FINAL
Preliminary Assessment Report
Fort Indiantown Gap, Pennsylvania

Perfluorooctane-Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

August 2018

Prepared for:

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Contract Number: W912DR-12-D-0014
Delivery Order: W912DR17F0192

Table of Contents

Figures

Appendices

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AMIB	Aviation Maintenance Instruction Building
amsl	above mean sea level
AOI	area of interest
ARNG	Army National Guard
BRAC	Base Realignment and Closure
CACTF	Combined Arms Collective Training Facility
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
EAATS	Eastern Army Aviation Training Site
FTA	fire training area
FTIG	Fort Indiantown Gap
IED	Installations and Environment Division
MAAF	Muir Army Airfield
PA	Preliminary Assessment
PAARNG	Pennsylvania Army National Guard
PADMVA	Pennsylvania Department of Military and Veteran Affairs
PAGS	Pennsylvania Geological Survey
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
SI	Site inspection
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VSI	visual survey inspection
WWTP	waste water treatment plant

Executive Summary

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division (IED), Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide. The ARNG is assessing potential effects on human health related to processes at facilities that used per- and poly-fluoroalkyl substances (PFAS) (a suite of related chemicals), primarily in the form of aqueous film forming foam released during firefighting activities or training, although other PFAS sources are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

AECOM completed a PA for PFAS at Fort Indiantown Gap (FTIG) in Annville, Pennsylvania, to assess potential PFAS release areas and exposure pathways to receptors. The FTIG facility was under the jurisdiction of the Federal Government from 1941 to 1998, when it was converted to a training site for ARNG, transferring management to the Pennsylvania Department of Military and Veteran Affairs. Currently, separate leases exist for the Army (1990 to 2049) and the Air Force (1989 to 2049). The performance of this PA included the following tasks:

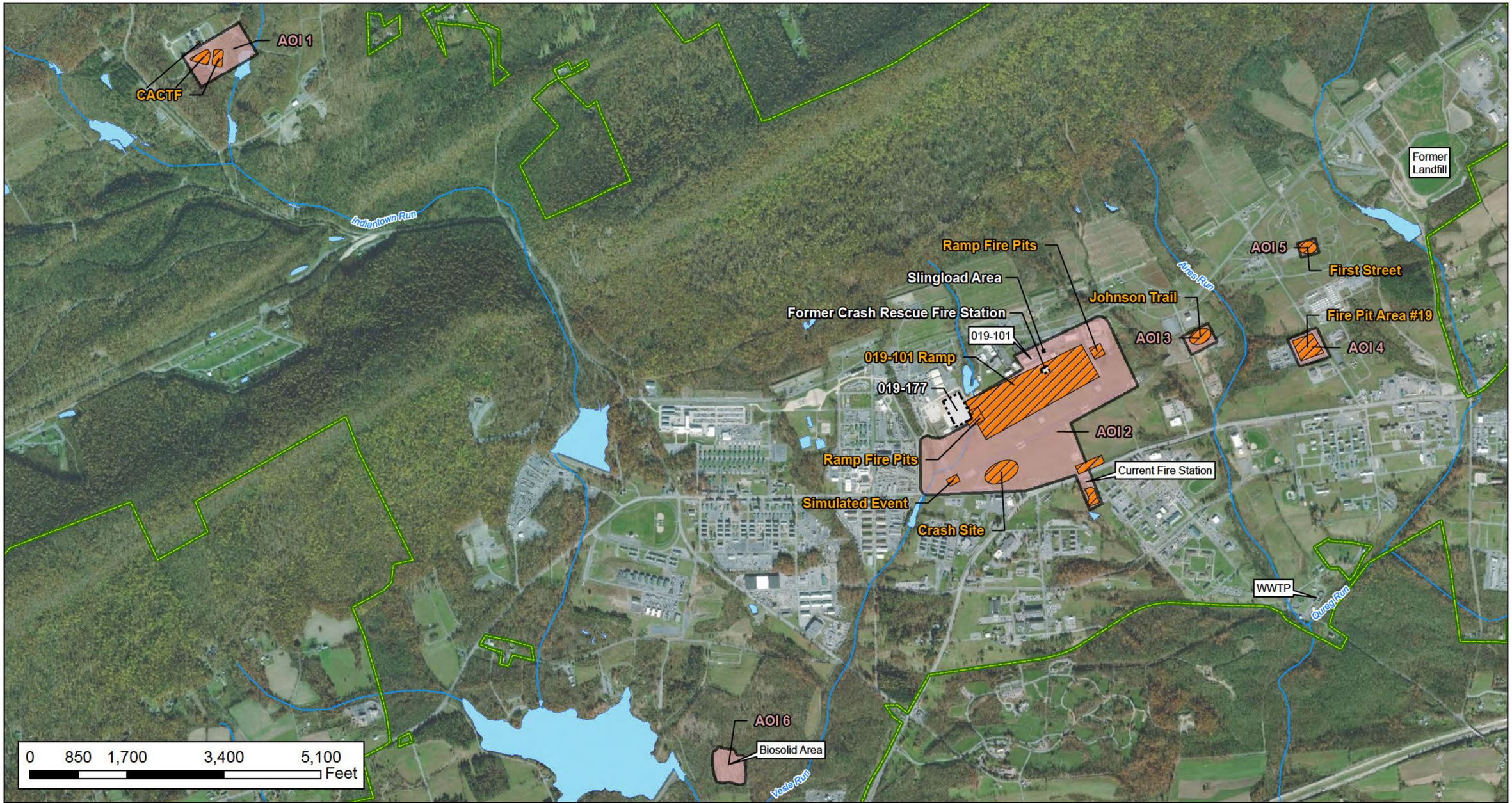
- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a 2-day site visit on December 13 and 14, 2017
- Interviewed current and retired FTIG personnel during the site visit including Pennsylvania ARNG (PAARNG) environmental managers, the current PAARNG Fire Department Chief and PAARNG Assistant Chief, purchasing staff, Sustainable Range Program staff, and Muir Army Airfield (MAAF) hangar maintenance, safety, and operations staff
- Completed visual survey inspections at known or suspected PFAS release locations and documented with photographs
- Developed a conceptual site model to outline the potential release and pathway of PFAS for the Areas of Interest (AOIs) and the facility

Six AOIs related to potential PFAS release were identified at FTIG during the PA. The AOIs are shown on **Figure ES-1** and described below:

Area of Interest	Name	Used by	Release Dates
AOI 1	CACTF	PAARNG	2012
AOI 2	MAAF	PAARNG and US Army	1974 to present
AOI 3	Johnson Trail	PAARNG	2015
AOI 4	Fire Pit Area #19	PAARNG and US Army	1975 to 1990
AOI 5	First Street	PAARNG	2014
AOI 6	Biosolid Area	PAARNG	2012 to present

Based on documented potential releases at these AOIs, there is potential for exposure to PFAS contamination in surface and subsurface soils to site and construction workers via inhalation and ingestion, in surface water and sediment for all receptors via ingestion, and in groundwater for site and construction workers using facility drinking water supply wells and in-holding residents via ingestion. In addition, off-Post residents using groundwater for drinking water surrounding the facility to the south and residents using a downstream public water supply intake may potentially be exposed to migrating PFAS contamination via ingestion. No sources of

PFAS were identified in the local area surrounding FTIG through interviews or the Environmental Data Resource Report. The CSM for FTIG is shown on **Figure ES-2**.



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SCALE	1:20,400	CHK BY	JZ	8/6/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	8/6/2018

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Legend

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

N

Summary of Findings

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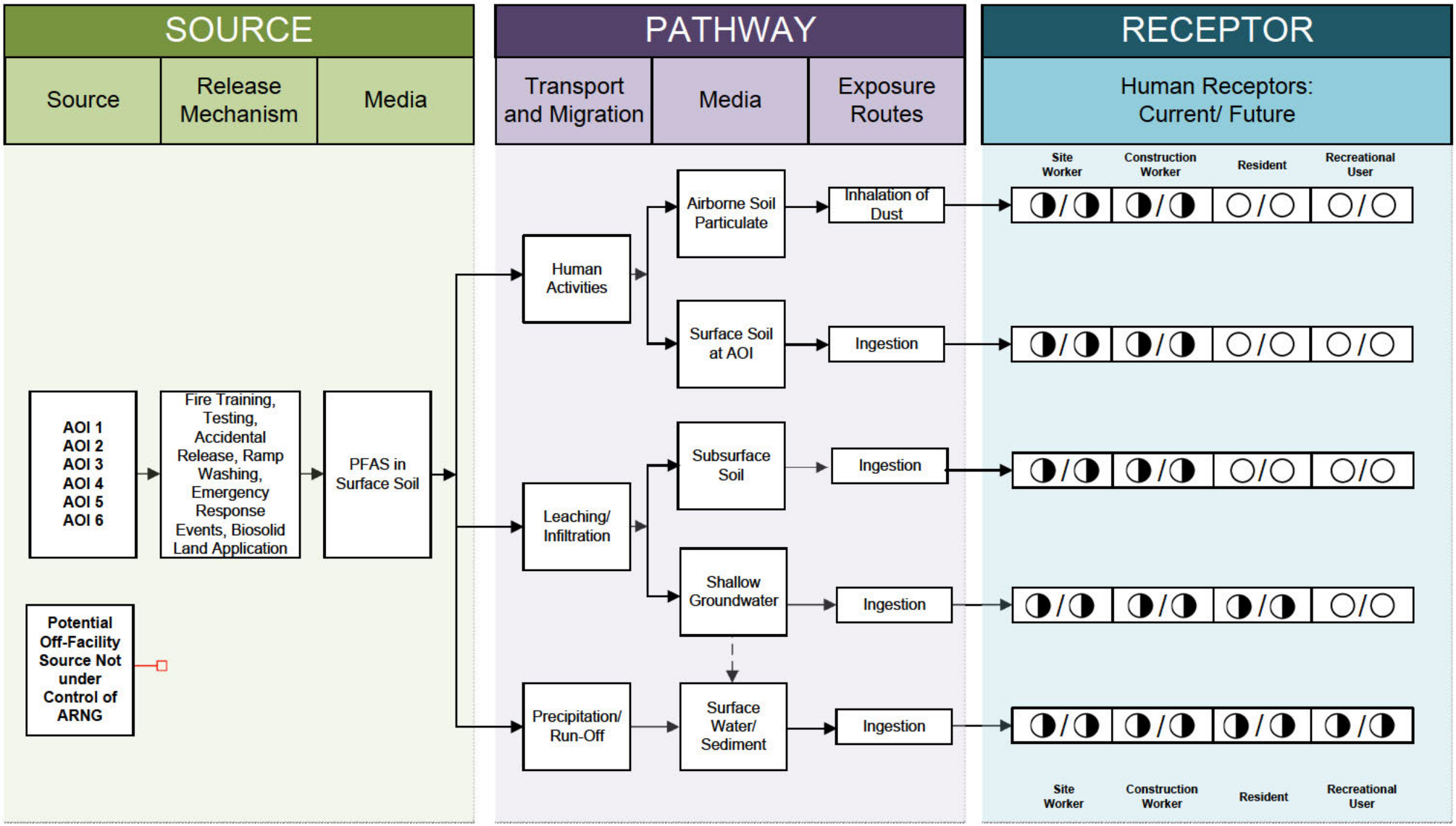
Figure ES-1



LEGEND

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

Figure ES-2
Conceptual Site Model
Fort Indiantown Gap

1. Introduction

1.1 Authority and Purpose

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division (IED), Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide* under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017, and Modification 01 issued 30 September 2017. The ARNG is assessing potential effects on human health related to processes at their facilities that used per- and poly-fluoroalkyl substances (PFAS) (a suite of related chemicals), primarily releases of aqueous film forming foam (AFFF) released during firefighting activities or training, although other sources of PFAS are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

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

This report presents findings of a Preliminary Assessment (PA) for PFAS at Fort Indiantown Gap (FTIG) in Annville, Pennsylvania, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300), and USACE requirements and guidance. This PA Report documents the known fire training areas (FTAs) as well as additional locations where PFAS may have been released into the environment at FTIG. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components AFFF.

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a 2-day site visit on December 13 and 14, 2017
- Interviewed current and retired FTIG personnel during the site visit including Pennsylvania ARNG (PAARNG) environmental managers, the current PAARNG Fire Department Chief and PAARNG Assistant Chief, purchasing staff, Sustainable Range Program staff, and Muir Army Airfield (MAAF) hangar maintenance, safety, and operations staff
- Completed visual survey inspections at known or suspected PFAS release locations and documented with photographs
- Developed a conceptual site model (CSM) to outline the potential release and pathway of PFAS for the Areas of Interest (AOIs) and the facility

1.3 Report Organization

This report has been prepared in accordance with the USEPA *Guidance for Performing Preliminary Assessments under CERCLA* (USEPA 1991). The report sections and descriptions of each are:

- **Section 1** – **Introduction:** identifies the project purpose and authority and describes the facility location, environmental setting, and methods used to complete the PA
- **Section 2** – **Fire Training Areas:** describes the FTAs at the facility identified during the site visit
- **Section 3** – **Non-Fire Training Areas:** describes other locations of potential PFAS releases at the facility identified during the site visit
- **Section 4** – **Emergency Response Areas:** describes areas of potential PFAS release at the facility, specifically in response to emergency situations
- **Section 5** – **Adjacent Off-Site Sources:** describes sources of potential PFAS release adjacent to the facility that are not under the control of ARNG
- **Section 6** – **Conceptual Site Model:** describes the pathways of PFAS transport and receptors at each AOI
- **Section 7** – **Conclusions:** summarizes the data findings and presents the conclusions of the PA
- **Section 8** – **References:** provides the references used to develop this document
- **Appendix A** – Data Resources
- **Appendix B** – Preliminary Assessment Documentation
- **Appendix C** – Photographic Log

1.4 Facility Location and Description

FTIG is located in Lebanon and Dauphin Counties in south central Pennsylvania near Annville, approximately 26 miles northeast of Harrisburg (**Figure 1-1**). The facility falls within five townships: East Hanover, Union, and Cold Spring Townships in Lebanon County; and East Hanover Township and West Hanover Township (far western portion of FTIG) in Dauphin County. Blue Mountain, a major topographic feature, separates the cantonment area from the training corridor. Second Mountain forms the northern boundary and borders State Game Lands 211. Interstate 81 and the Indiantown Gap National Cemetery border the facility to the south.

FTIG is an active National Guard Training Center and serves as headquarters for the Pennsylvania Department of Military and Veterans Affairs (PADMVA) and the PAARNG. FTIG was originally developed by the Commonwealth of Pennsylvania as a military training facility in 1931 with annual training maneuvers starting in 1933. The land surrounding FTIG was gradually acquired from local farmers, with the exception of 17 privately-owned properties or “in-holdings” that were not purchased during the acquisition. In 1941, the Federal Government began leasing the property from the Commonwealth of Pennsylvania and used it as a training site for armored and infantry divisions. The current lease expires in 2049.

In July 1995, the Base Realignment and Closure (BRAC) Commission recommended closing FTIG, except for minimum essential ranges, facilities, and training areas used by reserve components. The Commonwealth of Pennsylvania assumed control of the land from the Federal Government in 1998 and converted it back to a training site for ARNG and US Army Reserve

units. This arrangement transferred the management of FTIG to the PADMVA, the agency responsible for overseeing the operations of both the PAARNG and the PA Air National Guard. Currently, separate leases for the Army (1990 to 2049) and the Air Force (1989 to 2049) exist. See **Appendix A** for real estate documents. Fire training and/or aviation activities at the Combined Arms Collective Training Facility (CACTF), the MAAF, Johnson Trail FTA, First Street FTA, the current Fire Station, and Building 019-177, initially used by the US Army, continued after the property transfer in 1998 (see **Sections 2** and **3** for additional details).

The total facility is currently in excess of 18,000 acres and comprises a cantonment area, which includes the MAAF, bombing and strafing ranges, small arms ranges, and maneuver training. The contiguous State Game Lands 211 includes 44,000 acres over which the PAARNG and Eastern ARNG Aviation Training Site (EAATS) aviators conduct flight operations (PADMVA 2016).

1.5 Facility Environmental Setting

FTIG is located within the Appalachian Plateau at the junction of two sections of the Valley and Ridge Physiographic Province: the Appalachian Mountain Section and the Great Valley Section (Ogden 2001a). The training corridor lies between Blue and Second Mountains within the Appalachian Mountain Section, while the cantonment area and the small arms ranges lie to the south in the Great Valley Section. The Appalachian Mountain Section is composed of ridges and valleys. The mountain ridges reach elevations of 1,200 to 1,440 feet above mean sea level (amsl). The valley between Blue and Second mountains is approximately 600 to 700 feet amsl, and the cantonment area lies at 400 to 500 feet amsl.

1.5.1 Geology

The valley and ridge topography at FTIG is characteristic of folding and faulting of Paleozoic sedimentary rocks. The facility is underlain by an arm of one of the folds, resulting in a sequence of rock that becomes progressively younger from southeast (in the cantonment area) to northwest (in the training corridor) (Berg et al. 1980).

The cantonment area is primarily underlain by shale and siltstone of the Hamburg and Martinsburg sequences. The Tuscarora Formation quartzite and quartzitic sandstone forms the Blue Mountain ridgeline, while shales of the Clinton Group, Bloomsburg Formation, and Hamilton Group form the northern slope. The valley between Blue and Second Mountains is formed by the siltstones and mudstones of the Trimmers Rock Formation and the Irish Valley and Sherman Creek members of the Catskill Formation. The backbone of Second Mountain is supported by the sandstones in the Catskill Formation (the Clarks Ferry and Duncannon members) as well as the Spechty Kopf Formation and the Pocono Formation.

Bedrock is typically found within six feet of the ground surface, although it is often shallower (AMEC 2006). Some of the bedrock units at the facility reportedly contain thin interbeds of limestone and other calcareous components (Greyer et al. 1958; Royer 1983); however, no karst features have been identified in the vicinity of FTIG.

1.5.2 Hydrogeology

Structural deformation has extensively impacted the bedrock formations in the FTIG area. The shale and sandstone bedrock formations have low permeability; therefore, the secondary permeability resulting from faulting and fracturing provide the conduit for groundwater infiltration and migration through these units (Ogden 2001a). Productive aquifers are found in both the carbonate and sandstone formations, as evidenced by the number of public and private groundwater wells located near the southern facility boundary (Pennsylvania Geological Survey

[PAGS] 2006) (**Figure 1-2)**. The most productive aquifers are formed primarily in the carbonate rocks of the Martinsburg and Hamburg formations. However, there are a number of wells located to the northeast and southwest of the facility that are installed in the siltstone and mudstone units, which form the valley between Blue and Second Mountains. The average depth of drinking water wells in Lebanon and Dauphin counties ranges from 165 to 170 feet, with most wells installed at a depth of less than 200 feet (PADMVA 2002).

One active well is located on Range 27 and supplies a Range Maintenance building's bathrooms and work room. It is a non-potable well. A capped well, which is not accessible, is located at Building 0-47. It was drilled as a back-up water supply for an emergency operations center. This center has been relocated and all plumbing, electric controls, and the pump were removed from the well.

The US Geological Survey (USGS) has developed a highly generalized conceptual groundwater model based on several assumptions for the facility (USGS 2010) that indicates shallow groundwater flow is in the direction of adjacent surface water bodies. Streams throughout the facility are gaining, even during dry periods, indicating there is a high degree of interaction between shallow groundwater and surface water over much of FTIG. Within the training corridor, topography and site conditions appear to also favor localized shallow groundwater flow with discharge to adjacent streams rather than a significant portion of recharge reaching the deeper groundwater flow system. However, due to the fractured nature of bedrock at FTIG, a fraction of infiltrating water may enter a deeper groundwater flow system, bypass the perennial streams, and continue underground.

1.5.3 Hydrology

Surface water resources at FTIG include streams, open water features, and wetlands (PADMVA 2016). All streams originate on Post property and are perennial, with the exception of the upper reaches of some smaller tributaries. Two named springs exist on FTIG: Russian Spring, located south of Blue Mountain, flows into Qureg Run and St. Joseph Spring, located north of Blue Mountain, flows into Indiantown Run. Several small, unnamed springs also exist, mostly on steep mountainsides. In addition, there are a total of 288 acres of wetlands within the boundaries of FTIG (PADMVA 2002).

There are no natural ponds or lakes on-Post; however, there are two manmade lakes located on the non-operational, cantonment area of the facility. Marquette Lake is a 15-acre surface water impoundment of Indiantown Run located in the south-central portion of the facility, within the cantonment area. Shuey Lake, a 5.5-acre impoundment of Qureg Run, is located near the southeastern facility boundary.

Another surface water impoundment exists along Indiantown Run, Memorial Lake, located downstream from Marquette Lake. This 80-acre lake is contained within the 230-acre Memorial Lake State Park, an inholding at FTIG, and is adjacent to the southern post boundary (PADMVA 2002). Memorial Lake is classified as a Warmwater Fishery by the State of Pennsylvania, and the portion of Indiantown Run from and including St. Joseph Springs to Memorial Lake is open for public fishing. Trout in Memorial Lake are raised from Pennsylvania Fish and Boat Commission-provided fingerlings; therefore, they must be made available to the public upon release and any stocked water must be publicly fishable to return the commonwealth’s investment. Shuey and Marquette Lakes are also stocked annually. There is no public boating on facility waters, but the FTIG Fish and Game Conservation Club is allowed to use some small un-motorized rowboats on Marquette Lake (PADMVA 2016).

FTIG is located within the Susquehanna River and Swatara Creek drainage basins and is drained by the watersheds of Manada Creek, Bow Creek, Reeds Creek, and Swatara Creek

(Ogden 2001b). Approximately 6.5 stream miles of Manada Creek lie within FTIG boundaries and drain the western portion of the Post. Approximately 6 stream miles of Indiantown Run drain the central portion of FTIG, emptying first into Marquette Lake before flowing further downstream into Memorial Lake. After flowing from Memorial Lake, Indiantown Run is joined by 2 stream miles of Vesle Run, which drains the western edge of the cantonment area. Indiantown Run and Vesle Run drain the Bow Creek watershed. After Vesle Run joins, Indiantown Run flows approximately one mile before its confluence with Swatara Creek. Approximately 2 stream miles of Aires Run and Qureg Run drain the eastern portion of FTIG within the Reeds Run watershed, including most of the cantonment area. After they converge the stream continues 0.5 mile as Qureg Run to the FTIG boundary. Qureg Run confluences with Reeds Creek off-Post before joining Swatara Creek approximately 2 miles downstream. Unnamed tributaries of Trout Run and Forge Creek, each less than 0.5 mile long, drain small parcels of land at FTIG's easternmost boundaries. The entirety of FTIG drains into Swatara Creek, and a portion of Swatara Creek has been designated by the State of Pennsylvania as a Warmwater Fishery stream (AMEC 2006).

FTIG obtains water from the City of Lebanon, although some wells exist on-Post as backup wells as described in **Section 1.5.2**. In 2017, six drinking water sources at FTIG were tested for PFAS, and all PFAS results were less than the USEPA Health Advisory of 70 parts per trillion. Lebanon Water Company serves approximately 57,000 customers, including FTIG, and draws water from Swatara Creek, downstream of Forge Creek (Ogden 2001b). The Pennsylvania American Water Company also maintains a surface water intake located at the confluence of Swatara Creek and Manada Creek, approximately 10 miles downstream of the facility. Surface water features are presented on **Figure 1-3** and **Figure 1-4**.

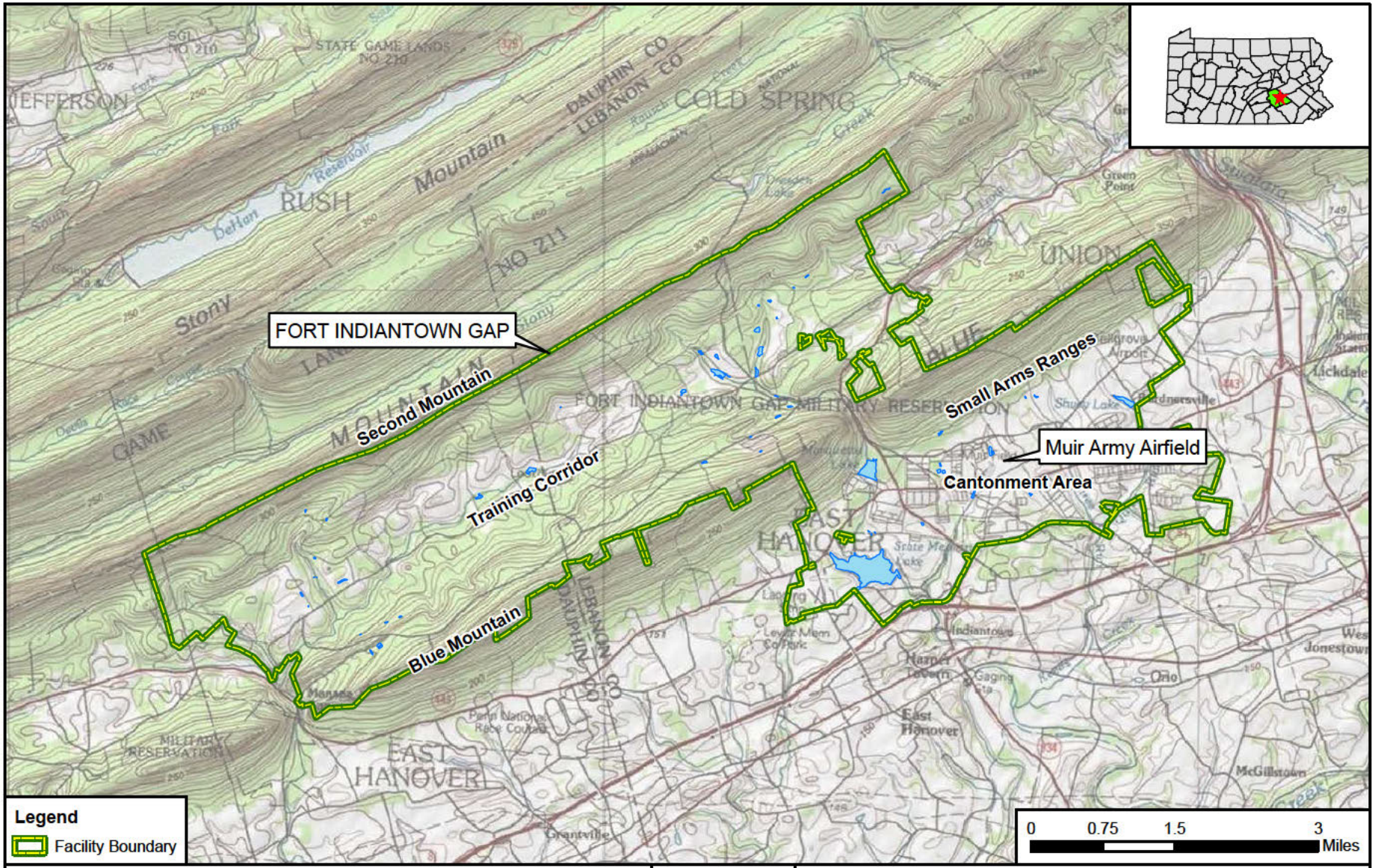
1.5.4 Climate

The climate in the area where FTIG is located is moderate, with an average temperature of 53 degrees Fahrenheit (°F). Seasonally, temperatures vary from summer highs of 84.5 °F to winter lows of 21 °F (World Climate 2018). Precipitation is relatively evenly distributed throughout the year, with an average of 42 inches of rain and 35 inches of snow. The prevailing wind is typically from the west at eight miles per hour, but topography influences the wind conditions (Ogden 2000).

1.5.5 Current and Future Land Use

FTIG is an open facility with public roads; however, ranges have controlled access for safety reasons. As previously stated, 17 privately held residential properties exist within the facility boundary, some of which have private drinking water wells (see **Figure 1-2**). Based on a 25-year development strategy, the FTIG Master Plan includes a comprehensive implementation plan to meet developing facility and training program needs in alignment with inevitable mission changes and growth. New facilities to house several additional Unmanned Aerial Systems platoons with runways for the ARNG and Air National Guard are being planned (PADMVA 2016).

The southern, eastern, and western boundaries of FTIG are abutted by primarily conservation, rural residential, and agricultural land uses. The lands directly to the north of the facility are owned and operated by the Pennsylvania Game Commission and used for public recreation. Future land use around the facility is projected to remain conservation, rural residential, and agricultural with some parcels becoming commercial and industrial. A light, industrial park is located to the east of the facility in Union Township. The closest urban environments are located approximately 13 miles from the facility in Hershey to the southwest and Lebanon to the southeast, and the closest major city is Harrisburg, 26 miles to the southwest (PADMVA 2016).



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SCALE	1:95,040	CHK BY	JZ	7/16/2018
Base Map: Copyright© 2013 National Geographic Society, i-cubed		PM	RH	7/16/2018

TITLE

Facility Location

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-1

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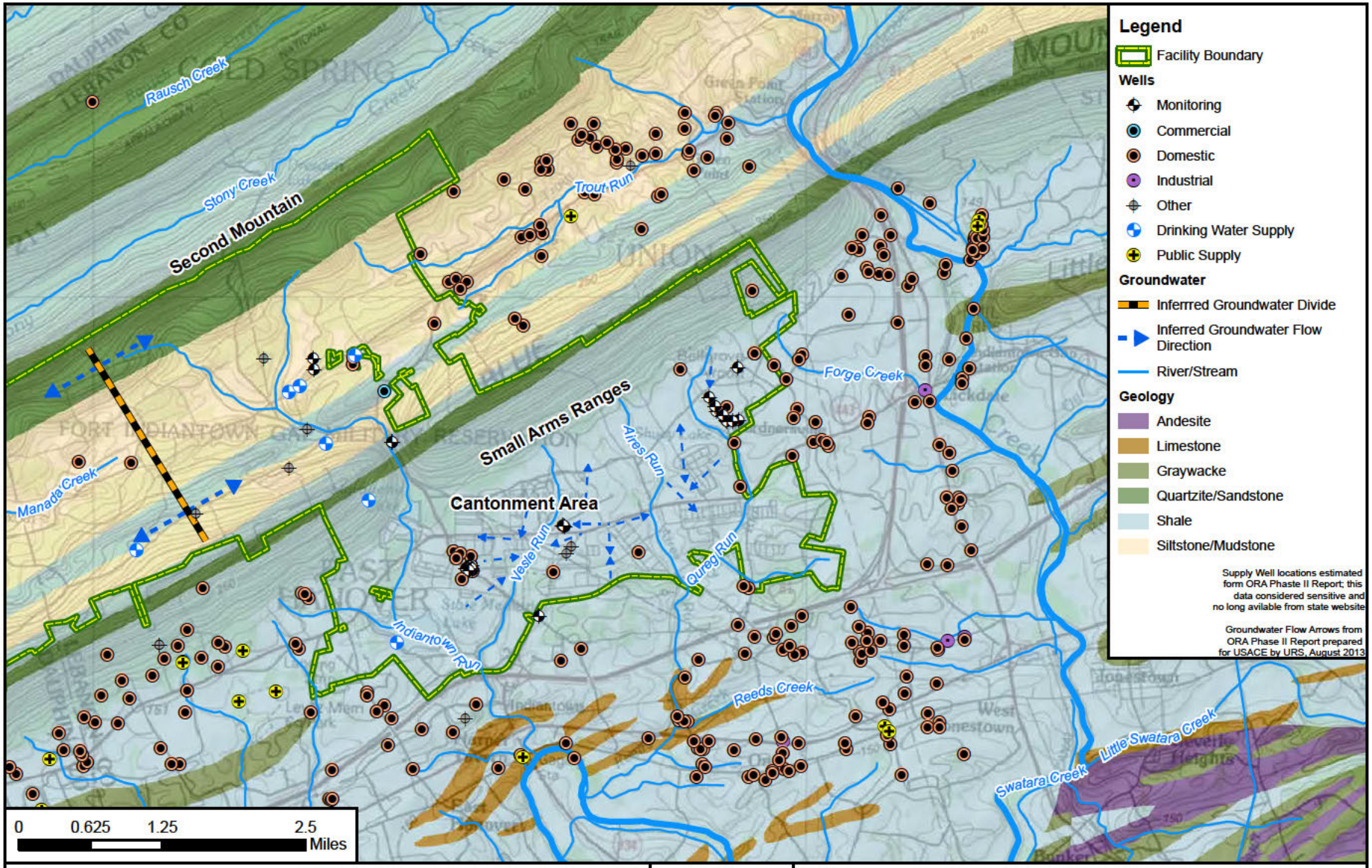

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TITLE

Groundwater Features

AECOM

12420 Milestone Center Drive
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Figure 1-2

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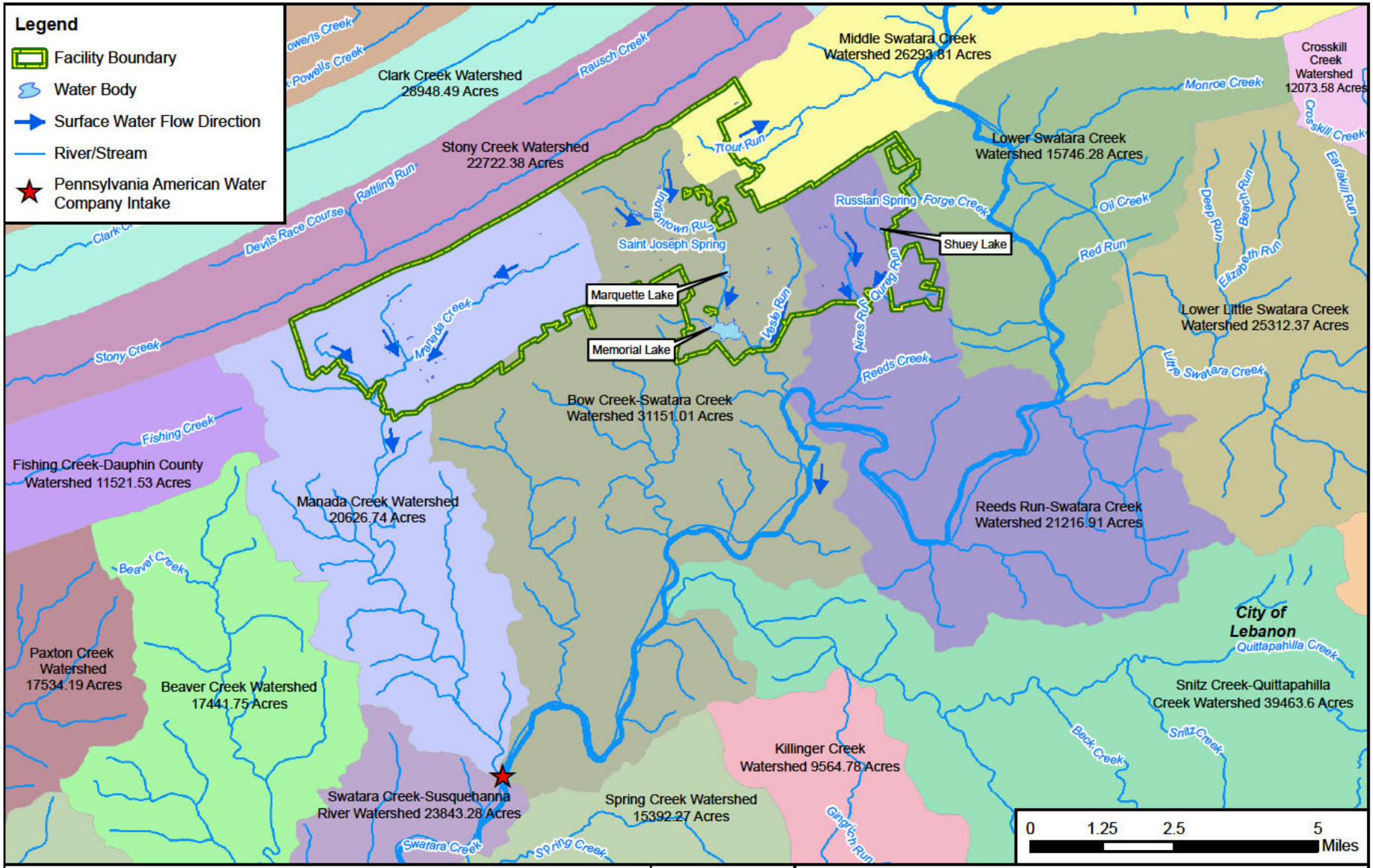

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TITLE

Regional Surface Water Features and Drainage Basins

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 1-3

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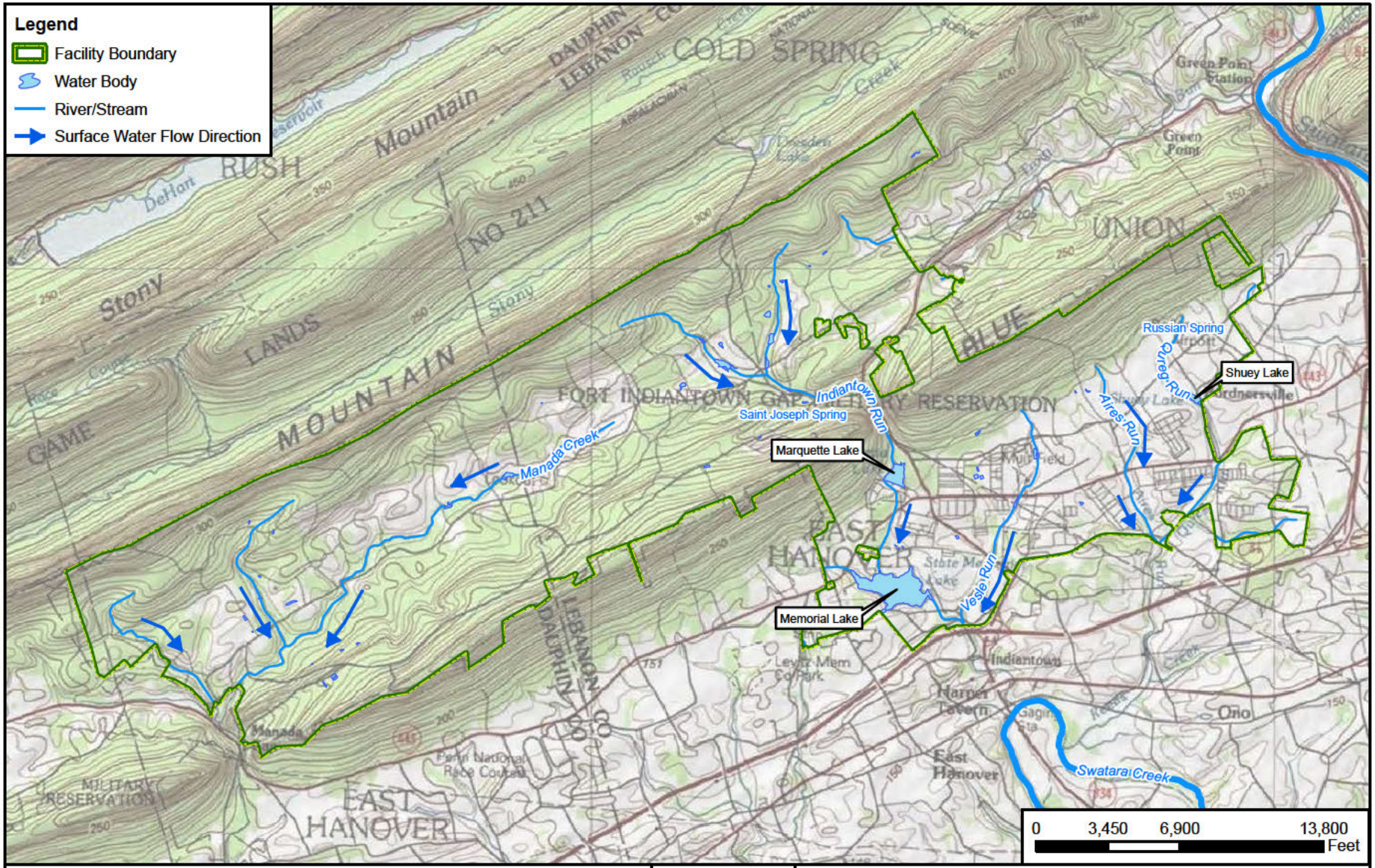

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Base Map: Copyright© 2013 National Geographic Society, i-cubed		PM	RG	7/16/2018

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TITLE

Facility Surface Water Features

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-4

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2. Fire Training Areas

Five FTAs were identified within the FTIG facility during the PA. A description of each FTA is presented below, and the FTA locations are shown on **Figure 2-1**. Photographs of the FTAs appear in **Appendix C**.

2.1 Combined Arms Collective Training Facility

The CACTF is located northeast of the intersection of Cold Springs Road and Tomstown Road in the north-central portion of FTIG (**Figure 2-1**). The CACTF is in the training corridor, and access to the area is only with permission from Range Control. The geographic coordinates are 40°27'11.2"N and 76°37'21.2"W.

The CACTF is an active, 1-square-kilometer replicated urban environment with an assortment of buildings including residences, office buildings, a church, a mock gas station, a store, streets, and sidewalks. The CACTF was constructed in 2009 and training exercises began in 2010. Range Facility Management Support System documents fire training activities at the CACTF by the PAARNG Fire Department in 2010, 2012, 2013, 2015, and 2016 (see summary spreadsheet in **Appendix A**). According to the current PAARNG Assistant Fire Chief, water only was used during fire training activities at this location with the exception of the 2012 training event, described below.

In November 2012, AFFF was discharged by the PAARNG during fire training activities at the mock gas station in the southeast corner of the CACTF. AFFF fire training activities were conducted by the PAARNG on November 18, 19, 26, and 29, 2012, and, in total, involved the discharge of approximately 20 gallons of 3 percent AFFF concentrate. On the last day of the training event, AFFF accumulated at the mock gas station and breached the storm drain and sewer outlets, which outfall to an earthen, bermed retention pond on the southeast corner of the CACTF lot. According to the current PAARNG Fire Chief and PAARNG Assistant Fire Chief, this location was used only once for AFFF training activities by the PAARNG. No remediation activities have occurred at this location.

2.2 Johnson Trail

The Johnson Trail FTA is located on the east side of Johnson Trail, to the south of Hartranft Road and just north of the wood chip area at the crest in the road (**Figure 2-1**). The geographic coordinates are 40°26'22.2"N and 76°33'35.1"W.

The Johnson Trail FTA is an earthen, bermed stockpile area for soil originating from projects at the FTIG facility. AFFF fire training activities were conducted by the PAARNG Fire Department on March 30 and 31, and April 1 and 6, in 2015. In total, the training involved the discharge of approximately 20 gallons of 1 percent AFFF concentrate, created by diluting 3 percent AFFF concentrate. According to the current PAARNG Fire Chief and PAARNG Assistant Fire Chief, this location was used only once for AFFF training activities by the PAARNG. No remediation activities have occurred at this location.

2.3 Fire Pit Area #19

Fire Pit Area #19 is located on the west side of First Street, north of B Street, but south of C Street (**Figure 2-1**). The geographic coordinates are 40°26'21.7"N and 76°33'08.7"W.

According to the BRAC 1997 *Environmental Baseline Survey Report* (Woodward-Clyde 1997), Fire Pit Area #19 was constructed in 1975 by excavating an area 40 feet in diameter to a depth of approximately 1.5 feet and constructing a 1-foot high earthen berm around the perimeter of

the pit. The fire pit was then lined with fire brick. The PAARNG Fire Department conducted coordinated fire training exercises with the US Army Fire Department on an average of twice annually at this location from 1975 to 1986. According to the former PAARNG Fire Chief, fuel was ignited and the fire was extinguished with AFFF by both the PAARNG and the US Army during these training exercises. No information was available on the concentration or amount of AFFF used during the training; however, approximately 3,000 gallons per year of used petroleum, oil, and lubricants generated in the Army Aviation Support Facility (AASF) were burned in the fire training pit.

The fire training pit was closed in 1990 and a limited SI was conducted. The results of the SI defined an area of soil contaminated with petroleum hydrocarbons (Weston 1992). The PAARNG excavated the petroleum hydrocarbon-contaminated soil and disposed of it an unknown location (Woodward-Clyde 1997). In 2003, a site specific remedial investigation was completed at Fire Pit Area #19, which identified volatile organic compound and semivolatile organic compound contamination below the non-residential statewide health standard and the site-specific standard. The Pennsylvania Department of Environmental Protection issued a Relief of Liability letter, dated May 27, 2003, to the PAARNG. The Medical Battalion Training Site was constructed at this location in 2007.

2.4 Ramp Fire Pit Training Areas

During an interview with the former PAARNG Fire Chief, two additional fire pit training areas, reportedly used for coordinated exercises with the PAARNG and US Army Fire Departments, were identified on either side of the MAAF ramp (see **Figure 2-1**; east end and west end).

2.4.1 East End

One fire training pit was located at the east end of the MAAF ramp (**Figure 2-1**). The geographic coordinates are 40°26'21.6"N and 76°33'58.1"W. At this location, a rotary-winged aircraft was ignited at least once annually from the late 1980s to the early 1990s using jet fuel and solvents and then extinguished with AFFF by the PAARNG and the US Army Fire Departments. The area is currently a paved parking lot adjacent to the nearby Brigade Armory built in 1995. The terrain was once level with the MAAF, but the area was excavated and lowered with an embankment during construction of the Brigade Armory parking lot. The soil from the excavation of the area may possibly still be on-Post; however, the exact fate of the soil could not be determined during the site visit.

2.4.2 West End

A second fire training pit was located at the west end of the MAAF ramp (**Figure 2-1**). The geographic coordinates are 40°26'09.5"N and 76°34'27.5"W. At this location, a rotary-winged aircraft was ignited using jet fuel during a one-time event in the early 1990s and then extinguished with AFFF by the PAARNG and the US Army Fire Departments. This area is collocated with the newly constructed Building 019-177 (EAATS hangar). The soil from the fire training pit location was scraped and hauled away prior to construction of Building 019-177. No information was available on the final disposition location of the excavated soil.

2.5 First Street

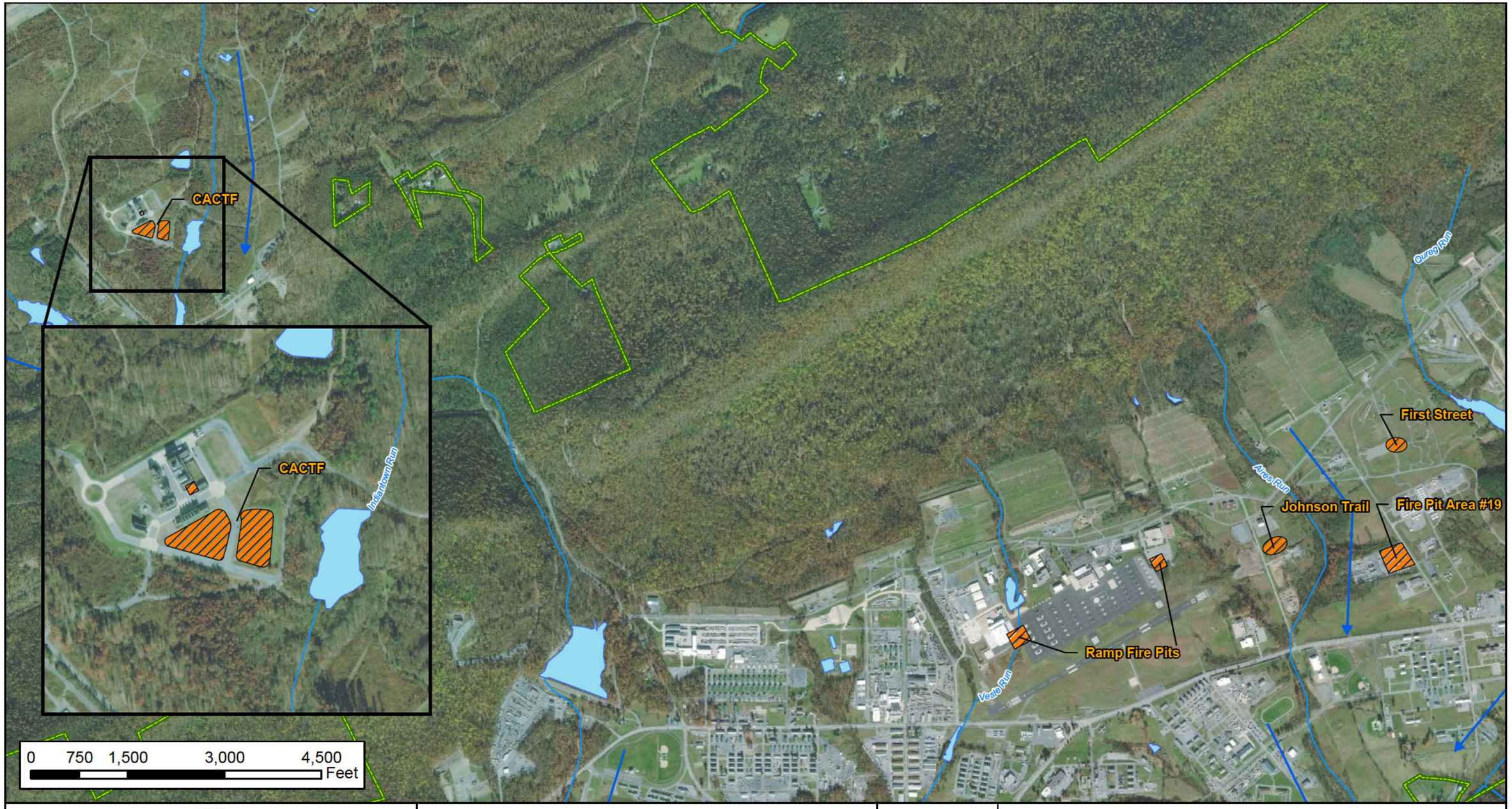
The First Street FTA is located to the east of First Street between East Tank Trail and Range Road (**Figure 2-1**). The geographic coordinates are 40°26'39.1"N and 76°33'08.6"W.

The First Street FTA consists of an open field with a rotary-winged aircraft encompassed by a circular drive. According to the current PAARNG Fire Chief and PAARNG Assistant Fire Chief,

this area was used once for a fire training activity in March 2014, during which approximately 20 gallons of 3 percent AFFF concentrate was dispensed by the PAARNG. No remediation activities have occurred at this location.

2.6 Prescribed Burns

FTIG has a history of large fires due to agricultural and training use. Therefore, the Forestry Section completes wildland, controlled burns and annual prescribed burns during early spring and late fall in accordance with the Wildland Fire Management Plan and the Annual Prescribed Fire Project Plan. Water and Class A foams (which do not contain PFAS) are used for suppression during wildland fire and prescribed burns at FTIG. AFFF is not used during wildland fire and prescribed burn operations.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Fort Indiantown Gap, PA			
REVISED	7/16/2018	GIS BY	MS	7/16/2018
SCALE	1:18,000	CHK BY	JZ	7/16/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	7/16/2018

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Legend

- Potential PFAS Release
- Facility Boundary
- Water Body
- River/Stream
- Surface Water Flow Direction

N

Fire Training Areas

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

3. Non-Fire Training Areas

Five non-fire training areas where AFFF was potentially released were also identified during the PA. A description of each non-FTA is presented below, and the non-FTAs are shown on **Figure 3-1**. Photographs of the non-FTAs appear in **Appendix C**.

3.1 Building 019-101

Building 019-101 is the AASF hangar on the MAAF (**Figure 3-1**) and is operated by the PAARNG. The MAAF is bordered on the north by Range Road, on the east by Johnson Trail, on the south by Fisher Avenue, and on the west by Utility Road. The geographic coordinates are 40°26'18.0"N and 76°34'10.6"W.

Building 019-101 was constructed in 1973 and began operation in 1974. In 1988, the building was retrofitted with an AFFF fire suppression system, which is supplied by two 1,000-gallon tanks of 3 percent AFFF concentrate. Following installation, the west end of the hangar was separated from the east end by a temporary curtain and filled with AFFF to test the system. Once the test was complete, the majority of the AFFF was squeegeed out of the west end of the hangar and onto the MAAF ramp by the PAARNG and allowed to dissipate. A small amount of foam was contained in the hangar trench drain that flows to an oil-water separator and then to the Waste Water Treatment Plant (WWTP). The former PAARNG Fire Chief and Air Traffic Control Tower Chief recall the foam persisting outdoors on the MAAF ramp and adjacent grass for about two days.

The former PAARNG Fire Chief also indicated that from 1988 until 2011, occasional, false alarms caused the fire suppression system to dispense approximately 5 to 10 gallons of AFFF per incident in the hangar. Per the facility maintenance manager, sensor interactions between a beam within the holding tank, temperature systems, and heat were the causes of the false alarms. These false alarm releases occurred approximately 20 times, most recently in 2011. Each time AFFF was dispensed during a false alarm, the pipes of Building 019-101 were flushed and the foam was squeegeed out on to the ramp, washed into the adjacent grass, and allowed to dissipate outdoors. In 2015, the AASF underwent an upgrade to retrofit the building with new sensors, lasers, and pipe liners. The existing AFFF was drained from the fire suppression system by Vector Fire Technology and disposed by Cycle Chem, Inc. at Modern Landfill in York, PA. There have been no accidental releases of AFFF since the building was retrofitted in 2015.

3.2 Building 019-101 Ramp

The Building 019-101 ramp lies between Building 019-101 and the runway and serves as an area for rotary-winged aircraft pre-flight activities (**Figure 3-1**). The geographic coordinates are 40°26'13.7"N and 76°34'08.8"W.

According to the former PAARNG Fire Chief, the ramp was “washed” repeatedly from approximately 1974 until 2011 with 3 percent AFFF concentrate by the PAARNG because AFFF acted as a detergent for spilled fuels. In addition, 3 percent AFFF concentrate that was dispensed intentionally or accidentally from the Building 019-101 hangar was squeegeed out of the hangar and onto the ramp. No remediation activities have occurred at this location.

The Air Traffic Control Tower Chief also recalled a potential PFAS release in the slingload area which is just north of the ramp and Building 019-135. No other interviewees recalled this potential PFAS release event. The geographic coordinates are 40°26'20.7"N and 76°34'06.9"W.

3.3 Fire Stations

3.3.1 Former Crash Rescue Fire Station

The former Crash Rescue Fire Station was located on the MAAF immediately east of the air traffic control tower (**Figure 3-1**). The geographic coordinates are 40°26'17.3"N and 76°34'08.5"W.

The PAARNG Fire Department operated the former Crash Rescue Fire Station from 1974 until 1998 and responded to all emergencies on the MAAF. In addition, the PAARNG Fire Department supported the US Army Fire Department, which operated out of the current Fire Station (Building 5-117) and responded to all other emergencies on-Post, as needed. Following BRAC in 1998, the former Crash Rescue Fire Station building was repurposed and the PAARNG Fire Department and US Army Fire Department were combined. The PAARNG Fire Department now operates the current Fire Station (Building 5-117) on-Post (the former US Army Fire Station) and responds to emergencies of all types. No known fire training activities were conducted at the former Crash Rescue Fire Station, and no known leaks or spills of AFFF were identified; therefore, this area is not considered a potential release area.

3.3.2 Current Fire Station (Building 5-117)

The current Fire Station (Building 5-117) is located at the southwest corner of Fisher Avenue and Smathers Road, south of the MAAF (**Figure 3-1**). Based on historical aerial imagery, the Fire Station was built sometime between 1937 and 1948. The geographic coordinates are 40°25'58.3"N and 76°33'57.6"W.

Prior to BRAC, the current Fire Station was operated by the US Army Fire Department. Following BRAC in 1998, the PAARNG Fire Department and US Army Fire Department were combined. The PAARNG now operates the current Fire Station (Building 5-117) on-Post (the former US Army Fire Station) and responds to fires of all types. The current fire staff consists of 12 state firefighters, 3 federal status technicians, and the federally-employed PAARNG Fire Chief.

AFFF is stored by the PAARNG Fire Department in two 250-gallon totes inside of the current Fire Station and is transferred to the fire trucks, as needed, via a pump. No known spills or leaks of AFFF were identified during the PA. However, the National Fire Protection Agency requires annual testing of the proportioning valves on the fire trucks and from 1998 until the present, the PAARNG Fire Department has tested the valves by discharging approximately 5 gallons of 3 percent AFFF concentrate onto the ground and testing the mixture using a hand-held refractometer. The valves have been tested in two locations: in the field immediately south of the current Fire Station behind a dumpster, and in the field on the north side of Fisher Avenue, immediately south of MAAF. The latter area was recently paved. No remediation activities have occurred at either potential release area. No information was available on the US Army Fire Department's storage or use of AFFF at the current Fire Station.

3.4 Waste Water Treatment Plant

The WWTP is located at the southeast corner of the intersection of Biddle Road and Coulter Road (**Figure 3-1**). The geographic coordinates are 40°25'39.3"N and 76°33'04.5"W.

According to the Director of Environmental Management, the WWTP historically overflowed during rain events; however, the treatment plant was renovated from 2000 to 2005 to reduce the number of overflow incidences. The Installation Maintenance Manager recalled that around 2011, an accidental discharge of AFFF occurred in the Building 019-101 hangar as a result of a

false alarm. The pipes of Building 019-101 were drained, and the WWTP approved the discharge of the AFFF from the hangar to the WWTP in small increments. Approximately 5 to 10 gallons of 3 percent AFFF concentrate were discharged to the WWTP before personnel were directed to stop because the AFFF concentrate killed all of the bacteria in the WWTP.

Prior to 2010, approximately 300,000 gallons of liquid sludge (3 percent solid) per quarter were transported from the WWTP by Kline's Services Inc, to Miller Environmental Inc, both of Lancaster, Pennsylvania, for conversion to sludge cake and composting. Following installation of a sludge press in spring 2010, approximately 11 dry tons per week of sludge cake (12 to 15 percent solid) were transported from the WWTP by Sattazahn's Inc, of Lebanon, Pennsylvania, to the Greater Lebanon Refuse Authority (local Lebanon Landfill). Since 2012, FTIG has been permitted to perform land application of biosolids from the WWTP on the southeastern boundary of Memorial Lake. Hay is grown in the biosolid land application area, then harvested and used for range and erosion control. Because potential PFAS releases have occurred at areas that flow to the WWTP, it is possible that land application of PFAS-laden sludge has occurred in the biosolid land application area. The geographic coordinates of the land application area are 40°24'56.0"N 76°35'35.4"W. The community of Ono also pumps water up to the FTIG WWTP for treatment and return to Swatara Creek.

3.5 Building 019-177

Building 019-177 is the new Aviation Maintenance Instruction Building (AMIB) and EAATS hangar located at the west end of the Building 019-101 Ramp (**Figure 3-1**). The geographic coordinates are 40°26'09.5"N and 76°34'27.5"W.

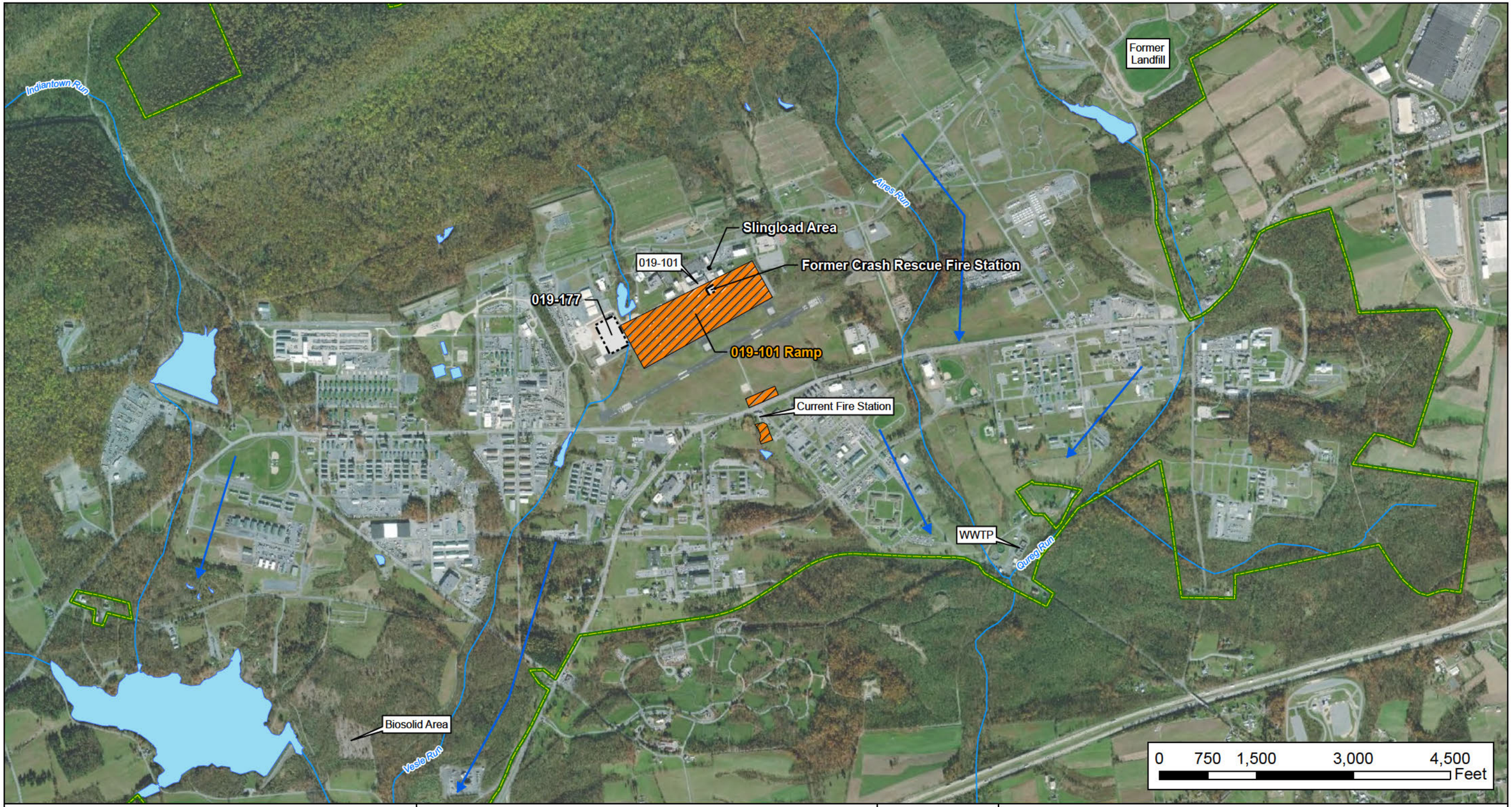
Construction on the AMIB began in 2014, and the building was dedicated on November 13, 2017. The building is fitted with a fire suppression system containing high expansion foam.

The fire suppression system at the AMIB was tested on September 6, 2017, by a contractor. The test lasted approximately 5 minutes and generated an estimated 12,000 gallons of water/foam solution. The foam was allowed to dissipate inside the hangar for approximately 24 hours. Then, the automatic valves connected to the floor drains were opened and the discharge of the oil-water separator was closed to prevent any discharge to the sanitary sewer (PADMVA 2017). The foam was rinsed to the floor drains and was recovered by pumping the solution from the oil-water separator to a 21,000-gallon Baker tank. Approximately 20,000 gallons of non-hazardous foam solution were transported to a certified treatment, storage, and disposal facility for solidification and disposal as a non-hazardous waste in a landfill (PADMVA 2017). All high expansion foam was recovered and transported off-Post; therefore, this area is not considered a potential release area.

3.6 Landfills

One former Landfill exists at FTIG. The geographic coordinates are 40°26'53.9"N 76°32'42.2"W (**Figure 3-1**). The 45-acre former Landfill, which is unlined, operated from 1942 to 1982 and accepted a variety of wastes from the facility (PADMVA 2002). In 2015, the former Landfill was capped with 18 inches of compacted soil and 6 inches of topsoil and graded for drainage.

Landfills are not usually a primary potential release area of PFAS, but materials disposed of in landfills may create a secondary source of contamination. Such materials, to name a few, may include sludge from a WWTP that processes PFAS-laden water, used AFFF storage containers, or products associated with waterproofing uniforms or boots. At FTIG, no information obtained indicates PFAS-related materials were disposed of in the landfill.



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REVISED	8/6/2018	GIS BY	MS	8/6/2018
SCALE	1:18,000	CHK BY	JZ	8/6/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	8/6/2018

Legend

- No Suspected Release
- Potential PFAS Release
- Facility Boundary
- Water Body
- River/Stream
- Surface Water Flow Direction

N

Non-Fire Training Areas

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 3-1

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4. Emergency Response Areas

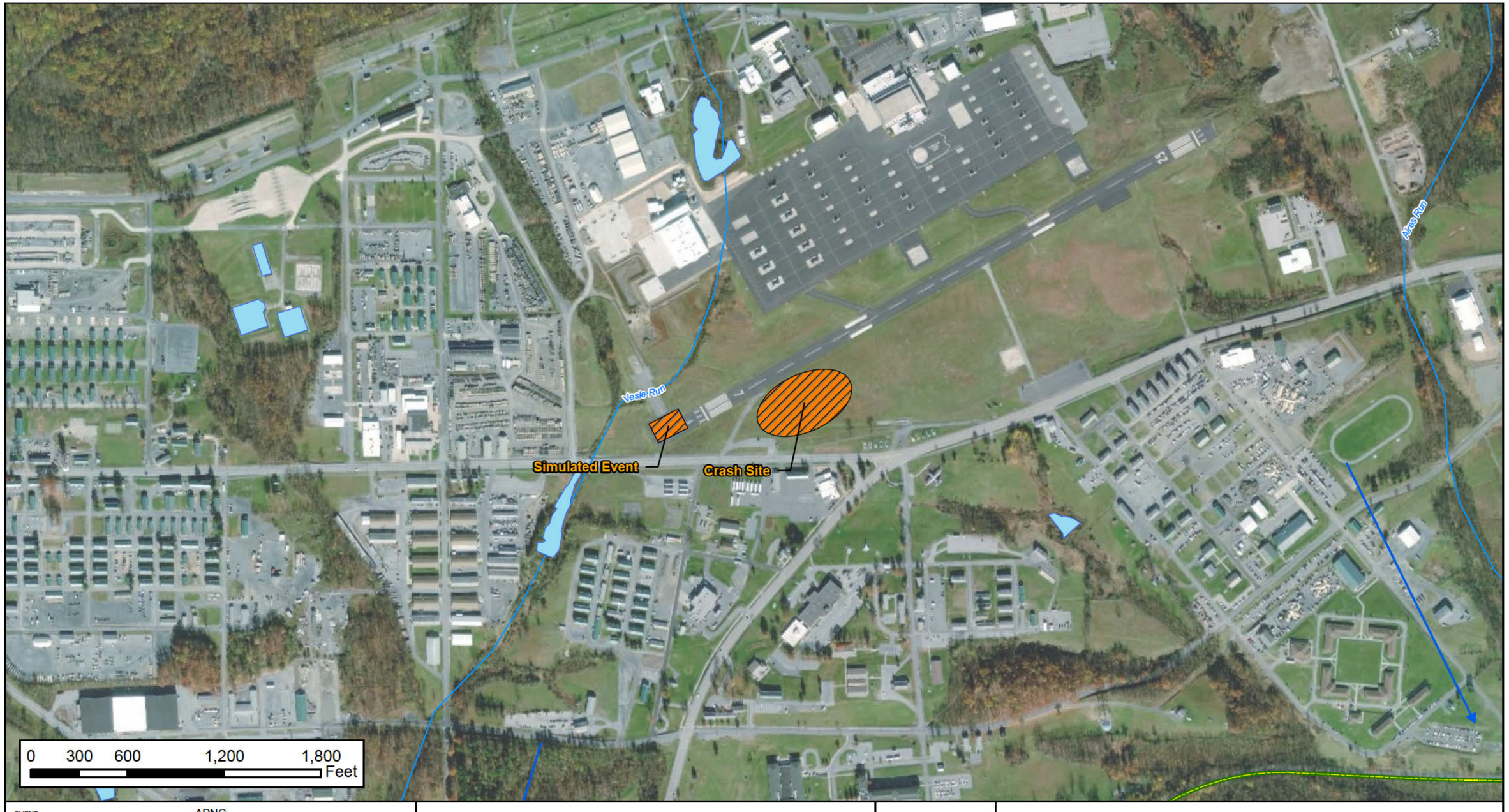
Two emergency response locations involving the potential release of AFFF were identified by the former PAARNG Fire Chief and current Air Traffic Control Tower Chief on the western end of MAAF during the site visit. No remediation activities have occurred at either emergency response location. The emergency response areas are shown on **Figure 4-1**, and photographs appear in **Appendix C**.

4.1 Crash Site

In the early 1990s, a rotary-winged aircraft clipped a tree during landing and crashed on the west end of MAAF, south of Runway 7 (**Figure 4-1**). The PAARNG Fire Department responded to the crash and extinguished the fire with AFFF. No information was available on the concentration or amount of AFFF used during the emergency response. This was the only crash site identified during the site visit. The approximate geographic coordinates are 40°25'58.7"N and 76°34'18.5"W.

4.2 Simulated Emergency Event

In 1991, the PAARNG Fire Department conducted a simulated emergency event using water at the western end of MAAF (**Figure 4-1**). The US Army Fire Department, which was not aware of the scheduled simulated emergency event, responded to the event, dispensing AFFF. No information was available on the concentration or amount of AFFF dispensed by the US Army Fire Department. The PAARNG Fire Department did not dispense AFFF during this event. The approximate geographic coordinates of the simulation event are 40°25'57.9"N and 76°34'28.3"W.



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SCALE	1:7,200	CHK BY	JZ	7/16/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	LS	7/16/2018

Legend

- Potential PFAS Release
- Facility Boundary
- Water Body
- River/Stream
- Surface Water Flow Direction

N

Emergency Response Areas

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 4-1

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5. Adjacent Sources

No off-site PFAS sources adjacent to the FTIG facility were identified during the PA through interviews or the Environmental Data Resource Report.

6. Conceptual Site Model

Based on the PA findings, the release areas were grouped into six AOIs: AOI 1 CACTF; AOI 2 MAAF, including the current Fire Station (Building 5-117); AOI 3 Johnson Trail; AOI 4 Fire Pit Area #19; AOI 5 First Street; and AOI 6 Biosolid Area. The AOI locations are shown on **Figure 6-1**. The following sections describe the CSM components and the specific CSM developed for each AOI. The CSM identifies the three components necessary for a potentially complete exposure pathway: (1) source, (2) pathway, (3) receptor. If any of these elements are missing, the pathway is considered incomplete.

In general, the potential PFAS exposure pathways are ingestion and inhalation. Dermal contact is not considered to be a potential exposure pathway as studies have shown very limited absorption of PFAS through the skin (National Ground Water Association 2018). Receptors at FTIG include site workers, construction workers, residents, and recreational users. The CSM for each AOI indicates which specific receptors could potentially be exposed to PFAS.

6.1 AOI 1 CACTF

AOI 1 is the CACTF. Potential PFAS releases to soil by the PAARNG occurred during fire training activities at AOI 1 in 2012.

Indiantown Run lies to the east of the AOI 1 and flows to Marquette Lake and Memorial Lake before flowing off-Post and joining Swatara Creek. Memorial Lake and a portion of Swatara Creek are classified as Warmwater Fisheries by the State of Pennsylvania and are open for public fishing. PFAS are water soluble and can migrate readily from soil to groundwater or surface water via leaching and run-off. Because potential PFAS releases to surface soil have occurred at AOI 1, it is possible that potential PFAS contamination has migrated from the soil at AOI 1 to Indiantown Run via over land surface water flow and into the groundwater via infiltration. At FTIG, infiltrating precipitation typically enters the shallow groundwater system and discharges to adjacent surface water bodies; however, a small fraction of infiltrating precipitation may enter a deeper groundwater flow system, especially in higher elevation, recharge areas such as AOI 1. The residential in-holdings at FTIG are located downstream of AOI 1 and may draw drinking water from the deeper groundwater basin of Indiantown Run. FTIG drinking water is supplied by the City of Lebanon; however, drinking water supply wells and residential in-holdings wells are present on-Post.

Ground-disturbing activities to surface soil at AOI 1 could result in site and construction worker exposure to potential PFAS contamination via inhalation of dust particles or ingestion of surface soil. Ground-disturbing activities to subsurface soil could result in site and construction worker exposure via ingestion of subsurface soil. Therefore, the exposure pathways for these receptors are potentially complete. In addition, because potential PFAS contamination may have migrated from the soil at AOI 1 to Indiantown Run, the surface water and sediment exposure pathways via ingestion for site and construction workers, residents, and recreational users of Indiantown Run and the associated surface water impoundments such as Marquette and Memorial Lakes (e.g., swimming and fishing) are potentially complete.

Groundwater flow at FTIG is predominantly in the direction of adjacent surface water bodies; therefore, groundwater flow at AOI 1 is to the south-southeast. Based on the groundwater flow at AOI 1, the drinking water supply wells and residential in-holdings wells are downgradient of AOI 1. Therefore, the exposure pathway for groundwater via ingestion is potentially complete for site and construction workers using downgradient facility drinking water supply wells and the in-holding residents. In addition, the exposure pathway for groundwater via ingestion is potentially complete for off-Post residents at the southern border of the facility, and residents using the Pennsylvania American Water Company intake, which is located approximately 10

miles downstream at the confluence of Manada Creek and Swatara Creek and serves approximately 30,000 people (URS/Arcadis 2013). The CSM for AOI 1 is shown on **Figure 6-2**.

6.2 AOI 2 MAAF

AOI 2 is the MAAF, including the current Fire Station (Building 5-117). Multiple potential PFAS releases to soil by the PAARNG and the US Army occurred at AOI 2 from the late 1980s until the early 1990s during coordinated fire training activities and emergency response events. Additional potential PFAS releases by the PAARNG only occurred from the early 1990s until the present at AOI 2 as a result of accidental releases from the fire suppression system at Building 019-101 and proportioning valve testing by the PAARNG Fire Department near the current Fire Station.

The eastern and western ends of the MAAF ramp are gently sloped with an apex occurring in the middle of the ramp. Therefore, the MAAF ramp is drained by two separate surface water features at FTIG. The east side of the ramp is drained by a tributary that feeds Aries Run. Aires Run drains the eastern edge of the cantonment area and joins Qureg Run just south of the WWTP. The west side of the MAAF ramp is drained by Vesle Run. Vesle Run drains the western edge of the cantonment area and joins Indiantown Run after Memorial Lake. All runs at FTIG eventually flow off-Post and join Swatara Creek. Because potential PFAS releases to surface soil have occurred at AOI 2, it is possible that potential PFAS contamination has migrated from the soil at AOI 2 to Aires Run and/or Vesle Run via over land surface water flow and into the groundwater via infiltration.

Ground-disturbing activities to surface soil at AOI 2 could result in site and construction worker exposure to potential PFAS contamination via inhalation of dust particles or ingestion of surface soil. Ground-disturbing activities to subsurface soil could result in site and construction worker exposure via ingestion of subsurface soil. Therefore, the exposure pathways for these receptors are potentially complete. In addition, because potential PFAS contamination may have migrated from the soil at AOI 2 to Aires Run and/or Vesle Run, the surface water and sediment exposure pathways via ingestion for site and construction workers, residents, and recreational users of Aires Run and Vesle Run are potentially complete.

The groundwater flow direction for the east end of AOI 2 is predominantly south-southwest, while the groundwater flow direction for the west end of AOI 2 is predominantly south-southeast. Based on the groundwater flow at AOI 2, the residential in-holdings wells are upgradient of AOI 2, and Vesle Run joins Indiantown Run downgradient of the drinking water supply wells present on-Post. Therefore, the exposure pathway for groundwater via ingestion is incomplete for site and construction workers and the in-holding residents. However, the exposure pathway for groundwater via ingestion is potentially complete for off-Post residents at the southern border of the facility, and residents using the Pennsylvania American Water Company intake. The CSM for AOI 2 is shown on **Figure 6-3**.

6.3 AOI 3 Johnson Trail

AOI 3 is the Johnson Trail FTA. Potential PFAS releases to soil by the PAARNG occurred during fire training activities at AOI 3 in 2015.

AOI 3 is drained by Aires Run, which lies nearby to the east. Aires Run drains the eastern edge of the cantonment area and joins Qureg Run just south of the WWTP. The confluence continues past the WWTP as Qureg Run and joins the Swatara Creek approximately 2 miles off-Post. Because potential PFAS releases to surface soil have occurred at AOI 3, it is possible that potential PFAS contamination has migrated from the soil at AOI 3 to Aires Run via over land surface water flow and into the groundwater via infiltration.

The groundwater flow direction, exposure pathways, and receptors for Aires Run are discussed in **Section 6.2** and are the same for AOI 3. Based on the groundwater flow at AOI 3, the residential in-holdings wells are upgradient of AOI 3, and the drinking water supply wells present on-Post are not impacted by Aires Run. The CSM for AOI 3 is shown on **Figure 6-3**.

6.4 AOI 4 Fire Pit Area #19 and AOI 5 First Street

AOI 4 is Fire Pit Area #19. Potential PFAS releases to soil by the PAARNG and the US Army occurred during coordinated fire training activities at AOI 4 from 1975 to 1986. AOI 5 is the First Street FTA. Potential PFAS releases to soil by the PAARNG occurred during fire training activities at AOI 5 in 2014.

AOI 4 and AOI 5 are drained by Qureg Run, which lies nearby to the east and drains the eastern portion of FTIG. As described in **Section 6.3**, Qureg Run joins Aires Run just south of the WWTP. Because potential PFAS releases to surface soil have occurred at AOI 4 and AOI 5, it is possible that potential PFAS contamination has migrated from the soil at AOI 4 and/or AOI 5 to Qureg Run via over land surface water flow and into the groundwater via infiltration.

Ground-disturbing activities to surface soil at AOI 4 and/or AOI 5 could result in site and construction worker exposure to potential PFAS contamination via inhalation of dust particles or ingestion of surface soil. Ground-disturbing activities to subsurface soil could result in site and construction worker exposure via ingestion of subsurface soil. Therefore, the exposure pathways for these receptors are potentially complete. In addition, because potential PFAS contamination may have migrated from the soil at AOI 4 and/or AOI 5 to Qureg Run, the surface water and sediment exposure pathways via ingestion for site and construction workers, residents, and recreational users of Qureg Run are potentially complete.

The groundwater flow direction for AOI 4 and AOI 5 is predominantly south-southeast. Based on the groundwater flow at AOI 4 and AOI 5, the drinking water supply wells and residential in-holdings wells are upgradient of AOI 4 and AOI 5, and the drinking water supply wells present on-Post are not impacted by Qureg Run. Therefore, the exposure pathway for groundwater via ingestion is incomplete for site and construction workers and the in-holding residents. However, the exposure pathway for groundwater via ingestion is potentially complete for off-Post residents at the southern border of the facility, and residents using the Pennsylvania American Water Company intake. The CSM for AOI 5 is shown on **Figure 6-4**.

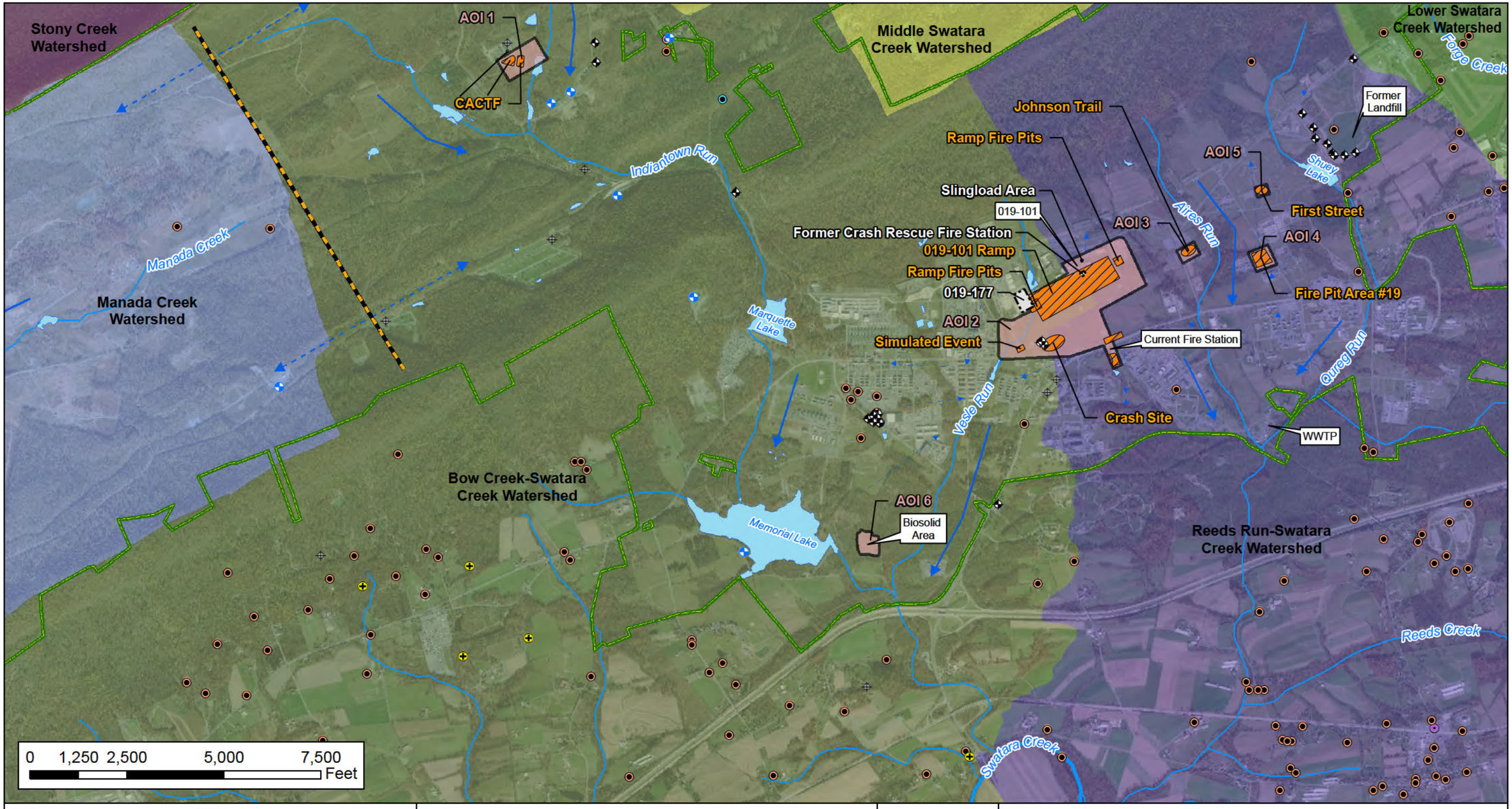
6.5 AOI 6 Biosolid Area

AOI 6 is the Biosolid Area. Potential PFAS releases have not been documented at AOI 6; however, potential PFAS releases have been documented going into the drains at Building 019-101 (AOI 2) which flows to the WWTP. FTIG has been permitted to perform land application of biosolids from the WWTP since 2012. Although potential PFAS releases at Building 019-101 occurred prior to the 2012, it is possible that undocumented releases of AFFF may have occurred after 2012 and subsequent land application of PFAS-laden sludge from the WWTP has occurred at AOI 6.

The biosolids from the WWTP are applied to a parcel of land on the southeastern boundary of Memorial Lake. As discussed in **Section 6.1**, Memorial Lake is a surface water impoundment of Indiantown Run and is classified as a Warmwater Fishery by the State of Pennsylvania. Because potential PFAS releases to surface soil have occurred at AOI 6, it is possible that potential PFAS contamination has migrated from the soil at AOI 6 to Memorial Lake or Indiantown Run via over land surface water flow and into the groundwater via infiltration.

Ground-disturbing activities to surface soil at AOI 6 could result in site and construction worker exposure to potential PFAS contamination via inhalation of dust particles or ingestion of surface soil. Ground-disturbing activities to subsurface soil could result in site and construction worker exposure via ingestion of subsurface soil. Therefore, the exposure pathways for these receptors are potentially complete. In addition, because potential PFAS contamination may have migrated from the soil at AOI 6 to Memorial Lake or Indiantown Run, the surface water and sediment exposure pathways via ingestion for site and construction workers, residents, and recreational users of Memorial Lake and Indiantown Run (e.g., swimming and fishing) are potentially complete.

The groundwater flow direction at AOI 6 is predominantly south-southeast. Based on the groundwater flow at AOI 6, the drinking water supply wells and residential in-holdings wells are upgradient of AOI 6. Therefore, the exposure pathway for groundwater via ingestion is incomplete for site and construction workers and the in-holding residents. However, the exposure pathway for groundwater via ingestion is potentially complete for off-Post residents at the southern border of the facility, and residents using the Pennsylvania American Water Company intake. The CSM for AOI 6 is shown on **Figure 6-5**.



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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	8/6/2018

Area of Interest
No Suspected Release
Potential PFAS Release
Facility Boundary
Monitoring
Drinking Water Supply
Commercial
Domestic
Industrial
Other
Public Supply
Water Body
Inferred Groundwater Divide
River/Stream
Surface Water Flow Direction
Inferred Groundwater Flow Direction

N

Areas of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1

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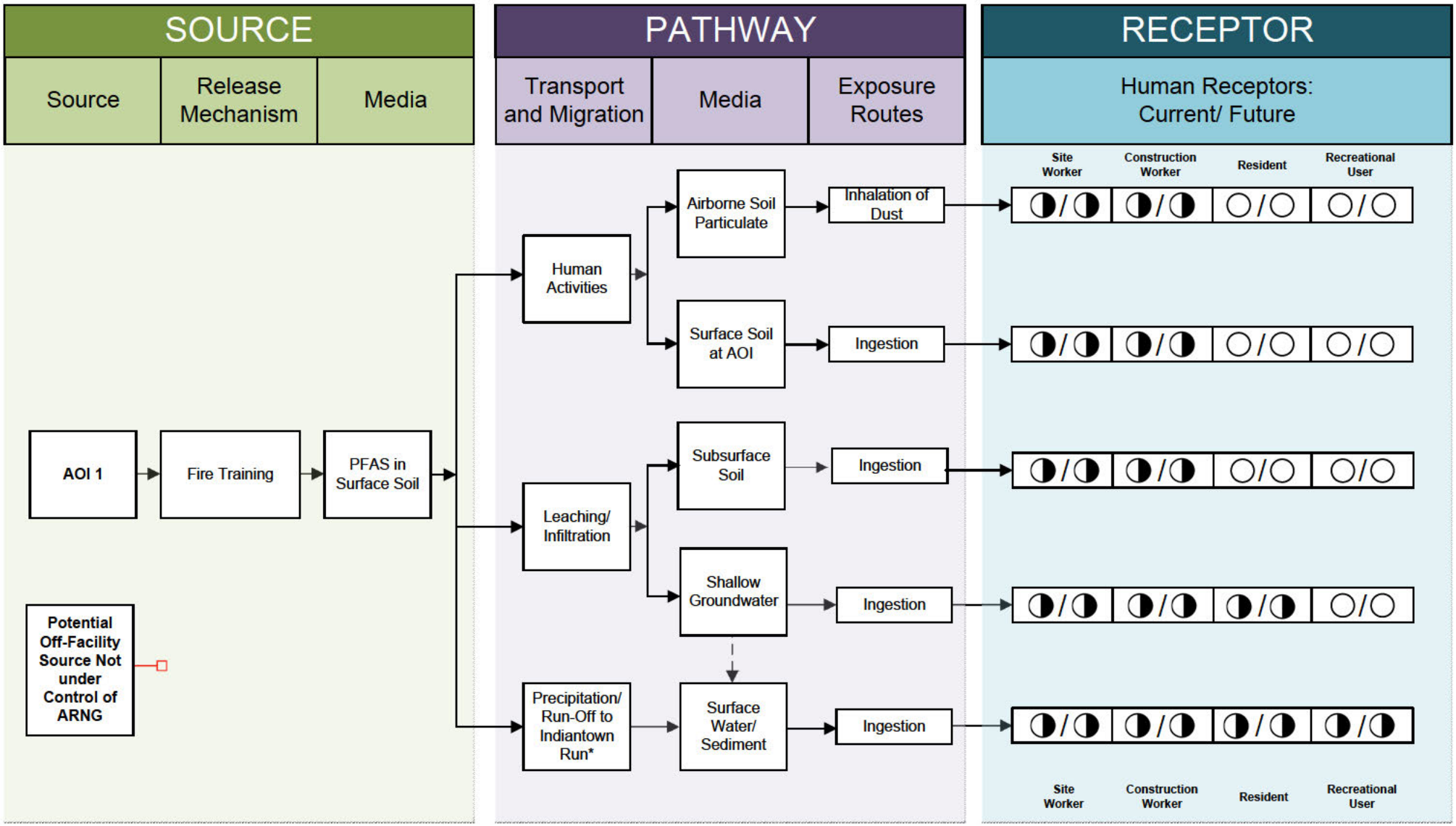


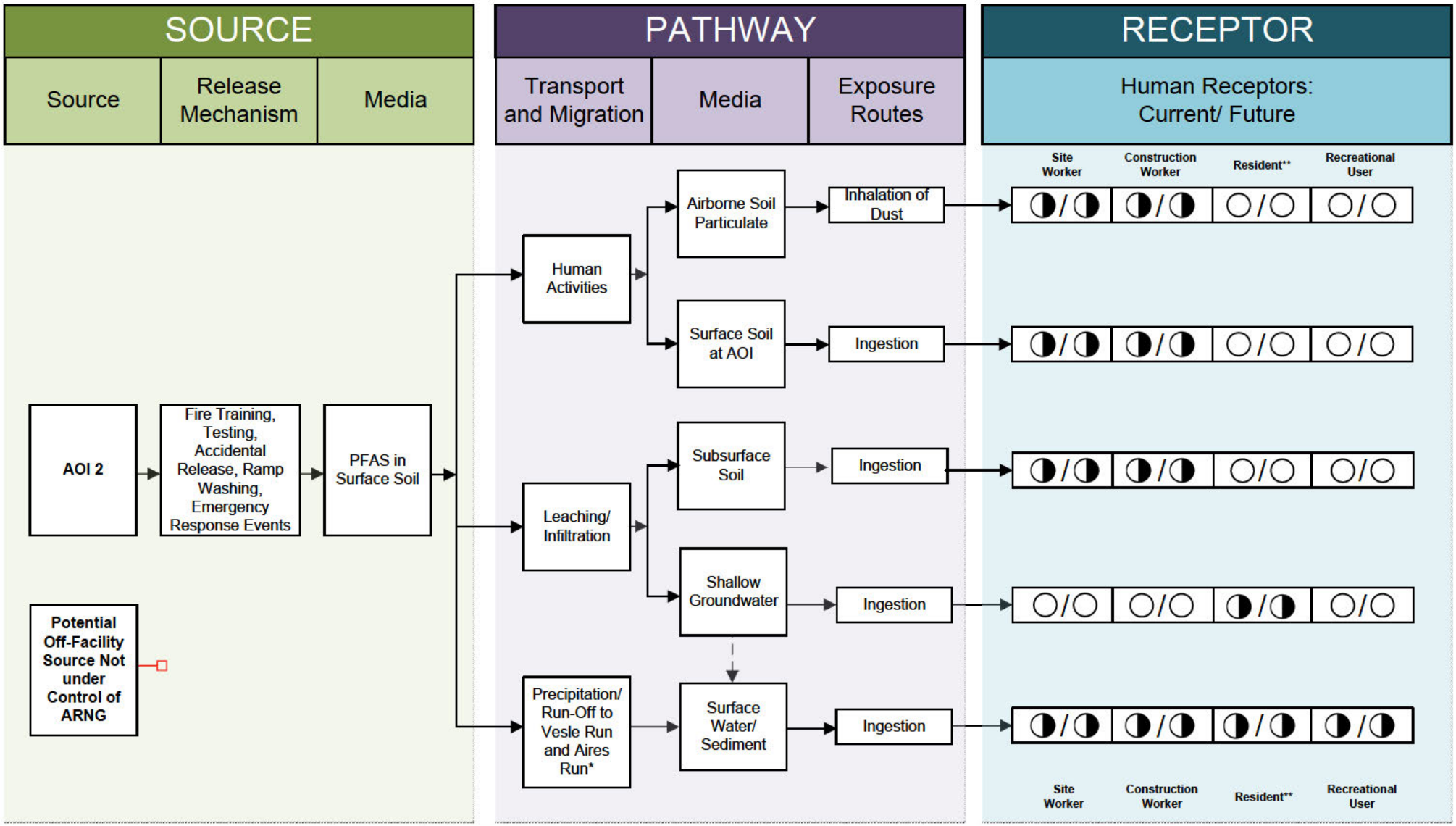
LEGEND

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

NOTES

*Indiantown Run drains the central portion of FTIG and includes runoff from AOI 1. Indiantown Run empties into Marquette Lake, then flows into Memorial Lake, and eventually off-Post joining Swatara Creek.

Figure 6-2
Conceptual Site Model
AOI 1 CACTF



LEGEND

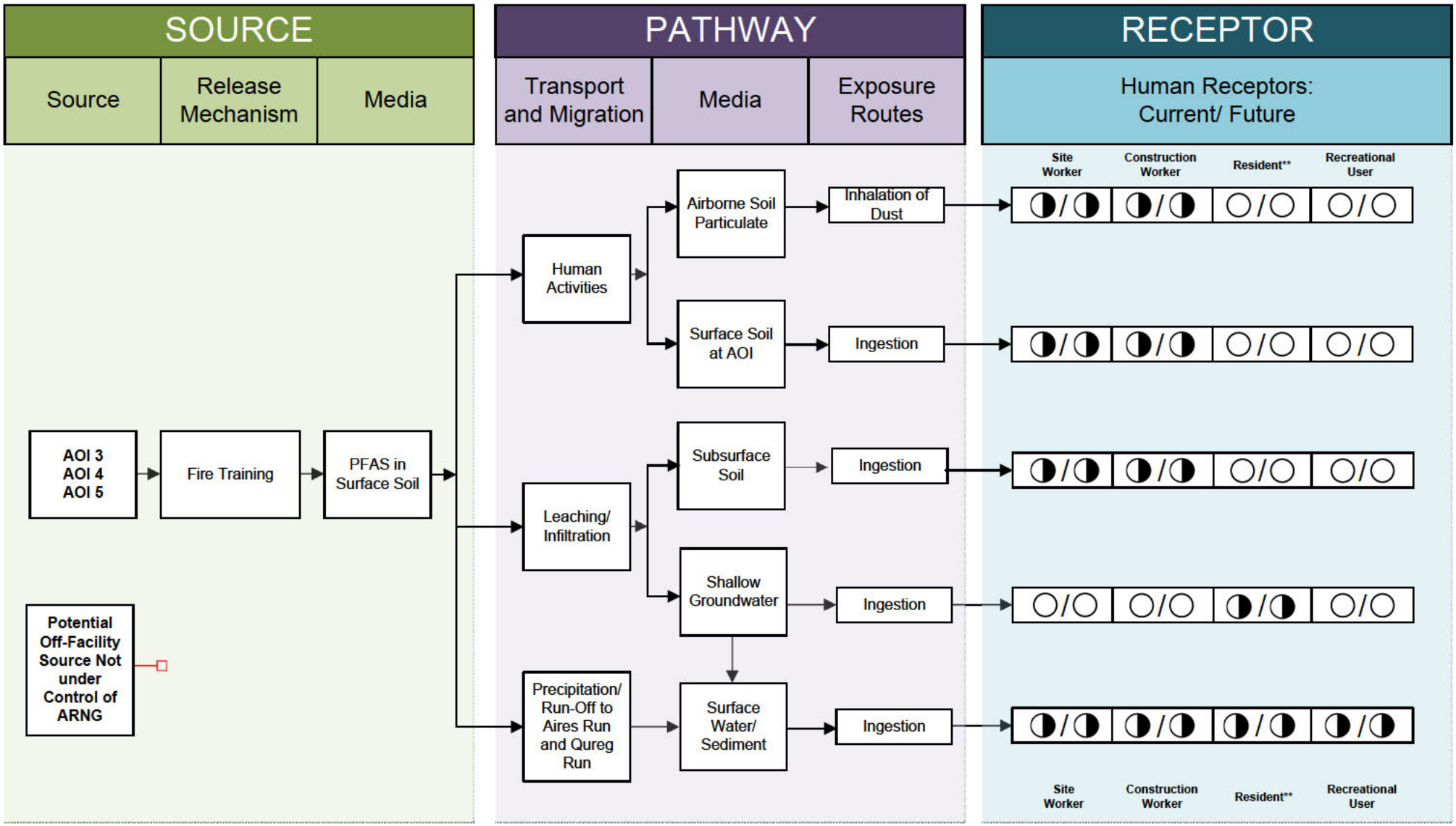
- Flow-Chart Stops
- Flow-Chart Continues
- Partial / Possible Flow
- Incomplete Pathway
- Potentially Complete Pathway
- Complete Pathway

NOTES

*Vesle Run drains the western edge of the cantonment area and includes runoff from the west side of AOI 2. Aires Run drains the eastern portion of FTIG and includes runoff from the east side of AOI 2. All runs eventually flow off-Post joining Swatara Creek.

**The shallow groundwater ingestion pathway is potentially complete for off-Post residents only.

Figure 6-3
Conceptual Site Model
AOI 2 MAAF



LEGEND

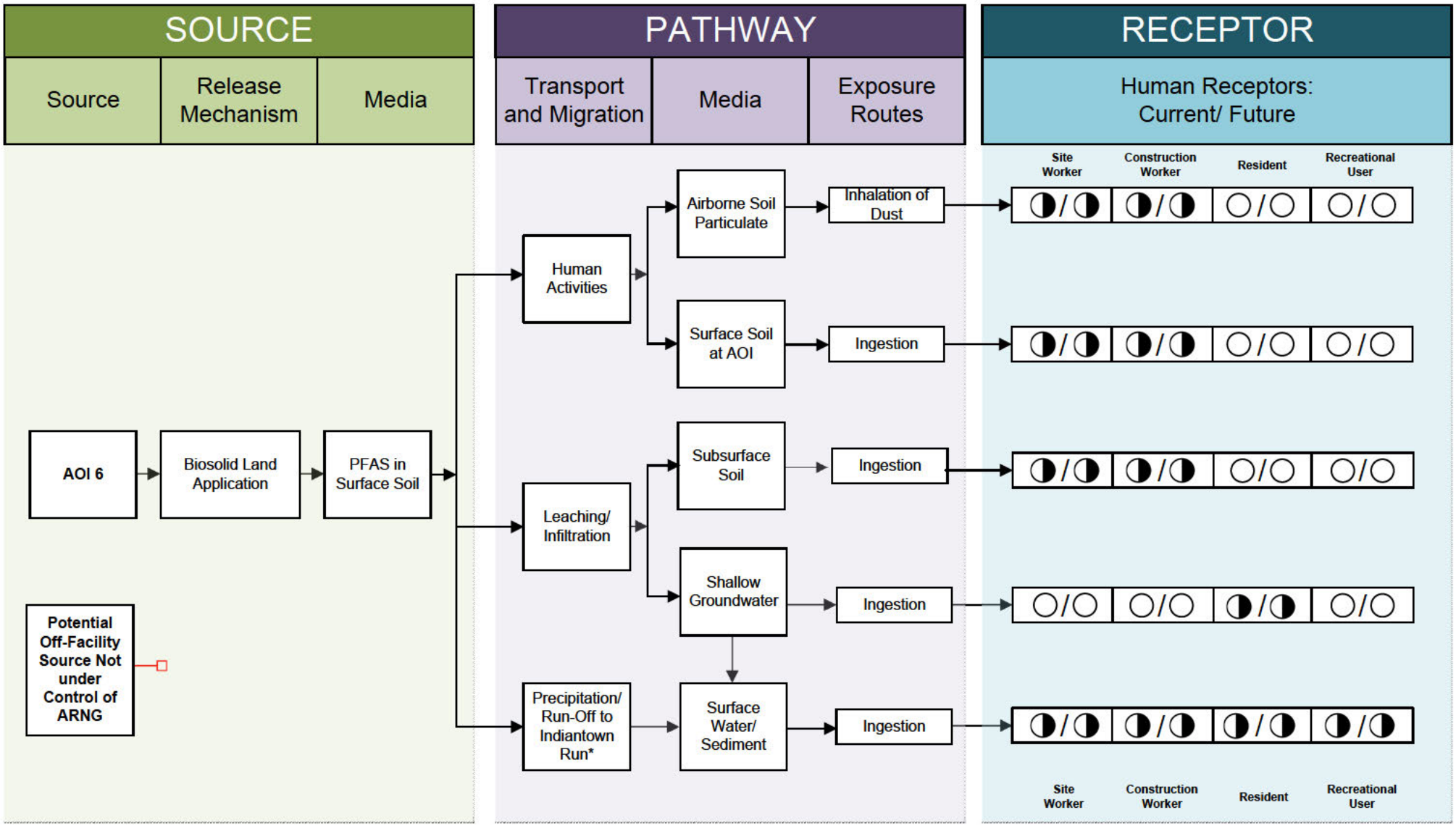
- Flow-Chart Stops
- Flow-Chart Continues
- Partial / Possible Flow
- Incomplete Pathway
- Potentially Complete Pathway
- Complete Pathway

NOTES

*Aires Run and Qureg Run drain the eastern portion of FTIG. Aires Run includes runoff from AOI 3. Qureg Run includes runoff from AOI 4 and AOI 5. All runs eventually flow off-Post joining Swatara Creek.

**The shallow groundwater ingestion pathway is potentially complete for off-Post residents only.

Figure 6-4
Conceptual Site Model
AOI 3 Johnson Trail, AOI 4 Fire Pit Area #19, AOI 5 First Street



LEGEND

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

NOTES

*Indiantown Run drains the central portion of FTIG and includes runoff from AOI 6. Indiantown Run flows off-Post downgradient of AOI 6, joining Swatara Creek .

Figure 6-5
Conceptual Site Model
AOI 6 Biosolid Area

7. Conclusions

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

7.1 Findings

Six AOIs related to potential PFAS release were identified at FTIG during the PA (**Figure 7-1**):

Area of Interest	Name	Used by	Release Dates
AOI 1	CACTF	PAARNG	2012
AOI 2	MAAF	PAARNG and US Army	1974 to present
AOI 3	Johnson Trail	PAARNG	2015
AOI 4	Fire Pit Area #19	PAARNG and US Army	1975 to 1990
AOI 5	First Street	PAARNG	2014
AOI 6	Biosolid Area	PAARNG	2012 to present

Based on documented potential PFAS releases at these AOIs, there is potential for exposure to PFAS contamination in surface and subsurface soils to site and construction workers via inhalation and ingestion, in surface water and sediment for all receptors via ingestion, and in groundwater for site and construction workers using facility drinking water supply wells and in-holding residents via ingestion. In addition, off-Post residents using groundwater for drinking water surrounding the facility to the south and residents using a downstream public water supply intake may potentially be exposed to migrating PFAS contamination via ingestion. No sources of PFAS were identified in the local area surrounding FTIG.

The following areas discussed in **Section 2** through **Section 5** were determined to have no suspected release:

No Suspected Release Area	Used by	Rationale for No Suspected Release Determination
Former Crash Rescue Fire Station	PAARNG	No known fire training activities were conducted at the former Crash Rescue Fire Station, and no known leaks or spills of AFFF were identified during the PA.
Slingload Area	PAARNG	The slingload area is used by the Forestry Section, which does not use AFFF. One interviewee recalled a potential AFFF release at this area, but the release could not be confirmed by any other interviewees. This is discussed further in **Section 7.2**. The slingload area is included in the AOI 2 boundary.
Building 019-177	PAARNG	All high expansion foam created during the testing of the fire suppression system was contained within the building, recovered, and transported off-Post

7.2 Uncertainties

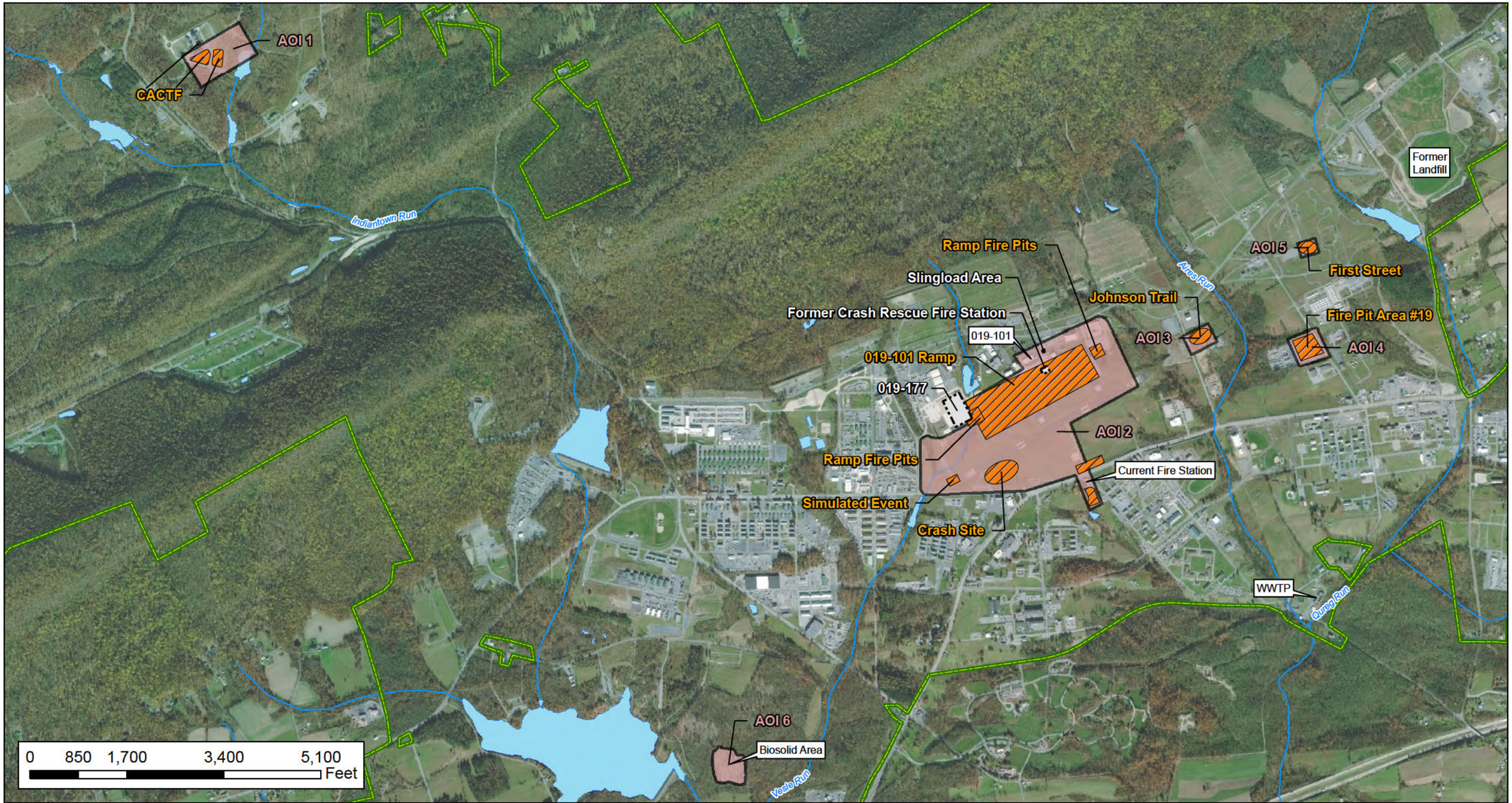
A number of information sources were investigated during this PA to determine the potential for PFAS-containing materials to have been present, used, or released at the facility. Historically, documentation of PFAS use was not required because PFAS were considered benign. Therefore, records were not typically kept by the facility or available during the PA on the use of PFAS in training, firefighting, or other non-traditional activities, or on its disposition.

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

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

The following table summarizes the uncertainties associated with the PA:

Area of Interest	Source of Uncertainty
All AOIs	No or limited information was available on the type, amount, and concentration of AFFF used at each AOI.
AOI 2 MAAF	The Air Traffic Control Chief recalled an AFFF release at the slingload area adjacent to the airfield; however, no other interviewees recalled this potential release.
AOI 6 Biosolid Area	Biosolid land application did not begin until after the last documented accidental release of AFFF at Building 019-101 which flows to the WWTP; however, undocumented releases of AFFF may have occurred after the start of land application of biosolids.
AOI 2 MAAF	The exact date and location of the rotary-winged aircraft crash could not be determined.
AOI 2 MAAF	The Brigade Armory was constructed in 1995, eliminating the east end ramp fire pit training area on the MAAF. The AMIB and EAATS hangar was constructed in 2014, eliminating the west end ramp fire pit training area on the MAAF. The final disposition of the soil from these locations is unknown.
AOI 3 Fire Pit Area #19	Fire Pit Area #19 underwent an Act 2 remediation in 2003. The associated documentation does not indicate the final disposition of the soil removed from this area.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Fort Indiantown Gap, PA			
REVISED	8/6/2018	GIS BY	MS	8/6/2018
SCALE	1:20,400	CHK BY	JZ	8/6/2018
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	8/6/2018

Legend

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

N

Summary of Findings

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 7-1

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Appendix A
Data Resources

Data Resources will be provided separately on CD. Data Resources for Fort Indiantown Gap includes:

FTIG Leases, Licenses, and Permits

- 1941 Commonwealth Lease to Federal Government, Fort Indiantown Gap Land Lease, Lease No. W-7028-QM-33
- 1963 DA-18-020-ENG-1865 Commonwealth Lease to Federal Government, Fort Indiantown Gap Lease 1963-1989
- 1985 Department of the Army License for National Guard Purposes DACA-31-3-86-115
- 1989 Land Lease between The Commonwealth of Pennsylvania and United States of America
- 1989 Supplemental Agreement No. 5 to Land Lease No. DACA 31-5-89-252 by and between The Commonwealth of Pennsylvania and the United States of America
- 1991 Supplemental Agreement No. 1 to Department of the Army License No. DACA-31-3-91-079
- 1998 Supplemental Agreement No. 1 to Department of the Air Force License No. DACA-31-3-91-205 by and between the United States of America and the Commonwealth of Pennsylvania
- 2005 Department of the Army License for National Guard Purposes, License No. DACA-31-3-05-395
- 2006 Supplemental Agreement No. 2 to Department of the Air Force License No. DACA-31-3-91-206 by and between the United States of America and the Commonwealth of Pennsylvania
- 2006 Supplemental Agreement No. 4 to Department of the Army Permit, DACA-31-4-91-204
- 2007 Supplemental Agreement No. 1 to Department of the Army Permit, DACA-31-4-02-111
- 2010 Authorization to Discharge Under the National Pollutant Discharge Elimination System Discharge Requirements for non-Municipal Sewage Treatment Works
- 2013 REMIS Military Outgrants Report

FTIG AFFF Release Documentation

- 1969 Military Specification MIL-F-24385, Fire Extinguishing Agent
- 2007 Class A Foam Safety Data Sheet
- 2009 Spill Report
- 2012 CACTF AFFF Release Photos
- 2016 Fire Suppression System Changes Overview
- 2017 Information regarding High Expansion Foam at Building 019-177
- 2017 Certificate of Disposal and 2015 Manifest for Building 019-101
- 2017 PFAS Data Call Correspondence
- 2017 Cantonment Building Burning Correspondence
- 2017 Potential Interview List

- 2017 Interview Schedule
- 2017 Interview Schedule with LTC Johnson's notes
- 2017 AFFF Release Map

FTIG FireFTIGhting Training and Pump Testing Documentation

- 2012 Fire Training Correspondence
- 2013 Pump Testing Correspondence
- 2014 Fire Training Correspondence
- 2015 Fire Training Correspondence
- 2016 Annual Training Plan
- 2017 RFMSS Fire Training Report
- Fort Indiantown Gap Fire Photographs

Previous Investigations Completed at FTIG

- 1992 Preliminary Assessment Report Addendum for Fort Indiantown Gap, PA
- 1997 Base Realignment And Closure 95 Program Environmental Baseline Survey Report and Interviews
- 2001 Final Site Inspection, National Guard Training Center at Fort Indiantown Gap
- 2002 Integrated Natural Resources Management Plan
- 2010 United States Geological Survey Surface-Water Quantity and Quality, Aquatic Biology, Stream Geomorphology, and Groundwater-Flow Simulation for National Guard Training Center at Fort Indiantown Gap, Pennsylvania, 2002-05
- 2013 Operational Range Assessment Phase II Report
- 2014 list of Act II Closed Sites
- 2017 Integrated Natural Resources Management Plan
- 2017 Fort Indiantown Gap ANG and USAR Sites List
- 2017 GIS Data Request
- 2017 PWS Well Data
- FTIG-006 Surveyed Well Locations
- Geological Descriptions
- Geology Map

FTIG Preparedness, Prevention, and Contingency Plan and Spill Prevention, Control, and Countermeasure Plan

- 2003 Preparedness, Prevention, and Contingency Plan (PPCP)
- PPC/Stormwater Inspection Checklist AASF
- PPC/Stormwater Inspection Checklist Area 6
- PPC Plan Comments
- 2004 Comprehensive Site Evaluation

- 2004 Notice of Intent
- 2004 Sample (PAG-03) Permit
- 2005 Guidelines for the Development and Implementation of Environmental Emergency Response Plans
- 2005 Comprehensive Site Evaluation
- 2006 PPCP Update
- 2006 Proposal for Analytical Testing Required Under NPDES Permit No. 0028142
- 2007 PPCP Update
- 2009 PPCP Update
- 2016 Spill Prevention, Control, and Countermeasure Plan

FTIG As-Builts, Drawings, and Plans

- 1973 Building 019-101 As-Builts
- 2006 CACTF Drawings
- 2009 CACTF Planning Documents
- 2009 Fire House Addition and Rehabilitation Floor, Ceiling, and Roof Plans
- 2014 AASF Alarm and Sprinkler System Drawings
- 2015 Area 2 Documentation
- 2017 Building 019-177 As-Builts
- AFFF Contractor Logo – Oliver
- AFFF Contractor Logo –Miller Bros. Construction

FTIG Installation Maps

- 1892 and 1956 Topography Maps
- 1938 and 1970 CACTF Aerial Photos
- 2002 Installation Map
- Fort Indiantown Gap Range Maps
- 2006 Ranges and Urban Operations Facilities Map
- 2017 Cantonment Area Mapsheets

FTIG EDR Report

- 2017 Fort Indiantown Gap EDR Report

Appendix B
Preliminary Assessment Documentation

Appendix B.1
Interview Records

Preliminary Assessment – Fort Indiantown Gap
1 Indiantown Gap Fort
Annville, Pennsylvania 17003-5099
December 13 and 14, 2017

12/14/2017 09:30 – VSI and multiple Interviews at Building 19-101 (Old Hangar, Muir Airfield)
Interview started with [redacted] (Safety) [redacted]. [redacted] has only been at Building 19-101 since April 2017; therefore, she brought several personnel to the interview to provide information: [redacted] aircraft mechanic supervisor; 2000), [redacted] (Ground Safety Equipment), [redacted] (electrical contractor; 1991), [redacted] (ground safety officer; 1983), [redacted] (aircraft maintenance supervisor; 1985).

Collectively, the group noted two releases of AFFF in the hangar. One release was done in 1989-1990, the other was prior to retrofitting the system. The hangar was halved off using a curtain and AFFF was released on the east end of the hangar. Note, the recount of the release was noted by some as the east end and as the west end by others. [redacted] confirmed west end release during his interview on 12/14/2017. Some of the AFFF moved into the trench drain and to the O/W separator, but most of the foam was squeegeed out the door and onto the ramp. Foam persisted for 1-2 days. Mobile fire suppression product on 17 pads of the airfield is currently PKP (Purple-K). PKP replaced AFFF in 2015 per [redacted]. No known leakage of AFFF ever occurred but the units required frequent maintenance.

While at Building 19-101, we were advised to talk to [redacted] (717-861-2378). [redacted] is the ATC Tower Chief and has been at FTIG since 1985. [redacted] provided Post, crash, and AFFF knowledge as follows: The hangar was constructed in 1974 but did not contain fire suppression until 1988 (AFFF). Following AFFF installation, the system was tested, most likely 1990. The airfield originally included a crash rescue fire department in addition to the fire department for the rest of the Post. The only crash that ever occurred on Post was in the early 1990s. Crash rescue aviation responded. A helicopter was landing and hit a tree. Both pilots were knocked unconscious. A NY unit responder pulled both pilots from the crash and received the governor's award. [redacted] also indicated two other releases of AFFF on the airfield: one in the slingload area (containment area in grass) AFFF was tested here in the 1990s and an accidental release in 1991 in response to a simulated emergency response. The Army fire department responded to a simulated emergency at the end of the airfield; Army fire was unaware the event was simulated. [redacted] indicated a history of prominent winds can be found with the weather department. [redacted] estimates the photo on the landing to the air traffic control tower to be late 1980s or early 1990s.

During the VSI, a 55-gallon drum and 5-gallon bucket of AFFF were seen in the slingload area near the pump house. The pump house appears to contain drums of AFFF (access unavailable). The slingload area also contained an airlift fire response unit used by the forestry department. The unit appeared to contain a proportioning valve although no known uses of the unit were known.

Preliminary Assessment – Fort Indiantown Gap
1 Indiantown Gap Fort
Annville, Pennsylvania 17003-5099
December 13 and 14, 2017

12/14/2017 14:10 – Interview with former [redacted] (contact through [redacted]) [redacted] previously served as the fire chief at FTIG from 1980 to 2009 and had knowledge of fire department history and AFFF usage.

AFFF Usage
The fire department used to train repeatedly at a fire pit east of the airfield. An old Bell UH-1 Iroquois "Huey" helicopter was lit on fire with jet fuel, most likely JP-4 and JP-8, and then put out with AFFF. The area is adjacent to the now Brigade Armory (est. 1995) and currently is a paved parking lot. The terrain was once level with the airfield but was excavated and lowered with an embankment to put in the Brigade Armory parking lot. The dirt from the excavation is most likely still on Post, possibly at the Johnson Trail stockpiling area (former FTA).

Another helicopter was burned at the west end of the ramp in the area under newly established Building 19-177. This training was a one-time event that occurred in the early 1990s. The dirt was scraped and hauled away prior to construction of Building 19-177. Both training areas were used for combined exercises with ARNG and Army personnel.

Accidental false alarms would historically release AFFF in the hangar at Building 19-101. This is why the building was retrofitted with new sensors, lasers,etc. To [redacted] recollection, these false alarm releases occurred approximately 20 times. When the releases would occur, the pipes of Building 19-101 would need to be flushed. The foam would not go down the trench drains due to the fluffiness. Instead, the foam would be squeegeed out on to the ramp and washed away.

The trucks containing AFFF would carry 40 gallons of concentrate and release approximately 5 gallons of 33% mixture when used. [redacted] indicated that the entire ramp area at Building 19-101 has been exposed to AFFF releases due to fuel fires and ramp washing of fuels. The AFFF is helpful in breaking down fuels to wash off the ramp. Foam was washed off the east and west end of the ramp. The west end of the ramp is newer (1980s).

According to [redacted], the brick lined fire pit in historical documents is equivalent to the medical detachment area. This area was used as a fuel spill FTA. A cleanup (Act II) was completed in early 2000s that may be available in the State archives.

In the photograph on the landing of the air traffic control tower, some small planes were noted. [redacted] indicated that the Civil Air Patrol had a couple of Cessnas at FTIG that were kept in a hangar at the northwest end of the airfield. The Civil Air Patrol may or may not have used foam; [redacted] did not know. The hangar is no longer present.

[redacted] indicated that mostly water was used during training because water gives the ability to relight the fire and continue training. Class A foam was used in various areas (e.g., 3, 4, 5, 6, old hospital, 14, 16). Class A foam composition was unknown but most likely contains some smaller percentage of PFAS compounds. Class A foam was also used during range and forest fires. According to Safety Data Sheets, Class A foam does not contain fluorochemicals. Any AFFF usage by the county is controlled by county hazmat and does not come from the Post.

[redacted] indicated that hand written logbooks may contain some information. Emergencies were always documented in red.

Preliminary Assessment – Fort Indiantown Gap
1 Indiantown Gap Fort
Annville, Pennsylvania 17003-5099
December 13 and 14, 2017

12/14/2017 08:10 – Interview with [redacted]
[redacted] is the EPAS Manager for the State of Pennsylvania and has been at FTIG since 2001. He works for the State and is federally reimbursed by the National Guard Bureau (sometimes subbed out to VA Homes). [redacted] used to run the water quality program and has knowledge of the ground and surface water flow on Post.

Muir Airfield is the apex of the Post with A-22 on the installation map as the low point of the Post. Stormwater outfalls on the east side of the Post drain to Qureg Run and Aries Run which empty into Reeds Creek and, eventually, Swatara Creek. Stormwater outfalls on the west side of the Post drain to Vesle Run and Indiantown Run which feed into Memorial Lake and, eventually, Swatara Creek. [redacted] recommends referencing the Preparative Prevention Contingency Plan (PPC) for outfalls and spill plans.

Regarding Building 19-101, [redacted] mentioned the east side of the hangar is used for fueling and the west side of the hangar is used for washing. Both sides of the tarmac contain oil water separators that feed into sanitary sewers and then to the WWTP. Regarding Building 19-177, [redacted] noted that AFFF testing was contained; no releases.

[redacted] noted that AFFF is included in Tier II and CSI Reports available through [redacted] also mentioned that UCMR3 data revealed FTIG is within 25 miles of a contaminated water supply attributed to United Water PA.

Preliminary Assessment – Fort Indiantown Gap
1 Indiantown Gap Fort
Annville, Pennsylvania 17003-5099
December 13 and 14, 2017

12/13/2017 14:30 – Interview with the current fire chief, [redacted]), and the assistant fire chief, [redacted]) and VSIs at FTAs. [redacted] has been at FTIG since April 2014; [redacted] has been at FTIG since 1996.

Training
The Assistant Chief of Training puts out a yearly training list for a variety of trainings and people sign up. The only AFFF use since 2014 is during testing of the proportioning valve on the trucks and the testing of the EAATS hangar. Fire staff consists of 12 state (single duty) fireFTIGhters and 3 federal (dual status, i.e., must be in ARNG to maintain job) technicians. The fire chief is also a Federal employee.

Truck Testing
AFFF is stored at the fire house in 250 gallon totes as a concentrate and is mixed with water at 3% on the truck prior to use. Filling of the fire trucks with AFFF concentrate is accomplished within the fire house using a pump. Four fire trucks (2 engines and 2 crash trucks) are tested annually to ensure the proportioning valve on the truck is properly mixing AFFF. Tank sizes on the tracks are 210 gallons, 110 gallons and 2 x 40 gallons. Testing of the proportioning valve has historically been done outside the firehouse by the dumpster and on the north side of Fisher Road but south of Muir Airfield (outside the fence). This area was recently paved. Testing of the mixture is done via a handheld refractometer.

Purchasing
Shelf life of the foam was estimated at approximately 5 years by the fire chief (however, last purchased in 2010). "Expired" foam was previously used at training sites but has not been used for training lately (since ~ 2013) due to high cost. [redacted] might have turned some AFFF in to [redacted]. Purchasing is done through the United States Property and Fiscal Office. Purchasing (USPFO) is done according to mil spec to release liability and proprietary issues.

Fire Training Areas

1. Staged Gas Station (B-12A on the CACTF)
   Training at this area occurred 11/29/2012 (pictures available). Four shifts of fireFTIGhters trained with expired or expiring foam. The training activity was cleared with environmental staff; however, the storm drain and sewer took on AFFF and outfalled to a retention pond on the northwest end of the site. The assistant fire chief estimates that 3-5 gallons per shift over 4 shifts were dispensed.
2. Johnson Trail (A-18 NW of Muir Airfield)
   This FTA was used in approximately 2015. FireFTIGhters dispensed approximately 18-20 gallons of AFFF in the area. Currently the area is bermed and being used to stockpile unwanted materials (per [redacted]). No apparent drainage was noted in the area.

3. First Street
   This FTA contains a helicopter at which approximately 20 gallons of AFFF was dispensed. Time period is unknown. No drainage noted in the area.
4. Fuel Fire Training Area (A-17 current medical detachment area)
   This FTA was used prior to BRAC in the 1980s. Solvents and fuels were burned in this area and put out using AFFF. The area is currently paved and used as the medical detachment area. The area underwent remediation/excavation prior to development. See [redacted] interview notes.

Other

The fire house also responds to mutual aid calls as assistance but is frequently first on-site. Only water is used during mutual aid calls. Some municipal fireFTIGhters come on Post to train. These fireFTIGhters bring their own supplies and train only with water. Some off Post training of fireFTIGhters has been done using ARNG trucks (water only). Buildings in the cantonment area were burned and put out with water (~1000-1500 buildings). Some buildings were put out with Class A foam (~5-6 buildings); Class A foam testing usage in the cantonment area was done by NIST. Forest fires are all put out with water using a brush truck. The only other noted crash was over Second Mountain – 2 A-10s collided and crashed; the fire was either put out with water or burned out on its own.

Preliminary Assessment – Fort Indiantown Gap
1 Indiantown Gap Fort
Annville, Pennsylvania 17003-5099
December 13 and 14, 2017

12/13/2017 11:30 – Interview with [redacted]
[redacted] is the FTIG Director of Environmental Management and the Environmental Program Manager for the State of Pennsylvania. [redacted] started at FTIG in 1991. [redacted] indicated the appropriate resource for GIS information is [redacted]. The ARNG lease is with the Commonwealth. ANG also has a lease with the Commonwealth separate from the ARNG, but ARNG provides all resources (e.g., water, fireFTIGhting) for the ANG. The ANG has no aviation assets at FTIG.

[redacted] discussed ground and surface water flow at the Facility. Well information can be found using the State database (PAGWIS). Drinking water wells are not present on Post. Instead, drinking water is brought to FTIG from Lebanon County. The Facility does have a self-run WWTP. Historically, the WWTP would overflow during rain events due to breaks in the terra cotta lines. The treatment plant was renovated in 1998 when FTIG was BRACed. The renovations and the installation of an overflow tank have reduced the number of overflow incidences. Biosolids were historically landfilled; however, for the last 5 years, FTIG has been permitted to perform land application of the biosolids on the southern boundary of Memorial Lake. Hay is grown in the land application area which is then used for range and erosion control. The community of Ono also pumps water up to FTIG, FTIG treats, and then pumps the water back to Swatara Creek. [redacted] suggested using a SWPPP to evaluate on Post flow.

[redacted] discussed his firehouse and fireFTIGhting knowledge. FireFTIGhters are both State and Federal employees. AFFF was definitely released to the surface at Building 19-101. At the time of testing, the trench drains were not tied into the sanitary or storm sewer. The foam was pushed out of the hangar onto the ramp. AFFF may have been used in the fireFTIGhters training program; [redacted] suggested discussing with [redacted] during his interview scheduled for 12/14/2017. Before the Facility was BRACed in 1998, the ARNG firehouse was on the airfield. The ARNG firehouse contained fireFTIGhting equipment for crash rescue. The Army firehouse (located at the current firehouse) responded to all other fires on Post and forest fires. ARNG firehouse used to support forest fires, but those fires are now controlled by Forestry. FTIG burns approximately 5,000 acres each year as a controlled or prescribed burn. The burn is controlled by fire breaks, trucks and ATVs, and water from wells and hydrants.

[redacted] indicated an online repository is available.

12/14/2017 1045 hours
Interviewed [redacted] at old warehouse building
[redacted] is Installation Maintenance Manager, retiring at the end of 2017
Interviewer: [redacted]
Fort Indiantown Gap

[redacted] was responsible for the oversight, purchase and disposal of AFF at the facility starting in the early 1990's. Prior to this date, there was no onsite maintenance and any AFFF ordering, storing, or maintenance would happen directly through the fire department. [redacted] was contacted for an interview to provide more information on the whereabouts of AFF onsite, quantity purchased, and uses, if any. The following was learned during the interviews:

- A discharge in the hanger occurred around 2011. The pipes were drained and the local waste water treatment plant was asked if FTIG could slowly release the AFFF from the pipes in increments. WWTP agreed so FTIG released approximately 5-10 gallons of AFF into the WWTP. FTIG was contacted the next day and directed to halt release of AFFF as all the bacteria in the WWTP was killed off, costing the WWTP over $5,000 to replace the bacteria
- Interaction between a beam within the holding tank, temperature systems, and heat can cause the pumps to go off and discharges in the pipes to occur, as what happened in 2011
- Building 19-101 (The Hanger) was the only location with AFFF stored onsite. There are approximately two (2) 1,000 gallon holdings tanks plus residual piping containing AFF.
- Approximately 8-10 years ago, over 4,000 gallons of AFFF (totaling over $60,000) was shipped to FTIG in 55-gallon drums. Half of the total amount of AFF ordered (approximately 2,000 gallons) was used to refill the holding tanks containing AFFF at the hanger. It is believed that some of the remaining 2,000 gallons were taken out of storage in 55-gallon drums, relocated, and stored at the fire department
- [redacted] at facility is attempting to track down purchase order for the 4,000+ gallons of AFFF
- In 2015, pipes containing AFF were replaced, old AFFF was pumped into tanker trucks for disposal, and new AFFF was placed inside of holding tanks.
- Old AFFF was disposed of at "Modern Landfill" in York, PA- attempting to find manifest which provides more details
- Samples from holding tanks were taken yearly and semi-annual inspections occurred to confirm AFFF was stable and the holding tanks contained no leaks, cracks, or structural deformities.
- The Hanger (building 19-101) and EAATS (building 19-177) have foam suppression systems. No other locations onsite, such as fueling stations, have foam suppression systems.
- EAATS (building 19-177) contains six (6) fire pumps, each pumping about 1,500/gallons a minute
- Dry tests are conducted twice yearly on the suppression systems onsite (buildings 19-101 and 19-177)
- [redacted] estimated a 5-8 year shelf life for AFFF but said all AFFF stored onsite did not contain expiration dates, and determination of when to replace the AFFF was based on laboratory analytical

12/13/2017 1330 hours
[redacted], Project Manager
[redacted]
Interviewer: [redacted]
Fort Indiantown Gap

[redacted] has been with PAANRG since 2012 and had specific knowledge on the Building 19-101 AASF AFFF system upgrade including replacement of the AFFF. The following information was provided:

- Work occurred in 2015.
- Upgrade activities included replacing the rubber liner in the two 1,000-gallon AFFF tanks, the beam (particulate detectors), and the electrical panel.
- No evidence of leaks were observed at the time of this project.
- Old AFFF was removed by truck from Building 19-101 on June 3, 2015. Disposal certificate provided by email on December 15, 2017 (attached).
- [redacted] a subcontractor to Miller Brothers Construction, handled the AFFF disposal and refill. 2,200 gallons of 3% AFFF was purchased. The "Military Specification for AFFF Foam Concentration (C301 & C601)," the Chemguard C301MS Material Safety Data Sheet, and the Material Approval Submittal Forms with supporting documents were provided (all attached).

12/14/2017 1000 hours
Three people with the Sustainable Range Program (umbrella for ITAM) were interviewed at Sustainable Range Program Office (Building 11-009):
[redacted] ([redacted] Range and Training Lands Program Coordinators
[redacted] ITAM Coordinator
Response to a data request was provided by [redacted]
Interviewer: [redacted]
Fort Indiantown Gap

Because it was known that the CACTF (an area managed by Range Control [RC]) was used for a fire FTIGhting training exercise using AFFF, Range Control was contacted to learn whether other such training events were scheduled or had occurred at the CACTF or other range training areas. The following was learned during the interviews:

- Other than the one 2012 training event, no one had knowledge of any other fire-FTIGhting training events being scheduled through RC.
- [redacted] recalled a structure in the 1980s/1990s comprising two poles connected by a wire with an object hung on the wire that appeared to be used for 'target' practice. This was located just west of the Car Care Center and near the fire house. It was unknown if water or AFFF was used although given the apparent target-practice use, water would be more likely.
- The bowling alley burned down in 1998, local and FTIG fire-departments responded. Unsure whether AFFF or water used.
- Any fires related to the training ranges are responded to first by forestry department and secondarily by the FTIG fire department. It was believed that water was used on these types of fires.
- [redacted] provided the results of a RFMSS data search. The dataset did contain some information on the November 2012 CACTF event as well as a couple of others at that range (see attached). There were no data on fire-FTIGhting training at other ranges.
- [redacted] provided the most recent FTIG GIS via AMRDEC to [redacted] later in the day. Note, it was confirmed that the files accessible to [redacted] were complete although it is known that not all monitoring wells are in the current GIS per the Environmental GIS person, [redacted].

RFMSS data 12/14/17
file rec'd by email

Tx3 Field Id	Organization Id	Request Event Personnel Qy	Request Training Date	Request Training End Date	Facility Nm	Event Nm
10-0721	FTIG FIRE DEPT	4	05/03/2010	05/06/2010	CACTF	URBAN OPERATIONS (UO) TRAINING SHOOTHOUSE - DRY
15-1345	FTIG FIRE DEPT	20	09/21/2015	09/21/2015	CACTF	FIRE FIGHTER TRAINING
13-0434	FTIG FIRE DEPT	20	11/18/2012	11/18/2012	CACTF	URBAN PLATOON OPERATIONS
13-0434	FTIG FIRE DEPT	20	11/19/2012	11/21/2012	CACTF	URBAN PLATOON OPERATIONS
13-0508	FTIG FIRE DEPT	22	11/26/2012	11/26/2012	CACTF	URBAN PLATOON OPERATIONS
13-0508	FTIG FIRE DEPT	22	11/29/2012	11/29/2012	CACTF	URBAN PLATOON OPERATIONS
14-0226	FTIG FIRE DEPT	20	10/15/2013	10/15/2013	CACTF	OTHER EVENT
	FTIG FIRE DEPT	0	02/16/2016	02/16/2016	CACTF	FIRE PACK

FORT INDIANTOWN GAP, PENNSYLVANIA
WARRIOR TRAINING GROUNDS

[redacted]

12/13/2017 1400 hours
[redacted], Environmental Planning Section
[redacted]
Interviewer: [redacted]
Fort Indiantown Gap

[redacted] has been at FTIG for eight years and had recently returned from temporarily working with the Air Guard. The following was learned during the interview:

- The Air Guard does not use AFFF products.
- One of [redacted] responsibilities is to evaluate potential locations for fire-FTIGhting training use. She recalled such a location across from the fire house but does not know if it was ever used.
- She recalled the CACTF training event where the AFFF was not confined to the immediate site and flowed down hill. Photographs from that event are attached (note that light snow is visible in the vicinity of the nearby basin).

Preliminary Assessment – Pre-Interview Form

1. Installation Name: Fort Indiantown Gap, PA

2. Primary Points of Contact:(Name/Title/Telephone Number/Email Address):

ARNG:	[redacted]
USACE:	[redacted]
Installation:	[redacted]

3. Suggested Personnel to Interview (Name/Title/Number of Years at Installation/Retired):

To be communicated via email from PA ARNG to AECOM

4. Is the ARNG property an enclave of a larger facility? What command or authority controls that facility? DoD or non-DoD?

The Air National Guard property is leased from the Commonwealth of Pennsylvania. Lease agreement will be provided. The Army National Guard may provide fire response service. Documentation of this is requested.

5. Installation History (dates of operation, types of activity, active airfield, firefighting training):

To be obtained from environmental study documents in the Administrative Record

6. Potential Sites to Investigate:

Flight facility Building 19-101

Fire training locations (3-4 separate)

Aircraft crash on airfield (helicopter)

7. Have we requested the following information from ARNG?

Lease Information:	**YES** / NO	Comment: For ANG enclave
Material Purchase Information:	YES / **NO**	Comment: at site visit
	YES / NO	Comment:

(Attach to the front of the Interview Form)

Preliminary Assessment – Pre-Interview Form

8. Does the Installation have an Administrative Record or a Document Repository? If so, does the installation have the following types of documents? Circle all that apply.

Historical Records Review

Preliminary Assessment

Site Inspections

Remedial Investigation

Remedial Action Documentation

Cultural Resources Management Plan

Natural Resources Management Plan

Firefighting Training Records (if documented)

Fire Suppression in Dining Facilities

Responded to an Aircraft Crash

Responded to Forest Fires

Federal Facility Agreement

State Permit

RCRA Permit

NPDES Permit

Environmental Baseline Study

Groundwater Flow Information

Groundwater Studies

Groundwater Treatment Units

Groundwater Monitoring Well Location Map

Surface Water Flow Information

Historical Aerials

9. What GIS data do we have? Do we need? Will aerial photographs be needed? (Ask about these during interview if we do not have)

[redacted] will provide recent GIS files showing buildings, roads, monitoring and supply wells, surface drainage, facility boundary, etc.

(Attach to the front of the Interview Form)

Appendix B.2
Visual Site Inspection Checklists

Visual Survey Inspection Log

Recorded by: [redacted]
ARNG Contact: [redacted]
Date: *12/14/2017*

Source/Release Information

Site Name / Area Name / Unique ID: Fort Indiantown Gap (FTIG)

Site / Area Acreage: Building 019-101

Historic Site Use (Brief Description): AASF; former Crash Rescue Fire Department was located on the MAAF ramp

Current Site Use (Brief Description): AASF

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

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

Fire suppression system on the west end of the hangar was tested once after installation . Fire fighting training was conducted at the east and west end of the ramp in fire pits. Accidental releases due to false alarms in the hangar. The ramp was "washed" with AFFF which acted like a detergent for fuel spills.

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

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

Usage has been documented by email; all associated documents and correspondence have been saved

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

3a. Indicate what businesses are located near the site

Brigade armory located within immediate vacinity; Many surrounding buildings in immediate area

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

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

ARNG

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N** (Not at this particular location on FTIG)

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

3% AFFF according to milspec

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

no set schedule; documentation was visible on chemical labels on the tanks

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

approximately every 5-8 years; note, no consensus on the shelf life of AFFF (range 2-25 years)

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

Yes, trench drains lead to OWS, then to WWTP; as-builts obtained

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Yes; Aries run lies to the east of the MAAF ramp and Vesle Run lies to the west of the MAAF ramp. The Runs converge off-Post at the Swatara Creek

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

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

Yes, to the east and west of the MAAF ramp; an apex exists in the middle of the MAAF ramp

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

3a. If so, please note the location:

Yes, wells are installed on the MAAF for a previous investigation and were left in place per Bonnie Packer

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

4a. If so, please note the location:

Significant Topographical Features:

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

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

The former Crash Rescue Fire Department building has been repurposed. Building 019-101 was retrofitted with new liners and sensors for the fire suppression system. The east end of the MAAF was lowered with an embankment around 1995 during the building of the Brigade Armory. The new EAATS hangar (019-177) was recently built on the west end of the MAAF.

Visual Survey Inspection Log

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

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

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

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

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

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

Receptor Information

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

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

Access is restricted to the airfield

2. Who can access the site? **Site Workers / Construction Workers / Trespassers / Residential / Recreational Users / Ecological**

2a. Circle all that apply, note any not covered above:

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

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

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

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

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

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

Additional Notes

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
Photograph No. 11	12/14/2017 Building 019-101	1,000 gallon tanks of AFFF for the Building 019-101 fire suppression system
Photograph No. 12	12/14/2017 Building 019-101	AFFF label with maintenance information on 1,000 gallon tank at Building 019-101
Photograph No. 16	12/14/2017 Slingload Area	AFFF 55-gallon drum and 5-gallon bucket in the slingload area east of Building 019-101
Photograph No. 13	12/14/2017 Building 019-101	East end of Building 019-101; photo is looking west
Photograph No. 14	12/14/2017 Building 019-101	Drainage on the MAAF ramp at the east end of Building 019-101; photo is looking northwest
Photograph No. 15	12/14/2017 Building 019-101	Outfall to the north of the MAAF ramp; flows to Aires Run; photo is looking west
Photograph No. 17	12/14/2017 East End Fire Pit	Paved parking lot adjacent to the Brigade Armory; prior location of East End Fire Pit on the east end of the MAAF; photo is looking west
Photograph No. 24	12/14/2017 Building 019-101	Approximate Crash Site on the MAAF; photo is looking north

Visual Survey Inspection Log

Recorded by: [redacted]
ARNG Contact: [redacted]
Date: *12/13/2017*

Source/Release Information

Site Name / Area Name / Unique ID: Fort Indiantown Gap (FTIG)

Site / Area Acreage: CACTF (Combined Arms Collective Training Facility), over 16 acres

Historic Site Use (Brief Description): Army and fire fighting training facility

Current Site Use (Brief Description): Army and fire fighting training facility

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

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

Used for fire fighting training in 2010, 2012, 2013, 2015, and 2016. All utilized water except training exercise in 2012 utilized AFFF; approximately 20 gallons of 3% AFFF were used during this training exercise

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

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

Usage has been documented by email; all associated documents and correspondence have been saved

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

3a. Indicate what businesses are located near the site

Entire area was built as training facility; all buildings on site (offices, buildings, church, gas station, etc.) are for training purposes only and not open to the public

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

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

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N** (Not at this particular location on FTIG)

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

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

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

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

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Indiantown Run lies immediately to the east of CACTF and drains this area

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

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

Outfalls and retention pond present; see graphics and map

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

3a. If so, please note the location:

A few domestic wells are located just east and west of CACTF

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

4a. If so, please note the location:

Significant Topographical Features:

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

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

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

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

Mostly paved with some grassy areas; trees on outskirt of site

Visual Survey Inspection Log

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

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

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

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

Potential for standing water in retention pond

Receptor Information

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

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

Must receive permission from Range Control to enter; must have escort accompany any visitors

2. Who can access the site? **Site Workers / Construction Workers / Trespassers / Residential / Recreational Users / Ecological**

2a. Circle all that apply, note any not covered above:

Any contractor with an escort who signs in with Range Control

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

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

Yes, just east and west of the CACTF area

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

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

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

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

Additional Notes

Fire fighting training at this site no longer uses AFFF

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
Photograph No. 1	12/13/2017; gas pump within CACTF	Drainage Area 1 outside of gas pumps located with CACTF
Photograph No. 2	12/13/2017; gas pump within CACTF	Drainage Area 2 outside of gas pumps located with CACTF
Photograph No. 3	12/13/2017; drainage basin	Drainage feature located at bottom of retention pond at CACTF
Photograph No. 4	12/13/2017; drainage basin	Drainage basin with retention pond located at CACTF (facing SE)
Photograph No. 5	12/13/2017; drainage basin	Drainage basin with retention pond located at CACTF (facing SW)
Photograph No. 6	11/29/2012; gas pump within CACTF	AFFF release at drainage basin near gas station pump at CACTF; source was fire fighting training in 2012
Photograph No. 7	11/29/2012; drainage basin	AFFF release at CACTF from fire fighting training in 2012 (facing SE)

Visual Survey Inspection Log

Recorded by: [redacted]
ARNG Contact: [redacted]
Date: *12/13/2017*

Source/Release Information

Site Name / Area Name / Unique ID: Fort Indiantown Gap (FTIG)

Site / Area Acreage: Fire Pit Area 19

Historic Site Use (Brief Description): Area for fire training exercises

Current Site Use (Brief Description): Regional Medical Training Site/Medical Detachment Area

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

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

Used for fire fighting training twice annually from 1975 to 1986. Fuel was ignited in the pit and the fire was extinguised with AFFF during training exercises. Quantity and type of AFFF could not be confirmed; however, approximately 3,000 gallons of used petroleum, oil, and lubricants generated in the Army Aviation Support Facility (AASF) were burned in the fire pit annually.

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

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

Usage has been documented by email; all associated documents and correspondence have been saved

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

3a. Indicate what businesses are located near the site

Building is currently medical detachment area; several other medical buildings located in close vacinity

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

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

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N** (Not at this particular location on FTIG)

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

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

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

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

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Yes; Qureg Run lies to the east of Fire Pit Area #19 and drains the AOI; Potential PFAS contamination could be transported to Qureg Run via over land surface water flow and groundwater infiltration

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

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

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

3a. If so, please note the location:

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

4a. If so, please note the location:

Significant Topographical Features:

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

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

Previously used for fire training; contaminated soil (from petroleum hydrocarbons) was excavated and disposed of prior to construction of Medical Detachment facilities

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

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

Mostly paved with some grassy areas

Visual Survey Inspection Log

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

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

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

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

Receptor Information

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

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

Once on facility, site can be reached by main roads

2. Who can access the site? **Site Workers / Construction Workers / Trespassers / Residential / Recreational Users / Ecological**

2a. Circle all that apply, note any not covered above:

Any contractor with an escort

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

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

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

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

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

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

Additional Notes

Fire training pit was closed in 1990 and a limited SI was performed. The results on the SI showed petroleum contaminated soil and the site was transferred to PAARNG for use as a Regional Medical Training Site. PAARNG excavated and disposed of petroleum hydrocarbon-contaminated soil prior to construction of the current Medical Detachment facilities.

Photographic Log

Photo ID/Name	Date & Location	Photograph Description

Visual Survey Inspection Log

Recorded by: [redacted]
ARNG Contact: [redacted]
Date: *12/13/2017*

Source/Release Information

Site Name / Area Name / Unique ID: Fort Indiantown Gap (FTIG)

Site / Area Acreage: Current Fire Station

Historic Site Use (Brief Description): Prior to BRAC, Fire Station was operated by the US Army.

Current Site Use (Brief Description): Following BRAC, PAARNG and US Army Fire Departments were combined and now operate out of the former US Army Fire Station

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

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

Approximately 5 gallons of 3% AFFF were released onto the ground during annual valve testing; annual testing occurred in the field immediately south of the current fire station behind a dumpster and in a field on the north side of Fisher Ave.

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

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

Usage has been documented by email; all associated documents and correspondence have been saved

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

3a. Indicate what businesses are located near the site

Digital training campus located within immediate vacinity; Many surrounding buildings in immediate area

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

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

Directly across the street from the flightline

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N** (Not at this particular location on FTIG)

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

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

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

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

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Yes; Aries run lies to the east of Johnson Trail and drains this AOI; Potential PFAS contamination could be transported to Aires Run via over land surface water flow and groundwater infiltration

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

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

Storm drains in paved roads and parking lots located within/near fire station

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

3a. If so, please note the location:

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

4a. If so, please note the location:

Significant Topographical Features:

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

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

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

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

Directly behind fire house near paved lot (behind dumpster) has wooded sections and marsh-like area

Visual Survey Inspection Log

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

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

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

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

Receptor Information

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

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

Once on facility, site can be reached by main roads

2. Who can access the site? **Site Workers / Construction Workers / Trespassers / Residential / Recreational Users / Ecological**

2a. Circle all that apply, note any not covered above:

Any contractor with an escort

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

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

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

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

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

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

Additional Notes

Pump testing still occurs yearly with approximately 5 gallons of 3% AFFF released onto the ground. Two 250-gallon totes are located inside the building and transferred to the trucks as needed via a pump

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
Photograph No. 18	12/13/2017; inside current fire station	250 gallon totes located inside of fire station
Photograph No. 19	12/13/2017; inside current fire station	AFFF label on 250 gallon totes located inside of fire station
Photograph No. 20	12/13/2017; inside current fire station	Drums of AFFF and pump located inside of fire station
Photograph No. 21	12/13/2017; inside current fire station	AFFF label on drums located inside of fire station
Photograph No. 22	12/13/2017; outside current fire station	Valve testing location outside of fire station; near dumpster area on grassy field
Photograph No. 23	12/13/2017; outside current fire station	Valve testing location in paved lot across from fire station

Visual Survey Inspection Log

Recorded by: [redacted]
ARNG Contact: [redacted]
Date: *12/13/2017*

Source/Release Information

Site Name / Area Name / Unique ID: Fort Indiantown Gap (FTIG)

Site / Area Acreage: First Street Fire Training Area (FTA)

Historic Site Use (Brief Description): Used during fire fighting training once in March 2014

Current Site Use (Brief Description): Not currently used

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

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

Used for fire fighting training on an old helicoper encompassed by a circular drive; Used approx. 20 gallons of 3% AFFF once in March 2014

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

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

Usage has been documented by email; all associated documents and correspondence have been saved

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

3a. Indicate what businesses are located near the site

None; area is in empty field; buildings across the street approximately 250 yards away

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

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

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N** (Not at this particular location on FTIG)

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

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

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

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

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Yes; Qureg Run lies nearby to the east of First Street and drains the AOI; Potential PFAS contamination could be transported to Qureg Run via over land surface water flow and groundwater infiltration

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

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

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

3a. If so, please note the location:

No wells in the general vacinity

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

4a. If so, please note the location:

Significant Topographical Features:

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

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

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

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

Site located in empty field; no nearby vegetation

Visual Survey Inspection Log

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

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

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

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

Receptor Information

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

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

Once on base, this site can be accessed by main roads

2. Who can access the site? **Site Workers / Construction Workers / Trespassers / Residential / Recreational Users / Ecological**

2a. Circle all that apply, note any not covered above:

Any employee, site worker, or contractor on site can access this site

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

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

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

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

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

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

Additional Notes

According to the fire chief, this location was only used once for fire fighting training activities.

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
Photograph No. 10	12/13/2017; in field at First Street	Abandoned helicoper in field on First Street

Visual Survey Inspection Log

Recorded by: [redacted]
ARNG Contact: [redacted]
Date: *12/13/2017*

Source/Release Information

Site Name / Area Name / Unique ID: Fort Indiantown Gap (FTIG)

Site / Area Acreage: Johnson Trail; small area comprising less than a few hundred square feet

Historic Site Use (Brief Description): Bermed stockpile area previously used for AFFF fire fighting training activities

Current Site Use (Brief Description): Not currently used

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

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

Approximately 20 gallons of 1% AFFF were released here between March 30-31 and April 1 and 6, 2015.

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

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

Usage has been documented by email; all associated documents and correspondence have been saved

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

3a. Indicate what businesses are located near the site

None; area is in empty field; buildings across the street approximately 100 yards away

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

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

Other Significant Site Features:

1. Does the facility have a fire suppression system? **Y / N** (Not at this particular location on FTIG)

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

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

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

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

Transport / Pathway Information

Migration Potential:

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

1a. If so, note observation and location:

Yes; Aries run lies to the east of Johnson Trail and drains this AOI; Potential PFAS contamination could be transported to Aires Run via over land surface water flow and groundwater infiltration

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

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

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

3a. If so, please note the location:

No wells in the general vacinity

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

4a. If so, please note the location:

Significant Topographical Features:

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

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

Originally flat land; soil was excavated and stockpiled here from various projects around FTIG facility

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

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

Mostly paved with some grassy areas; trees on outskirt of site

Visual Survey Inspection Log

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

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

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

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

Receptor Information

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

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

Once on base, this site can be accessed by main roads

2. Who can access the site? **Site Workers / Construction Workers / Trespassers / Residential / Recreational Users / Ecological**

2a. Circle all that apply, note any not covered above:

Any employee, site worker, or contractor on site can access this site

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

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

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

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

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

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

Additional Notes

According to the fire chief, this location was only used once for fire fighting training activities.

Photographic Log

Photo ID/Name	Date & Location	Photograph Description
Photograph No. 8	12/13/2017; Johnson Trail	Former AFFF training area slightly facing pit (west of ramp)
Photograph No. 9	12/13/2017; Johnson Trail	Former AFFF training area facing ramp which vehicles would access

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Fort Indiantown Gap

Why has this location been identified as a site?

Several AFFF releases have occurred at FTIG. Five AOIs were identified: CACTF AOI, the MAAF AOI, Johnson Trail AOI, Fire Pit Area #19 AOI, and First Street AOI

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

None known

Training Events

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

If so, how often? CACTF - 2012, MAAF – several releases, Johnson Trail – 2015, Fire Pit Area # 19 – several releases, First Street - 2014

How much material was used? Is it documented? Information regarding AFFF use was obtained during interviews; see interview forms

Identify Potential Pathways: Do we have enough information to fully understand over land surface water flow, groundwater flow, and geological formations on and around the facility? Any direct pathways to larger water bodies?

Surface Water:

Surface water flow direction? Surface water divide exists in the training corridor; All surface water confluences at Swatara Creek

Average rainfall? 42 inches of rain

Any flooding during rainy season? No

Direct or indirect pathway to ditches? Yes

Direct or indirect pathway to larger bodies of water? Yes, Marquette Lake, Memorial Lake, Swatara Creek

Does surface water pond any place on site? Yes

Any impoundment areas or retention ponds? Yes

Any NPDES location points near the site? None known

How does surface water drain on and around the flight line? An apex exists in the middle of the MAAF. The east end drains to Aires Run. The west end drains to Vesle Run.

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? Generally , with the flow of surface water

Depth to groundwater? Shallow GW exists; DW wells range from 165 to 170 feet

Uses (agricultural, drinking water, irrigation)? Yes

Any groundwater treatment systems? Yes, on-Post WWTP

Any groundwater monitoring well locations near the site? No

Is groundwater used for drinking water? In-holding residents only; drinking water is piped in from Lebanon County

Are there drinking water supply wells on installation? Yes

Do they serve off-post populations? No

Are there off-post drinking water wells downgradient Yes

Waste Water Treatment Plant:

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

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

Do we understand the fate of sludge waste? Biosolid application on the south side of Memorial Lake

Is surface water from potential contaminated sites treated? No

Equipment Rinse Water

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

Yes, on the ground.

2. Are nozzles tested? How often are nozzles tested? Where are nozzles tested? Are nozzles cleaned after use? Where does the rinse water flow after cleaning nozzles?

Yes, annually, behind the fire station dumpster and across the street from the fire station, south of the MAAF.

3. Other?

N/A

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker Yes

Construction Worker Yes

Recreational User Yes

Residential Yes

Child Yes

Ecological Yes

Note what is located near by the site (e.g. daycare, schools, hospitals, churches, agricultural, livestock)?
None noted

Documentation

Ask for Engineering drawings (if applicable). Done

Has there been a reconstruction or changes to the drainage system? When did that occur? None known

Appendix C
Photographic Log

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 1

Description:

Looking north. Drainage area at the south end of the mock gas station at the CACTF

Photograph No. 2

Description:

Looking northwest. Drainage area at the southeast end of the mock gas station at the CACTF

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 3

Description:

Looking northwest. Outfall to the retention pond at the southeast end of the CACTF

Photograph No. 4

Description:

Looking southeast. Retention pond at the southeast end of the CACTF

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 5

Description:

Looking south. Retention pond at the southwest end of the CACTF

Photograph No. 6

Description:

Looking north. AFFF release at the mock gas station at the CACTF. The white material in the photograph is AFFF.

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 7

Description:

Looking southwest. AFFF release outfall to the retention pond at the CACTF. The white material in the photograph is AFFF.

Photograph No. 8

Description:

Looking northwest. Johnson Trail Fire Training Area

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 9

Description:

Looking northwest. Stockpiling at the Johnson Trail Fire Training Area

Photograph No. 10

Description:

Looking west. First Street Fire Training Area

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 11

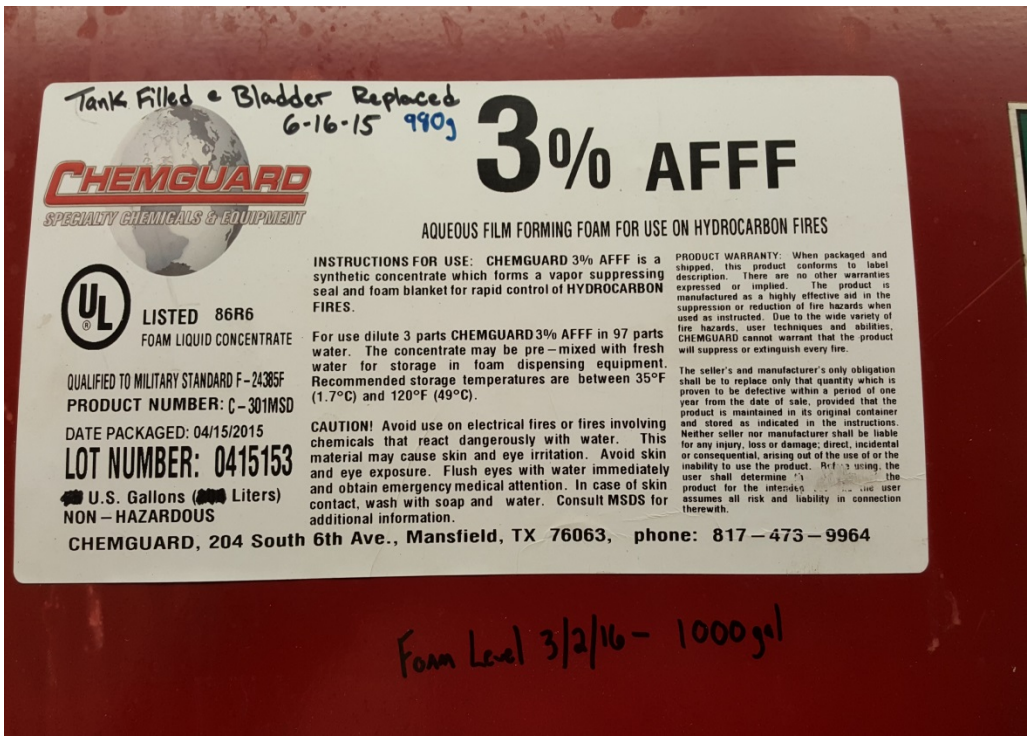
Description:

1,000-gallon tanks of AFFF located at Building 019-101

Photograph No. 12

Description:

AFFF label on 1,000-gallon tanks at Building 019-101



APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 13

Description:

Looking west. East end of Building 019-101. The white material in the photograph is snow.

Photograph No. 14

Description:

Looking northwest. Drainage area at the end end of Building 019-101. The white material in the photograph is snow.

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 15

Description:

Looking west. Outfall at the east end of Building 019-101. The white material in the photograph is snow.

Photograph No. 16

Description:

Looking east. 55-gallon drum and 5-gallon bucket of AFFF in the slingload area. The white material in the photograph is snow.

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 17

Description:

Looking west. Former east end fire pit (Brigade Armory parking lot). The white material in the photograph is snow.

Photograph No. 18

Description:

250-gallon totes of AFFF inside the Fire Station

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 19

Description:

AFFF label on 250-gallon totes inside Fire Station

Photograph No. 20

Description:

55-gallon drums and 5-gallon bucket of AFFF with transfer pump inside the Fire Station

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 21

Description

AFFF label on 55-gallon drum inside Fire Station

Photograph No. 22

Description:

Looking south. Valve testing location behind the south side of the Fire Station

APPENDIX C – Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Fort Indiantown Gap	Annville, Pennsylvania

Photograph No. 23

Description:

Looking north. Valve testing location south of the MAAF on Fisher Avenue

Photograph No. 24

Description:

Looking north. Approximate helicopter crash location. The white material in the photograph is snow.