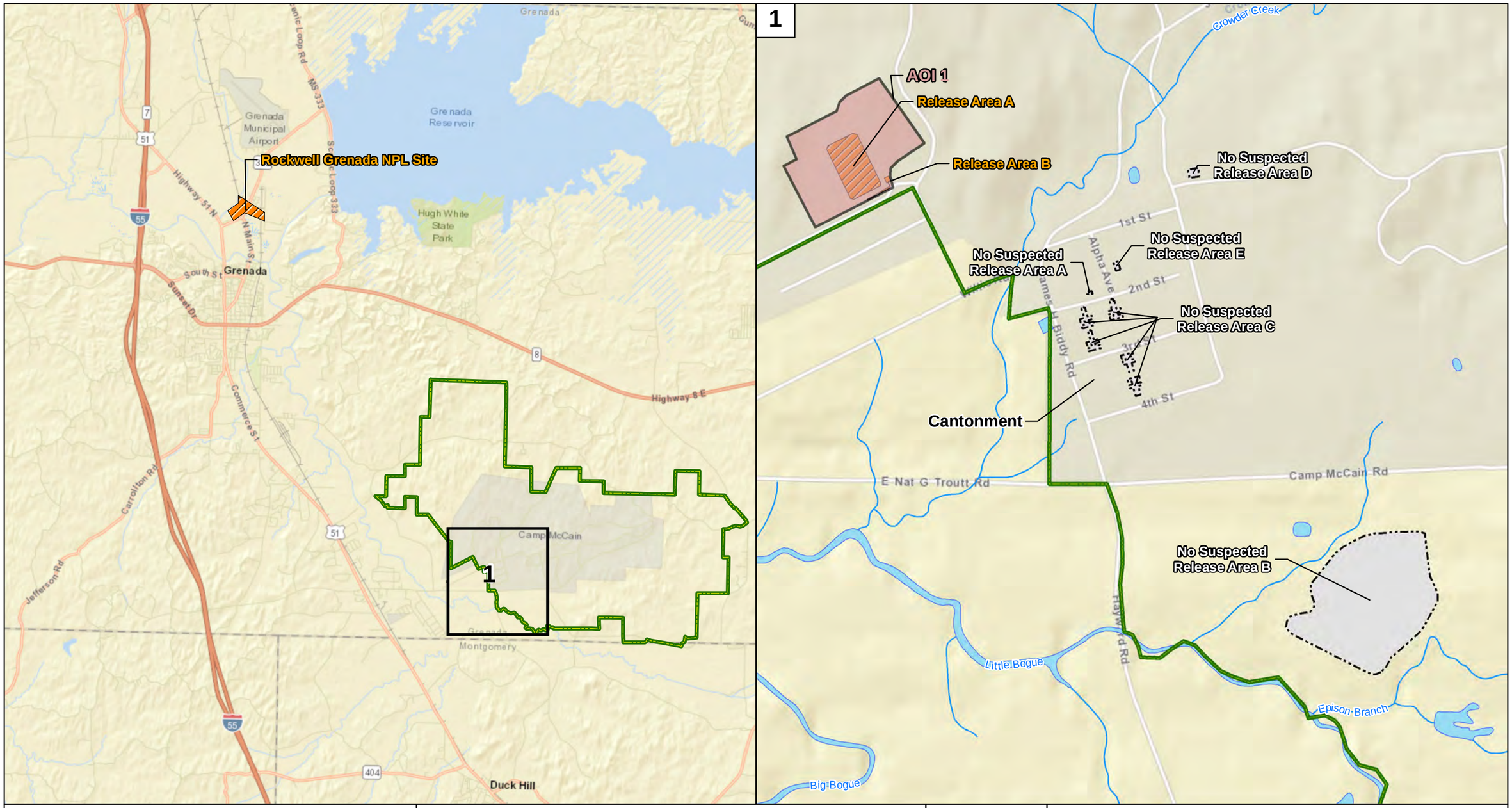
One AOI related to a potential PFAS release was identified at Camp McCain during the PA. The AOI is shown on **Figure ES-1** and described in **Table ES-1** below:

Table ES-1 AOIs at Camp McCain

Area of Interest	Name	Used by	Potential Release Date
AOI 1	Release Areas A and B	MSARNG	Early 2009-2011

Based on a potential PFAS release at this AOI, there is potential for exposure to PFAS to receptors. Potential receptors in the area include on-facility site workers, construction workers, and trespassers, and downgradient off-facility residents and recreators. All receptors may be exposed to PFAS contamination in surface water and sediments/biosolids via ingestion; site and construction workers may be exposed to surface soil via ingestion and inhalation of soil particulates; construction workers may also be incidentally exposed to potential PFAS in subsurface soil. Off-facility residents and on-facility site and construction workers may potentially be exposed to PFAS in groundwater via ingestion.

Adjacent sources of PFAS surrounding Camp McCain were not identified during the PA; however, Rockwell International Wheel and Trim, a former chrome plating facility and superfund site, is located approximately 8-miles downgradient of Camp McCain. The preliminary CSM for Camp McCain is shown on **Figure ES-2**.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Camp McCain, MS			
REVISED	7/15/2020	GIS BY	MS	7/15/2020
SCALE	1:14,400	CHK BY	LC	7/15/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	RG	7/15/2020

Legend

- Area of Interest
- Potential PFAS Release
- No Suspected Release
- Facility Boundary
- Water Body
- River/Stream

0 600 1,200 2,400 Feet

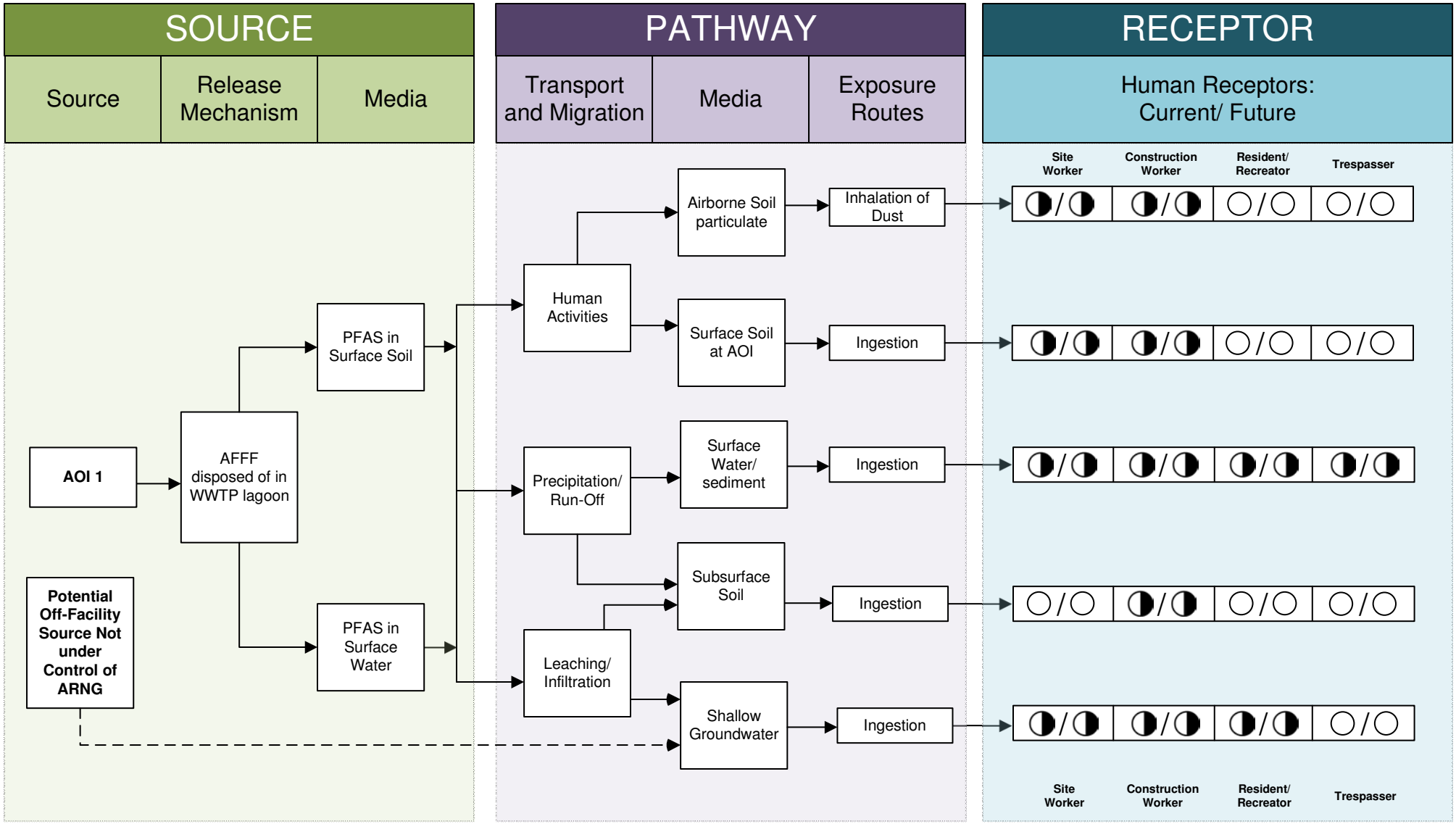
N

Summary of Findings

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure ES-1

C:\Users\grace.canham\AECOM Directory\Stankevich, Michael - ARNG_PFAS_GIS_60552172\MXDs\MS\Camp_McCain_Figures\Fig_ES-1_Camp_McCain_Summary.mxd



LEGEND

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

Notes:

1. The resident and recreator receptors refer to an off-site receptor.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure ES-2
Preliminary Conceptual Site Model
Camp McCain

1. Introduction

1.1 Authority and Purpose

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG) G9 Division, Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide* under Contract Number W912DR-09-D-0003 / 0008, Task Order W912DR17F0192, issued 11 August 2017. The ARNG is assessing potential effects on human health related to processes at facilities that used per- and poly-fluoroalkyl substances (PFAS), primarily in the form of aqueous film forming foam (AFFF) released as part of firefighting activities, although other PFAS sources are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. PFAS formulations contain highly diverse mixtures of compounds. Thus, the fate of PFAS compounds in the environment varies. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued Drinking Water Health Advisories for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water.

This report presents the findings of a PA for PFAS at Camp McCain (also referred to as the "facility"), in Grenada, Mississippi, 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 USACE requirements and guidance.

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

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit on 6 March 2019
- Interviewed current Camp McCain personnel and operations staff during the site visit
- Completed visual site inspections (VSIs) at known or suspected PFAS release locations and documented with photographs
- Developed a preliminary conceptual site model (CSM) to outline the potential release and pathway of PFAS for the area of interest (AOI) and the facility

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 fire training areas (FTAs) at the facility identified during the site visit
- **Section 3** – **Non-Fire Training Areas:** describes other locations of potential PFAS releases at the facility identified during the site visit
- **Section 4** – **Emergency Response Areas:** describes areas of potential PFAS release at the facility, specifically in response to emergency situations
- **Section 5** – **Adjacent Sources:** describes sources of potential PFAS release adjacent to the facility that are not under the control of ARNG
- **Section 6** – **Preliminary Conceptual Site Model:** describes the pathways of PFAS transport and receptors for the AOIs and the facility
- **Section 7** –**Conclusions:** summarizes the data findings and presents the conclusions 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

Camp McCain is located in Grenada, Mississippi and is approximately 13 miles north of the city of Winona **(Figure 1-1)**. The facility is primarily in Grenada County; however, a small portion is located south of the county line, in Montgomery County. Approximately 8 miles to the northwest of the facility is the county seat of Grenada, while Interstate 55 is approximately 6 miles directly west of the facility.

In the early 1940s, the War Department acquired 42,073 acres for the Army to establish a Triangular Division Camp. Once the camp was established, the name was changed from the provisional Grenada Triangular Division Camp to Camp McCain in honor of Major General Henry P. McCain from neighboring Carroll County, Mississippi. In December 1944, Camp McCain was designated an inactive facility. On 25 January 1946, the Army reported the 42,073 acres in fee surplus to the War Assets Administration. On 3 December 1946, 3005.69 acres were withdrawn from surplus and licensed to the State of Mississippi for year-round use in support of the National Guard. In 1969, tracked vehicle training was added to Camp McCain, and in 1971, a maintenance facility was built. Many changes followed, including the organization of the 221st Engineer Detachment. On 12 August 1986, an additional 4,600 adjoining acres were added to the Camp McCain property, increasing the tactical training area. In 1987 and 1988, eight modern small arms ranges were constructed. All of the newly acquired land falls within the original borders of the facility, dating back to the 1940s. Through this expansion, Camp McCain has grown to its current size of approximately 13,027 acres.

1.5 Facility Environmental Setting

Camp McCain is located in the North-Central Hill Section of the Coastal Plain physiographic province. Long-term erosion and a well-developed drainage system are the two main factors in producing the slightly rolling surface landscape on the facility (Brown and Adams, 1943). Topography tends to slope to the southwest, toward the Batupan Bogue Valley. Five stream valleys cut across Camp McCain in the northeast-southwest direction, and these connect to the larger Batupan Bogue Valley along the southern boundaries. Elevations at the ground surface range from 460 feet (ft) above mean sea level in the center of the Camp to 200 ft above mean sea level along the southwestern portions of the Little Bogue Valley (United States Geological Survey [USGS], 1983).

1.5.1 Geology

Camp McCain lies within the Mississippi embayment, a regional geologic feature whose sedimentary strata range in age from Jurassic to Quaternary and encompass a large area within the Gulf Coastal Plain physiographic region, stretching from southern Illinois in the north to Alabama and Texas in the east and west. Structurally, the embayment is a syncline in which the axis generally parallels the Mississipapi River, plunging to the south. The embayment thickens down plunge, with the deepest Jurassic strata lying approximately 18,000 feet below ground surface (bgs) in the southern part of the region. These Jurassic strata generally bear non-potable water. Parts of the embayment have been subjected to regional metamorphism (Cushing et al., 1964), and the dip is to the south-southwest, controlled by the attitude of the underlying basement rock (MSARNG, 2003).

Locally, the facility lies within the north-central Mississippi section of the embayment, where outcrops generally date to the Eocene Epoch. Underlying these are the Paleocene strata of the Midway Group, and Upper Cretaceous strata. The thickness of the Tertiary deposits (Eocene and Paleocene) reach a maximum thickness of 7,000 feet in the southern part of the region, with the Paleocene strata accounting for the lower 1,000 feet. Therefore, the Eocene strata account for much of the underlying bedrock and water-bearing formations in this section of Mississippi.

The Eocene strata present within the area are the Wilcox Formation and the Claiborne Group. The Jackson Formation has been eroded in this area, leaving exposures of the Claiborne Group at surface level. These outcrops in the Camp McCain area consist, in stratigraphic order, of the Kosciusko Formation; the Zilpha Shale; the Winona Sand; and the Neshoba Sand member of the Tallahatta Formation. The Wilcox Formation underlies these strata.

A small outcrop of the basal section of the Kosciusko Formation is present approximately 3 miles southwest of the facility. This section of the Formation consists of coarse to medium-grained quartz sand, with percentages of glauconite increasing towards its gradational contact with the underlying Zilpha Shale. The Zilpha Shale is composed of dark gray marine clay and acts as an aquitard to the underlying, highly glauconitic and fossiliferous Winona Sand, which is used locally as an aquifer in north-central Mississippi. The maximum thickness of the Zilpha and Winona Formations reaches roughly 100 feet in areas southwest of Camp McCain.

The Tallahatta Formation consists of several sandy members, namely the Neshoba Sand, used locally as aquifers. The Neshoba Sand is typically a fine, micaceous quartz sand with a thickness of about 50 ft. Underlying the Neshoba Sand is the Basic City Shale, a clay formation reaching up to 150 ft thick below Camp McCain (MSARNG, 2003). It is composed of light-colored, sparsely fossiliferous clay- and siltstone. The basal member of the Tallahatta Formation (and Claiborne Group) is the Meridian Sand, a characteristically crossbedded, fine to very coarse quartz sand formation, averaging 100, but reaching up to 500, ft thick. The Meridian Sand's contact with the

underlying Wilcox Formation is determined by the presence of lignitic clay or other carbonaceous material characteristic of the Wilcox (Cushing et al., 1964).

The Wilcox Formation is undifferentiated in this section of Mississippi but does consist of two identifiable units: an upper shale and a lower sand unit. The shale unit is the differentiating marker between the Meridian-Upper Wilcox and the Middle Wilcox aquifers. These aquifers are the principle aquifers in the region.

The unconsolidated deposits throughout the Camp McCain area consist of channel and floodplain deposits in the eroded stream valleys and terrace and weathered loess deposits in the uplands. The channel and floodplain deposits are classified as loose sand, clay, and vegetal debris up to 20 ft thick. The terrace and loess deposits are described as loose sand, clay, and loam up to 15 ft thick (Brown and Adams, 1943).

There is a north-northeast-trending thrust fault between Highway 51 and the western boundary of Camp McCain. Approximately 80 ft of displacement are shown on stratigraphic cross-sections and geologic logs presented by Brown and Adams. Camp McCain is located on the down-thrust side of the fault (Brown and Adams, 1943).

The geology of the Camp McCain area is illustrated in **Figure 1-2**.

1.5.2 Hydrogeology

The Mississippi embayment aquifer system is the system of water-bearing units that underlie the Mississippi embayment, comprising a hydraulically connected system of various sand and clay units that encompass an area of more than 160,000 square miles. This system serves Mississippi as well as areas of Texas, Alabama, Arkansas, Illinois, Tennessee, and Louisiana. The most widely used aquifers in the embayment are those of the Wilcox Group, namely the Meridian-Upper Wilcox and Middle Wilcox aquifers (Darden, 1986a).

Depth to groundwater varies throughout the region, but within the boundaries of Camp McCain historically ranges from below 1 ft. bgs. to greater than 50 ft. bgs. (Brown and Adams, 1943). These measurements were taken from wells completed in the Meridian-Upper Wilcox and Middle Wilcox aquifers. Groundwater levels in the southeast section of Camp McCain ranged from 2 to 9 ft bgs in the wells completed in the shallow floodplain deposits (USGS, 2004).

The regional groundwater gradient in the Meridian-Upper Wilcox aquifer is to the southwest (Darden, 1986a). Groundwater data reported by Brown and Adams (1943) and in the USGS lysimeter study (2004) suggest shallow groundwater underlying Camp McCain is controlled predominately by the local topography, resulting in localized variations in the shallow groundwater gradient.

A watershed divide that also indicates a shallow groundwater divide exists in the northeast corner of Camp McCain. North of this divide, the shallow groundwater is expected to flow to the north, toward Redgrass Creek. Groundwater flow directions (USACE, 2009) are shown in **Figure 1-2.**

Surface infiltration is the primary manner of recharge to the groundwater aquifer system in the Camp McCain area. Recharge to the Meridian-Upper Wilcox aquifer occurs on the ground within Camp McCain. Recharge to the Middle and Lower Wilcox aquifers occurs east of Camp McCain (Darden, 1986a, 1986b). Groundwater flows from high elevations and discharges to numerous wetlands and surface water bodies at and near Camp McCain, including Crowder Creek, Epison Branch, Campbell Creek, Little Bogue, and Batupan Bogue.

Domestic and public water supply wells located downgradient of Camp McCain (i.e., northeast, west, and southwest of the facility) are primarily completed in the Meridian-Upper Wilcox, Middle Wilcox, and Lower Wilcox aquifers (USGS, 1992).

According to facility personnel, three wells are located at Camp McCain. Well #1 is located adjacent to and services the tank wash located northeast of the cantonment area. This 525-foot deep well draws water from the Middle Wilcox aquifer; water from Well #1 is solely used for the tank wash facility, not potable water. Well #2 was installed in 2015, according to the Mississippi Department of Environmental Quality (MDEQ) permit application (**Appendix A**), to a depth of 390 ft., within the Middle Wilcox aquifer, for potable water use. It is located just south of the tank washing facility. Lastly, Well #3 is a potable well located near the fuel point. The majority of Camp McCain now obtains its potable water entirely from on-site groundwater wells; interviewees noted that a small southeast portion of the camp is served by Hays Creek public water system.

Based on the USEPA Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS were detected in a public water system above the USEPA Health Advisory level within 20 miles of the facility. In 2017, National Guard Bureau conducted PFAS drinking water sampling at Camp McCain. Pre-treatment samples were collected from Well #2 and Well #3, a post-treatment sample of finished drinking water was also collected and analyzed. The only PFAS detected above reporting limits among samples was Perfluorotetradecanoic acid (PFTeA), which was also detected in the field reagent blank. No exceedances of the USEPA Health Advisory level were observed in Camp McCain drinking water.

1.5.3 Hydrology

Surface water from Camp McCain drains into several watersheds. In order of greatest areal coverage, Camp McCain drains to the Crowder Creek-Little Bogue, Sykes Creek-Batupan Bogue, Redgrass Creek, Mouse Creek-Little Bogue, and Grenada Lake-Yalobusha River drainage basins. These watersheds all lie within the Yalobusha River basin.

Various sections of the facility lie within these watersheds. Drainage from approximately 67 percent (%) of the facility, including the cantonment area, is collected into the Crowder Creek-Little Bogue watershed, drained mostly by Crowder Creek, Epison Branch, and tributaries of Campbell Creek. The Sykes Creek-Batupan Bogue watershed drains approximately 28% of the facility in the northwest. The wastewater treatment plant (WWTP) falls on the divide between these two watersheds, with the majority of its footprint located within the latter. Both watersheds eventually drain to the Batupan Bogue. The northeast section of the facility, approximately 5%, drains north into the Redgrass Creek watershed. Redgrass Creek empties directly to Grenada Lake, a reservoir approximately 3 miles north of Camp McCain that was formed by damming of the Yalobusha River. Trace percentages of the facility drain to the Mouse Creek-Little Bogue watershed in the east and the Grenada Lake-Yalobusha River watershed in the north.

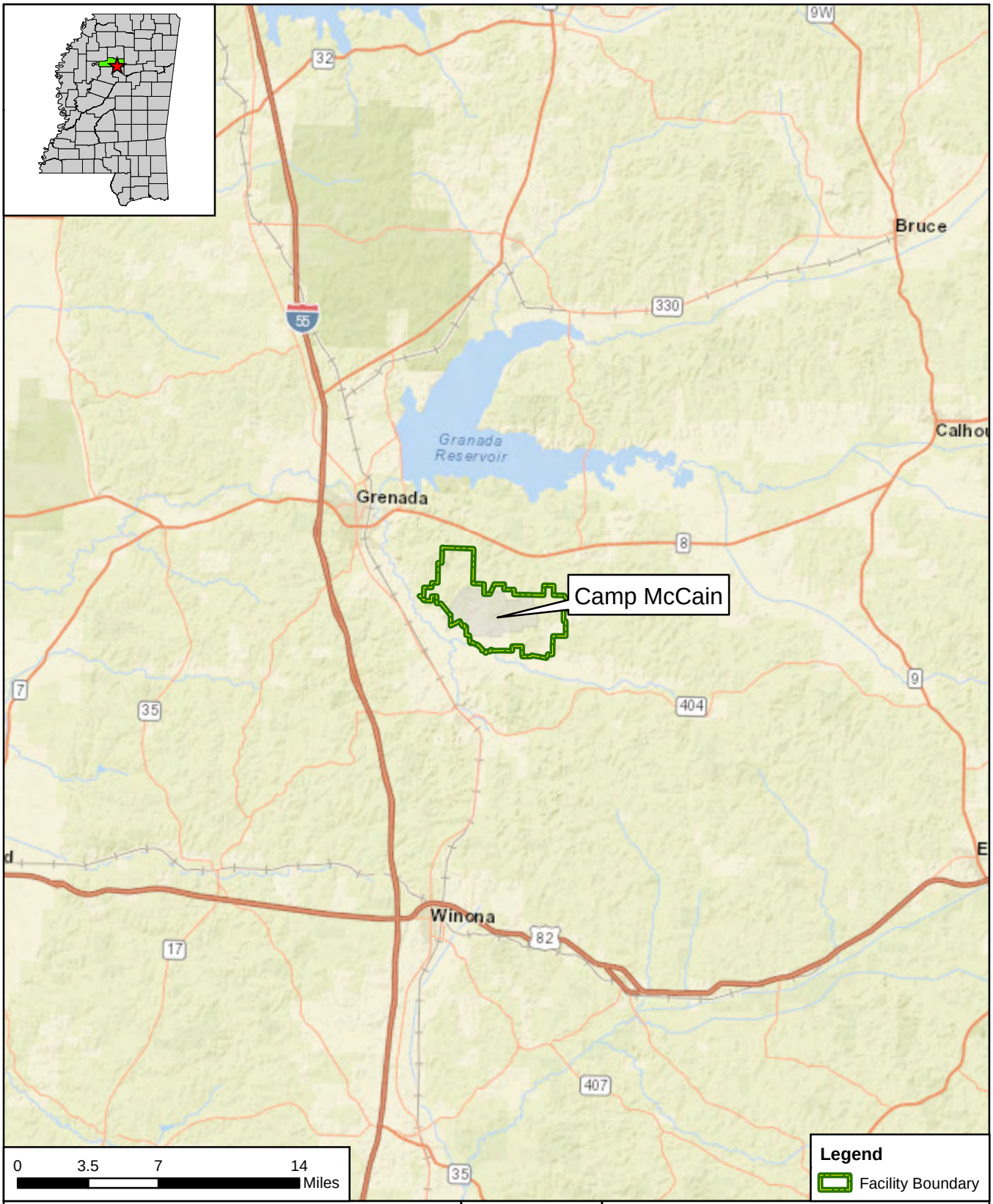
Other surface water features within the facility include 30 ponds, 116 acres of wetlands, and Hunt Lake. Hunt Lake is used for occasional training exercises, and recreational fishing is permitted in the lake. Hunt Lake is directly north of the WWTP on a tributary of the Batupan Bogue. Surface water features are shown in **Figure 1-3**.

1.5.4 Climate

The climate of the area surrounding Camp McCain is characterized by generally mild temperatures year-round, but with a noticeable change of seasons. Limited climatological data was available for the nearby City of Grenada. In February, the average high temperature is 48.8 degrees Fahrenheit (°F), and the average low temperature is 26.5°F. In July, the average high temperature is 92.9°F, and the average low temperature is 72.7°F. The annual precipitation is approximately 46.46 inches, with April, the wettest month, having an average of 8.56 inches of precipitation, and September, the driest month, having an average of 0.75 inches of precipitation. Snowfall in the area is less than 2 inches per year (National Oceanic Atmospheric Administration [NOAA], 2019)

1.5.5 Current and Future Land Use

Camp McCain's current land use includes serving as a weekend training area for Mississippi ARNG (MSARNG) units located in northern Mississippi and other National Guard and Reserve units from Mississippi and adjacent states. Camp McCain currently accommodates training activities at small arms ranges and non-firing tactical maneuver areas for armor, armored cavalry, infantry, mechanized infantry, artillery, engineer, medical, aviation, and other troop units. Numerous support facilities are also present within the cantonment, including maintenance shops, dining halls, barracks, paint shop, fuel point, and recycling center. Reasonably anticipated future land use is not expected to change from the current land use.



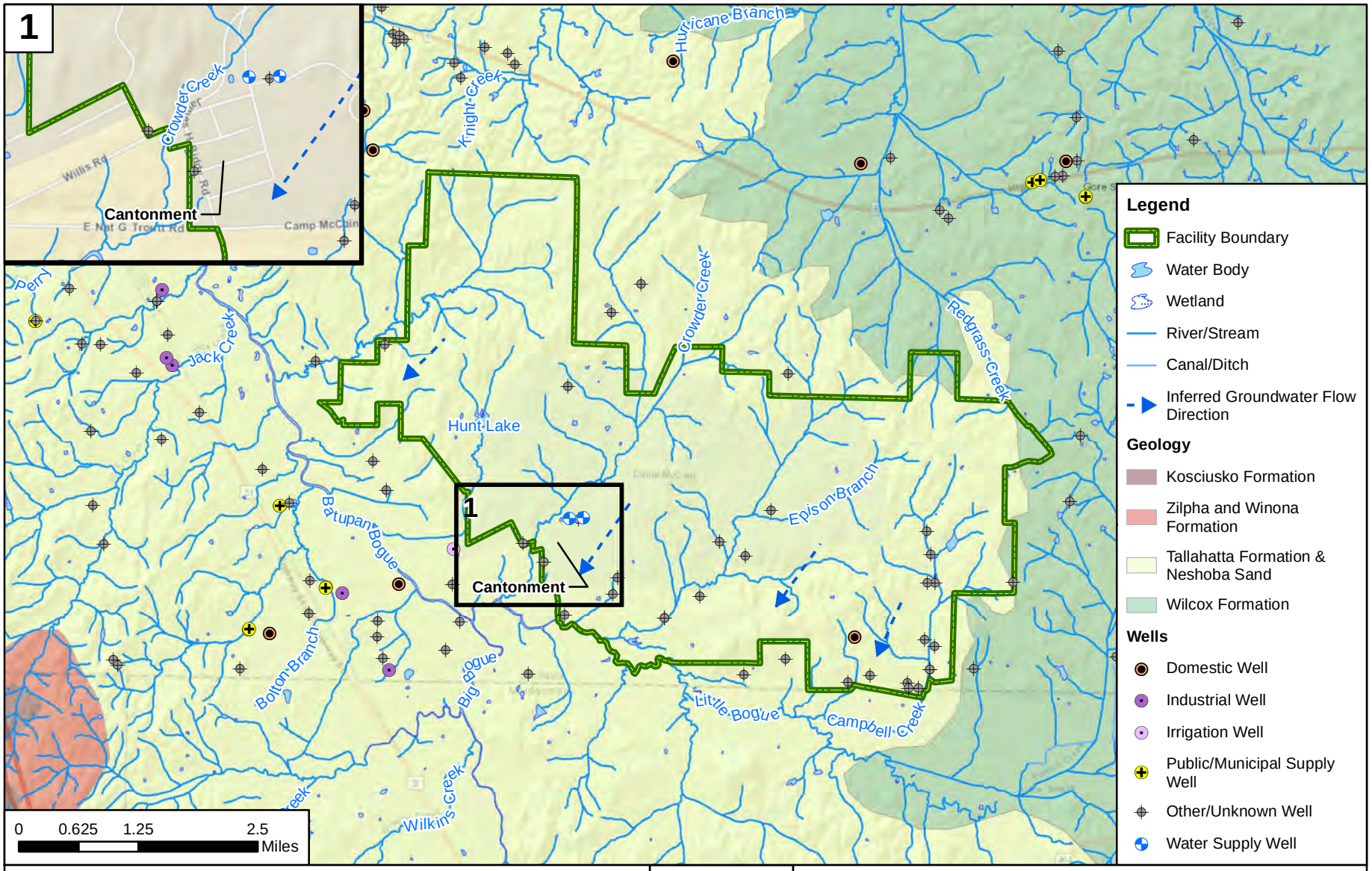
CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Camp McCain, MS			
REVISED	7/16/2019	GIS BY	MS	7/16/2019
SCALE	1:443,520	CHK BY	LC	7/16/2019
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	7/16/2019

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-1

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\MS\Camp_McCain_Figures\Fig_1-1_Camp_McCain_Facility_Location.mxd



CLIENT	ARNG			
Preliminary Assessment for PFAS at Camp McCain, MS				
REVISED	7/15/2020	GIS BY	MS	7/15/2020
SCALE	1:95,040	CHK BY	LC	7/15/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	RG	7/15/2020

N

TITLE

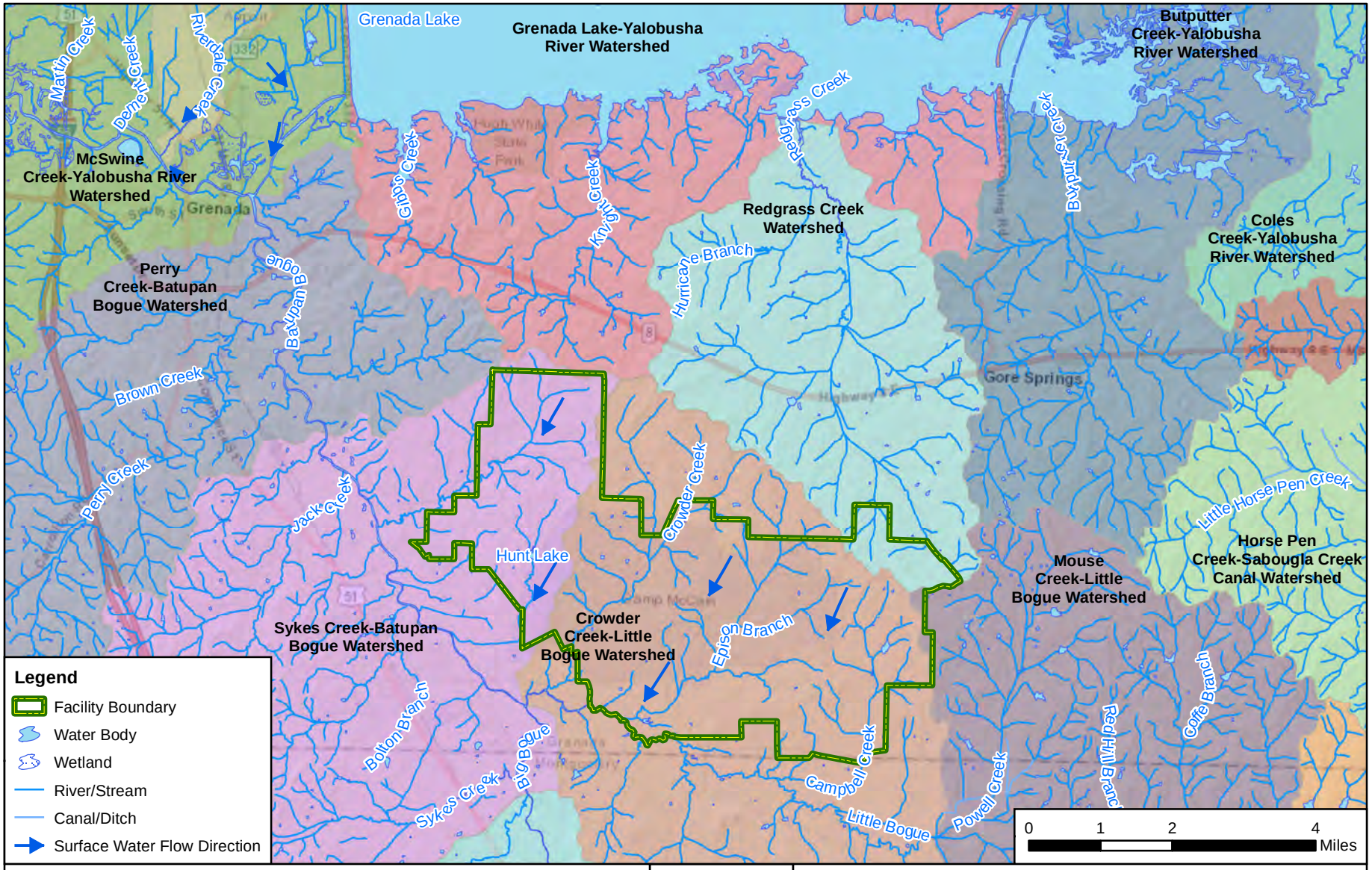
Groundwater Features

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-2

C:\Users\grace.canham\AECOM Directory\Stankevich, Michael - ARNG_PFAS_GIS_60552172\MXDs\MS\Camp_McCain_Figures\Fig_1-2_Camp_McCain_Groundwater.mxd



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Camp McCain, MS			
REVISED	7/15/2020	GIS BY	MS	7/15/2020
SCALE	1:126,720	CHK BY	LC	7/15/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	RG	7/15/2020

TITLE

Surface Water Features

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-3

C:\Users\grace.canham\AECOM Directory\Stankevich, Michael - ARNG_PFAS_GIS_60552172\MXDs\MS\Camp_McCain_Figures\Fig_1-3_Camp_McCain_Surface_Water.mxd

2. Fire Training Areas

No FTAs were identified at Camp McCain during the PA through interviews (**Appendix B.1**) or the Environmental Data Resource Report (**Appendix A**). Interviewees (tenure dates back to 1985) noted that emergency response for the facility is provided by the City of Elliott Volunteer Fire Department.

3. Non-Fire Training Areas

Five non-FTAs where AFFF or other PFAS containing material were potentially stored and/or released were identified during the PA. All buildings in the cantonment area are equipped with water-based sprinkler systems and/or dry chemical ABC fire extinguishers. No AFFF Fire Suppression Systems exist at the facility. A description of each non-FTA is presented below, and the non-FTAs are shown on **Figure 3-1**.

3.1 Release Areas A and B – Wastewater Treatment Plant (WWTP) AFFF Disposal and Forced Discharge Area

The current Camp McCain WWTP was constructed in 2005 and is located approximately 0.5 miles northwest of the cantonment. The WWTP consists of three connected stabilization lagoons, three spray-irrigation fields, and a discharge treatment facility. The treatment facility collects overland flow from the irrigation fields for treatment by chlorination, dechlorination, and aeration prior to discharging to a dry drainage ditch that runs the southern length of the lagoons and connects to tributaries of the Batupan Bouge river. The system is unlined; however, according to an environmental assessment of the WWTP design, because soils are predominantly dense clay material, there is little percolation of effluent through soil from the lagoons and spray-fields (MSARNG, 2003). Sludge/biosolids have never been removed from the WWTP.

According to an interviewee, a single 5-gallon bucket of AFFF was present at Camp McCain when they arrived at the facility in 2005. At that time, the bucket was filled with 3 to 5 gallons of an unknown concentration or type of AFFF. Interviewees said that the AFFF was never used on fires or for other purposes and subsequently expired. Sometime between 2009 and 2011, the expired AFFF was slowly disposed of at a rate of approximately 1 gallon per month into the first, easternmost, lagoon of the WWTP (referred to as Release Area A).

In 2010, the WWTP was forced to discharge into the dry drainage ditch (Release Area B) to collect effluent for compliance sampling. No more than 10 gallons of post-treated effluent was discharged into the drainage ditch. Interviewees reported that water flows through the ditch during heavy rainfall and travels west towards an unnamed tributary of the Batupan Bouge river. Given the potential overlap in AFFF disposal to the WWTP and forced system discharge timeframes, Release Area B is also an area of potential PFAS release.

3.2 No Suspected Release Area A – Fire Station

The Camp McCain Fire Station, referred to as No Suspected Release Area A, is a small two-bay building that contains one water-capable firetruck and a 1.5-gallon foam-capable Gator utility vehicle that has reportedly never been used with foam. Another foam-capable truck was purchased for the facility in the mid-1980's but was never loaded with foam. The truck remained at the facility until it was moved to Camp Shelby sometime between 2007 and 2008. According to interviewees, AFFF has not been stored in the station since disposal of the single 5-gallon bucket between 2009 to 2011 (**Section 3.1**). During the VSI, two 5-gallon buckets of Class A foam were found stored on shelving within the station along with numerous dry chemical handheld extinguishers, and a portable Class A foam backpack unit was found stored within the firetruck cabinets (**Appendix C**). There is no evidence of AFFF use or storage at No Suspected Release Area A.

3.3 No Suspected Release Area B – Aviation Operations

The Aviation Operations training area, referred to as No Suspected Release Area B, consists of several paved landing pads for helicopter training maneuvers. Interviewees reported that training units bring their own extinguishers during exercises. Positive identification on these extinguishers was not possible during the VSI because training activities were not occurring; however, they were described as tall, wheeled, single cylinders that were most likely Halon, a non-PFAS containing suppressant. No AFFF extinguishers are stored at the facility, and no fueling operations are known to occur at the training area. There is no evidence of AFFF use or storage at No Suspected Release Area B.

3.4 No Suspected Release Area C – Dining Facilities (DFACs)

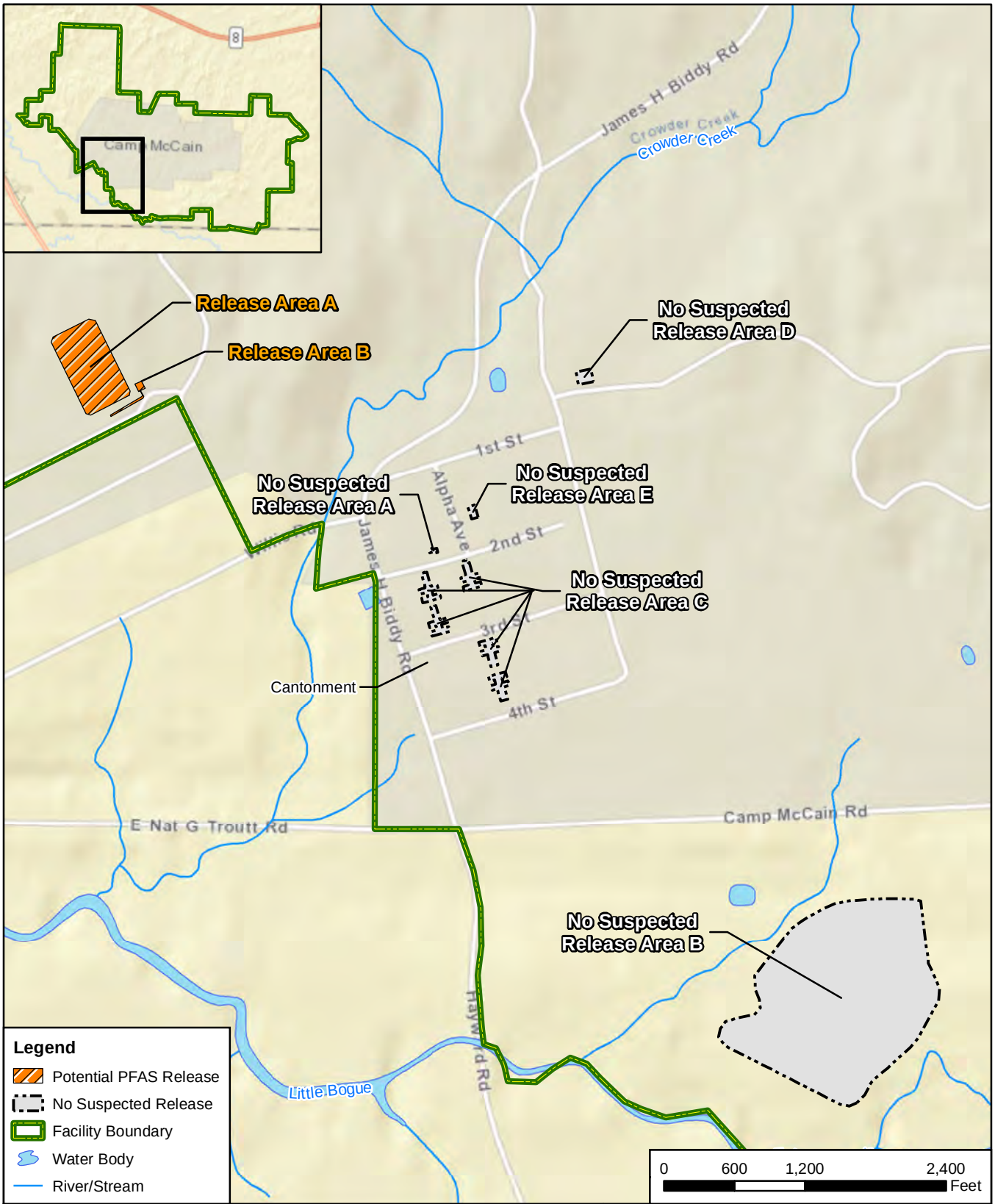
There are five dining facilities (DFACs), referred to as No Suspected Release Area C, in the cantonment area; the cooking ranges within each building are equipped with a PyroChem, K-Class (potassium carbonate-based) suppression systems. Outside of the kitchens, the buildings are equipped with portable ABC and K-class extinguishers only. There is no evidence of the use or storage of PFAS containing materials at No Suspected Release Area C.

3.5 No Suspected Release Area D – Fuel Point

The Fuel Point, referred to as No Suspected Release Area D, on Camp McCain is located within the northern area of the cantonment and is owned by the state of Mississippi and operated by the Defense Logistics Agency. At the time of the VSI, the Fuel Point had four 20-gallon dry chemical extinguishers stationed around the above ground storage tanks. No foam suppressants of any type were observed. No Suspected Release Area D is not suspected to be a potential release area.

3.6 No Suspected Release Area E – Paint Booth

The Combined Support Maintenance Shop Paint Booth, referred to as No Suspected Release Area E, is centrally located within the cantonment. During the VSI, it was confirmed that the building is not equipped with any fire suppression system; only handheld dry chemical extinguishers are present. There are no suspected releases of AFFF at No Suspected Release Area E.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Camp McCain, MS			
REVISED	7/15/2020	GIS BY	MS	7/15/2020
SCALE	1:14,400	CHK BY	LC	7/15/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	7/15/2020

Non-Fire Training Areas

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

C:\Users\grace.canham\AECOM Directory\Stankevich, Michael - ARNG_PFAS_GIS_60552172\MXDs\MS\Camp_McCain_Figures\Fig_3-1_Camp_McCain_Non-Fire_Training_Areas.mxd

4. Emergency Response Areas

No emergency response areas were identified at Camp McCain during the PA through interviews (**Appendix B.1**) or Environmental Data Resource Reports (**Appendix A**). Emergency services for the facility are provided primarily by the nearby City of Elliott Volunteer Fire Department, approximately 2.5 miles to the east-southeast.

Fire response at training ranges is operated by Range Control. Two pull-behind pump trailers, each without foam capability, are the only vehicle-mounted fire suppression used by Range Control. Wildfire fighting techniques are primarily Minimum Impact Suppression Techniques (MISTs), such as digging fire lines, and prescribed burns are occasionally conducted. Interviewees reported that no AFFF or other types of firefighting foam are used or stored by Range Control.

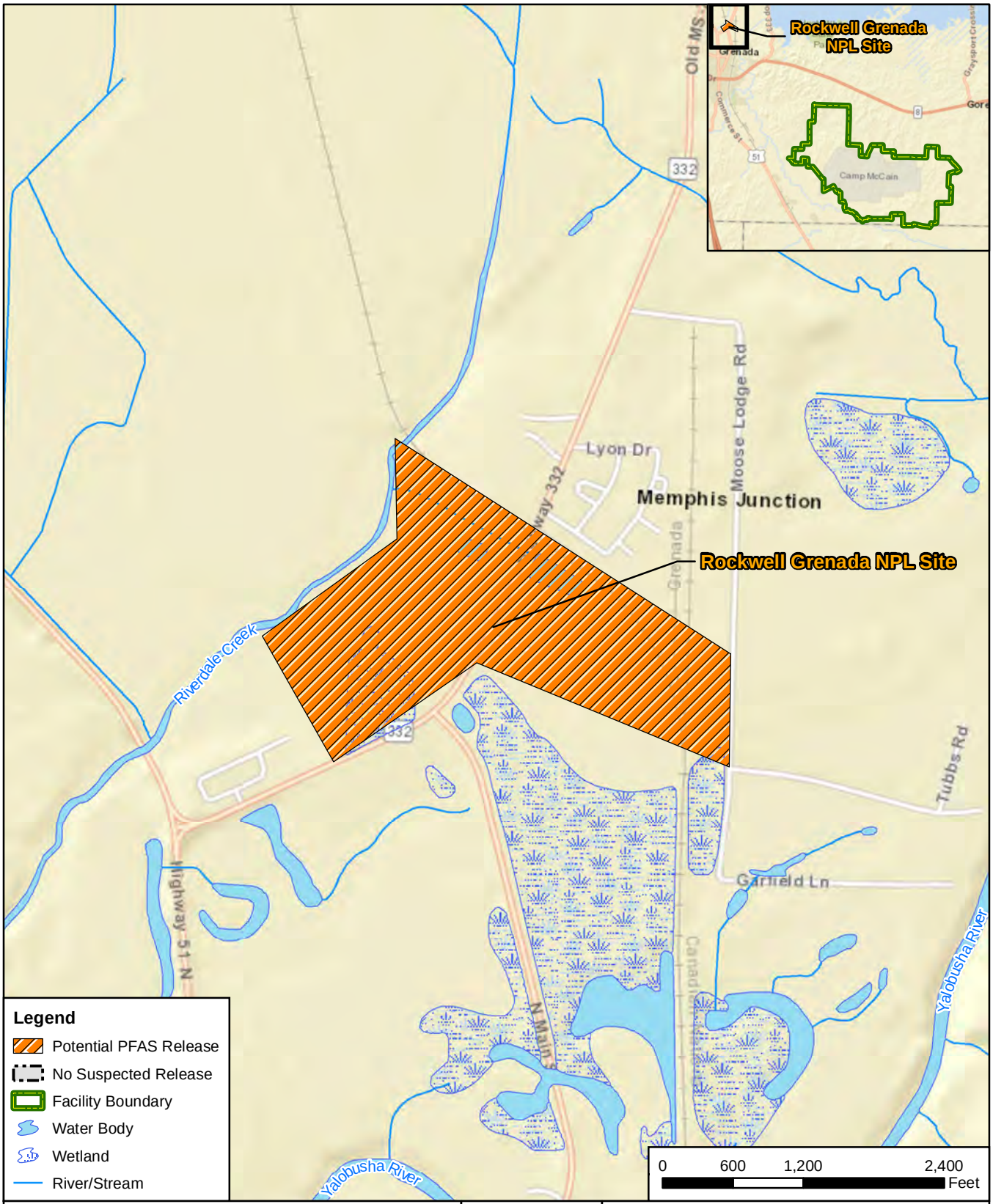
5. Adjacent Sources

One potential off-facility source of PFAS was identified during the PA. A description of the adjacent source is presented below and shown on **Figure 5-1**.

5.1 Rockwell International Wheel and Trim – Superfund Site

A wheel cover manufacturing and chrome plating facility, originally operated by Rockwell International, followed by Textron Automotive Company and Grenada Manufacturing, was in operation north of the City of Grenada from 1966 to the early 2000's. The site is listed on the USEPA's Superfund National Priorities List for contamination of groundwater, surface water, and soil with trichloroethylene and hexavalent chromium, among other contaminants. The facility is currently run as a metal stamping operation by Grenada Manufacturing (USEPA, 2018). The superfund site is located downgradient of the facility, approximately 8 miles northwest from Camp McCain.

Chrome plating operations commonly involved PFAS-containing mist suppressants to reduce worker exposure to chromic acid mist resulting from chrome plating baths. Because former site use included chrome plating facilities and associated disposal areas (i.e., onsite landfills and wastewater lagoons), it is possible that PFAS-containing suppressants were used and potentially released to the environment at some point during the operational history of the plant.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Camp McCain, MS			
REVISED	7/15/2020	GIS BY	MS	7/15/2020
SCALE	1:14,400	CHK BY	LC	7/15/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	7/15/2020

N

Adjacent Source

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

C:\Users\grace.canham\AECOM Directory\Stankevich, Michael - ARNG_PFAS_GIS_60552172\MXDs\MS\Camp_McCain_Figures\Fig_5-1_Camp_McCain_Adjacent_Source.mxd

6. Preliminary Conceptual Site Model

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

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

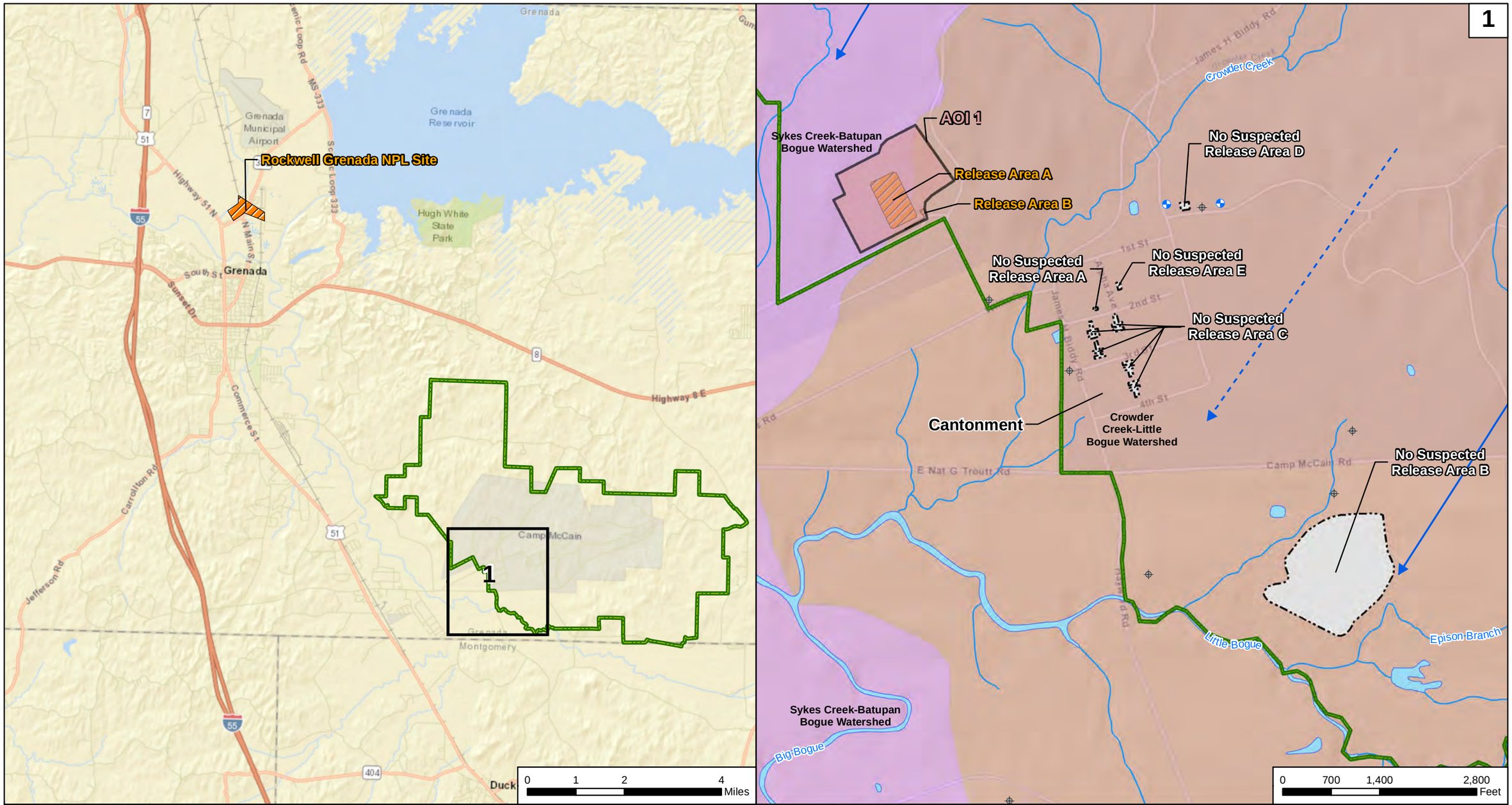
6.1 AOI 1: Release Areas A and B

Approximately 3 to 5 gallons of AFFF were disposed of in the WWTP's eastern lagoon (Release Area A) over a period of 3 to 5 months sometime between 2009 and 2011. The lagoon system is connected in series with spray-irrigation fields and a treatment facility. In 2010, the WWTP was forced to discharge no more than 10 gallons of post-treatment effluent to a dry drainage ditch (Release Area B) to collect compliance samples (**Section 3.1**). The WWTP system (lagoons and irrigation fields) is unlined; however, dense clay soils are believed to restrict percolation of wastewater through soils. Regardless, deposition of PFAS into surface and subsurface soil, as well into lagoon sediments/biosolids, may have occurred at the WWTP and the dry ditch that runs along its southern boundary. AOI 1 includes the entirety of Release Areas A and B.

In their anionic forms, PFAS are water soluble and can migrate readily from soil to groundwater or surface water via leaching and runoff. PFAS may have migrated from the lagoon system into surface water via discharge of effluent to the southern dry ditch. There has not been a discharge of effluent into the ditch since 2010. During rainfall, rainwater bypasses the treatment facility and flows west towards an unnamed tributary of the Batupan Bouge river. Although dense clays may restrict the migration of wastewater/effluent to groundwater within the lagoons and irrigation fields, the pathway cannot be ruled out for off-facility discharges through the southern drainage ditch.

Potential receptors in the area include on-facility site workers, construction workers, and trespassers, and off-facility residents and recreators. Site and construction workers may be exposed to PFAS through inhalation of airborne soil particulates or ingestion of surface soil during soil disturbing activities (i.e. maintenance and construction). Construction workers may additionally be exposed to PFAS by ingestion of subsurface soil during intrusive work. Site workers, construction workers, and trespassers at AOI 1 may additionally be exposed to PFAS in surface water and sediment/biosolids within the lagoons. Off-facility residents located downgradient from the Camp may be exposed to PFAS through ingestion of groundwater from potable wells or surface water and sediment from the unnamed tributary that the connects to the southern drainage ditch.

Camp McCain obtains its drinking water from on-facility groundwater wells located cross-gradient to AOI 1. Sampling results from 2017 found that PFAS were detected in drinking water above the reporting limit, but no exceedances of the USEPA Health Advisory level were observed. However, because PFAS were detected, the drinking water pathway for on-facility site workers, construction workers, and off-facility residents is considered potentially complete.



1

CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Camp McCain, MS			
REVISED	7/15/2020	GIS BY	MS	7/15/2020
SCALE	1:16,800	CHK BY	LC	7/15/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	RG	7/15/2020

Legend

- Area of Interest
- Potential PFAS Release
- No Suspected Release
- Facility Boundary
- Water Body
- River/Stream
- Surface Water Flow Direction
- Inferred Groundwater Flow Direction
- Other/Unknown Well
- Water Supply Well

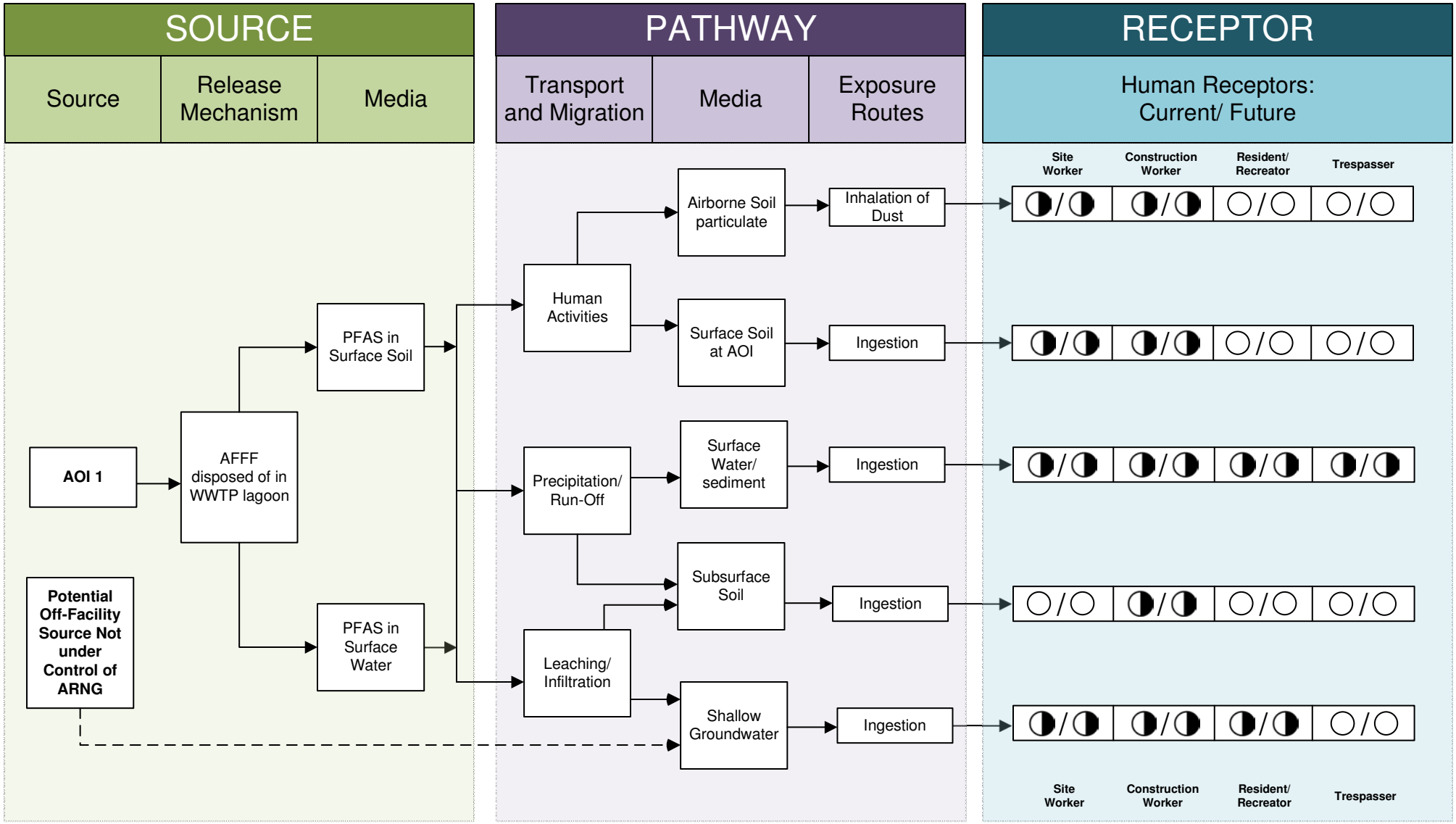
N

Areas of Interest

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-1

C:\Users\grace.canham\AECOM Directory\Stankevich, Michael - ARNG_PFAS_GIS_60552172\MXDs\MS\Camp_McCain_Figures\Fig_6-1_Camp_McCain_AOIs.mxd



LEGEND

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

Notes:

1. The resident and recreator receptors refer to an off-site receptor.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure 6-2
Preliminary Conceptual Site Model
AOI 1 Release Areas A and B

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 Camp McCain. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

Table 7-1 presents the one AOI related to potential PFAS release was identified at Camp McCain during the PA (**Figure 7-1**).

Table 7-1 AOIs at Camp McCain

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	Release Areas A and B	MSARNG	Between 2009 and 2011

Based on potential PFAS releases at this AOI, there is potential for exposure to PFAS contamination in surface water and sediments/biosolids to all receptors via ingestion and inhalation of dust, surface soil to site and construction workers, and subsurface soil to construction workers via ingestion and inhalation. Off-facility residents and on-facility site and construction workers may potentially be exposed to PFAS in groundwater via ingestion.

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

Table 7-2 Areas of No Suspected Release

No Suspected Release Area	Used by	Rationale for No Suspected Release Determination
No Suspected Release Area A – Fire Station	MSARNG	No AFFF was stored in the station or the station's firefighting vehicles. Primary firefighting capacity is provided by City of Elliott Volunteer Fire Department. Only Class A foams used.
No Suspected Release Area B – Aviation Operations	MSARNG/Visiting Training Units	Firefighting support is self-provided by visiting units during training; single-cylinder systems described by interviewees are typical of Halon-based extinguishers.
No Suspected Release Area C – DFACs	MSARNG	Fire suppression systems in the kitchens are potassium carbonate, non-AFFF based systems. Handheld extinguishers within the dining halls are ABC/K-class.
No Suspected Release Area D – Fuel Point	MSARNG	No AFFF based systems or extinguishers present. Dry chemical handheld extinguishers are present around the above ground storage tanks.
No Suspected Release Area E – Paint Booth	MSARNG	No fire suppression system present; dry chemical handheld extinguishers are provided.

Adjacent sources of PFAS surrounding Camp McCain were not identified during the PA; however, Rockwell International Wheel and Trim, a former chrome plating facility and superfund site, is located approximately 8-miles downgradient of Camp McCain.

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 predominantly based on the information provided during interviews with personnel who had direct knowledge of PFAS use at the facility. Sometimes, the provided information was vague or conflicted with other sources. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge due to staffing changes, the time passed since PFAS were first used (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS release locations, dates of release, volume of releases, and the concentration of AFFF used. There is also a possibility the PA has missed a source of PFAS, as the science of how PFAS may enter the environment continually evolves.

In order to minimize the level of uncertainty, readily available data regarding the use and storage of PFAS were reviewed, retired and current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected.

Table 7-3 summarizes the uncertainties associated with the PA.

Table 7-3 Uncertainties

Area of Interest	Source of Uncertainty
No Suspected Release Area B –Aviation Operations	Positive Identification of Halon-based extinguishers was unobtainable during the VSI.
AOI 1 Release Area A	The exact date is of when the expired AFFF was disposed of in the WWTP is unknown as well as the concentration and definitive volume released.
AOI 1 Release Area B	Because the date of AFFF disposal is not known, it is unknown if the forced discharge of the system occurred before or after introduction of AFFF to the lagoon.
General	Interviewee tenure dates back to 1985, information regarding activities conducted at Camp McCain as it relates to use the of PFAS or AFFF prior to 1985 was not available.

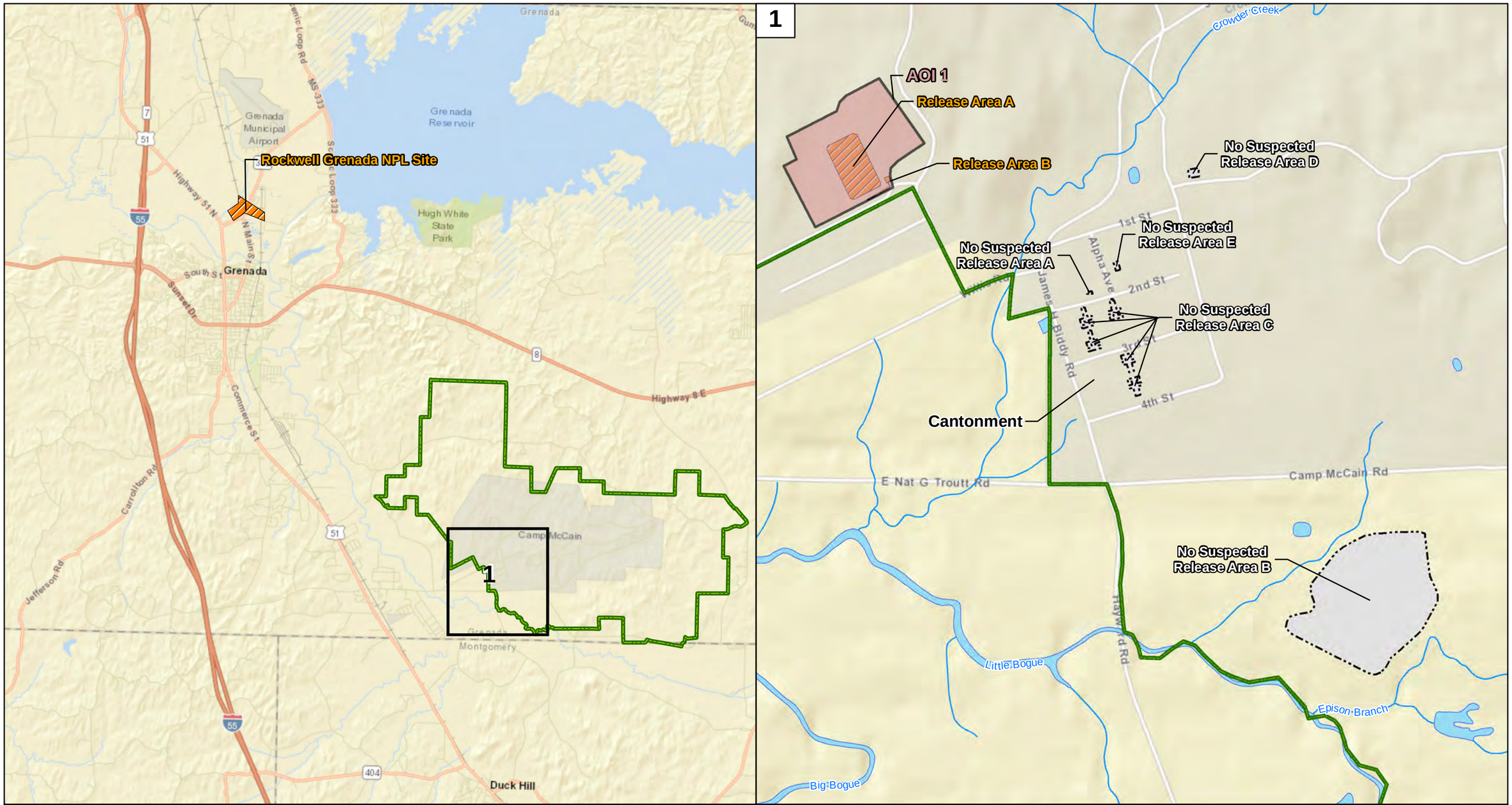
7.3 Potential Future Actions

Interviews and records (covering 1985 to present) indicate that former ARNG activities may have resulted in a potential PFAS release at the AOI identified during the PA. Based on the CSM developed for the AOI, there is potential for receptors to be exposed to PFAS contamination in soil, groundwater, 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.

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

Table 7-4 PA Findings Summary

Area of Interest	Rationale	Potential Future Action
AOI 1 Release Areas A and B	Approximately 3 to 5 gallons of AFFF was disposed of in the WWTP's eastern lagoon between 2009 and 2011. Effluent was potentially released to the southern drainage ditch.	Proceed to an SI, focus on soil, sediment, surface water, and groundwater



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Camp McCain, MS			
REVISED	7/15/2020	GIS BY	MS	7/15/2020
SCALE	1:14,400	CHK BY	LC	7/15/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	RG	7/15/2020

Legend

- Area of Interest
- Potential PFAS Release
- No Suspected Release
- Facility Boundary
- Water Body
- River/Stream

0 600 1,200 2,400 Feet

N

Summary of Findings

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 7-1

C:\Users\grace.canham\AECOM Directory\Stankevich, Michael - ARNG_PFAS_GIS_60552172\MXDs\MS\Camp_McCain_Figures\Fig_7-1_Camp_McCain_Summary.mxd

8. References

Brown, G.F. and R. Adams 1943. Geology and Groundwater Supply at Camp McCain. Mississippi State Geological Survey Bulletin.

Cushing, E.M., Boswell, E.H., and Hosman, R.L. 1964. *General Geology of the Mississippi Embayment: Water Resources of the Mississippi Embayment*. Geological Survey Professional Paper 448-B. USGS, Dept. of the Interior.

Darden, D. 1986a. Potentiometric Map of the Meridian-Upper Wilcox Aquifer in Mississippi, Fall 1983. U.S. Geological Survey Water Resources Investigations Report 86-4018.

Darden, D. 1986b. Potentiometric Map of the Lower Wilcox Aquifer in Mississippi, Fall 1982. U.S. Geological Survey Water Resources Investigations Report 86-4059.

United States Environmental Protection Agency (USEPA). 2018. *NPL List: Rockwell International Wheel & Trim, Grenada, Mississippi.*

Mississippi Army National Guard (MSARNG), 2003. Final Environmental Assessment, Proposed Construction and Operation of a Wastewater Treatment Plant, Camp McCain Training Site, Mississippi.

National Oceanic and Atmospheric Administration. 2019. *Climate Data Online Database*. https://www.ncdc.noaa.gov/cdo-web/ (Accessed June 2019).

USACE, 2009. Draft Final Operational Range Assessment Program, Phase I Qualitative Assessment Report, Camp McCain, Mississippi. Prepared by Malcolm Pirnie for USACE Baltimore District, February 2009.

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

United States Geological Survey (USGS), 1983. Duck Hill Quadrangle, Mississippi 7.5-Minute Series, 1:24000 Scale.

USGS 1992. USGS Public and Private Supply Wells. Geographic information system shapefiles for publicly and privately owned water wells monitored by the USGS. http://www.maris.state.ms.us/HTM/DownloadData/Statewide-Theme.htm.

USGS, 2004. Quality of Water in the Unsaturated Zone at Camp McCain, Mississippi – 2002-2004. U.S. Geological Survey Scientific Investigations Report 2004-5279.

Appendix A
Data Resources

Data resources will be provided separately on CD. Data resources for Camp McCain include:

Previous Investigations Completed

- 2018 The EDR Radius Map™ Report with GeoCheck®; Aerial Photo Decade Package; & Certified Sanborn Map Report; Target Property Camp McCain, 3152 James H. Biddy Rd., Grenada, MS 38901.
- 2018 Final Spill Prevention, Control, and Countermeasures Plan (SPCC) for Camp McCain at Grenada, MS.
- 2017 Camp McCain Stormwater Pollution Prevention Plan, Volumes I & II.

Miscellaneous Documents

- 2015 Camp McCain State Well Report Driller's Log.
- 2014 MDEQ Drinking Water Well Permit.
- 2006 Operational Guidance Manual for Camp McCain WWTP.
- 2003 Final Environmental Assessment for the Proposed Construction of a Wastewater Treatment Plant at Camp McCain, Mississippi

Appendix B
Preliminary Assessment Documentation

Appendix B.1
Interview Records

PA Interview Questionnaire - Other

Facility:_Camp McCain, MS_
Interviewer:_[redacted]_
Date/Time:_6 March 2019 @ 0800_

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** _____

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

[redacted], Environmental Officer, since 2010

[redacted], Fire Emergency Coordinator, since 2005

[redacted], Equipment Operator, since 1985

[redacted], Water & Wastewater Operator, since 1988

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

- Acquired a brand new fire truck in mid-1980's that was foam capable. Foam was never put in the fire truck. The water tank was used to wash buildings. The fire truck was moved to Camp Shelby sometime between 2007 and 2008.
- **Old AFFF & WWTP**:
  - One 5-gallon bucket of AFFF was present at Camp McCain in 2005 when [redacted] started. At that time, the bucket was said to be partially full with between 3 and 5 gallons of concentrate. It is not known if or where the difference went. It was never used on fires or otherwise and subsequently went out of date. The manufacturer and % is unknown – the canister described as beige-ish in color with white lettering.
  - Sometime between 2009-2011, the out-of-date AFFF was disposed of in the first pond (eastern most) of the Camp McCain WWTP. Over the course of 3-5 months, approx. 1-gallon at a time was poured into the first pond (approx. rate of 1-gal per month). All ponds are connected in succession.
  - WWTP was thought to be lined but according to the WWTP operator it is not lined (see completion report for details). It is spray irrigated to spray fields to the east and north of the ponds then overflow routed through the treatment facility which discharges to a dry ditch running the southern length of the ponds. The sludge has never been removed.
  - In 2010, a forced system discharge of the WWTP was produced to collect effluent samples from the point of discharge at the dry ditch. No more than 10-gallons of effluent was discharged into the dry ditch. The dry ditch does flow during heavy rain events and flows to west.

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

PA Interview Questionnaire - Other

Facility:_Camp McCain, MS_
Interviewer:_[redacted]_
Date/Time:_6 March 2019 @ 0800_

- **Fire Station and fire response**:
  - Fire truck is not foam capable. Storage cabinets in truck contain a Class A foam backpack portable unit. No AFFF stored in Fire Station, only two 5-gallon buckets of Class A foams. Also have a foam capable Gator (1.5-gal foam capacity) but it has never been used for foam.
  - Wildfire fighting activities are predominantly Minimum Impact Suppression Techniques (MIST) such as digging fire lines
  - Prescribed burns are conducted but no foams are used for wildfires
  - Range/wildfire team is run by Range Control. First response to range fires is from Range Control – they have two pull behind pump trailers with no foam capabilities (water only). They do not have AFFF or other foams.
  - Emergency response for the Camp is provided by the city of Elliott Volunteer Fire Dept. No fires to date.
  - All buildings in cantonment have water sprinkler systems and/or dry chem ABC extinguishers
- **Fuel Point**:
  - Is State owned/ run by DLA. Fuel point has four 20-gallon dry chemical extinguishers. Zero foam.
- **Dining Facilities (DFAC)**:
  - 5 DFACs in Cantonment. Cooking ranges within each have a PyroChem, K-Class suppression system (potassium carbonate based) with 2 tanks. Not AFFF. Rest of the building has no suppression system – only portable ABC and K-class extinguishers.
- **CSMS Paint Booth**:
  - Painting building located separate from CSMS building just to the south of it. There is no suppression system in the building. Only dry chem extinguishers are present.
- **Aviation Ops Training**:
  - No portable AFFF extinguishers are stored at the facility for aviation operations. Training units bring own portable extinguisher units to landing pads during exercises – described as tall wheeled cylinders that have a single cylinder/canister – most likely Haylon. No fueling operations are known to occur at the training area.
- **Historical Training:**
  - Outside training units bring own fire suppression in to the facility in the form of dry chem extinguishers. McCain hosts small arms training for FBI on occasion. Most training activities are weapons qualifications, Dry fire with the 109th, CTTT training, and Armor & Engineer units training. There are no engineer firefighting units at Camp McCain or within Mississippi.
- **Drinking Water Source:**
  - Camp water is provided by an on-site well that is ~6 years old. Completed in the Wilcox aquifer (see completion and permit reports), a confined aquifer. Down range (southeastern portion of the Camp) is connected to Hays Creek public water system. Most surrounding communities get drinking water from City of Grenada which pulls from the Wilcox aquifer.
- **Adjacent sources:**
  - Rockwell International Wheel & Trim Grenada NPL site approximately 5 miles NW of Camp McCain boundary (north of Grenada city). Was a former chrome plating facility. See Superfund site for information.
- **Misc.**
  - On-site laundry facilities are not commercial. They have non-commercial washing machines for soldiers to use. No water proofing activities are conducted at Camp McCain.

Appendix B.2
Visual Site Inspection Checklists

Visual Site Inspection Checklist

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

Recorded by: [redacted]

ARNG Contact: [redacted]

Date and Time: ***March 6, 2019 0800***

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

Source/Release Information

Site Name / Area Name / Unique ID: ***Camp McCain***

Site / Area Acreage: ***13,027 acres***

Historic Site Use (Brief Description): Estabilshed in the early 1940s as a triangular division camp, Military training, tracked vehicle training, equipment maintenance, tactical training, small arms training

Current Site Use (Brief Description): Military training, tracked vehicle training, equipment maintenance, tactical training, small arms training

Physical barriers or access restrictions: Access Resticted with a Security Gate and Guard

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 was never formally used at the site, but approximately 3-5 gallons of unused out-of-date AFFF (% and manufacturer unknown) was disposed of in the first pond of the WWTP over the course of 3-5 months sometime between 2009-2011

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

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

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

3a. Indicate what businesses are located near the site

Rockwell International Wheel & Trim Grenada NPL site approximately 5 miles NW of Camp McCain boundary (north of Grenada city). Was a former chrome plating facility.

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

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

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:

Fire suppression systems on site are either water spinkler, or dry chemical ABC extinguishers, Class-K suppression systems and Class-K extinguishers in dining facilities

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

Unknown, no known/
reported leaks

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

No AFFF Suppression systems

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

No AFFF Suppression systems

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Drainage is generally to the southwest to the Batupan Bogue river

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

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

Stormwater culverts and convayances throughout the site

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

3a. If so, please note the location:

Camp water is provided by an on-site well that is ~6 years old. Completed in the Wilcox aquifer; Domestic and public water supply wells located downgradient of Camp McCain (i.e., northeast, west, and southwest of the installation)

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.

Rockwell International Wheel & Trim Grenada NPL site approximately 5 miles NW of Camp McCain boundary (north of Grenada city). Was a former chrome plating facility.

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

Visual Survey Inspection Log

Significant Topographical Features:

1. Has the infrastructure changed at the site/area? Y / **N**

1a. If so, please describe change (ex. Structures no longer exist):

2. Is the site/area vegetated? **Y** / N

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

3. Does the site or area exhibit evidence of erosion? Y / **N**

3a. If yes, describe the location and extent of the erosion:

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

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

WWTP and various small lakes

Receptor Information

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

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

Access restricted by gate with guard.

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:

Rural Grenada, MS 0.4 miles to the west

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:

116 acres of wetlands spread across the facility

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: Camp McCain, Mississippi

Why has this location been identified as a site? *AFFF release between 2009-2011 into unlined WWTP*

Are there any other activities nearby that could also impact this location? *Rockwell International Wheel & Trim Grenada NPL site approximately 5 miles NW of Camp McCain boundary - downgradient*

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? *Generally to the southwest*

Average rainfall? *54 inches annually*

Any flooding during rainy season? *Yes*

Direct or indirect pathway to ditches? *Yes*

Direct or indirect pathway to larger bodies of water? *Yes*

Does surface water pond any place on site? *Yes*

Any impoundment areas or retention ponds? *Yes – WWTP*

Any NPDES location points near the site? *Unknown*

How does surface water drain on and around the flight line? *N/A*

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? *Regional Groundwater flow is to the Southwest (Darden, 1986b), Groundwater is believed to flow to the north, north of the watershed/ groundwater divide*

Depth to groundwater? *<1 to >50 feet bgs*

Uses (agricultural, drinking water, irrigation)? *Drinking, Commercial*

Any groundwater treatment systems? *No*

Any groundwater monitoring well locations near the site? *Yes, near Campbell Creek*

Is groundwater used for drinking water? *Yes*

Are there drinking water supply wells on installation? *Yes*

Do they serve off-post populations? *No*

Are there off-post drinking water wells downgradient *Yes*

Waste Water Treatment Plant:

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

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

Do we understand the fate of sludge waste? *Yes – not removed to date*

Is surface water from potential contaminated sites treated? *No*

Equipment Rinse Water

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

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? *On-site laundry facilities are not commercial. They have non-commercial washing machines for soldiers to use. No water proofing activities are conducted at Camp McCain.*

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)?
mixed rural residential, agricultural, with some industrial use

Documentation

Ask for Engineering drawings (if applicable).

Has there been a reconstruction or changes to the drainage system? When did that occur? *No*

Appendix C
Photographic Log

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Camp McCain	Grenada, Mississippi

Photograph No. 1

Description:

Camp McCain Waste Water Treatment Plant (WWTP). Eastern most stabilization lagoon, location where out-of-date AFFF was disposed of between 2009-2011. Standing on southeastern corner facing northwest.

Date Taken:

6 March 2019

Photograph No. 2

Description:

WWTP: Southern drainage ditch. Black piping from WWTP effluent treatment facility visible in the lower righthand corner. Standing on eastern end facing southwest.

Date Taken:

6 March 2019

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Camp McCain	Grenada, Mississippi

Photograph No. 3

Description:

Camp McCain Fire Station.

Date Taken:

6 March 2019

Photograph No. 4

Description:

Camp McCain firetruck, this fire truck is not foam capable. A portable Class A foam backpack is stored within its cabinets.

Date Taken:

6 March 2019

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Camp McCain	Grenada, Mississippi

Photograph No. 5

Description:

Class A foam portable backpack unit stored in firetruck storage cabinet.

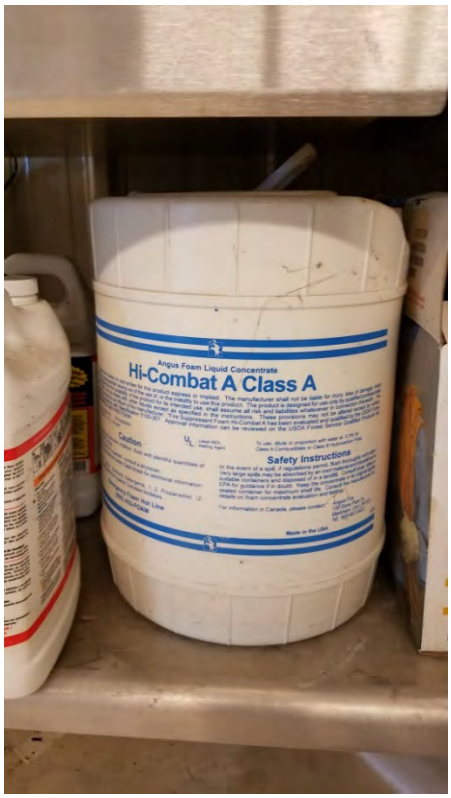
Date Taken:

6 March 2019

Photograph No. 6

Description:

Two 5-gallon buckets of Class A foams are stored in the fire station at Camp McCain.



APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Camp McCain	Grenada, Mississippi

Photograph No. 7

Description:

Gator utility vehicle unit (not foam capable) stored in the fire station. Not shown in photograph is the M1 Gator that has foam capability.

Date Taken:

6 March 2019

Photograph No. 8

Description:

Portable dry chemical fire extinguishers stored within the fire station.

Date Taken:

6 March 2019

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Camp McCain	Grenada, Mississippi

Photograph No. 9

Description:

Kitchen within DAFC. PyroChem K-class (potassium carbonate-based) fire suppression system.

Date Taken:

6 March 2019

Photograph No. 10

Description:

Kitchen within DFAC: Cooking Range Hood with PyroChem K-class (potassium carbonate-based) fire suppression system sprinklers.

Date Taken:

6 March 2019

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Camp McCain	Grenada, Mississippi

Photograph No. 11

Description:

Helicopter Landing pad/ Aviation Operations Training Area.

Date Taken:

6 March 2019

Photograph No. 12

Description:

Interior of Paint Booth building showing floor drains and no fire suppression system.

Date Taken:

6 March 2019