Final
Site Inspection Report
Camp Minden Training Site
Doyline, LA

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

UNCLASSIFIED

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Acronyms and Abbreviations

6:2 FTS	6:2 Fluorotelomer sulfonate
8:2 FTS	8:2 Fluorotelomer sulfonate
µg/kg	micrograms per kilogram
°C	degrees Celsius
°F	degrees Fahrenheit
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARNG	Army National Guard
AST	Aboveground Storage Tank
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMTS	Camp Minden Training Site
CoC	chain of custody
CSM	conceptual site model
DA	Department of the Army
DoD	Department of Defense
DPT	Direct-Push Technology
DQI	Data Quality Indicator
DQO	Data Quality Objective
DUA	Data Usability Assessment
DUP	duplicate
DVR	Data Validation Report
EIS	extraction internal standards
ELAP	Environmental Laboratory Accreditation Program
EM	Engineers Manual
FTA	Fire Training Area
GCAL	Gulf Coast Analytical Laboratories, LLC
HA	Health Advisory
HDPE	high-density polyethylene
IDW	Investigation Derived Waste
ITRC	Interstate Technology Regulatory Council
LAAP	Louisiana Army Ammunition Plant
LAARNG	Louisiana Army National Guard
LC/MS/MS	liquid chromatography tandem mass spectrometry
LCS	laboratory control spike
LCSD	laboratory control spike duplicate
LDEQ	Louisiana Department of Environmental Quality
LDH	Louisiana Department of Health
LMD	Louisiana Military Department
LOD	Limit of Detection
LOQ	Limit of Quantitation
LSU FETI	Louisiana State University Fire and Emergency Training Institute
MDL	method detection limit

mg/kg	milligrams per kilogram
MS	matrix spike
MSD	matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
NEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
ng/L	nanograms per liter
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
NPL	National Priority List
OSD	Office of the Secretary of the Defense
PA	Preliminary Assessment
PFAS	Per- and polyfluoroalkyl substances
PFBA	Perfluorobutyrate
PFBS	Perfluorobutanesulfonic acid
PFCs	Perfluorinated compounds
PFDA	Perfluorodecanoic acid
PFDoA	Perfluoroheptanoic acid
PFHpA	Perfluoroheptanoic acid
PFHxA	Perfluorohexanoic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PFPeA	Perfluoropentanoic acid
PFTeDA	Perfluorotetradecanoic acid
PFTrDA	Perfluorotridecanoic acid
PFUdA	Perfluoroundecanoic acid
PID	photo ionization detector
PQAPP	Programmatic UFP-QAPP
PVC	poly-vinyl chloride
QAPP	Quality Assurance Project Plan
QC	Quality Control
QSM	Quality Systems Manual
RI	Remedial Investigation
ROD	Record of Decision
RPD	relative percent differences
SI	Site Inspection
SL	screening level
TOC	Total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

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Executive Summary

The Army National Guard (ARNG) is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at per- and polyfluoroalkyl substances (PFAS)-impacted sites at ARNG facilities nationwide. The objective of the SI at each facility is to identify whether there has been a release to the environment from the Areas of Interest (AOIs) identified in the PA and determine the presence or absence of perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), and perfluorobutanesulfonic acid (PFBS) at or above screening levels (SLs). A SI was completed at Camp Minden Training Site (CMTS) in Doyline, Louisiana.

CMTS includes approximately 15,269 acres of land in Webster and Bossier Parishes. The installation is bounded by U.S. Highway 80 and I-20 to the north, U.S. Highway 164 to the south, Dorcheat Bayou to the east, and Clarke Bayou to the west. During the PA, one potential PFAS release area, Louisiana State University (LSU) Fire and Emergency Training Institute (FETI), was identified and designated as an area of interest (AOI) 1 (AECOM, 2019a). The LSU FETI is a 33.8-acre tenant of CMTS. While the land use agreement was originally dated 15 October 2002 and amended again on 18 October 2005, LSU FETI began operations after the former Louisiana Army Ammunition Plant property ownership was transferred from the Army to the State of Louisiana. AOI 1 was investigated during the SI. SI field activities were conducted from 18 to 21 June 2019 and consisted of grab soil, groundwater, surface water, and sediment sampling at LSU FETI (the Site).

To fulfill the project Data Quality Objectives (DQOs) set forth in the approved SI Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2019c), samples were collected and analyzed for a subset of 18 PFAS via liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual (QSM) 5.1 Table B-15. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.9** of this Report.

The Department of Defense (DoD) has adopted a policy to retain facilities in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG PFAS SIs follow this DoD policy and, when the maximum site concentration for sampled media exceed the SLs, the site [under control and jurisdiction of the ARNG] will proceed to a Remedial Investigation (RI), the next phase under CERCLA. The SLs apply to three compounds, PFOA, PFOS, and PFBS, for both soil and groundwater, as presented in **Table ES-1**. All other results presented in this report are considered informational in nature and serve as an indication as to whether soil, groundwater, sediment, and surface water contain or do not contain the 18 PFAS analyzed within the boundaries of the Site.

Sample chemical analytical concentrations were compared against the project SLs as described in **Table ES-1**. A summary of the results of the SI data relative to the SLs is as follows:

- PFOA, PFOS, and PFBS were not detected in groundwater; groundwater SLs were not exceeded.
- PFOS and PFBS were not detected in soil; soil SLs were not exceeded. PFOA was detected in the intermediate soil sample at CMTS-SB-1 located northeast of the LSU FETI fire training area (AOI 1) at a concentration of 0.022J micrograms per kilogram, which is several orders of magnitude below the SL.

Table ES-2 summarizes the SI results for soil and groundwater. Based on the LSU FETI history, fire training operations at the Site began after the CMTS property ownership was transferred to the State of Louisiana. The CSM developed during the PA was revised in light of the SI data and findings discussed herein. These data indicate no complete exposure pathways exist for PFOA, PFOS, and PFBS in groundwater and soil, with one exception. The exposure pathway for PFOA in subsurface soil, specifically for construction workers during ground disturbing activities, is potentially complete. The exposure pathways in surface water and sediment for receptors at the Site (workers, construction workers, and trespassers and recreational users) is potentially complete. Exposure pathways in surface water and sediment for offsite receptors (recreational users) is incomplete. Other PFAS were detected in all media (groundwater, soil, surface water and sediment) at the Site and CMTS boundary. However, because screening levels are not established for these other PFAS, such data are included in this report for informational purposes only. LSU FETI activities are not, and have never been, associated with the DoD or the ARNG; therefore, PFAS detections identified during the SI are not attributed to the ARNG.

Table ES-3 summarizes the rationale to determine if AOI 1 should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, no PFOA, PFOS, or PFBS were detected in groundwater; PFOS and PFBS were not detected in soil; PFOA was detected in soil at a concentration below the SL; and, PFOA, PFOS and PFBS were not detected in surface water or sediment at the CMTS boundary. LSU FETI is not under the control of ARNG. Based on the State of Louisiana owner-operator status of LSU FETI and other PFAS detections in all media at the Site and CMTS boundary, the State may consider the need for future investigation or follow-up action.

Table ES-1: Screening Levels (Soil and Groundwater)

Analyte	Industrial/ Commercial Composite Worker (Soil) (µg/kg)[a,b]	Tap Water (Groundwater) (ng/L)[a,b]
PFOA	1,600	40
PFOS	1,600	40
PFBS	1,600,000	40,000

Notes:

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. HQ=0.1. 15 October 2019.

b.) If only one PFAS is present, a Hazard Quotient (HQ) of 1 applies and the values presented would increase by a factor of x10.

Table ES-2: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil - Source Area	Groundwater – Source Area	Groundwater - Near Boundary
1	LSU FETI	◐	○	○

Legend:

● = exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

Table ES-3: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	LSU FETI	No detections of PFOA, PFOS and PFBS in groundwater; no PFOS or PFBS detected in soil; PFOA detected in soil northeast of AOI 1 at a concentration several orders of magnitude below the SL.	LSU FETI is not under the control of the ARNG. Based on the State of Louisiana owner-operator status of LSU FETI and other PFAS detections in media at the Site and CMTS boundary, the State may consider the need for future investigation or follow-up action.

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1. Introduction

1.1 Project Authorization

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, ARNG Installations, 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 performed this SI at Camp Minden Training Site (CMTS) in Doyline, Louisiana, more specifically at the Louisiana State University (LSU) Fire and Emergency Training Institute (FETI) referenced herein as “the Site”.

The SI project elements were performed in compliance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; United States Environmental Protection Agency [USEPA], 1980), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300; USEPA, 1994), and in compliance with Army requirements and guidance for field investigations including specific requirements for sampling for PFOA, PFOS, and perfluorobutanesulfonic acid (PFBS), and the group of related compounds known in the industry as per- and poly-fluoroalkyl substances (PFAS). The term PFAS will be used throughout this report to encompass all PFAS chemicals evaluated, including PFOA, PFOS, and PFBS, which are the key components of the suspected releases being evaluated, and the other 15 related compounds listed in the task order.

1.2 SI Purpose

The PA performed at CMTS identified a single area of interest (AOI) at the LSU FETI, designated as AOI 1 (AECOM, 2019a). The objective of the SI is to identify whether there has been a release to the environment from the AOI and determine the presence or absence of PFOA, PFOS, and PFBS at or above screening levels (SLs).

As stated in the *Federal Facilities Remedial Site Inspection Summary Guide* (USEPA, 2005), an SI has the following goals:

1) Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.
2) Determine the potential need for a removal action.
3) Collect or develop data to evaluate potential release.
4) Collect data to better characterize the release for more effective and rapid initiation of a Remedial Investigation (RI).
5) Collect data to determine whether the release is more than likely the result of activities associated with the Department of Defense (DoD).

In addition to the USEPA identified goals of an SI, the ARNG SI effort will also identify potential off-facility sources.

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2. Site Background

2.1 Site Location and Description

CMTS includes approximately 15,269 acres of land in Webster and Bossier Parishes (**Figure 2-1**). The installation is bounded by U.S. Highway 80 and I-20 to the north, U.S. Highway 164 to the south, Dorcheat Bayou to the east, and Clarke Bayou to the west. The cities of Shreveport and Bossier City are approximately 22 miles west of the installation, and the towns of Dixie Inn and Minden are approximately 5 and 8 miles to the northeast of the installation, respectively. Private parcels (off-facility) surround CMTS. The Village of Doyline and surrounding rural areas border CMTS to the south and the unincorporated community of Goodwill borders CMTS to the north (URS, 2016).

At CMTS, administrative and residential facilities occupy approximately 154 acres, Louisiana Military Department (LMD) mission support facilities and CMTS commercial/industrial tenants (including the LSU FETI) occupy 2,970 acres, and 12,142.8 acres are woodlands. The operational range area consists of 18 ranges used by the Louisiana ARNG (LAARNG) for tactical training for Army National Guard troops. Current training includes both non-live-fire and live-fire activities. The non-operational area is composed of 27 small parcels scattered throughout the west-central portion of the installation.

The U.S. Government acquired CMTS (formerly the Louisiana Army Ammunition Plant [LAAP]) in 1941 for use as a U.S. Army Armament, Munitions, and Chemical Command installation. The primary purpose of LAAP was loading, assembly and packing of ammunition. LAAP operations began in 1942 with eight ammunition lines and one ammonium nitrate graining plant. In 1996, all production ceased at LAAP, and the facility was placed in modified caretaker status (LAAP, 2001). In 1989, LAAP was added to the National Priority List (NPL). In 2004, legislation authorized the U.S. Army to convey LAAP to the State of Louisiana. In accordance with the Deed of Transfer, approximately 14,949 acres were transferred to the State of Louisiana by and through the LMD. As described in the Finding of Suitability for Transfer (LAAP, 2004a) and separate Finding of Suitability for Early Transfer (LAAP, 2004b), the State is expected to use the majority of the property for military training activities, with the remaining area used for commercial/industrial purposes, and the U.S. Army retains the responsibility for ensuring that CERCLA selected remedies, as established in Records of Decision (RODs), remain protective of human health and the environment. In 2005, the former LAAP was renamed CMTS.

2.2 Facility Environmental Setting

CMTS is located within the Upper West Gulf Coast Plain region. Most of CMTS has flat terrain, and the major landform is the ancient Red River floodplain. Elevations throughout CMTS range from 145 feet to 225 feet above mean sea level (Shaw Environmental, 2005). Further information regarding the environmental setting at CMTS/LSU FETI is described below, with selected elements presented in **Figure 2-2** (Site topography), **Figure 2-3** (surface water features in the vicinity of CMTS), and **Figure 2-4** (groundwater features in the vicinity of CMTS).

2.2.1 Geology

The geology of CMTS is characterized by unconsolidated continental and marine sediments ranging in age from Eocene to Pleistocene. Pleistocene terrace deposits derived from the ancestral Red River cover the surface and generally grade from clays and silts at the surface to sand and gravel at depth. The terrace deposits are divided into Upper and Lower Terrace sands. The Sparta Sand Formation lies directly below the Terrace deposits but is limited to the far eastern portion of CMTS (i.e., east of Boone Creek). The Sparta Sand Formation origin is fluvial-deltaic, deposited by the ancestral Mississippi River, and consists of non-marine massive sands, silty sands, and occasional lignite shale. The Cane River Formation is a low-permeability marine clay unit separating the overlying Terrace and Sparta Sands and the underlying Wilcox-Carrizo Sand. The Cane River Formation varies in thickness from 200 to 300 feet. The Wilcox Group and Carrizo Sand underlie the Cane River Formation. The Upper Wilcox Group consists of massive continuous sand beds and subcrops beneath the western quarter of CMTS up to thicknesses as great as 550 feet (Shaw Environmental, 2005).

At the LSU FETI, boring logs drilled during the SI activities indicate that the top ten feet of soil is fat and lean clays, which grade downward into silts and sandy silts and, finally, to silty sands (**Appendix F**).

2.2.2 Hydrogeology

Three water-bearing units are present at the facility and are listed in order from shallow to deep: Upper Terrace, Lower Terrace/Sparta Sand, and the Wilcox-Carrizo; one confining unit (Cane River Formation) overlies the Wilcox-Carrizo. The shallow groundwater system includes the Upper Terrace aquifer and the Lower Terrace/Sparta Sand aquifer, while the deep groundwater system is made up of the Wilcox-Carrizo aquifer. The deep groundwater within the Wilcox-Carrizo is confined by the overlying beds of the Cane River Formation. On the far west side of CMTS, the Cane River Formation is absent, and the Lower Terrace sands rest unconformably on the Wilcox-Carrizo sands. The Sparta Sand is absent west of Boone Creek (Shaw Environmental, 2005).

The stream erosional valleys truncate the Lower Terrace / Sparta Sand aquifers. Clarke Bayou on the west and Bayou Dorcheat on the east form effective flow boundaries for the Upper Terrace aquifer, and to some extent, the Lower Terrace/Sparta Sand aquifer. As shown on **Figure 2-4**, groundwater flow within the Terrace units generally follows the topography and discharges to surface water drainage features (URS, 2016). There is some component of downward groundwater flow from the Upper Terrace to the Lower Terrace. The deep Wilcox-Carrizo aquifer is an important drinking water and industrial use aquifer in northwest Louisiana. The aquifer is recharged from rainfall in the outcrop areas and from the overlying alluvial sediments.

Camp Minden has three installation potable wells, well numbers 4A, 18, and 22 which draw from the Wilcox aquifer. The total depths of these wells are 420, 691, and 612 feet below ground surface (bgs), respectively (URS, 2017).

Under the Installation Restoration Program, the ARNG completed an inventory of nearby water supply wells. In addition to the three installation potable wells, the inventory identified two public water supply wells north of the installation which draw from the Terrace aquifer (Village water system); public wells south of the installation (four Doyline water system, one Jenkins water system and one Horseshoe Road water system) which draw from the Wilcox-Carrizo aquifer; and numerous private residential wells south of the installation which draw from both the Wilcox-Carrizo aquifer and from the overlying Terrace aquifer. These well locations and other groundwater features are shown on **Figure 2-4**.

Sampling of the three Camp Minden installation potable water wells for PFAS compounds was conducted by the ARNG in April 2017. With one exception, no detections were reported in the sample results. The exception was 6:2 fluorotelomer sulfonate (FTS), which was detected in Well 22 at an estimated concentration of 5.72 nanograms per liter (ng/L). The laboratory qualified the result with a “J” flag because the detected concentration is less than the method reporting limit. Due to its unknown toxicity, a screening level has not been developed for this compound.

2.2.3 Hydrology

All surface water runoff from the installation exits along the southern boundary by four natural streams that originate north of CMTS**.** Bayou Dorcheat forms the eastern boundary of the installation, and Clarke Bayou forms the western boundary (**Figure 2-3**). Boone Creek and its tributaries drain the eastern and central portions of the installation and flow into Bayou Dorcheat. Caney Branch drains the western portions of the installation, and then flows into Clarke Bayou. Both Clarke Bayou and Bayou Dorcheat flow south into Lake Bistineau. The streams on CMTS receive both surface runoff as well as groundwater discharge from the Upper and Lower Terrace aquifers. The installation's active wastewater treatment plant discharges to Boone Creek, near the southern installation boundary (URS, 2016).

2.2.4 Climate

Prevailing southerly winds provide a moist, subtropical climate. Climate data are reported for the nearby city of Minden, where average annual temperatures range from 52.3 degrees Fahrenheit (°F) to 75.6°F. January is the coldest month, with average temperatures from 33°F to 56°F. The warmest month tends to be July, with average monthly temperatures from 72°F to 93°F. Average annual rainfall in Minden is 55.43 inches. The wettest months are November and December, with the least rainfall during August and September (U.S. Climate Data, 2019).

2.2.5 Current and Future Land Use

The LSU FETI is a 33.8-acre tenant of CMTS that operates a fire training academy. While the land use agreement was originally dated 15 October 2002 and amended again on 18 October 2005, LSU FETI began operations after the former Louisiana Army Ammunition Plant property ownership was transferred from the Army to the State of Louisiana. Based on the Finding of Suitability for Early Transfer (LAAP, 2004b), current and future land uses for CMTS are limited to commercial, industrial, storage, and military activities, with limited residential areas near the north installation entrance gate. Fishing is permitted on CMTS (LAARNG, 2019). Reasonably anticipated future land use is not expected to change from the current land use described above.

2.2.6 Critical Habitat and Threatened/Endangered Species

According to the U.S. Fish and Wildlife Service (USFWS), there are four federally threatened or endangered species found in Webster and Bossier Parishes, near CMTS (USFWS, 2019).

- **Mammals:** Northern long-eared bat, *Myotis septentrionalis* (Threatened)
- **Birds:** Red-cockaded woodpecker, *Picoides borealis* (Endangered); Least tern, *Sterna antillarum* (Endangered)
- **Fish:** Pallid sturgeon, *Scaphirhynchus albus* (Endangered)

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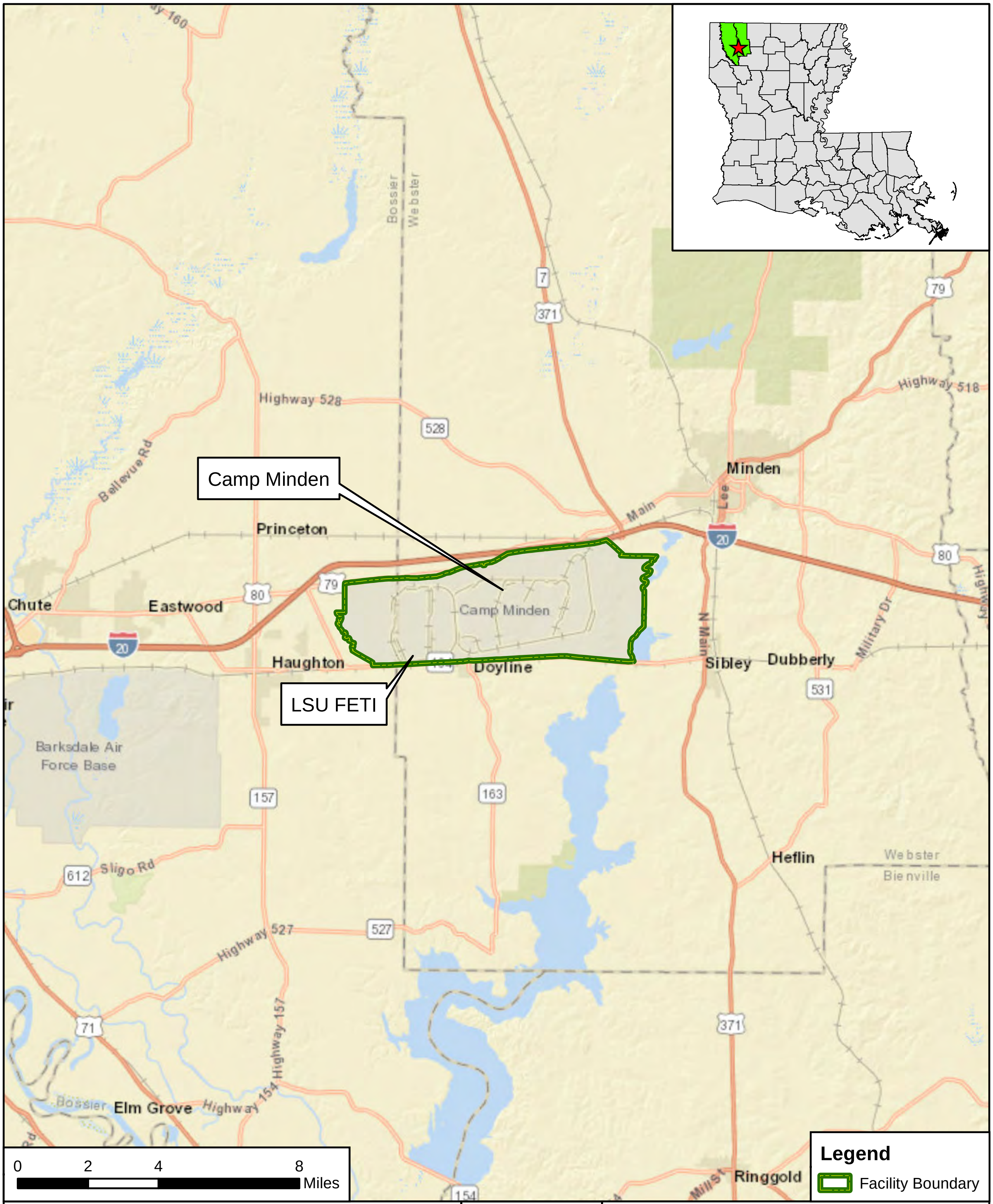

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Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	11/7/2019

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

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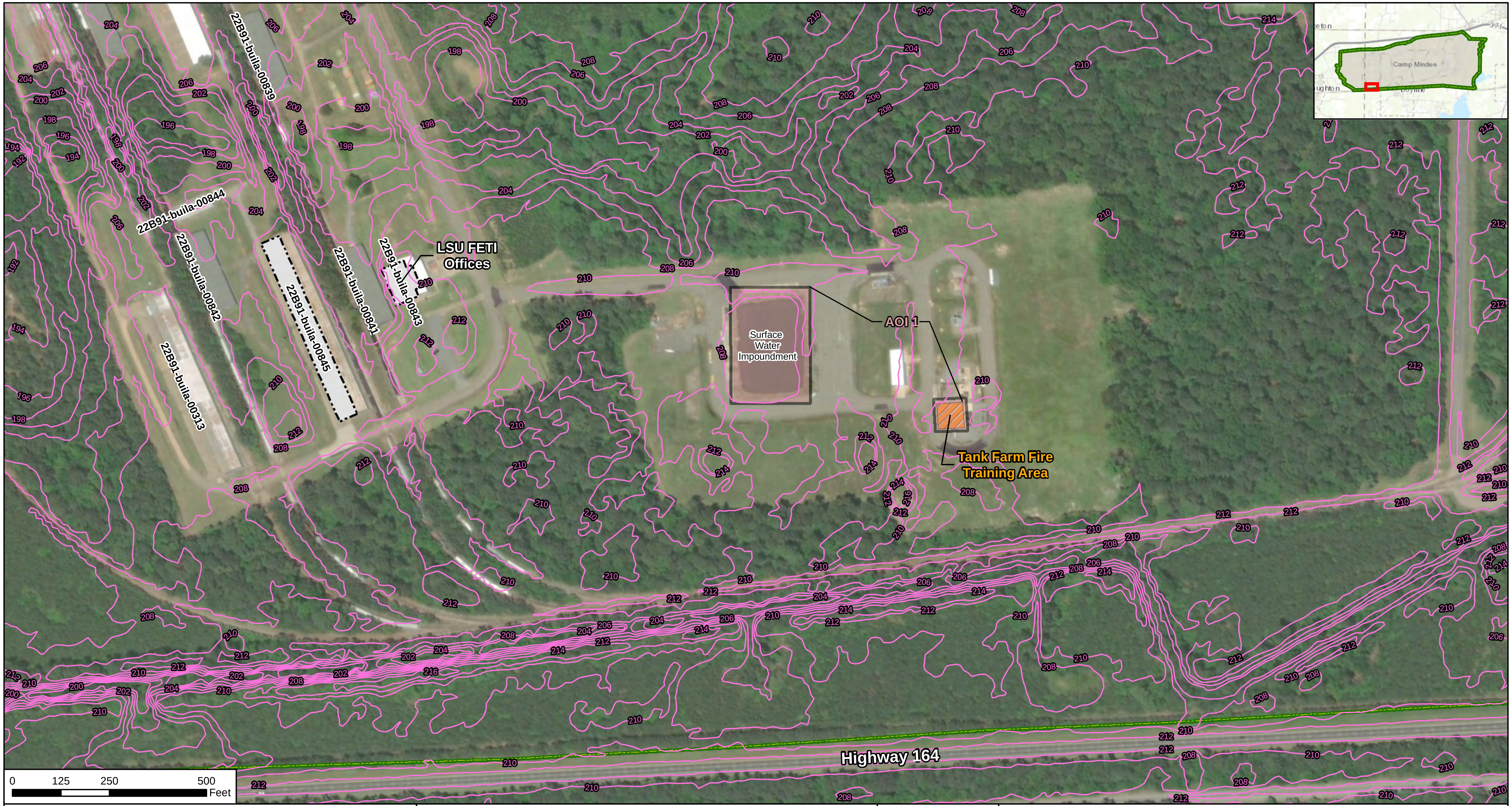

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Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	8/22/2019

Legend

▭	Area of Interest
▨	Potential PFAS Release
⬚	No Suspected Release
🟩	Facility Boundary
—	Topographic Contour (2ft contour interval)

Contourdata distributed by "Atlas: The Louisiana Statewide GIS." LSU CADGIS Research Laboratory, Baton Rouge, LA, 2006. http://atlas.lsu.edu

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Site Topography

AECOM 12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2

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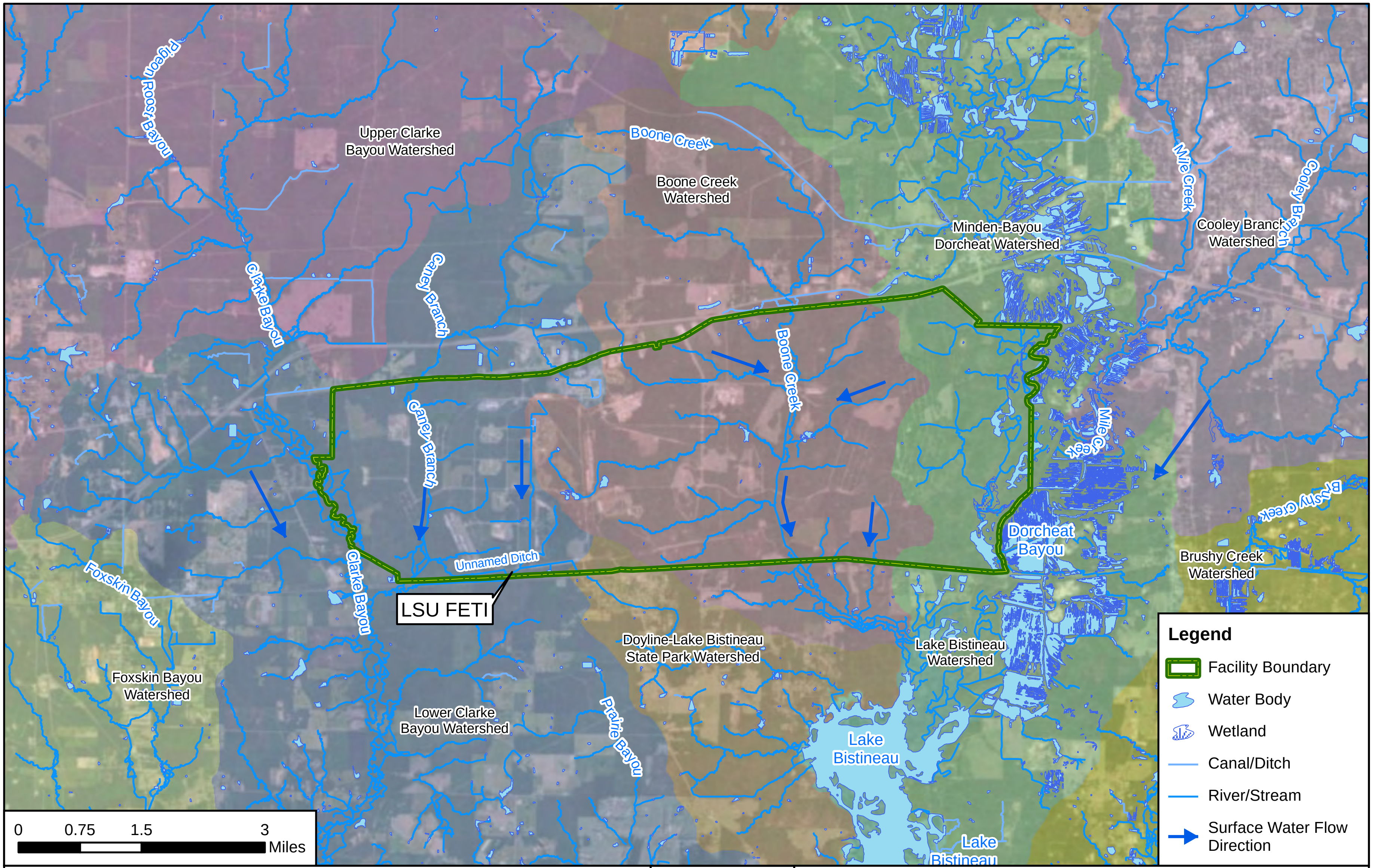

CLIENT ARNG

PROJECT Site Inspection for PFAS at Camp Minden, LA

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TITLE

Surface Water Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

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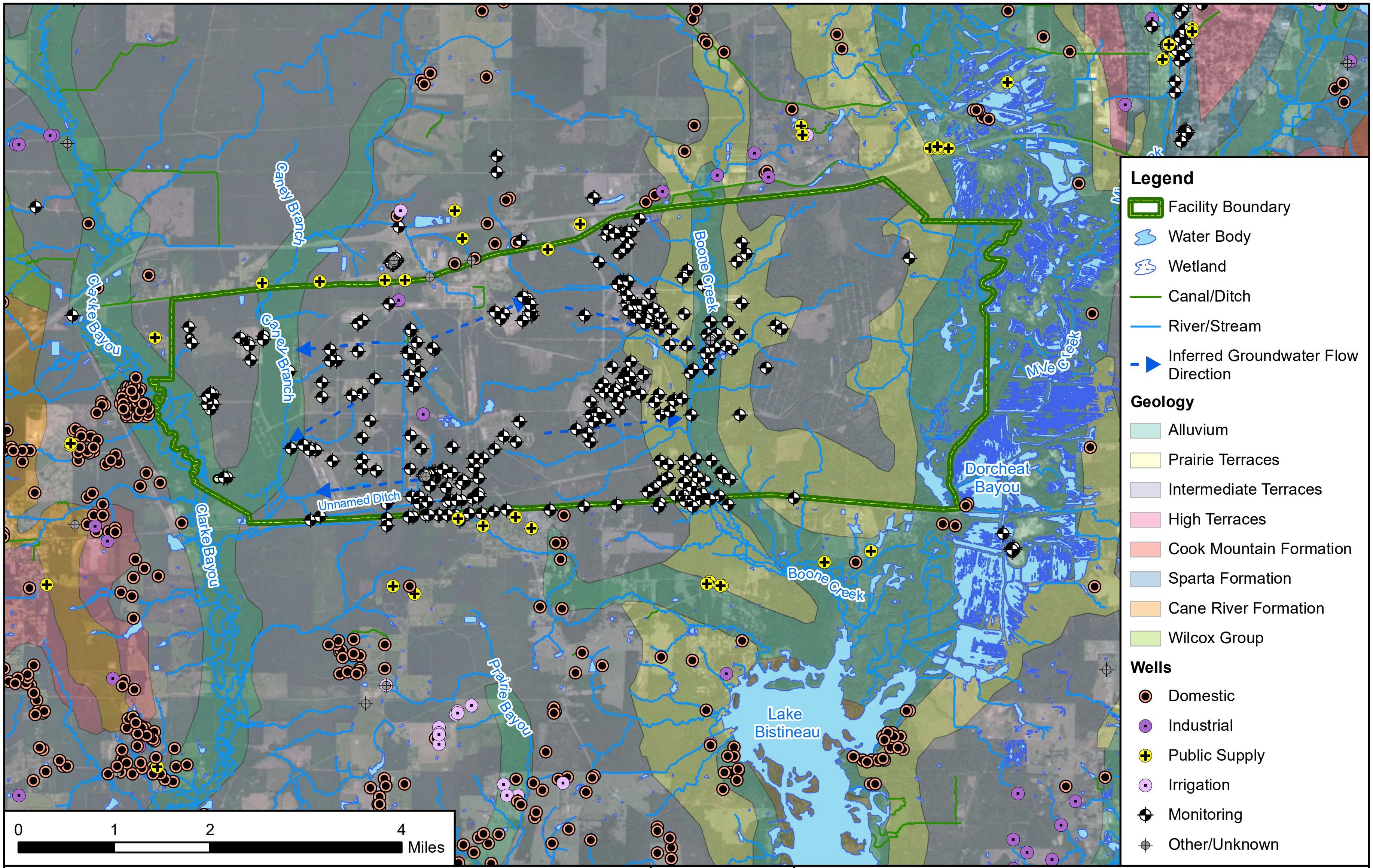

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Groundwater Features

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4

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3. Summary of Areas of Interest

This section describes the findings of the PA and a description of the potential PFAS release area identified. One AOI was identified at CMTS (AOI 1).

3.1 AOI 1 - Louisiana State University Fire and Emergency Training Institute

LSU FETI is a fire training area (FTA) that began operations in 2007 (**Figure 3-1**). Although fire training occurs at LSU FETI, emergency responses at CMTS are provided by the Bossier Parish Fire Department which maintains its own training facility several miles west of CMTS. AOI 1-LSU FETI is located on the southwest portion of CMTS, within the security-controlled perimeter fence. LSU FETI occupies one of several large inert storage warehouses (built between 1941 and 1950) that are located in this area of CMTS. The geographic coordinates are 32°32'18.31"N; 93°26'13.14"W.

The FTA includes a mock petroleum fuel aboveground storage tank (AST) “farm” situated within an approximate 850 square feet bermed concrete containment area located in an approximate 19-acre clearing. A 0.9-acre surface water impoundment is adjacent to the FTA. LSU FETI offices and warehouse space are located approximately 0.5 mile west of the training area.

Since 2007, propane is used to simulate fuel fires inside the bermed mock AST farm for the purpose of industrial brigade training performed approximately 3 to 4 times per year. Currently such training uses Micro Blaze Out®, a firefighting concentrate, procured from Verde Environmental. The chemical composition reported on the Micro Blaze Out® excludes PFAS. Prior to 2013, a different material, Fomtec, was used for training. All current Fomtec formulations are described as containing fluoroproteins or fluorocarbons with some fluorine free formulations available that are referred to as 3F. Earlier formulations of Fomtec cannot be confirmed. Fomtec is manufactured by Dafo Fomtec AB, a privately-owned Swedish company. For training exercises conducted at the mock AST farm, the firefighting concentrate is diluted in water at a one percent (1%) concentration.

Fluids generated during training are contained within a concrete-lined bermed area. The bermed area drains to the nearby surface impoundment through conveyance piping and open ditch, with the inlet on the northeast side of the impoundment. Construction details for the impoundment and ditch were not available; therefore, these features are presumed to be unlined. An underground culvert conveys impoundment overflow north, beneath the roadway to a drainage ditch. During heavy rain/flooding there is potential for surface water to breach these ditches and the impoundment and flow in other directions locally. Surface water throughout this portion of CMTS eventually drains west to Caney Branch, which flows south then east, then discharges to Lake Bistineau.

Water supplied by the CMTS water supply well network is used for all other training conducted at the LSU FETI.

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CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Minden, LA			
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Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	8/21/2019

Legend

- ▭ Area of Interest
- ▨ Potential PFAS Release
- ⬚ No Suspected Release
- 🟩 Facility Boundary
- 💧 Water Body
- — River/Stream
- → Surface Water Flow Direction
- ⇢ Inferred Groundwater Flow Direction

N

Area of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\LA\Camp_Minden_PFAS_Figures\Minden_SI_Figures\SI_Report\Fig_3-1_Minden_AOI.mxd

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4. Project Data Quality Objectives

Project Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of data and define the level of certainty required to support project decision-making. The specific DQOs established for this SI are described below. These DQOs were developed in accordance with the USEPA's seven-step iterative process (USEPA, 2006).

4.1 Problem Statement

The following problem statement was developed during project planning:

The presence of PFAS, which may pose a risk to human health or the environment, in environmental media at the facility is currently unknown. PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. The regulatory framework for managing PFAS at both the federal and state level continues to evolve.

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the site [under control and jurisdiction of the ARNG] will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS. The SLs are presented in **Section 6.1** of this Report.

The following quotes from the US Department of the Army (DA) policy documents formed the basis for this project (DA, 2016; DA, 2018):

- "The Army will research and identify locations where PFOS and/or PFOA containing products, such as AFFF, are known or suspected to have been used. Installations shall coordinate with installation/facility fire response or training offices to identify AFFF use or storage locations. The Army will consider FTAs, AFFF storage locations, hangars/buildings with AFFF suppression systems, fire equipment maintenance areas, and areas where emergency response operations required AFFF use as possible source areas. In addition, metal plating operations that used certain PFOS-containing mist suppressants shall be considered possible source areas."
- "Based on a review of site records…determine whether a CERCLA PA is appropriate for identifying PFOS/PFOA release sites. If the PA determines a PFOS/PFOA release may have occurred, a CERCLA SI shall be conducted to determine presence/absence of contamination."
- "Identify sites where perfluorinated compounds (PFCs) are known or suspected to have been released, with the priority being those sites within 20 miles of the public systems that tested above USEPA HAs" (USEPA, 2016a; USEPA, 2016b).

4.2 Goals of the Study

The following goals were established for this SI:

1) Determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs.
2) Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.

3) Determine the potential need for a removal action.
4) Collect data to better characterize the release areas for more effective and rapid initiation of an RI.
5) Identify, within 4 miles of the installation, other potential PFAS sources (fire stations, major manufacturers, other DoD facilities) and receptors, including both groundwater and surface water receptors, to determine whether the ARNG is the likely source of PFAS or whether there is an off-facility source of PFAS responsible for installation detections of PFAS (USEPA, 2005).
6) Determine whether a potentially complete pathway exists between the source and potential receptors, and whether ARNG is the likely source of the contamination.

4.3 Information Inputs:

Primary information inputs included:

- PA for Camp Minden Training Site, LA (AECOM, 2019a)
- Groundwater, soil, surface water and sediment sample data collected in accordance with the Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2019c)
- Field data including groundwater and surface water quality parameters measured at the time of sampling.

4.4 Study Boundaries

The SI sampling approach was bounded by the property limits of CMTS, specifically, to the south by the CMTS boundary along Highway 164 and to the west near Caney Branch. Off-facility sampling was not included in the scope of this SI.

4.5 Analytical Approach

All samples were analyzed by Gulf Coast Analytical Laboratories, LLC (GCAL), accredited under the DoD Environmental Laboratory Accreditation Program (ELAP) (Accreditation Number 74960) and the National Environmental Laboratory Accreditation Program (NELAP) (Certificate Number 01955). Data were compared to SLs (discussed further in Section 6) and decision rules as defined in the QAPP Addendum. Decision rules were developed and applied to all data collected. These rules governed response actions based on the results of the SI sampling effort.

The decision rules described in the **Worksheet #11** of the QAPP Addendum identified action-based answers to the following questions:

<u>Groundwater/Surface Water</u>:

- Is there a human receptor within 4 miles of the Site?
- What is the concentration of PFOA, PFOS, and PFBS at the potential release area?
- What is the concentration of PFOA, PFOS, and PFBS at the facility boundary upgradient and downgradient of the potential release area?
- What does the conceptual site model (CSM) suggest in terms of source, pathway and receptor?

Soil/Sediment:

- What is the concentration of PFAS constituents in shallow surface soil or sediment (0 to 2 feet bgs)?
- What is the concentration of PFOA, PFOS, and PFBS in deep soil (i.e., capillary fringe)?
- What does the CSM suggest in terms of source, pathway, and receptor?

The resulting decision rules (described in QAPP Addendum Tables WS11-1 and WS11-2) are summarized as follows:

1. IF PFOA, PFOS, and PFBS concentrations are not detected in media, THEN no further action is required during the SI Phase.
2. IF PFOA, PFOS, and PFBS are detected in media, THEN the CSM will be revised accordingly, and the State of Louisiana may consider the need for further investigation or follow-up action.

As specified in the QAPP Addendum, soil, groundwater, surface water, and sediment samples were collected at, and downgradient of, the potential PFAS release area to evaluate the Site in accordance with these decision rules.

4.6 Data Usability Assessment

The Data Usability Assessment (DUA) is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met installation-specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD, 2018a; DoD, 2018b; USEPA, 2017).

Data Quality Indicators (DQIs) (Precision, Accuracy, Representativeness, Comparability, Completeness and Sensitivity) are important components in assessing data usability. These DQIs were evaluated in the subsequent sections and demonstrate that the data presented in this SI report are of high quality. Although the SI data are considered reliable, some degree of uncertainty can be associated with the data collected. Specific factors that may contribute to the uncertainty of the data evaluation are described below. The Data Validation Report (DVR) (**Appendix A**) presents explanations for all qualified data in greater detail.

4.6.1 Precision

Precision is the degree of agreement among repeated measurements of the same characteristic on the same sample or on separate samples collected as close as possible in time and place. Field sampling precision is measured with the field duplicate relative percent differences (RPD); laboratory precision is measured with calibration verification, internal standard recoveries, and laboratory control spike (LCS) and matrix spike (MS) duplicate RPDs.

Extraction internal standards (EIS) were added by the laboratory during sample extraction to measure relative responses of target analytes and were used to correct for bias associated with matrix interferences and sample preparation efficiencies, injection volume variances, mass spectrometry ionization efficiencies, and other associated preparation and analytical anomalies. Several field samples displayed EIS area counts less than the lower Quality Control (QC) limit of 50%. The positive field sample result associated with EIS area counts less than the QC limit, but greater than 20% was qualified “J+”, while non-detects were qualified “UJ”. The qualified results should be considered usable as estimated values with a positive bias. The field sample results associated with area counts less than 20% were non-detect and were qualified “X”. The qualified field sample results associated with EIS area counts less than 20%, but greater than 10%, are recommended for use as estimated values reported with interpreted qualifiers of “UJ”. The project team determined these non-detect results were usable for project purposes.

Calibration verifications were performed routinely to ensure that instrument responses for all calibrated analytes were within established QC criteria. All calibration verifications were within the project established precision limits presented in the QAPP Addendum (AECOM, 2019c).

Laboratory control spike/laboratory control spike duplicate (LCS/LCSD) pairs were prepared by addition of known concentrations of each analyte in a matrix-free media known to be free of target analytes. LCS/LCSD pairs were analyzed for every analytical batch to demonstrate the ability of the laboratory to detect similar concentrations of a known quantity in matrix-free media. The LCS/LCSD samples were within the project established precision limits presented in the QAPP Addendum (AECOM, 2019c).

Matrix spike/matrix spike duplicate (MS/MSD) samples were prepared, analyzed, and reported for all preparation batches. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested. MS/MSD samples were submitted to the laboratory for analysis at a rate of 5%. The MS/MSD samples were within the project established precision limits presented in the QAPP Addendum (AECOM, 2019c).

Field duplicate samples were collected at a rate of 10% to assess the overall sampling and measurement precision for this sampling effort. The field duplicate samples were analyzed for PFAS and general chemistry parameters. The field duplicate pair performed on parent sample CMTS-GW-4 displayed an RPD greater than the upper QC limit for PFBA, at 180%. The associated parent sample result and field duplicate result were positive and were qualified “J”. This anomaly is considered minor and the qualified field sample results should be considered usable as estimated values.

4.6.2 Accuracy

Accuracy is a measure of confidence in a measurement. The smaller the difference between the measurement of a parameter and its "true" or expected value, the more accurate the measurement. The more precise or reproducible the result, the more reliable or accurate the result. Accuracy is measured through percent recoveries in the LCS/LCSD, MS/MSD, and surrogates.

LCS/LCSD samples were prepared by addition of known concentrations of each analyte in a matrix free media known to be free of target analytes. LCS/LCSD samples were analyzed for every analytical batch and demonstrated that the analytical system was in control during sample preparation and analysis, with one exception. The LCS/LCSD pairs prepared in batches 662442 and 663009 displayed percent recoveries less than the lower QC limit of 70% for NEtFOSAA and PFBA. The positive associated field sample results were qualified “J-“, while non-detects were qualified “UJ”. The qualified field sample results should be considered usable as estimated values with a negative bias.

MS/MSD samples were prepared, analyzed, and reported at a rate of 5%. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested, with a limited number of exceptions. Several MS/MSD pairs displayed percent recoveries outside the QC limits. The positive parent sample results associated with the positive biases were qualified “J+”. The qualified field sample results should be considered usable as estimated values with a positive bias. The parent sample result associated with the percent recovery less than 30% was positive and was qualified “J-”. The positive parent sample results associated with the remaining negative biases were qualified “J-”, while non-detects were qualified “UJ”. The qualified field sample results should be considered usable as estimated values with a negative bias. The positive parent sample result associated with the combination of high and low percent recoveries was qualified “J”. The qualified field sample result should be considered usable as an estimated value with an indeterminate bias.

4.6.3 Representativeness

Representativeness qualitatively expresses the degree to which data accurately reflect site conditions. Factors that affect the representativeness of analytical data include appropriate sample population definitions, proper sample collection and preservation techniques, analytical holding times, use of standard analytical methods, and determination of matrix or analyte interferences.

Several field samples were re-extracted outside the holding time requirement of 14 days due to internal standard failures in the initial extraction with similar results. The positive associated field sample results were qualified “J”, while non-detects were qualified “UJ”. The qualified field sample results should be considered usable as estimated values. For all samples with re-extracted results, the data reviewer recommended one usable result from either the initial or re-extracted analysis based on professional judgement of data quality.

Relating to the use of standard analytical methods, the laboratory followed the method as established in PFAS by LC/MS/MS Compliant with Quality Systems Manual (QSM) 5.1 Table B-15, including the specific preparation requirements (i.e. ENVI-Carb or equivalent used), mass calibration, spectra. Furthermore, all the ion transitions identified in Table B-15 were monitored, standards that contained both branched and linear isomers when available were used, and isotopically labeled standards were used for quantitation.

Field QC samples were collected to assess the representativeness of the data collected. Field duplicates were collected at a rate of 10% for all field samples, while MS/MSD samples were collected at a rate of 5%. All preservation techniques were followed by the field staff, and all technical and analytical holding times were met by the laboratory, with the exception of the re-extracted field samples previously discussed. The laboratory used approved standard methods in accordance with the QAPP Addendum (AECOM, 2019c) for all analyses.

Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative control. Several PFAS instrument blanks and method blanks displayed detections greater than the detection limit for multiple target analytes. In total, 192 field sample results were qualified “U” during data validation due to associated detections in instrument and/or method blanks. The reported field sample result values were adjusted to be equal to the limit of detection (LOD); the LOD was elevated to the concentration of the blank detection in instances where the blank concentration was greater than the LOD. The results are usable as qualified but should be considered false positives and treated as non-detect.

Field blanks were also collected for groundwater and soil samples. Several equipment blanks displayed detections greater than the detection limit. In total, 20 field sample results were qualified “U” during data validation due to associated field blank detections. The reported field sample result values were adjusted to be equal to the LOD, and the LOD was elevated to the concentration of the blank detections. The results are usable as qualified but should be considered as false positives and treated as non-detect.

A sample of the water used for decontamination of the drill rig was collected in advance of the field effort. The drill rig decontamination sample, WW4, displayed non-detect results for all target analytes. Based on the sample results, the potable water source was deemed acceptable for use during the investigation for decontamination of drilling equipment and during well installation.

Overall, the data are usable for evaluating the presence or absence of PFAS at the Site. Sufficient usable data were obtained to meet the objectives of the SI and risk screening.

4.6.4 Comparability

Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. Using standardized sampling and analytical methods, units of reporting, and site selection procedures help ensure comparability. Standard field sampling and typical laboratory protocols were used during the SI and are considered comparable to ongoing investigations.

4.6.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. The laboratory provided data meeting system QC acceptance criteria for all samples tested. Project completeness was determined by evaluating the planned versus actual quantities of data. Percent completeness per parameter is as follows:

- PFAS in groundwater by LC/MS/MS compliant with QSM 5.1 Table B-15 at 100%
- PFAS in soil by LC/MS/MS compliant with QSM 5.1 Table B-15 at 100%
- PFAS in surface water by LC/MS/MS compliant with QSM 5.1 Table B-15 at 100%
- PFAS in sediment LC/MS/MS compliant with QSM 5.1 Table B-15 at 100%
- pH in soil by USEPA Method 9045D at 100%
- total organic carbon (TOC) by USEPA Method 9060 at 100%

4.6.6 Sensitivity

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, a method detection limit (MDL) study, and calibration standards at the limit of quantitation (LOQ). In order to meet the needs of the data users, project data must meet the measurement performance criteria for sensitivity and project LOQs specified in the QAPP Addendum (AECOM, 2019c). The laboratory provided the requested MDL studies and provided applicable calibration standards at the LOQ. In order to achieve the DQOs for sensitivity outlined in the QAPP Addendum (AECOM, 2019c), the laboratory reported all field sample results at the lowest possible dilution. Additionally, any analytes detected below the LOQ and above the MDL were reported and qualified “J” as estimated values by the laboratory.

5. Site Inspection Activities

This section describes the environmental investigation and sampling activities that occurred as part of the SI. The SI sampling approach was based on the findings of the PA and was implemented in accordance with the following approved documents.

- *Final Preliminary Assessment Report Camp Minden Training Site, Louisiana* dated February 2019 (AECOM, 2019a)
- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan* dated March 2018 (AECOM, 2018a)
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum Camp Minden Training Site, Louisiana* dated June 2019 (AECOM, 2019c)
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b)
- *Final Site Safety and Health Plan Camp Minden Training Site, Louisiana* dated June 2019 (AECOM, 2019b)

SI field activities were conducted from 18 to 21 June 2019 and consisted of grab soil, groundwater, surface water, and sediment sampling. Field activities were conducted in accordance with the QAPP Addendum (AECOM, 2019c), except as noted in **Section 5.7**.

The following summarizes the rationale and samples collected and analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.1 Table B-15 to fulfill the project DQOs:

- 18 grab soil samples and 6 grab groundwater samples collected from 6 borings/temporary monitoring wells located in the vicinity of the mock AST farm, as well as areas presumed upgradient and downgradient, with one at the installation boundary;
- 6 sediment samples at locations where drainage from the FTA is conveyed (FTA drainage ditches, surface impoundment inflow and outflow, and Caney Branch where it exits the southern installation boundary); and,
- 3 surface water samples paired with sediment locations noted above where surface water was available for sampling.

Figure 5-1 shows the sample locations for all media across the Site. **Table 5-1** presents all samples collected for each media, including blanks. Daily reports were completed throughout field activities, which are provided in **Appendix B**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

In preparation for the SI field activities, project team members participated in Technical Project Planning (TPP) meetings, performed utility clearance, and sampled decontaminated source water, each of which is discussed in more detail below.

5.1.1 Technical Project Planning

The USACE TPP Process, EM 200-1-1 (USACE, 2016) defines four phases to project planning: 1.) defining the project phase; 2.) determining the data needs; 3.) developing data collection strategies; and 4.) finalizing the data collection plan. The TPP process encourages stakeholder involvement in the SI, beginning with defining overall project objectives, including quantitative and qualitative DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

TPP meetings 1 and 2 were held on 14 March 2019, prior to field activities. Meeting minutes are provided in **Appendix D**. TPP meetings 1 and 2 were conducted in general accordance with Engineers Manual (EM) 200-1-2 (USACE, 2016).

The stakeholders for this SI include ARNG G9, USACE, CMTS, LAARNG, USEPA, Louisiana Department of Environmental Quality (LDEQ), Louisiana Department of Health (LDH), LSU FETI, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods. The outcome of TPP meetings 1 and 2 were memorialized in the SI QAPP Addendum. Future TPP meetings will provide an opportunity to discuss the results, findings, and future actions, where warranted.

5.1.2 Utility Clearance

Utility clearance was conducted by LAARNG with input from the AECOM field team. AECOM contacted “Louisiana 811”, the local-one-call utility location system. AECOM also contacted the ARNG Environmental Manager and LSU FETI Facility Manager five business days prior to the start of SI field activities.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

A sample from a local potable water source at CMTS was collected on 23 May 2019, prior to field mobilization, and analyzed for PFAS via LC/MS/MS compliant with QSM 5.1 Table B-15. The results of the potable well sample are provided in **Appendix H**. As presented in **Section 4.6.3**, potable well sample results were non-detect for all target analytes.

All materials that were used within the sampling zone were confirmed as acceptable for use in the PFAS sampling environment and to decontaminate drilling equipment. The checklist of acceptable materials for use in the PFAS sampling environment is provided in the Programmatic Uniform Federal Policy (UFP)- QAPP (PQAPP) Appendix C, Table 1 (AECOM, 2018a). Prior to the start of field work each day, a PFAS Sampling Checklist was completed as an additional layer of control (PQAPP Appendix C, Table 2). The checklist served as a daily reminder to each field team member regarding the allowable materials within the sampling environment.

5.2 Soil Borings and Soil Sampling

Soil samples were collected via direct-push technology (DPT), in accordance with the QAPP Addendum (AECOM, 2019c). A GeoProbe® 7720DT dual-tube sampling system was used to collect continuous soil cores. Three discrete soil samples were collected for chemical analysis from each soil boring using DPT: one surface soil sample (0.5-1 foot depth), one subsurface soil sample approximately 1 foot above the groundwater table, and one subsurface soil sample at the mid-point between the surface and the groundwater table.

The soil cores were continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System (USCS). A photo ionization detector (PID) was used to screen the breathing zone during boring activities. Observations and measurements were recorded in a non-treated field logbook. Photographs were also taken of the boring cores. Depth interval, recovery thickness, PID concentrations, moisture, relative density, color, and texture were recorded along with any other observations.

Each sample was collected using laboratory-supplied bottleware and submitted to the laboratory for analysis of selected parameters. All samples were analyzed for PFAS via LC/MS/MS compliant with QSM 5.1 Table B-15, pH (USEPA Method 9045D), and TOC (USEPA Method 9060A). All sample containers were provided by the laboratory and PFAS-free. Samples were packaged on ice and transported daily via overnight commercial carrier under standard chain of custody (CoC) procedures to the laboratory in accordance with the QAPP Addendum (AECOM, 2019c).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. Matrix spike and matrix spike duplicates were collected at the rate of 5% and analyzed for the same parameters as the accompanying samples. Field Reagent Blanks accompanied each cooler containing samples for PFAS analysis and were analyzed for select PFAS. No equipment blanks were prepared or analyzed. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 4 degrees Celsius (ºC) during shipment.

5.3 Temporary Well Installation and Groundwater Grab Sampling

Temporary wells were installed using a GeoProbe® 7720DT dual-tube sampling system. Once the borehole was advanced to the desired depth, the temporary well was constructed of a 5-foot section of 1-inch diameter Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe was used for each sampling location to avoid cross-contamination. The well depths and screen intervals of each temporary well is provided in **Table 5-2**.

The temporary wells were allowed to recharge after installation. The wells were purged at a rate determined by the estimated recharge rate into the well to reduce turbidity in the groundwater prior to sampling. Groundwater samples were collected in accordance with low-flow sampling protocols using a peristaltic pump with tubing that was determined to be PFAS-free. When possible, water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen, oxidation–reduction potential) were measured and recorded in the field notes after the grab sample was collected in accordance with QAPP Addendum (AECOM, 2019c). However, wells SB-TW-1, SB-TW-2, SB-TW-3, SB-TW-4, and SB-TW-6 had insufficient volumes of water to collect field water quality parameter readings. Consequently, groundwater was collected directly from the high-density polyethylene (HDPE) tubing.

Each sample was collected into laboratory-supplied PFAS-free bottleware and submitted to the laboratory for analysis of PFAS via LC/MS/MS compliant with QSM 5.1 Table B-15. All sample containers were PFAS-free. Samples were packaged on ice and transported daily via overnight commercial carrier under standard CoC procedures to the laboratory. Any non-dedicated sampling materials were decontaminated between boring locations.

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs samples were collected at the rate of 5% and analyzed for the same parameters as the accompanying samples. Field Reagent Blanks accompanied each cooler containing samples for PFAS analysis and were analyzed for select PFAS in accordance with the PQAPP (AECOM, 2018a). A temperature blank was placed in each cooler to ensure that samples were preserved at or below 4 ºC during shipment.

Temporary wells were abandoned in accordance with the QAPP Addendum (AECOM, 2019c) by removing the PVC pipe and backfilling the hole with bentonite chips. All temporary wells were installed in grassy areas to avoid disturbing concrete or asphalt.

5.4 Surface Water and Sediment Sampling

Three surface water and six sediment samples were collected from locations at LSU FETI and Caney Branch at the downstream CMTS boundary. Surface water and sediment sampling was initiated at the CMTS boundary and then proceeded toward the impoundment. At three locations, surface water and sediment samples were co-located. At these locations, the surface water samples were collected prior to the sediment.

Surface water grab samples were collected from a single point in the waterbody using a dip sampler at a depth of approximately two-thirds from the bottom. Sampling was performed deliberately and methodically to minimize the disturbance of the bottom sediments and as quickly as possible to ensure a representative sample was collected. The surface water samples were transferred to appropriate sampling containers. A sediment coring device was used to collect the sediment sample from the first foot of sediment. The sediment was then transferred to a stainless-steel bowl, where stones larger than 1 centimeter in diameter were removed.

General water quality parameters (i.e., temperature, pH, conductivity, dissolved oxygen and oxidation reduction potential) were collected at each surface water sampling location with a water quality meter (**Appendix E**). The surface water dipper, sediment coring device, and water quality probe were ensured to be PFAS-free.

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at the rate of 5% and analyzed for the same parameters as the accompanying samples. Field Reagent Blanks accompanied each cooler containing samples for PFAS analysis and were analyzed for select PFAS. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 4 ºC during shipment.

All surface water and sediment samples were collected into laboratory-supplied bottleware and submitted to the laboratory for analysis of PFAS via LC/MS/MS compliant with QSM 5.1 Table B-15. The sediment samples were also analyzed for pH (USEPA Method 9045D) and TOC (USEPA Method 9060A). All sample containers were PFAS-free. Samples were packaged on ice and transported daily via overnight commercial carrier under standard CoC procedures to the laboratory

5.5 Investigation Derived Waste

Currently, the disposal of PFAS investigation derived waste (IDW) is not regulated. PFAS IDW is considered a non-hazardous waste and was managed in accordance with the QAPP Addendum (AECOM, 2019c).

Non-hazardous solid and liquid IDW generated during SI activities were containerized in properly-labeled 55-gallon drums and stored at LSU FETI until sample results were received. Solid (soil and sediment) and liquid (groundwater and surface water) PFOA and PFOS concentrations were below the 23 milligrams per kilogram (mg/kg) (solid) and 0.07 micrograms per liter (liquid) thresholds, as described in Worksheet 17e of the QAPP Addendum (AECOM, 2019c). Therefore, the solid and liquid IDW was distributed on the ground surface at the Site. AECOM collected global positioning points at the location where the solid and liquid IDW was placed. The IDW polygon is displayed in **Appendix G**.

Other solids, such as spent personal protective equipment, plastic sheeting, tubing, rope, unused monitor well construction materials, and other environmental media generated during the field activities were disposed of at a licensed solid waste landfill.

5.6 Laboratory Analytical Methods

Samples were analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.1 Table B-15 at GCAL in Baton Rouge, Louisiana, a DoD ELAP and NELAP certified laboratory.

The 18 PFAS analyzed as part of the ARNG SI program include the following:

- 6:2 fluorotelomer sulfonate (6:2 FTS)
- 8:2 fluorotelomer sulfonate (8:2 FTS)
- N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)
- N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)
- Perfluorobutyrate (PFBA)
- Perfluorobutanesulfonic acid (PFBS)
- Perfluorodecanoic acid (PFDA)
- Perfluorododecanoic acid (PFDoA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorohexanoic acid (PFHxA)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluorononanoic acid (PFNA)
- Perfluorooctanoic acid (PFOA)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluoropentanoic acid (PFPeA)
- Perfluorotetradecanoic acid (PFTeDA)
- Perfluorotridecanoic acid (PFTrDA)
- Perfluoroundecanoic acid (PFUdA)

Soil and sediment samples were also analyzed for TOC using USEPA Method 9060A, and pH by USEPA Method 9045D.

5.7 Deviations from QAPP Addendum

Deviations from the QAPP Addendum occurred based on field conditions and are noted below:

- Five of the six wells had insufficient water volumes and, therefore, water quality parameters were not measured and recorded. Additionally, groundwater samples were collected directly from the HDPE tubing.

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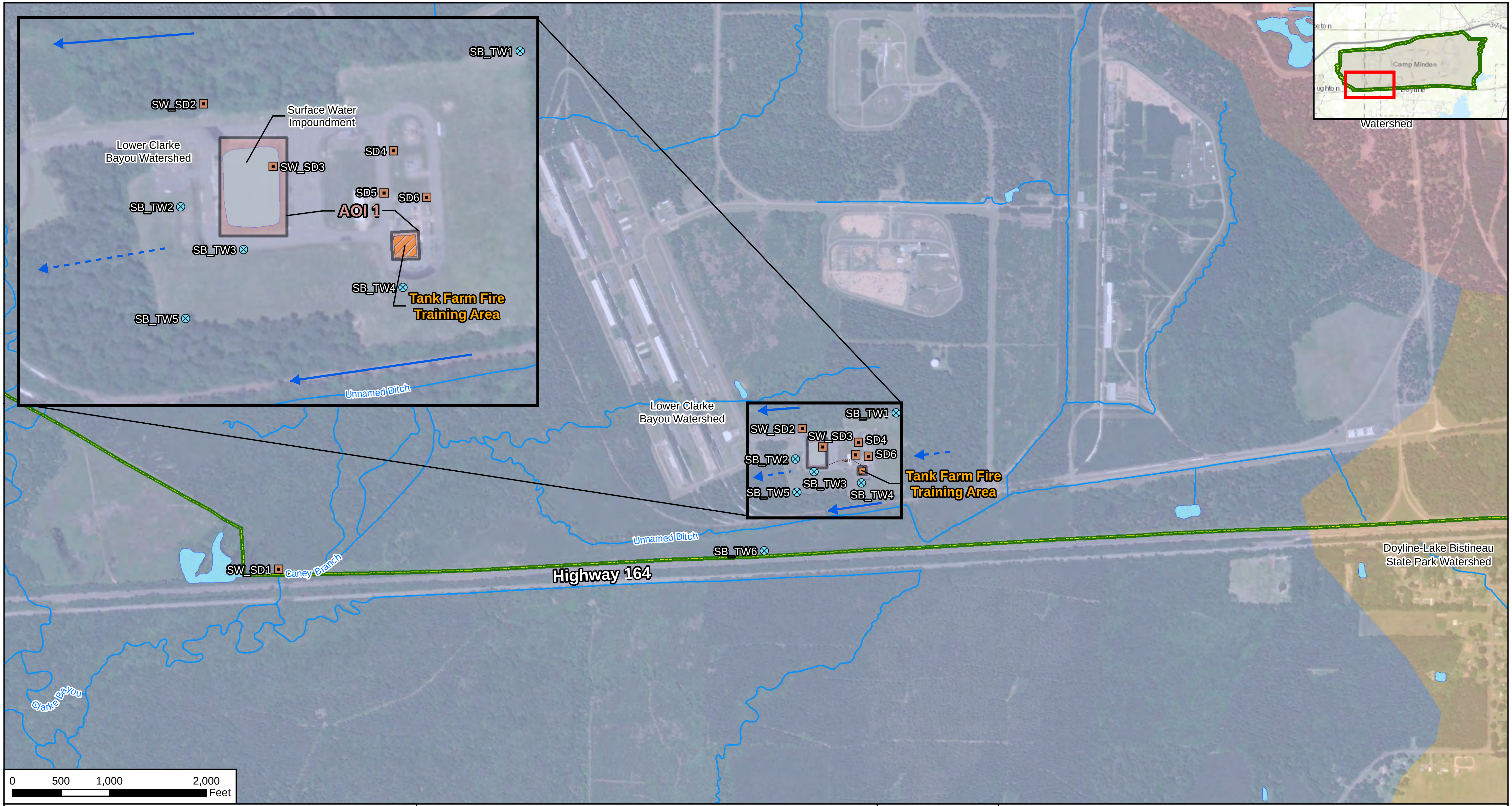

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Minden, LA			
REVISED	8/21/2019	GIS BY	MS	8/21/2019
SCALE	1:12,000	CHK BY	SS	8/21/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	8/21/2019

Legend

▭	Area of Interest	—	River/Stream
▨	Potential PFAS Release	→	Surface Water Flow Direction
▭	Facility Boundary	- →	Inferred Groundwater Flow Direction
≈	Water Body	⊗	Soil Boring/Temporary Monitoring Well
		▣	Surface Water/Sediment

N

Sample Locations

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\LA\Camp_Minden_PFAS_Figures\Minden_SI_Figures\SI_Report\Fig_5-1_Minden_SI_Sample_Locations.mxd

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Table 5-1
Samples by Medium
Site Inspection Report, Camp Minden

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Comments
Soil Samples						
CMTS-SB-1 (0-2)	6/19/2019	0 - 2	x	x	x	
CMTS-SB-1 (10-12)	6/19/2019	10 - 12	x	x	x	
CMTS-SB-1 (18-19)	6/19/2019	18 - 19	x	x	x	
CMTS-SB-2 (0-2)	6/19/2019	0 - 2	x	x	x	
CMTS-SB-2 (10-12)	6/19/2019	10 - 12	x	x	x	
CMTS-SB-2 (18-19)	6/19/2019	18 - 19	x	x	x	
CMTS-SB-3 (0-2)	6/19/2019	0 - 2	x	x	x	
CMTS-SB-3 (0-2) MS	6/19/2019	0 - 2	x	x	x	MS/MSD
CMTS-SB-3 (0-2) MSD	6/19/2019	0 - 2	x	x	x	MS/MSD
CMTS-SB-3 (10-12)	6/19/2019	10 - 12	x	x	x	
CMTS-SB-3 (18-19)	6/19/2019	18 - 19	x	x	x	
CMTS-SB-3 (18-19) DUP	6/19/2019	18 - 19	x	x	x	Field Duplicate
CMTS-SB-4 (0-2)	6/19/2019	0 - 2	x	x	x	
CMTS-SB-4 (10-12)	6/19/2019	10 - 12	x	x	x	
CMTS-SB-4 (18-19)	6/19/2019	18 - 19	x	x	x	
CMTS-SB-4 (18-19) DUP	6/19/2019	18 - 19	x	x	x	Field Duplicate
CMTS-SB-5 (0-2)	6/19/2019	0 - 2	x	x	x	
CMTS-SB-5 (10-12)	6/19/2019	10 - 12	x	x	x	
CMTS-SB-5 (18-19)	6/19/2019	18 - 19	x	x	x	
CMTS-SB-6 (0-2)	6/20/2019	0 - 2	x	x	x	
CMTS-SB-6 (7-9)	6/20/2019	7 - 9	x	x	x	
CMTS-SB-6 (12-13)	6/20/2019	12 - 13	x	x	x	
CMTS-IDW-SOIL	6/20/2019		x			
Groundwater Samples						
CMTS-GW-1	6/20/2019	20.5	x			
CMTS-GW-1 MS	6/20/2019	22.5	x			MS/MSD
CMTS-GW-1 MSD	6/20/2019	22.5	x			MS/MSD
CMTS-GW-2	6/20/2019	22.5	x			
CMTS-GW-3	6/20/2019	22.5	x			
CMTS-GW-4	6/20/2019	22.5	x			
CMTS-GW-4 DUP	6/20/2019	22.5	x			Field Duplicate
CMTS-GW-5	6/20/2019	22.5	x			
CMTS-GW-6	6/20/2019	22.5	x			
CMTS-IDW-Down Water	6/20/2019	22.5	x			
Surface Water Samples						
CMTS-SW-1	6/20/2019	0 - 1	x			
CMTS-SW-1 MS	6/20/2019	0 - 1	x			MS/MSD
CMTS-SW-1 MSD	6/20/2019	0 - 1	x			MS/MSD
CMTS-SW-2	6/18/2019	0 - 1	x			
CMTS-SW-2 DUP	6/18/2019	0 - 1	x			Field Duplicate
CMTS-SW-3	6/18/2019	0 - 1	x			

Table 5-1
Samples by Medium
Site Inspection Report, Camp Minden

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Comments
Surface Sediment Samples						
CMTS-SD-1	6/20/2019	0 - 1	x	x	x	
CMTS-SD-2	6/18/2019	0 - 1	x	x	x	
CMTS-SD-3	6/18/2019	0 - 1	x	x	x	
CMTS-SD-4	6/18/2019	0 - 1	x	x	x	
CMTS-SD-4 DUP	6/18/2019	0 - 1	x	x	x	Field Duplicate
CMTS-SD-5	6/18/2019	0 - 1	x	x	x	
CMTS-SD-5 MS	6/18/2019	0 - 1	x	x	x	MS/MSD
CMTS-SD-6	6/18/2019	0 - 1	x	x	x	
Field Blanks						
CMTS-SD-1 FB	6/20/2019	---	x			Field Blank
CMTS-SB-4 FB	6/19/2019	---	x			Field Blank
CMTS-SB-6 FB	6/20/2019	---	x			Field Blank
CMTS-SD-6 FB	6/18/2019	---	x			Field Blank
CMTS-SW-1 FB	6/20/2019	---	x			Field Blank
CMTS-GW-2 FB	6/20/2019	---	x			Field Blank
CMTS-SW-3 FB	6/18/2019	---	x			Field Blank

Notes:
ft = feet
MS/MSD = matrix spike/ matrix spike duplicate
PFAS = per- and polyfluoroalkyl substances
pH = potential for hydrogen
TOC =total organic carbon
USEPA = United States Environmental Protection Agency

Table 5-2
Soil Boring Depths and Temporary Well Screen Intervals
Site Inspection Report, Camp Minden

Area of Interest	Boring Location	Soil Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)
AOI 1	SB_TW 1	23	18 - 23
	SB_TW 2	25	20 - 25
	SB_TW 3	25	20 - 25
	SB_TW 4	25	20 - 25
	SB_TW 5	25	20 - 25
	SB_TW 6	25	20 - 25

Notes:
bgs = below ground surface
* = sample collected using SP16 sampling tool

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6. Site Inspection Results

This section presents the analytical results of the SI for AOI 1. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results is provided in **Section 6.3**. **Table 6-2** through **Table 6-6** present PFAS results for samples with detections in soil, sediment, surface water, or groundwater; only constituents detected in one or more samples are included. Tables that contain all results are provided in **Appendix H**, and the laboratory reports are provided in **Appendix I**.

6.1 Screening Levels

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, sites [under control and jurisdiction of the ARNG] would proceed to a RI, the next phase under CERCLA. The SLs apply to three compounds, PFOA, PFOS, and PFBS, for both soil and groundwater, as presented in **Table 6-1**.

All other results presented in this report are considered informational in nature and serve as an indication as to whether soil, groundwater, sediment, and surface water contain or do not contain PFAS within the boundaries of the Site.

Table 6-1: Screening Levels (Soil and Groundwater)

Analyte	Industrial/ Commercial Composite Worker (Soil) (µg/kg)[a,b]	Tap Water (Groundwater) (ng/L)[a,b]
PFOA	1,600	40
PFOS	1,600	40
PFBS	1,600,000	40,000

Notes:

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. HQ=0.1. 15 October 2019.

b.) If only one PFAS is present, a Hazard Quotient (HQ) of 1 applies and the values presented would increase by a factor of x10.

6.2 Soil Physicochemical Analyses

To provide basic soil parameter information, soil samples were analyzed for TOC and pH, which are important for evaluating transport through the soil medium. **Appendix H** contains the results of the TOC and pH sampling.

The data collected in this investigation may be used in subsequent investigations, where appropriate, to assess fate and transport of PFAS contaminants. According to the Interstate Technology Regulatory Council (ITRC), several important PFAS partitioning mechanisms include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors. At relevant pH values, certain PFAS are present as organic anions, and are, therefore, relatively mobile in groundwater (Xiao et al., 2015), but tend to associate with the organic carbon fraction that may be present in soil or sediment (Higgins and Luthy 2006; Guelfo and Higgins, 2013). When sufficient levels of organic carbon are present, organic carbon normalized distribution coefficients (Koc values) can help in evaluating transport potential, though other geochemical factors (for example, pH and presence of polyvalent cations) may also affect PFAS sorption to solid phases (ITRC, 2018).

6.3 AOI 1

This section presents the analytical results for soil, groundwater, surface water, and sediment in comparison to SLs (if applicable) for AOI 1. The detected compounds are presented in **Table 6-2** through **Table 6-6**. **Figures 6-1** through **6-5** present detections for PFOS and PFOA in soil, groundwater, surface water, and sediment.

6.3.1 AOI 1 Soil Analytical Results

Soil samples were collected from three intervals at each of six boring locations. Samples CMTS-SB-1 through CMTS-SB-5 were each sampled from the shallow soil interval (0 to 2 feet bgs), the intermediate interval (10 to 12 feet bgs), and the deep interval (17 to 19 feet bgs). CMTS-SB-6 was sampled from the shallow interval (0 to 2 feet bgs), intermediate interval (7 to 9 feet bgs), and deep interval (12-13 feet bgs). PFOA was detected in one intermediate soil sample at CMTS-SB-1, which was initially presumed to be upgradient from the FTA. The PFOA concentration detected was 0.22 J micrograms per kilogram (µg/kg), which is several orders of magnitude lower than the SL. PFOS and PFBS were not detected in any soil samples. Consequently, PFOA, PFOS, and PFBS did not exceed the SLs in soil at AOI 1. **Figure 6-1** and **Figure 6-2** present detections in soil for PFOS and PFOA. The detected compounds in soil are summarized on **Table 6-2** and **Table 6-3**.

6.3.2 AOI 1 Groundwater Analytical Results

Groundwater was sampled in all six temporary wells. As shown on **Figure 6-3**, PFOA and PFOS were not detected in any groundwater samples. PFBS also was not detected in any of the samples. Therefore, no SLs were exceeded. The detected compounds from the SI are summarized in **Table 6-4**.

6.3.3 AOI 1 Sediment Analytical Results

Sediment was sampled from six locations at AOI 1. PFOA was detected in six out of seven samples (including a duplicate), with concentrations ranging from non-detect to 4.96 µg/kg. The only sample with no detected PFOA was near the facility boundary in CMTS-SD-1. PFOS was detected in four of the seven samples, ranging in concentrations from non-detect to 0.363 J µg/kg. The highest concentrations of PFOA and PFOS were detected in CMTS-SD-4 where the two FTA drainage ditches converge. PFBS was not detected in any of the samples. The detected compounds from the SI are summarized in **Table 6-5**. **Figure 6-4** presents the PFOA and PFOS detections in sediment.

6.3.4 AOI 1 Surface Water Analytical Results

Surface water was sampled from three locations at AOI 1. PFOA was detected in three of the four samples collected (including a duplicate), with concentrations ranging from 9.55 to 10.5 ng/L. The highest concentration was detected in CMTS-SW-3, where FTA drainage water enters the impoundment. The furthest downgradient surface water sample at Caney Branch (CMTS-SW-1) did not have detected PFOA. PFOS or PFBS in any of the samples. The detected compounds from the SI are summarized in **Table 6-6**. **Figure 6-5** presents the detections of PFOA and PFOS in surface water.

6.3.5 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS did not exceed the SLs in soil or groundwater. Only PFOA was detected in one soil sample at a concentration several orders of magnitude below the SL. PFOS and PFBS were not detected in any soil sample. PFOA, PFOS, and PFBS were not detected in any groundwater samples. There are no established SLs for surface water or sediment; therefore, these data are presented for informational purposes only. Based on knowledge of Site use and sources of PFAS, it is believed that the LSU FETI FTA represents the source of PFAS in the area.

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Table 6-2
PFAS Detections in Surface and Shallow Subsurface Soil
Site Inspection Report, Camp Minden Training Site

	Area of Interest	AOI1																			
	Sample ID	CMTS-SB-1 (0-2)		CMTS-SB-1 (10-12)		CMTS-SB-2 (0-2)		CMTS-SB-2 (10-12)		CMTS-SB-3 (0-2)		CMTS-SB-3 (10-12)		CMTS-SB-4 (0-2)		CMTS-SB-4 (10-12)		CMTS-SB-5 (0-2)		CMTS-SB-5 (10-12)	
	Sample Date	06/19/2019		06/19/2019		06/19/2019		06/19/2019		06/19/2019		06/19/2019		06/19/2019		06/19/2019		06/19/2019		06/19/2019	
	Depth	0 - 2 ft		10 - 12 ft		0 - 2 ft		10 - 12 ft		0 - 2 ft		10 - 12 ft		0 - 2 ft		10 - 12 ft		0 - 2 ft		10 - 12 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)																					
6:2 FTS	-	0.038	J	ND		ND		ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	-	ND	UJ	ND		0.019	J	ND		ND		ND		0.015	J	0.018	J	ND		ND	
NEtFOSAA	-	ND	UJ	0.00684	J	ND		ND		ND		ND		ND		ND		ND		ND	
NMeFOSAA	-	ND	UJ	ND		ND		0.025	J	ND		ND		ND		ND		ND		ND	
PFBA	-	ND		0.058	J	ND		ND		ND		0.068	J	ND		ND		ND		ND	
PFDoA	-	ND	UJ	ND		ND		ND		ND		ND		ND		0.046	J	ND		ND	
PFHpA	-	ND	UJ	ND		0.011	J	ND		ND		ND		0.010	J	0.011	J	0.014	J	ND	
PFHxA	-	ND		0.046	J	ND		ND		ND		0.053	J	ND		ND		ND		ND	
PFHxS	-	0.016	J	ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFNA	-	ND	UJ	ND		0.00729	J	ND		0.00819	J	ND		0.016	J	ND		ND		ND	
PFOA	1600	ND		0.022	J	ND		ND		ND		ND		ND		ND		ND		ND	
PFTrDA	-	ND	UJ	ND		0.016	J	0.017	J	ND		ND		ND		0.051	J	0.013	J	ND	

▨ Grey Fill	Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutyrate
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFTrDA	perfluorotridecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable

Table 6-2
PFAS Detections in Surface and Shallow Subsurface Soil
Site Inspection Report, Camp Minden Training Site

	Area of Interest	AOI1					
	Sample ID	CMTS-SB-6 (0-2)		CMTS-SB-6 (7-9)		CMTS-SB-6 (12-13)	
	Sample Date	06/20/2019		06/20/2019		06/20/2019	
	Depth	0 - 2 ft		7 - 9 ft		12 - 13 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)							
6:2 FTS	-	ND		ND		ND	
8:2 FTS	-	0.018	J	0.013	J	0.011	J
NEtFOSAA	-	ND		ND		ND	
NMeFOSAA	-	ND		ND		ND	
PFBA	-	ND		ND		ND	
PFDoA	-	ND		0.010	J	ND	
PFHpA	-	0.010	J	ND		ND	
PFHxA	-	ND		ND		ND	
PFHxS	-	ND		ND		ND	
PFNA	-	ND		0.051	J	ND	
PFOA	1600	ND		ND		ND	
PFTrDA	-	ND		ND		0.012	J

Grey Fill	Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutyrate
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFTrDA	perfluorotridecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
µg/Kg	micrograms per Kilogram
-	Not applicable

Table 6-3
PFAS Detections in Deep Subsurface Soil
Site Inspection Report, Camp Minden Training Site

Area of Interest	AOI1													
Sample ID	CMTS-SB-1 (18-19)		CMTS-SB-2 (18-19)		CMTS-SB-3 (18-19)		CMTS-SB-3 (18-19) DUP		CMTS-SB-4 (18-19)		CMTS-SB-4 (18-19) DUP		CMTS-SB-5 (18-19)	
Sample Date	06/19/2019		06/19/2019		06/19/2019		06/19/2019		06/19/2019		06/19/2019		06/19/2019	
Depth	18 - 19 ft		18 - 19 ft		18 - 19 ft		18 - 19 ft		18 - 19 ft		18 - 19 ft		18 - 19 ft	
Analyte	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (µg/Kg)														
6:2 FTS	0.00879	J	ND		ND		ND		ND		ND		ND	
8:2 FTS	ND		0.018	J	0.018	J	0.019	J	ND		0.014	J	ND	
NEtFOSAA	ND		0.011	J	ND		ND		ND		ND		ND	
PFBA	0.053	J	ND		ND		ND		ND		ND		ND	
PFDoA	0.00653	J	ND		ND		0.042	J	ND		ND		ND	
PFNA	ND		ND		0.029	J	0.00886	J	ND		ND		ND	
PFTrDA	ND		0.016	J	ND		0.045	J	0.00776	J	ND		ND	
PFUnDA	0.011	J	ND		ND		ND		ND		ND		ND	

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
PFBA	perfluorobutyrate
PFDoA	perfluorododecanoic acid
PFNA	perfluorononanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
Qual	Interpreted Qualifier
QSM	Quality Systems Manual
SB	Soil boring
µg/Kg	micrograms per Kilogram

Table 6-4
PFAS Detections in Groundwater
Site Inspection Report, Camp Minden Training Site

	Area of Interest	AOI1															
	Sample ID	CMTS-GW-1		CMTS-GW-2		CMTS-GW-3		CMTS-GW-4		CMTS-GW-4 DUP		WW4		CMTS-GW-5		CMTS-GW-6	
	Sample Date	06/20/2019		06/20/2019		06/20/2019		06/20/2019		06/20/2019		05/23/2019		06/20/2019		06/20/2019	
Analyte	**OSD Screening Level** [a]	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																	
6:2 FTS	-	ND		ND		5.45	J	ND		ND		ND		ND		1.56	J
PFBA	-	6.49	J	ND		16.7		51.1		2.56	J	ND		ND	UJ	7.12	J
PFHpA	-	3.18	J	ND		4.40	J	3.05	J	1.91	J	ND		ND		2.47	J
PFHxA	-	2.51	J	ND		3.23	J	ND		ND		ND		ND		ND	
PFPeA	-	ND		ND		4.95	J	ND		ND		ND		ND		ND	

▨ Grey Fill	Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Leve Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

Interpreted Qualifiers

J = Estimated concentration

UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
GW	Groundwater
LCMSMS	Liquid Chromatography Mass Spectrometry
HQ	Hazard quotient
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable

Table 6-5
PFAS Detections in Sediment
Site Inspection Report, Camp Minden Training Site

Area of Interest	AOI1													
Sample ID	CMTS-SD-1		CMTS-SD-2		CMTS-SD-3		CMTS-SD-4		CMTS-SD-4 DUP		CMTS-SD-5		CMTS-SD-6	
Sample Date	06/20/2019		06/18/2019		06/18/2019		06/18/2019		06/18/2019		06/18/2019		06/18/2019	
Depth	0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 1 ft	
Analyte	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)														
6:2 FTS	0.027	J	0.047	J	0.177	J	3.83		2.29		2.05	J-	1.56	
8:2 FTS	0.014	J	0.037	J	0.035	J	0.353	J	0.514	J	1.02	J-	0.323	J
NMeFOSAA	0.036	J	ND		ND		ND		ND		ND		ND	
PFBA	0.065	J	0.141	J	0.073	J	0.852	J	0.286	J	0.441	J	1.67	
PFDA	ND		ND		ND		1.65		1.76		1.53	J+	2.11	
PFDoA	ND		0.011	J	0.012	J	0.702	J	0.467	J	0.762	J-	0.315	J
PFHpA	ND		0.165	J	0.038	J	5.19		1.02	J	1.56		3.74	
PFHxA	ND		ND		ND		5.51		1.39		2.68	J-	4.67	
PFHxS	0.00394	J	ND		ND		0.048	J	0.014	J	0.027	J	0.021	J
PFNA	ND		0.048	J	0.023	J	1.98		0.894	J	0.911	J+	3.46	
PFOA	ND		0.093	J	0.033	J	4.96		0.907	J	1.70	J+	3.53	
PFOS	ND		ND		ND		0.363	J	0.256	J	0.288	J	0.301	J
PFPeA	0.030	J	0.351	J	0.151	J	5.75		1.41		3.12		7.96	
PFTeDA	ND		ND		0.024	J	0.356	J	0.178	J	0.337	J	0.257	J
PFTrDA	ND		0.021	J	0.039	J	0.865	J	0.234	J	0.301	J	0.269	J
PFUnDA	0.00569	J	ND		ND		0.695	J	0.738	J	0.472	J	0.447	J

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutyrate
PFDA	perfluorodecanoate
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
ft	feet
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SD	Sediment
µg/Kg	micrograms per Kilogram

Table 6-6
PFAS Detections in Surface Water
Site Inspection Report, Camp Minden Training Site

Area of Interest	AOI1							
Sample ID	CMTS-SW-1		CMTS-SW-2		CMTS-SW-2 DUP		CMTS-SW-3	
Sample Date	06/20/2019		06/18/2019		06/18/2019		06/18/2019	
Analyte	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)								
6:2 FTS	ND		13.8		16.1		15.7	
8:2 FTS	ND		ND		1.91	J	3.62	J
PFBA	5.52	J	18.5		16.5		17.5	
PFDA	ND		3.91	J	3.62	J	3.80	J
PFHpA	2.54	J	21.8		20.2		19.9	
PFHxA	2.41	J	47.1		42.8		44.9	
PFOA	ND		10.2		9.55		10.5	
PFPeA	4.47	J	72.2		75.4		66.6	

Interpreted Qualifiers

J = Estimated concentration

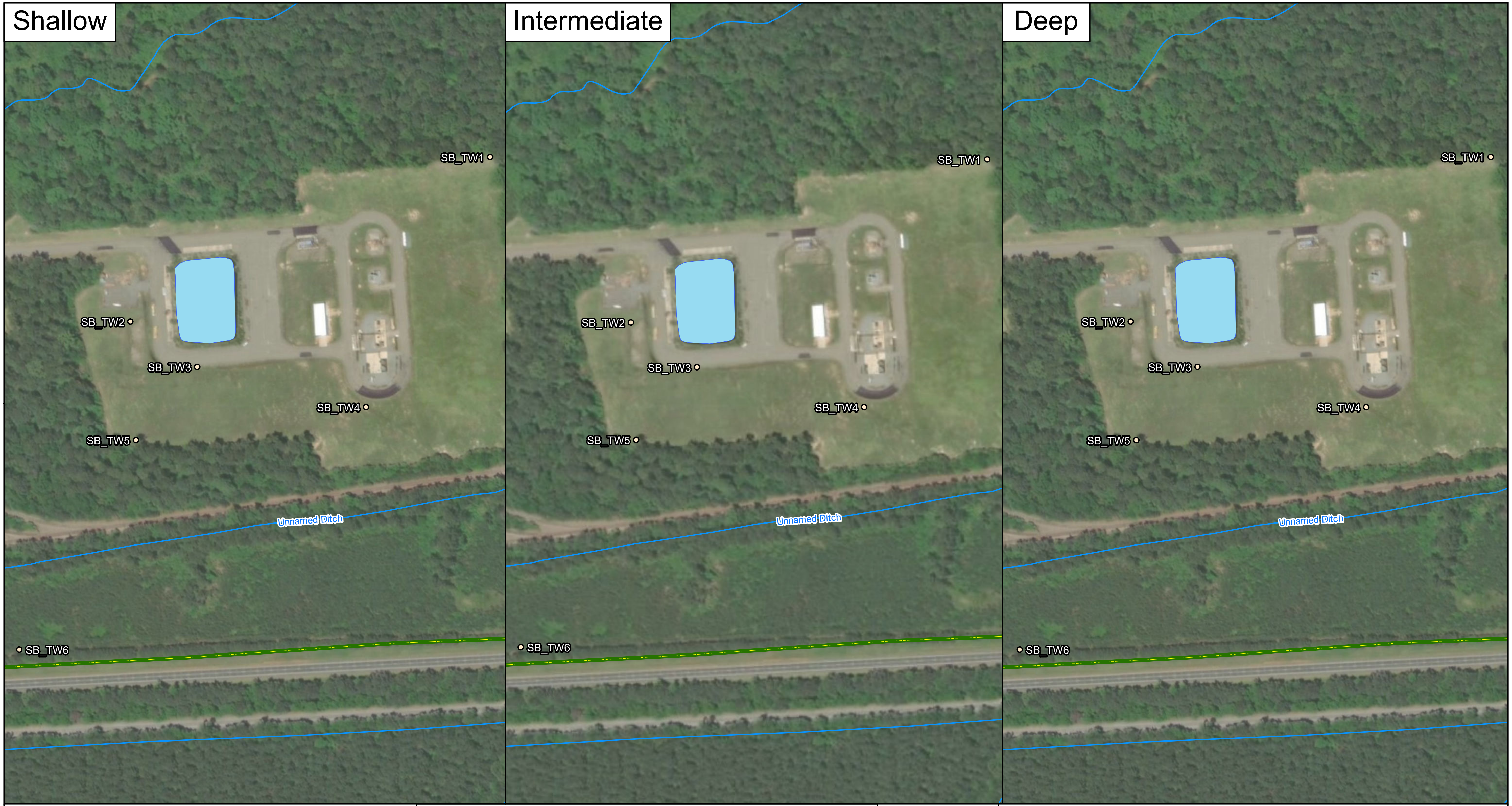
UJ = The analyte was not detected at a level greater than or equal to the adjusted DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFOA	perfluorooctanoic acid
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DUP	Duplicate
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SW	Surface water
ng/L	nanogram per liter



CLIENT ARNG				
PROJECT Site Inspection for PFAS at Camp Minden, LA				
REVISED	2/7/2020	GIS BY	MS	2/7/2020
SCALE	1:3,360	CHK BY	JH	2/7/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	2/7/2020

🟩 Facility Boundary
Water Body
River/Stream

PFOS Results (µg/Kg)
○ ND
● >ND - 10
● >10 - 130
● >130 - 1,600
● >1,600

0 140 280 560 Feet

N

PFOS Detections in Soil

AECOM 12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1

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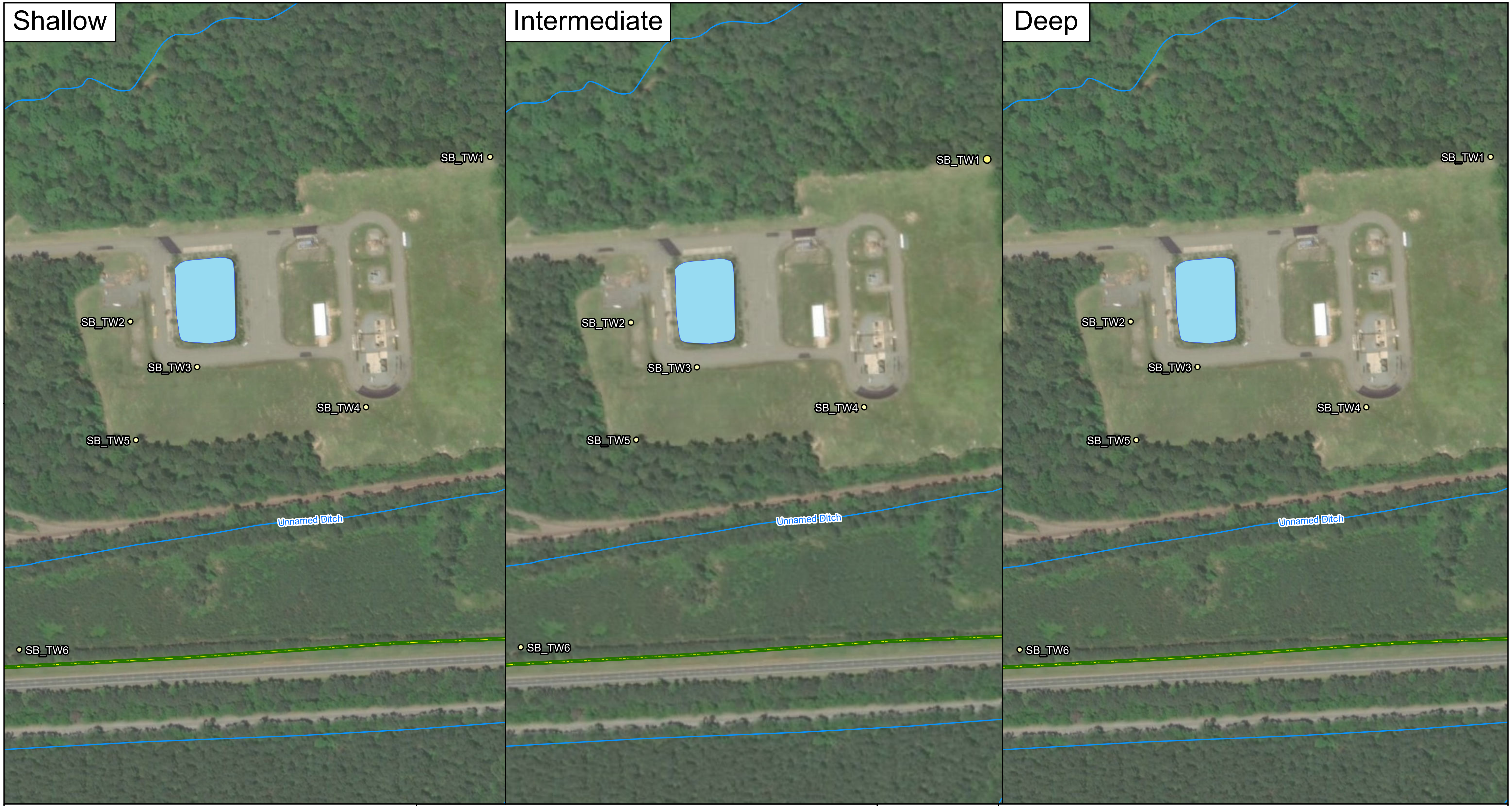

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Minden, LA			
REVISED	2/7/2020	GIS BY	MS	2/7/2020
SCALE	1:3,360	CHK BY	JH	2/7/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	2/7/2020

🟩 Facility Boundary
Water Body
River/Stream

PFOA Results (µg/Kg)
● ND
● >ND - 10
● >10 - 130
● >130 - 1,600
● >1,600

0 140 280 560
Feet

N

PFOA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-2

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CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Minden, LA			
REVISED	7/22/2020	GIS BY	MS	7/22/2020
SCALE	1:3,360	CHK BY	JH	7/22/2020
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	7/22/2020

🟩 Facility Boundary
Water Body
River/Stream

PFOA Results (ng/L)
- ○ ND
- ● >ND - 40
- ● >40 - 70
- ● >70 - 400
- ● >400

PFOS Results (ng/L)
- ○ ND
- ● >ND - 40
- ● >40 - 70
- ● >70 - 400
- ● >400

N

PFOA and PFOS Detections in Groundwater

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Germantown, MD 20876

Figure 6-3

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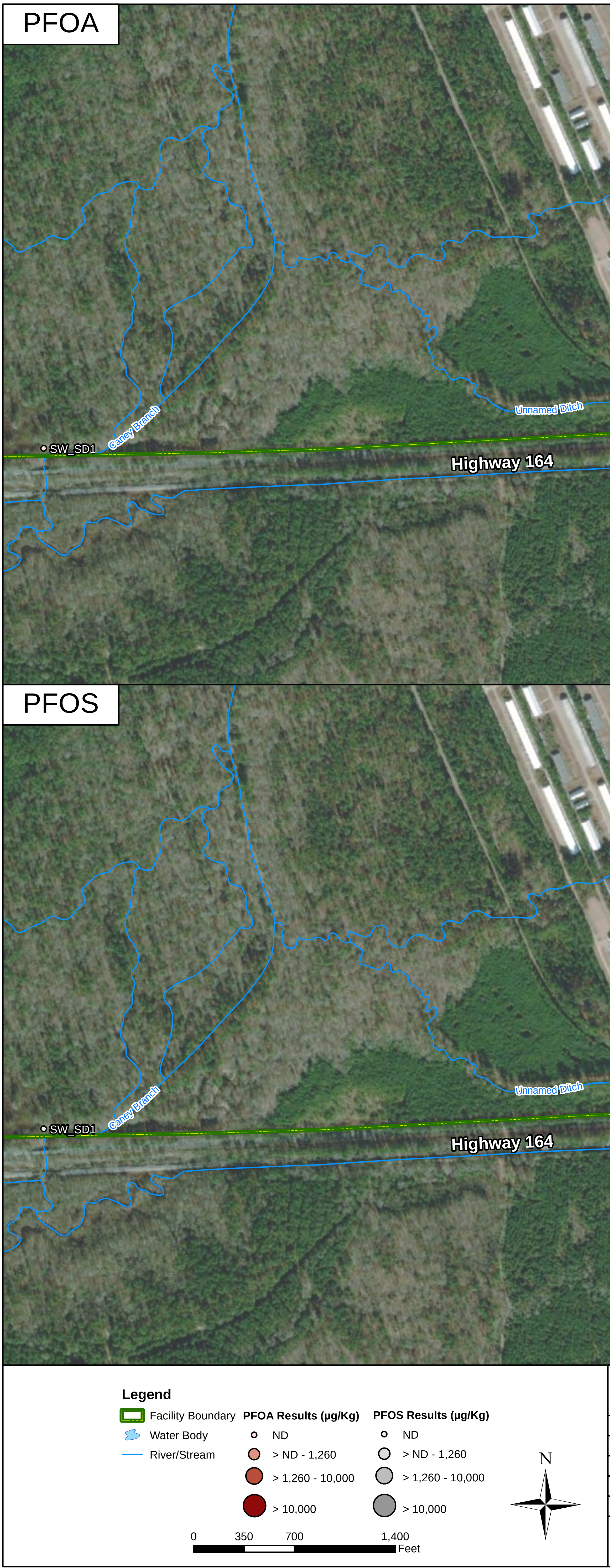

PFOA and PFOS Detections in Surface Sediment

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Minden, LA			
REVISED	7/28/2020	GIS BY	MS	7/28/2020
SCALE	1:8,400	CHK BY	JH	7/28/2020
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,		PM	RG	7/28/2020

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Figure 6-4

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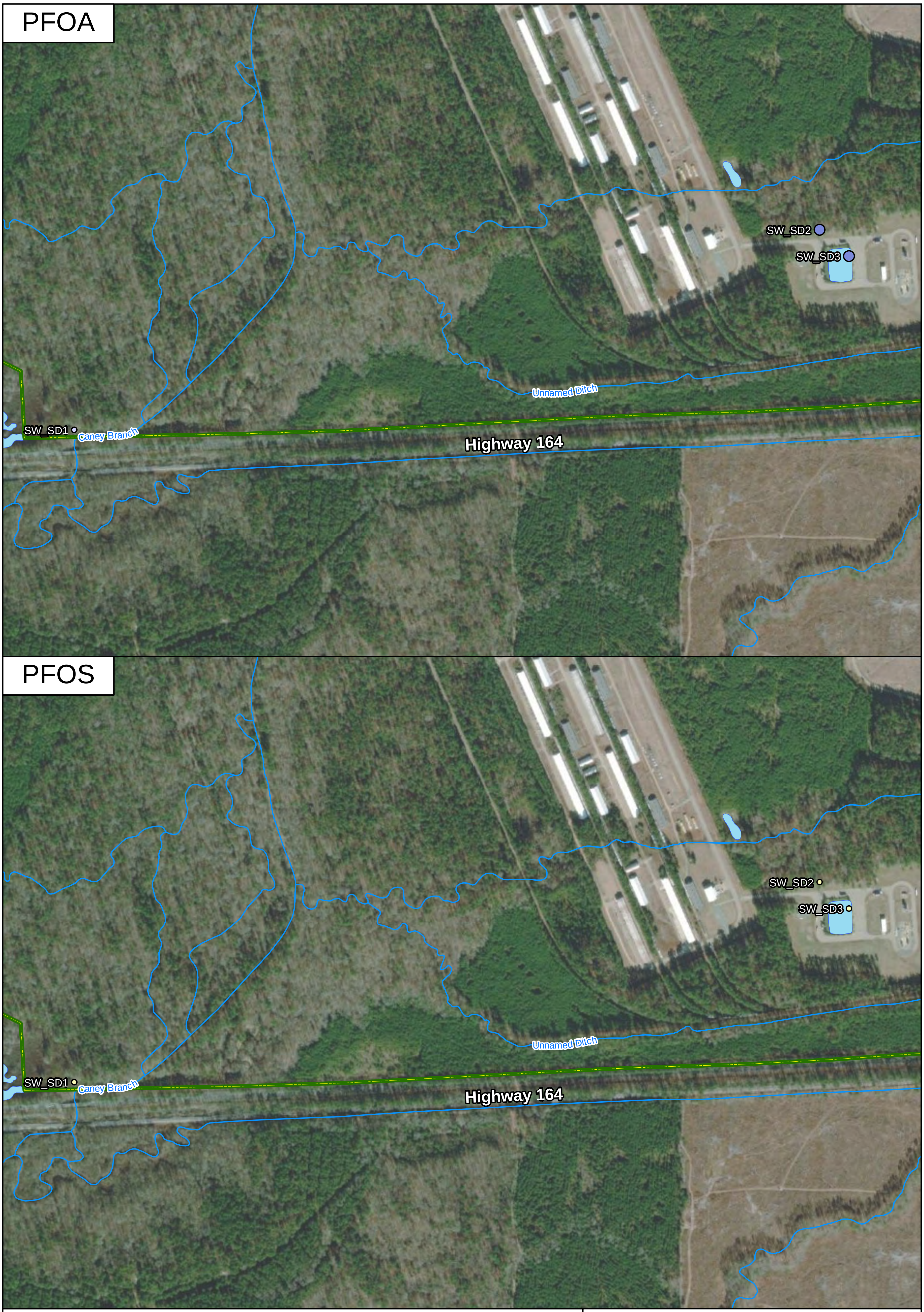

Legend

	PFOA Results (ng/L)	**PFOS Results (ng/L)**
🟩 Facility Boundary	○ ND	○ ND
Water Body	● > ND - 100	● > ND - 100
— River/Stream	● > 100 - 1,000	● > 100 - 1,000
	● > 1,000	● > 1,000

0 350 700 1,400
Feet

N

PFOS and PFOA Detections in Surface Water

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Minden, LA			
REVISED	7/28/2020	GIS BY	MS	7/28/2020
SCALE	1:8,400	CHK BY	JH	7/28/2020
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN.		PM	RG	7/28/2020

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Figure 6-5

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7. Exposure Pathways

The CSM for AOI 1, revised based on the SI findings, is presented on **Figure 7-1**. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

1. Contaminant source;
2. Environmental fate and transport;
3. Exposure point;
4. Exposure route; and
5. Potentially exposed populations.

If any of these elements are missing, the pathway is incomplete. The CSM figure uses an empty circle to represent an incomplete exposure pathway. Areas with no identified complete pathway generally warrant no further action. However, the pathway is considered potentially complete if PFOA, PFOS, or PFBS are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of PFOA, PFOS, or PFBS above the SLs. Areas with an identified potentially complete pathway may warrant further investigation.

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. The receptors evaluated are consistent with those listed in USEPA guidance for risk screening (USEPA, 2001). Receptors at the Site include site workers (e.g., LSU FETI staff), visitors, construction workers and trespassers. Receptors outside the CMTS boundary include residents and recreational users. Potential source areas were eliminated from further consideration in the CERCLA process if concentrations of PFOA, PFOS, and PFBS were below the SLs in soil and groundwater.

7.1 Soil Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at the AOI based on the aforementioned criteria.

7.1.1 AOI 1

Beginning in 2007, fire training activities have been performed three to four times a year at AOI-1. From 2007 to around 2013, a firefighting concentrate called Fomtec was used. From 2013 to present, Micro Blaze Out® was used and reportedly contains no PFAS. PFOA was detected in one subsurface soil sample (CMTS-SB-1 from 10-12 feet bgs) at a concentration several orders of magnitude below the SL, which was presumed to be upgradient of the source area. However, PFOS and PFBS were not detected in any soil samples. Based on the results of the SI, ground-disturbing activities to subsurface soil could potentially result in future construction worker exposure to PFOA via ingestion. PFOA, PFOS, and PFBS exposure pathways for inhalation of dust and ingestion of surface soil are considered incomplete for all evaluated receptors. The CSM is presented on **Figure 7-1**.

7.2 Groundwater Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors at the AOI based on the aforementioned criteria.

7.2.1 AOI 1

PFOA, PFOS, and PFBS were not detected in any groundwater samples. Consequently, the groundwater exposure pathways via ingestion are incomplete for all receptors, including drinking water receptors and other receptors via incidental ingestion (i.e., construction workers). The CSM is presented on **Figure 7-1**.

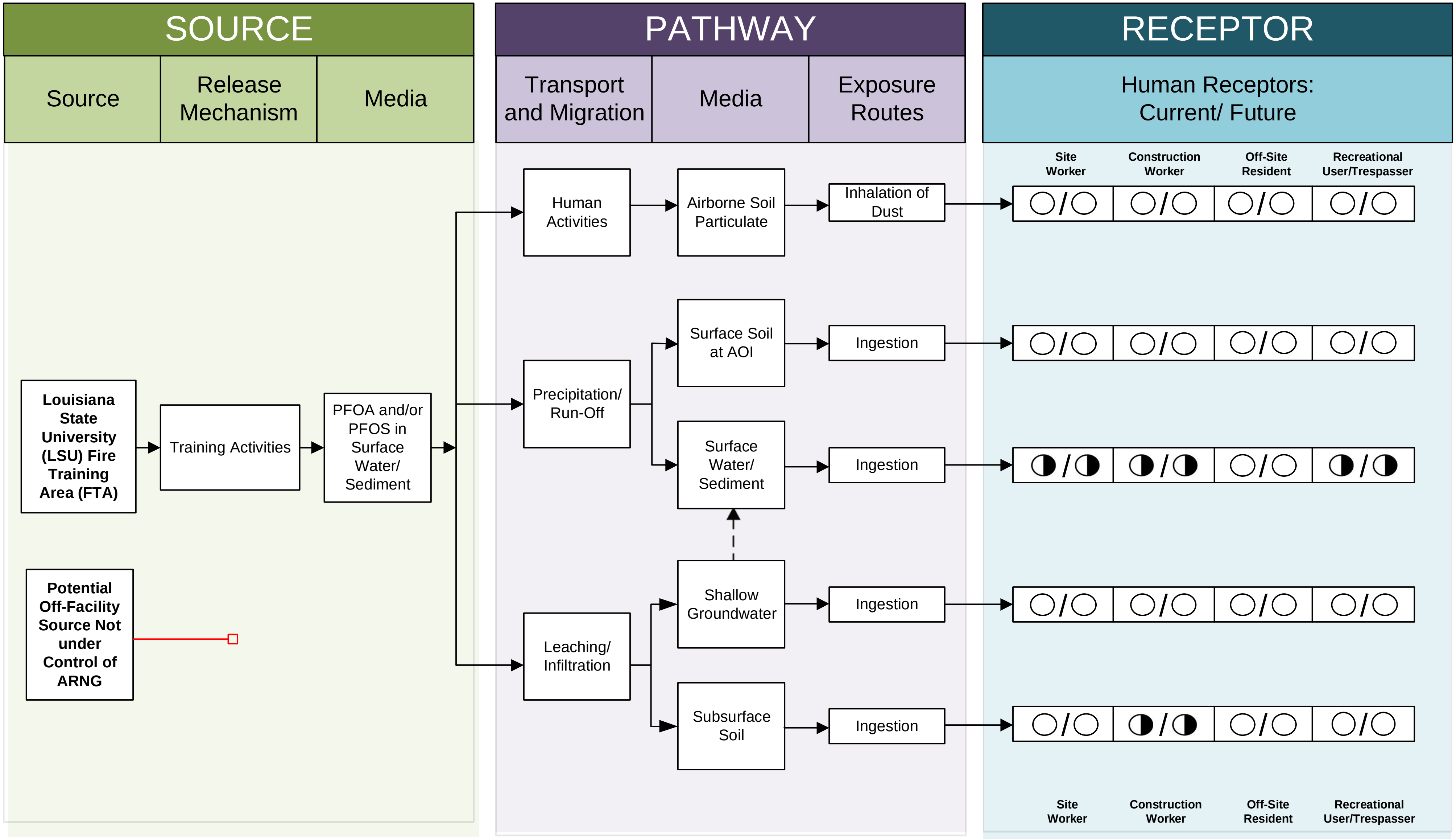
7.3 Surface Water and Sediment Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in surface water and sediment were used to determine whether a potentially complete pathway exists between the source and potential receptors at the AOI based on the aforementioned criteria.

7.3.1 AOI 1

Surface water primarily drains from the FTA to the surface water impoundment. The impoundment drain system then conveys flow to the north, with the potential for flow in other directions locally during heavy rain/flooding. Surface water in this portion of CMTS eventually drains west to Caney Branch, which flows south, crosses the CMTS boundary, and continues south to Clarke Bayou which then discharges to Lake Bistineau. Caney Branch, Clarke Bayou and Lake Bistineau are used for recreation.

PFOS and PFOA were detected in sediment and PFOA was detected in surface water at the Site. PFBS was not detected in sediment or surface water. Therefore, incidental ingestion exposure pathway for surface water and sediment is considered potentially complete for receptors at the Site (workers, construction workers, and trespassers and recreational users). No PFOA, PFOS, or PFBS were detected in surface water or sediment at the CMTS boundary. Therefore, the exposure pathway in surface water and sediment for offsite receptors (e.g., recreational users) is incomplete. The CSM is presented on **Figure 7-1**.



Exposure Routes	Site Worker	Construction Worker	Off-Site Resident	Recreational User/Trespasser
Inhalation of Dust	○/○	○/○	○/○	○/○
Ingestion (Surface Soil at AOI)	○/○	○/○	○/○	○/○
Ingestion (Surface Water/ Sediment)	◐/◐	◐/◐	○/○	◐/◐
Ingestion (Shallow Groundwater)	○/○	○/○	○/○	○/○
Ingestion (Subsurface Soil)	○/○	◐/◐	○/○	○/○

LEGEND

—□ Flow-Chart Stops

→ Flow-Chart Continues

- - → Partial / Possible Flow

○ Incomplete Pathway

◐ Potentially Complete Pathway

● Potentially Complete Pathway with Exceedance of SL

Notes:

1. Recreational users refer to off-site receptors.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure 7-1
Conceptual Site Model
AOI 1 – LSU Fire Training Area
Camp Minden Training Site

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8. Summary and Outcome

This section summarizes SI activities and findings. The most significant findings are summarized in this section and are reproduced directly or abstracted from information contained in this report. The outcome provides general and comparative interpretations of the findings relative to the SLs.

8.1 SI Activities

SI field activities were conducted from 18 to 21 June 2019 and consisted of grab soil, groundwater, surface water, and sediment sampling. Field activities were conducted in accordance with the QAPP Addendum (AECOM, 2019c), except as noted in **Section 5.7**.

The following samples were collected and analyzed for PFAS by LC/MS/MS compliant with QSM 5.1 Table B-15 to fulfill the project DQOs:

- 18 grab soil samples from 6 boring locations;
- 6 grab groundwater samples from 6 temporary well locations;
- 3 grab surface water samples; and
- 6 grab sediment samples.

The information gathered during this investigation was used to determine if PFOA, PFOS, and/or PFBS were present at or above the SLs. Additionally, the CSM was refined to assess whether a complete pathway exists between the source and potential receptors for exposure to PFOA, PFOS, and PFBS at the AOI, which is described in **Section 7**.

8.2 SI Goals Evaluation

As described in **Section 4.2**, the SI activities were designed to achieve six main goals or DQOs. This section describes the SI goals and the conclusions that can be made for each based on the data collected during this investigation.

1) *Determine the presence or absence of PFOA, PFOS, and PFBS at or above the SLs.*

   PFOS and PFBS were not detected in soil. PFOA was detected in soil at a concentration several orders of magnitude below the SL. PFOA, PFOS, and PFBS were not detected in groundwater. PFOA and PFOS were detected in sediment and PFOA was detected in surface water. Consequently, all detected concentrations were below SLs (if applicable).

2) *Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.*

   PFOA, PFOS, and PFBS were not detected in groundwater. PFOS and PFBS were not detected in soil and PFOA was detected in soil at a concentration below the SL. PFOA, PFOS, and PFBS were not detected in any media (groundwater, soil, surface water or sediment) at the CMTS boundary.

3) *Determine the potential need for a removal action.*

   Based on the detection of PFOA and PFOS at the Site, the State of Louisiana may consider the need for further investigation or follow-on action.

4) *Collect data to better characterize the release areas for more effective and rapid initiation of a RI.*

   Geologic data, collected as a part of the SI, indicate the top 10 feet of soil have low permeability and are dominated by clay that grades into silt and sand-dominated soil. This data is consistent with deposits associated with the ancient Red River, which is characteristic of the study area. Depth to water (at time of drilling) at CMTS ranges from 14 to 20 feet bgs. Groundwater on the west side of CMTS generally flows westward toward Caney Branch

5) *Identify within 4 miles of the installation other potential PFAS sources (fire stations, major manufacturers, other DoD facilities), and receptors including both groundwater and surface water receptors, to determine the likely source of PFAS or whether there is an off-facility source of PFAS responsible for Site detections of PFAS (USEPA, 2005).*

   With the exception of LSU FETI, no PFAS sources were identified during the SI within CMTS or in the vicinity of CMTS.

6) *Determine whether a complete pathway exists between the source and potential receptors and whether ARNG is the likely source of the contamination.*

   SI data indicate no complete exposure pathways exist for PFOA, PFOS, and PFBS in groundwater and surface soil. The exposure pathway for PFOA in subsurface soil, specifically for construction workers during ground disturbing activities, is potentially complete. Exposure pathways for PFOA and PFOS in surface water and sediment for receptors at the Site (workers, construction workers, trespassers and recreational users) is potentially complete. Exposure pathways for PFOA and PFOS in surface water and sediment for offsite receptors (recreational users) is incomplete. Other PFAS were detected in all media (groundwater, soil, surface water and sediment) at the Site and CMTS boundary. However, because SLs are not established for these other PFAS, such data are included in this report for informational purposes only.

   LSU FETI activities are not, and have never been, associated with the DoD or the ARNG; therefore, PFAS detections identified during the SI are not attributed to the ARNG.

   Based on the State of Louisiana owner-operator status of LSU FETI and detections of other PFAS constituents in all media at the Site and CMTS boundary, the State may consider the need for future investigation or follow-up action.

8.3 Outcome

Sample chemical analytical concentrations measured during this SI were compared against the SLs for PFOA, PFOS and PFBS in soil and groundwater. The following summarizes the SI results:

- PFOA, PFOS, and PFBS were not detected in groundwater and thus do not exceed the SLs.
- PFOS and PFBS were not detected in soil. PFOA was detected in soil at a concentration several orders of magnitude below the SL.
- PFOA and PFOS were detected in site sediment and PFOA was detected in site surface water. PFBS was not detected in site surface water or sediment.
- PFOA, PFOS, and PFBS were not detected in any media at the CMTS boundary.
- Other PFAS, for which screening levels have not been established, were detected in all media (soil, groundwater, surface water and sediment) at the source area and the CMTS boundary.
- No off-site potential source areas have been identified during SI activities.

Tables 8-1 summarizes the SI results for soil and groundwater. **Table 8-2** summarizes the rationale used to determine if an AOI [under the control and jurisdiction of the ARNG] should be considered for further action under CERCLA and undergo an RI. LSU FETI is not under the control of ARNG. Based on the findings of this SI, the State of Louisiana may consider the need for future investigation or follow-up action.

Table 8-1: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil - Source Area	Groundwater – Source Area	Groundwater - Near Boundary
1	LSU FETI	◐	○	○

Legend:
● = exceedance of the screening levels
◐ = detected; no exceedance of the screening levels
○ = not detected

Table 8-2: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	LSU FETI	No detections of PFOA, PFOS and PFBS in groundwater; no PFOS or PFBS detected in soil; PFOA detected in soil northeast of AOI 1 at a concentration several orders of magnitude below the SL.	LSU FETI is not under the control of the ARNG. Based on the State of Louisiana owner-operator status of LSU FETI and other PFAS detections in media at the Site and CMTS boundary, the State may consider the need for future investigation or follow-up action.

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